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LES CAHIERS DE
RECHERCHE

Transformations monétaires et financières dans les pays d'Europe centrale et orientale

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Centre Interdisciplinaire de Recherche sur le Commerce Extérieur et l'Économie

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Transformations monétaires et financières dans les pays d'Europe centrale et orientale

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ÉDITORIAL

Le CIRCEE, Centre Interdisciplinaire de Recherche sur le Commerce Extérieur et l'Economie de l'École Supérieure du Commerce Extérieur (Paris-La Défense), en collaboration avec le CEREGE, Centre de Recherche en Gestion, de l'IAE de Poitiers, et le GDR Européen Monnaie-Banque-Finance ont organisé le colloque international « Transformations monétaires et financières dans les Pays d'Europe Centrale et Orientale » qui s'est tenu le 20 novembre 2008, à l'ESCE, Paris-La Défense.

Avec l'effondrement du bloc communiste les Pays d'Europe Centrale et Orientale ont fait face à des bouleversements majeurs de leurs économies passant de l'économie centralement planifiée à l'économie de marché. Cette transition a particulièrement été sensible dans la sphère monétaire et financière. S'inscrivant dans la perspective de la transition monétaire et financière dans les PECO le colloque «Transformations monétaires et financières dans les Pays d'Europe Centrale et Orientale» a permis de réunir les chercheurs, du monde académique et professionnel, travaillant dans les domaines de l'économie monétaire, la finance et l'économie de la transition pour présenter leurs travaux récents dans ce domaine. Les contributions ont ainsi porté sur l'intégration monétaire et financière européenne, les politiques monétaires, les choix de régimes de change, le développement des marchés financiers et l'activité bancaire.

Le colloque a ainsi rassemblé une cinquantaine d'économistes, de financiers et de banquiers centraux d'Europe, de Russie, des États-Unis et du Japon. L'événement scientifique s'est articulé autour de deux ensembles de quatre sessions parallèles et a été rythmé par deux conférences plénières. Ces dernières ont été données par les professeurs

Nikola Fabris, Chef Economiste de la Banque Centrale du Monténégro et professeur à l'université de Belgrade, et Nikolay Nenovsky membre du Conseil des Gouverneurs de la Banque Nationale de Bulgarie et professeur à l'université de Sofia. Nikola Fabris a traité le cas original de l'euroisation au Monténégro. Nikolay Nenovsky a exposé les problématiques liées au choix d'un régime de change pour les économies en transition.

Cette 11e édition des Cahiers de Recherche de l'ESCE reprend les articles présentés par Nikola Fabris « Implications of dollarization with a special overview of Montenegro » et Nikolay Nenovsky «Transformation in Eastern Europe–Challenges for Central Bank Practice and for Monetary Theory». Cette édition publie également une sélection réalisée par le Comité Scientifique du Colloque de quatorze communications présentées lors de cette journée. Les articles sélectionnés s'inscrivent dans les thèmes de la politique monétaire, des marchés financiers, de la banque, des taux de change, du risque pays, de l'intégration ou de la relation prix-produit.

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IMPLICATIONS OF DOLLARIZATION WITH A SPECIAL OVERWIEW OF MONTENEGRO

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ABSTRACT:

Although being a relatively old phenomenon, dollarization has not been sufficiently examined in theory, and even less in practice. Economic theory has yet to provide an unambiguous answer to the question whether dollarization affects economic growth. The purpose of this paper is to give a contribution to the debate on dollarization by comparing macroeconomic performance of dollarized countries with that of the rest of the world and certain regions. Special attention is given to Montenegro. This analysis focuses on the history of monetary system in Montenegro, the determining factors regarding the euroisation of Montenegro, and the comparison of economic performance.

JEL classification: E40, E42, E52, G28

"There is an old joke that says that the exam questions in economics remain the same every year - only the answers change. Certainly the debate about the best exchange rate regime has been with us forever, but new answers keep appearing. The newest answer to question of what exchange rate regime countries should choose is noon" (Berg and Borenzstein [2000, p. 38]).

INTRODUCTION

Since abandonment of the gold standard, and especially after the crash of the Bretton Woods system, some countries have been desperately seeking the way to promote national stability and hence their own prosperity. The decision about which exchange rate system should be adopted has become more difficult as the world trade and capital markets have become

more integrated. For some of these countries the optimal way to obtain currency stability has been to peg the local currency to a major convertible currency. However, some other countries recognized dollarization as the most befitting solution. It is typically a result of unstable macroeconomic conditions and is a rational response of people seeking to diversify their assets in the face of heightened domestic currency risk.

Dollarization is not a new term, but comes from a phenomenon that was "out-of-date"(1) and it has become an instrument of economic policy that has been recommended by an increasing number of economists in the last decade. Although official dollarization is a relatively rare phenomenon, many countries in recent years have been opting for this regime and an increasing number of papers have been dedicated to this problem.

Today, dollarized countries are very heterogeneous with regard to the degree of their development, geographical position, prevailing economic activity, as well as the reasons for introducing this regime. However, they all have on thing in common - they are almost all small countries. The biggest country is Ecuador with the population of around 13.8 million, and most of the other dollarized countries are micro countries with less than one million residents.

The term "dollarization" implies several different monetary systems sharing one common characteristic - a broad use of a foreign currency as the means of exchange for formal or informal transactions. This term refers to the use of any foreign currency, not only the US dollar. It is undeniable that the two most widespread currencies are the USD and the EUR.

Official dollarization(2) occurs when a foreign currency has the exclusive status as the full legal tender and a national currency does not exist. Official semi-dollarization implies the situation where both foreign and a national currency are used as legal tenders. Unofficial dollarization is

(1) The greatest number of countries used foreign currencies as legal tenders in the 19th and at the beginning of the 20th century. For example in the United States, foreign coins were legal tender until 1857.

(2) Officially dollarized are also considered those countries that use national coins of low value.

the situation where due to the lack of confidence in the national currency a foreign currency is used as a means of payment, a unit of account, and a store of value, but not as the official legal tender. Monetary union can be considered as the special variant of dollarization - when several countries use one common currency. Monetary union, as dollarization phenomenon, should be treated prudently because member *countries of a monetary union does not lose, but share monetary sovereignty, unlike* countries that unilaterally adopt dollarization regime. In addition, countries in this regime share seigniorage.

Table 1
Officially dollarized countries

Country	GDP in billion USD	Population	Currency	Political status
Andorra	3.3	69150	euro	Independent
Cocos Islands	n.a.	600	Australian dollar	Australian external territory
Cook Islands	0.15	18500	N. Zealand dollar	N. Zealand self-governing
Cyprus, Northern	1.8	180000	Turkish lira	Not resolved
Ecuador	41.4	13500000	US dollar	Independent
El Salvador	18.6	7000000	US dollar	Independent
Guam	n.a.	160 000	US dollar	US dependency
Greenland	1.7	56344	Danish krone	Danish self-governing
Kiribati	0.06	90000	Australian dollar	Independent
Liechtenstein	3.6	35365	Swiss franc	Independent
Marshall Islands	0.128	61963	US dollar	Independent
Micronesia, Federated States of	0.245	107862	US dollar	Independent
Monaco	1.2	32671	euro	Independent
Montenegro	2.4	700000	euro	Independent
Nauru	0.055	9275	Australian dollar	Independent

Niue	0.01	1679	N. Zealand dollar	N. Zealand self-governing
Norfolk Island		2114	Australian dollar	Australian external territory
North Mariana Islands	n.a.	48 000	US dollar	US dependency
Palau	0.156	20842	US dollar	Independent
Panama	17.1	3300000	US dollar	Independent
Pitcairn Islands	n.a.	48	N. Zealand and US dollars	British dependency
Puerto Rico	90.7	3994259	US dollar	US dependency
San Marino	1.4	29615	euro	Independent
Timor	0.35	1000000	US dollar	Independent
Tokelau		1466	N. Zealand dollar	N. Zealand dependency
Tuvalu	0.026	11992	Australian dollar	Independent
Turks and Caicos Islands	n.a.	14 000	US dollars	British dependency
Vatican	n.a.	824	euro	Independent
Virgin Islands U.K.	n.a.	18000	US dollar	US dependency
Virgin Islands U.S.	n.a.	97000	US dollar	British dependency

Source: IMF, World Economic Outlook and United Nations, Statistics

Many countries that are not categorized as being officially dollarized have a widespread unofficial dollarization. As. Bogetic [1999] argues, it is useful to distinguish between a currency substitution, which is the use of foreign cash and foreign currency deposits primarily as a means of payment, and asset substitution, which is the use of foreign currency assets primarily as a store of value. Economists have generally associated unofficial dollarization with asset substitution.

The following index is used as the measurement of unofficial dollarization:

$$IOD = (FCC + FCD) / M$$

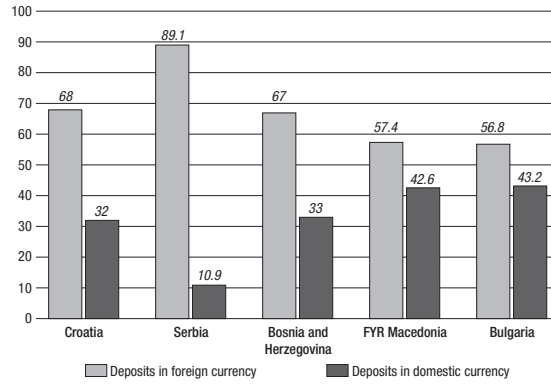
Whereby *IOD* is the unofficial dollarization index, *FCC* is foreign currency cash, *FCD* foreign currency deposits and *M* selected monetary aggregate.

Nevertheless, what makes a practical usage of this formula difficult is the identifying of the amount of foreign currency cash. It could be determined through a survey, but this has often provided unreliable results because private individuals are reluctant to disclosing the amount of foreign currency cash they hold. A research carried out by Dvorski [2007] in Central and Southeast Europe has shown that the percentage of foreign cash in these regions varies significantly - from 8% in Hungary to even 49 % in FYR Macedonia. It is obvious that such results underestimate the actual share of foreign currency used.

Therefore, a share of foreign currency deposits in total deposits could be used as a better indicator of unofficial dollarization. Considering that legal persons are often limited by local regulations regarding the holding of foreign currency, even better indicator of official dollarization is a share of household deposits in total foreign currency deposits. The following graph clearly shows that countries of Southeast Europe are unofficially dollarized economies.

Figure 1

SHARE OF HOUSEHOLD DEPOSITS IN DOMESTIC AND FOREIGN CURRENCIES (%)



Source: Central banks of the selected countries

The monitoring of this indicator is important with regard to dollarization because unofficially dollarized countries could be potential candidates for official dollarization. Almost all countries that have accepted either full or partial dollarization had to experience unofficial dollarization first. As a rule, unofficial dollarization comes after or during periods of hyperinflation and/or devaluations (depreciations) that is, anticipating their occurrence. First, a foreign currency becomes the means of savings to avoid potential losses due to macroeconomic instability. Then, the foreign currency becomes the unit of account, first in property and higher-value products transactions, then gradually including more products, and finally, it becomes the means of payment. In fact, dollarization is the result of rational behaviour by individuals, undertakings, and others who strive to protect their property from losing its value, as the result of disastrous economic policy.

The experience of most Latin American economies has revealed that dollarization is connected to the hysteresis effect, that is, the situation when in inflationary conditions a part of the national currency is substituted by the foreign currency, and after inflation the foreign currency is not crowded out and the national currency does not regain primacy.(3)

According Furstenberg [2000] one of the reasons may be that once adjustment costs have been paid and business activities adjust to this monetary system, economics entities are not ready to pay for any readjustment to the system that is likely to experience a new crisis.

1 - DOLLARIZATION IMPLICATIONS

Dollarization brings numerous benefits for countries opting for it, yet it incurs numerous expenses. Dollarization benefits and weaknesses have been theoretically examined to a great extent and as systemised in the following table:

(3) For more details see Gomis-Porquiras, P., C. Serrano, A. Somuano [1997], "Currency Substitution in Latin America: Lessons from 1990s", World Bank Policy Research Working Paper No. 2340, World Bank, Washington.

Table 2

Costs and benefits of dollarization

Benefits	Costs
A low inflation rate ensured (close to that in the country of "reserve currency")	Loss of foreign exchange reserves
Limited possibility for abuses of monetary policy	There is no possibility of adjusting the level of exchange rate
Lower interest rates resulting from the low inflation and the absence of depreciation risk	Limited opportunities for independent monetary policy
Accelerated development of domestic capital market	No issue premiums
Reduced transaction costs in international economic relations	No possibility of using inflationary tax in emergency situations
Facilitated integration of domestic companies into international economy and increased FDI inflows	Restricted possibilities of a central bank to follow the policy of lender of the last resort
Increased foreign trading	One-off shocks: currency conversion, new software, changes in accounting, and the like
Strengthened fiscal discipline	Increased currency outflow in case of problems in the balance of payments
Eliminated currency risk	

Weighing the cost and benefits of dollarization is complicated by the virtual absence of historical experience. Most of the dollarized countries are very small and have no statistical records or have a relatively short history of dollarization in order to provide any valid conclusions. Panama is the only sizable country with the history of using a foreign currency.

ECB research [2004] has shown that dollarized countries have higher GDP per capita, on average, than countries with their own currency. Twelve dollarized countries belong to the group of the forty richest countries in the world, and only five dollarized countries have GDP per capita lower than USD 1,500. This is presented in the following table:

Table 3

GDP per capita in dollarized economies and countries with their own currency

	Average value	Meridian
World (all countries and jurisdictions-total of 228)	8,800	4,780
Countries with their own currency (all countries and jurisdictions-total of 228)	8,200	4,200
Dollarized countries (all countries and jurisdictions-total of 46) [4]	11,120	8,850
Independent	9,400	4,500
Dependencies	12,340	11,150

Source: Winkler, A., F. Mazzafero, H. Nerkich, and C. Thimann [2004], "Official Dollarisation/Euroisation: Motives, Features and Policy Implications of Current Cases", Occasional Paper Series, No. 11, European Central Bank, Frankfurt am Main.

Edwards [2001] has come to a somewhat different conclusion. He points out that dollarized economies have much lower inflation rates, lower GDP rates, and similar fiscal performances to the countries with their own currency. He does not give any definite conclusions regarding dollarization, but suggests that dollarization would generate more costs than profit to large countries with variable trading relations, and which are not integrated in the international economy to a great extent, and in which financial transactions are mostly in domestic currencies. However, bearing in mind a relatively small sample, its specificity, and the lack of sufficient reliable data (which Edwards also points out), it is difficult to accept these conclusions as generally acceptable theoretical postulates. One definitely valid conclusion that can be drawn from this research is that dollarization itself is not an arrangement which guarantees economic prosperity.

In their joint paper, Edwards and Magendozo [2001] show that dollarized countries, as a rule, have lower price increase rates than those they can be compared with and which are not dollarized. On the other hand, they came

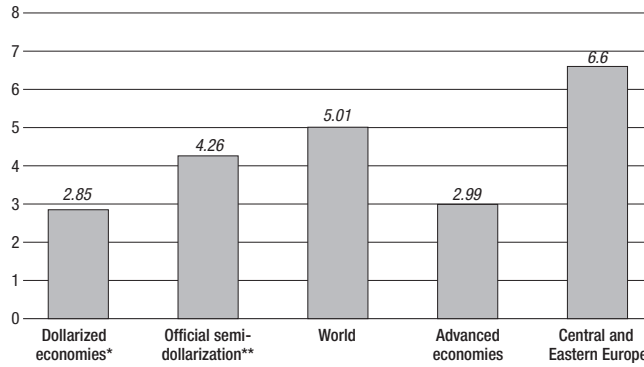
(3) Excluding Pitcairn Islands, Cocoa Islands, Vatican, Eastern Islands, and Norfolk Islands.

to the conclusion that the countries that had substituted their currencies had lower rates of economic growth than comparative countries that had not done so. This can be explained by the inability of these countries to adjust to external disturbances, such as costs of capital and trade flows.

Available data from the World Economic Outlook and the United Nations statistics could be used to prove that Edward's hypothesis that dollarized countries experience slower economic growth is essentially true. The following graph shows that dollarized countries had the lowest rates of growth than countries of all other regions. The situation is somewhat better if official semi-dollarized economies are included, but then the GDP growth rate is lower than the global average rate.

Figure 2

GDP RATES OF GROWTH IN 2006



** covers 17 dollarized countries and regions (non-weighted average)*

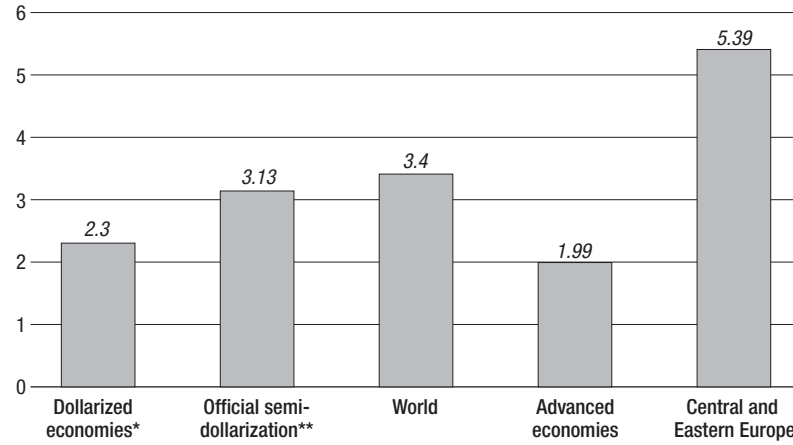
*** covers 26 dollarized countries and official semi-dollarized countries (non-weighted average)*

Source of data: World Economic outlook and UN statistics

With regard to inflation, it can be concluded that dollarized economies had lower rates of inflation than the global average rate, yet somewhat higher than rates of inflation in developed countries (figure 3).

Figure 3

INFLATION IN 2006



* *covers 21 dollarized countries and regions (non-weighted average)*

** *covers 30 dollarized countries and official semi-dollarized countries (non-weighted average)*

Source of data: World Economic outlook and UN statistics

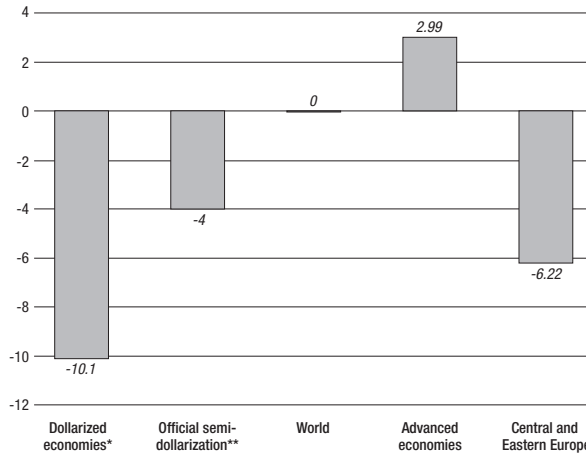
Nevertheless, some dollarized economies have relatively bad economic performance. This can be explained primarily by the fact that this group of countries have opted for dollarization after deep recessions, hyperinflation episodes, macroeconomic instability, and so on. Therefore, it is unreasonable to expect that dollarization itself can lead to an accelerated economic growth. It can create only one of the necessary prerequisites - stable economic environment.

Winkler [2004] came to the conclusion that most dollarized countries have problems with their balance of payments. According to his research, of 50 countries with the highest foreign trade deficits, 25 are dollarized countries. This is not a surprising conclusion since foreign exchange rate policy cannot be used to reduce imports and a foreign convertible currency to be used to reduce transaction costs and cheapens imports.

The analysis based on the World Economic Outlook and the UN statistics data has also confirmed this hypothesis, as shown in the following graph:

Figure 4

CURRENT ACCOUNT DEFICIT IN 2006 (IN % OF GDP)



* *covers 11 dollarized countries and regions (non-weighted average)*

** *covers 14 dollarized countries and official semi-dollarized countries (non-weighted average)*

Source of data: World Economic outlook and UN statistics

2 - INTRODUCTION OF EURO (DEM) IN MONTENEGRO

After the disintegration of SFRY, two former member republics - Montenegro and Serbia formed the Federal Republic of Yugoslavia (FRY) on 28 April 1992. In the new country the monetary system was re-centralized, wherein the National Bank of Montenegro (NBM) lost its autonomy and became a regional office of the National Bank of Yugoslavia whose main office was in Belgrade. Thus, the National Bank of Montenegro was no longer governed by the Governor, who had been previously appointed by the Parliament or the Government of the Republic

of Montenegro, but by the Director General who was appointed by the Governor of the NBY in Belgrade.

Accumulated foreign debts, bad use of foreign credits and their bureaucratic allocation (the same as with domestic sources of income) resulted in periodical devaluations and foreign exchange fluctuation losses, i.e. the accumulation of losses in the National Bank of Yugoslavia. To wit, the NBY conducted a policy of taking over the exchange rate risk from the banking system, which was socially owned, and mostly from the enterprises it was crediting (these were also socially owned, and not privately owned enterprises). The second most important characteristic of the banking system was direct allocation of loans instead of profitable allocations, with the policy of soft budgetary limitation for all socially owned banks and enterprises, at the same time. Wrongly allocated loans led many banks to illiquidity and insolvency crises, and the economy was directed towards mutual lending. With the lack of banking loans, this lending led to an increase in mutual indebtedness and the illiquidity of enterprises. Another important characteristic of the monetary system was such currency hedging where the NBY took over the currency risk from the banking system which was not profit motivated, but non-economically oriented.

The situation deteriorated drastically since 1993 when Slobodan Milošević, using all means to preserve his power, starts with the monetary policy abuse. Monetary policy of that time was used for financing wars and preserving social order, but with no adjustments in the fiscal policy. Such a policy led to the longest, and the second highest hyperinflation in the world history. Montenegro suffered the negative consequences of this monetary policy, but with almost no possibility to participate in its creation.

After a short break and a successful stabilization program in 1994, and the removal of economic sanctions in 1995, a gradual increase in inflation reoccurred. However, the sale of Telecom Serbia for USD 1 billion in 1997 brought another relief. Nevertheless, the situation additionally worsened after the problems in Kosovo in 1998 and the NATO intervention in 1999.

Montenegrin Government of that time made a decision not to stay aside any longer and to undertake certain measures to prevent the continuation of the wrong policy. After considering numerous options, the decision was made to legalize the existing practice, i.e. to make the Deutsche Mark (DEM) the legal tender in Montenegro, thus creating the double-currency system with the Deutsche Mark and the Dinar as legal tenders.

The Government of Montenegro paid from its reserves salaries in DEM to employees financed from the Budget. The new system gained trust, so more and more transactions previously performed in the grey zone started entering the legal flows. In January 2001, it was estimated that there was enough DEM in circulation, making the DEM the only means of payment, the role undertaken by the EUR after the conversion of DEM into EUR.

The Monetary Council[5] ran the monetary system of Montenegro from the moment the Deutsche Mark was adopted until the establishment of the Central Bank of Montenegro. Until the establishment of the Central Bank of Montenegro, during 2000 and 2001, this body enacted numerous regulations and acts which enabled the Deutsche Mark to be fully accepted as the means of payment, accounting, and hoarding. Taking into account that inflows and outflows of money into and from a country is primarily related to the balance of payments transactions, there was some fear that a substantial portion of the money supply could outflow abroad due to the low competitiveness of Montenegrin economy. Nevertheless, in spite of dollarization opponents, the money supply continued increasing both in nominal values and as a share of GDP.

Montenegro also met all theoretical requirements for a successful implementation of euroisation. It was small, highly open economy, with recent hyperinflation history, without seigniorage and with foreign reserves that can support dollarization.

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(5) The Decission on the Appointment of the Members of the Monetary Council (Official Gazette of the Republic of Montenegro, no. 41/99, 45/99 and 39/00)

3 - LESSONS FROM MONTENEGRO

The euroization of Montenegro was accompanied by numerous controversies, with a number of economists opposing the introduction of a foreign currency and advocating the creation of a national currency instead. The most frequent arguments against euroization were that, in a situation of prevailing low competitiveness of the economy and a high budget deficit, Montenegro would lose its euros (or, at the time, its Deutsche Marks) to a quick outflow abroad, which could create recessionary effects. However, the money supply behaved completely differently (Table 4) and remonetization was swift.

Table 4

Money supply and GDP developments

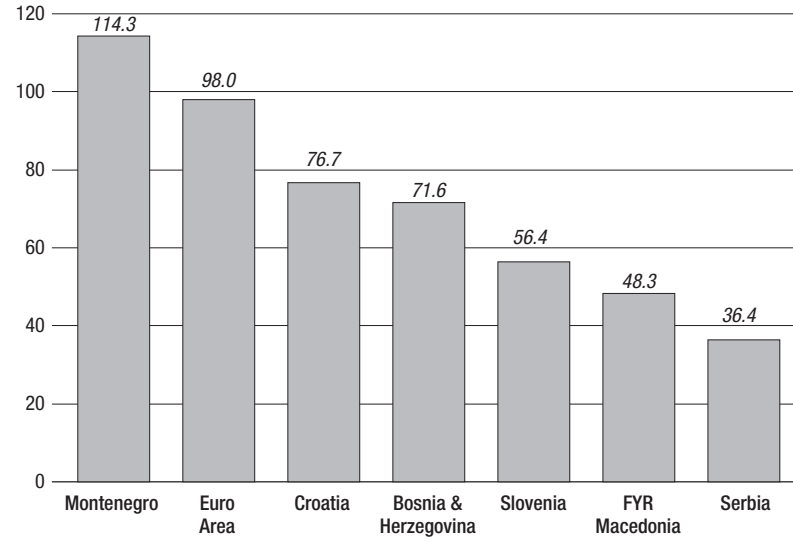
Description/Period	2003.	2004.	2005.	2006.	2007.
GDP (EUR million)	1.510,1	1.669,8	1.815,0	2.003,6	2.278,1
M2 (EUR million)	460,8	535,5	802,3	1.507,1	2.604,6
M2 share in GDP (%)	30,5	32,1	44,2	75,3	114,3

Several reasons affected the growth in the money supply. The first was that the system gained the public's confidence relatively quickly, and that money kept "under the mattress" began entering circulation. In addition, the quick growth of the tourism industry caused a significant amount of foreign currency to enter the country, both as cash spent by tourists and as FDIs dominantly aimed at tourism development. Portfolio investments were another major source of funds, since all market indices recorded robust growth over a period of time. Remittances should not be overlooked either; in addition, the early years of this century saw significant inflows of donation funds.

The ratio of money supply to GDP in Montenegro is today one of the highest in the region (figure 5), and ideas on the abolishment of euroisation that used to be present at the beginning of the process are no longer mentioned.

Figure 5

M2/GDP RATION, END-2007, IN %

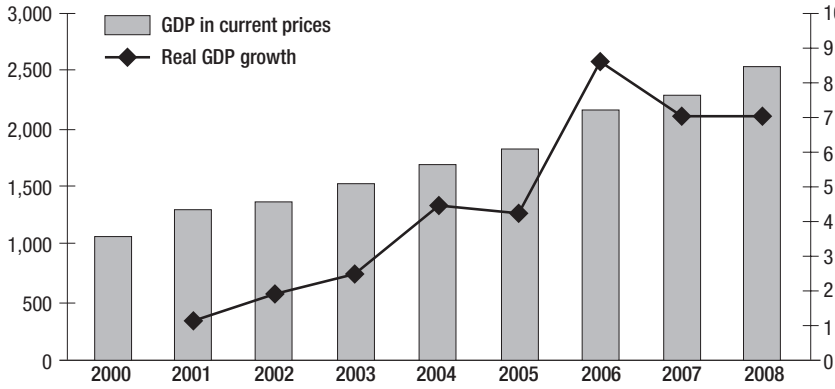


Source Fabris, N. [2008], Chief Economist Annual Report, Central Bank of Montenegro: Podgorica

The experience of Montenegro provides another valid conclusion that dollarization creates stability and prerequisites for economic growth, but cannot be the substitute for economic reforms. On the other hand, the statement by Kurt Schuler, the German Minister of Economy, uttered three decades ago is truly valid: "Stability is not everything, but without stability, everything is nothing". The following graph shows that Montenegro has seen an accelerated growth over the last few years, which is also to a great extent owing to the process of dollarization.

`Figure 6

M2/GDP ration, end-2007, in %

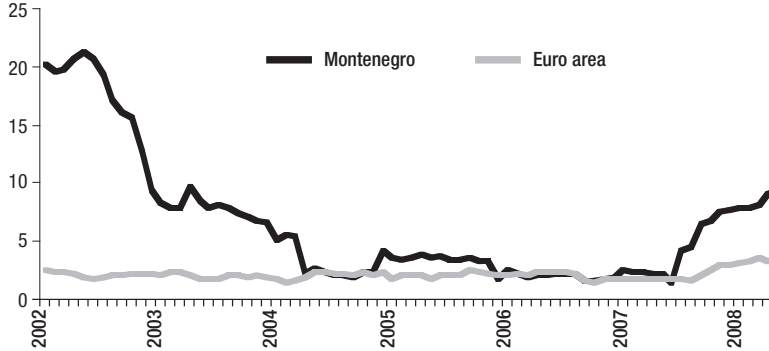


All empirical studies have demonstrated beyond doubt that the switch to a system of full euroization (dollarization) causes inflation to drop. The credibility of monetary policy is no longer an issue, since money supply and the exchange rate policy are no longer controlled by the national monetary and political authorities.

The Montenegrin experience has shown that it is only in the medium term that its inflation rate harmonized with that of the country whose currency was adopted (figure 7). In the year the Deutsche mark was introduced, inflation in Montenegro stood at 128%; it took six years for it to reach the euro area levels.

Figure 7

INFLATION IN EURO AREA AND MONTENEGRO

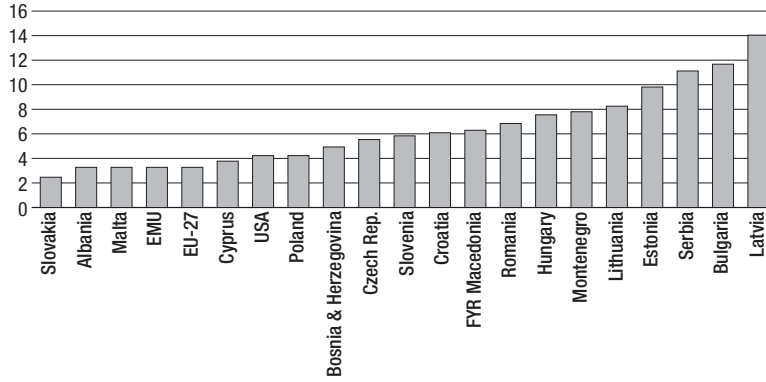


However, Montenegro's experience has shown that if inflation increase is driven by some external shocks, all national policies (monetary and fiscal) are mainly unable to curb this growth. Namely, during 2007 and 2008, inflation in Montenegro was on an uptrend. The initial trigger was certainly global rises in energy and food prices, followed by higher electricity prices in the country as the consequence of removing price disparities.

An ongoing increase in aggregate demand, as the result of credit growth, substantial inflows from abroad and the sale of real estates to foreigners additionally influenced the inflation increase. After the inflation rate of 1.8% in 2006, it is likely that in 2008 inflation will be about 7%.

Figure 8

ANNUAL INFLATION IN SELECTED COUNTRIES, DECEMBER 2007



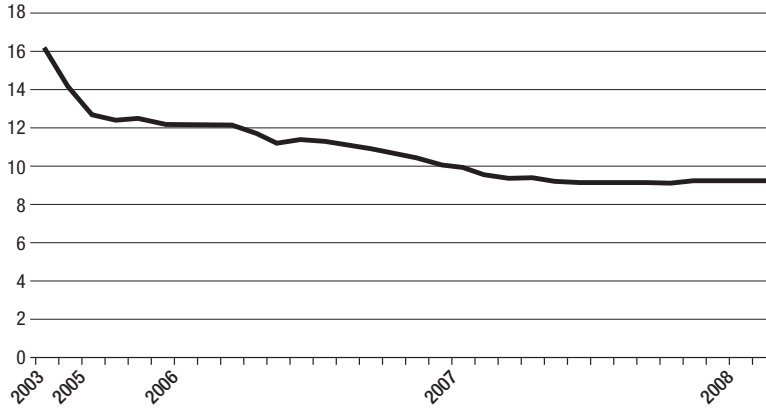
Simultaneously, core inflation remained relatively low, at 3.2%. This situation has proved that limited instruments of monetary policy can hardly curtail inflation. The Central Bank of Montenegro has no reference interest rate and currency issue policy, whereas open market operations are possible in theory, but have not been performed so far. Practically, the most important instrument of the Central Bank of Montenegro's monetary policy is reserve requirement. The Central Bank has already passed a set of administrative measures aimed at curbing credit growth and amending the reserve requirement policy.

Euroisation did not lead to the convergence of interest rates, but it eliminated the foreign exchange risk, leaving the country risk and the client risk behind. Although interest rates are falling, there are still many factors that hinder the convergence of interest rates, such as: the slow and inefficient judicial system, a widespread moral hazard, inflation higher than that in the EMU, poor solvency of borrowers, still high country risk, and so on. The following graph shows the movement of the weighted average lending effective interest rate(6)

(6) The Decission on the Appointment of the Members of the Monetary Council (Official Gazette of the Republic of Montenegro, no. 41/99, 45/99 and 39/00)

Figure 9

WEIGHTED AVERAGE LENDING EFFECTIVE INTEREST RATE



Euroization also had a positive impact on the development of the banking system, which was practically non-existent in the late 1990s. The main characteristics of the banking system before the introduction of dollarization were: non-market allocation of loans to privileged companies, the lack of responsibility for banks` business operations, the lack of savings, no consumer loans, a high level of losses, a high amount of non-performing assets, and so on. Nowadays, the banking system is characterized by a high liquidity level, a continuous growth in loans, deposits and bank capital. Of course, euroization was just one of the factors that facilitated the reform of the banking sector, with a whole range of various other measures also implemented. The end result of all these was the growth and revival of banking. Table 5 shows the share of bank assets in GDP.

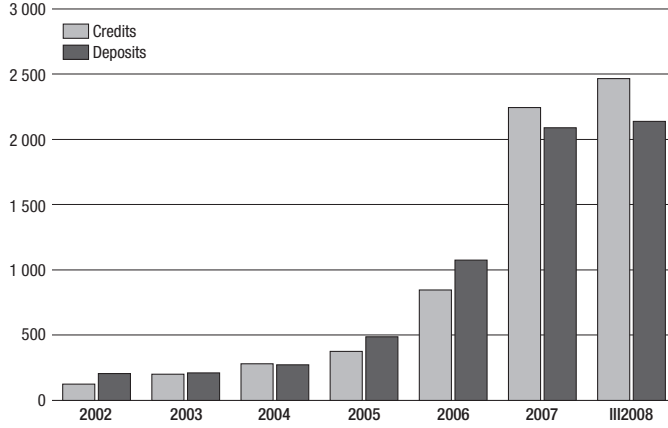
Table 5

Assets/GDP ratio, year-end, %

Description/Period	2003	2004	2005	2006	2007
Assets/GDP	23.2	26.6	38.3	71.4	130.6

Figure 10

CREDITS AND DEPOSITS (IN MIL. €)



Euroization tightens budget discipline, and it is also an important precondition for the sustainability of the system as a whole, since it limits potential sources that can be used to cover deficits (as there is no longer a primary issue). In addition, euroization has made it easier to introduce "hard" budgetary limitations, as it has restricted the scope for subsidizing "downfallen" state-owned enterprises and insolvent banks. In the year of the Deutsche Mark introduction, the fiscal deficit amounted to no less than 20% of GDP. However, euroisation has brought about a kind of self-discipline, resulting in substantial fiscal surpluses over the past two years. In addition, it should be taken into account that privatisation revenues in 2007 and 2008 were insignificant.

Table 6

Primary budget deficit/surplus movements

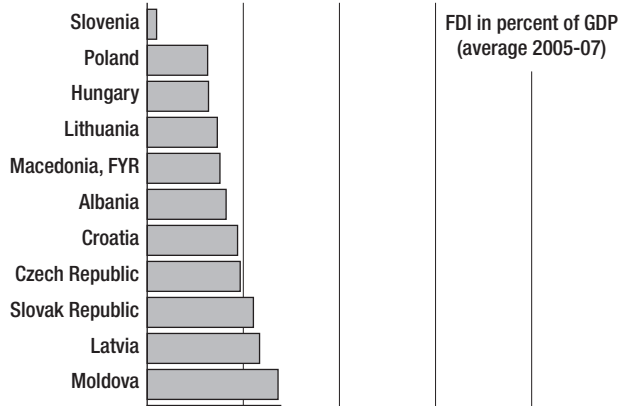
Description/Period	2002	2003	2004	2005	2006	2007	Plan 2008
Montenegro primary budget deficit/surplus (EUR million)	-25.2	-45.9	-32.8	-30.1	85.1	168.4	6.5
As % share in GDP	-1.85	-3.04	-1.96	-1.66	4.50	7.39	0.26

Source: Fabris, N. [2008], Chief Economist Annual Report, Central Bank of Montenegro: Podgorica

The introduction of a stable currency is a good signal to foreign investors because it is, in a way, an advance guarantee of stable conditions for doing business. Foreign investors prefer doing business in a "hard" currency that reduces the exchange rate risk. Euroization, combined with a very liberal system and exceptional incentives for economic growth, has resulted in exceptionally high FDI inflows. Montenegro's economy has topped the list of European countries in transition by share of FDI in GDP. Net FDI amounted to 529 million € in 2007, that is, around 25% of GDP.

Figure 11

FDI INFLOWS IN THE SELECTED COUNTRIES



Source: IMF [2008], "Selected Issues - Montenegro", IMF, Washington

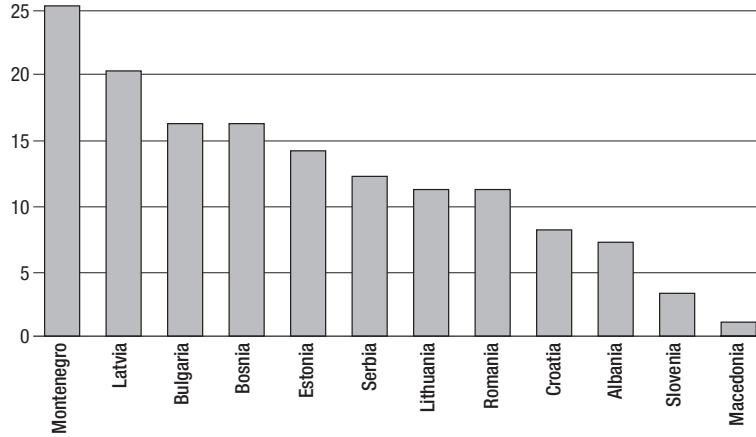
High foreign capital inflows are, without doubt, a factor of exceptional importance for Montenegro's rapid economic growth. However, it should be borne in mind that excessive capital inflows, above the target country's absorption rate, may also cause problems, including rising inflation, price "bubbles" in markets, a worsening of the foreign trade imbalance, etc. Some of these problems are already apparent in Montenegro.

A highly open and liberal system, in conjunction with high capital inflows, rising aggregate demand, and low competitiveness, has resulted in an exceptionally high current account deficit: according to preliminary

data, in 2007 this amounted to over EUR 1 billion or some 45% of the estimated GDP. Over the past two years, the ratio of the current account deficit to GDP has been the highest in Europe.

Figure 12

CURRENT ACCOUNT DEFICIT IN SELECTED COUNTRIES IN PERCENTAGE OF GDP (2005 - 2007)



Source: IMF [2008], World Economic Outlook, IMF: Washington

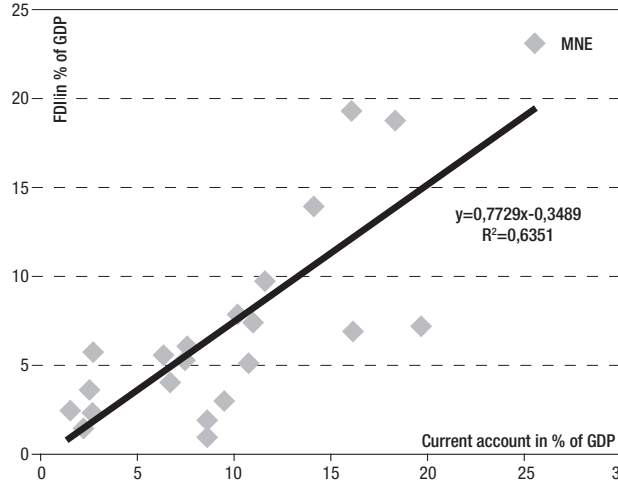
The current account deficit poses less of a risk in euroised economies, but this does not mean it can safely be ignored. On the other hand, euroization reduces the scope of measures that can be taken to eliminate the deficit, since the exchange rate policy, as a means of adjusting to external shocks, is lost. Although the deficit is to a great extent the consequence of rapid growth, the fact remains that the share of private debt in the current account deficit is growing at the expense of coverage by FDIs. In 2007, net FDI inflows could cover a mere 52% of the current account deficit; the coverage ratio amounted to 88% in 2006.

There are many reasons for the current account deficit: high energy imports, substantial FDI inflows, the low competitiveness of Montenegro's manufacturing industry, high credit growth rates, high inflows of capital directed at households, etc. According to the IMF, the current account

deficit may also be considered an equilibrium response to large private capital inflows and fast credit growth. When FDI inflows unwind, the deficit will drop by a significant measure. Other countries also exhibit a substantial degree of correlation between FDI inflows and current account deficits and Montenegro is no exception (figure 13).

Figure 13

CORRELATION BETWEEN THE CURRENT ACCOUNT DEFICIT AND FDI
(2005 - 2007)



Source: IMF [2008], "Selected Issues - Montenegro", IMF, Washington

The issue of euroisation with regard to relations with the EU could be a potential problem for Montenegro. However, Montenegro`s stance is that euroisation should not be treated as a shortcut towards joining the EU or the EMU and that the country is ready to meet all other Maastricht and other relevant criteria that have to be fulfilled by other potential candidate countries as well. A potential request to abolish the euro would have a remarkably adverse effect on the Montenegrin economy.

Exit strategies for official dollarization are rather rare. They were often the result of a struggle for independence in the distant past, and the only example in modern history is Liberia where dollarization occurred due to

the reduction of money in circulation, civil war, and the high fiscal deficit. As there is no empirical evidence, it is difficult to forecast what would happen to economic performance of a country that opted for this strategy. However, there are many arguments in favour of the hypothesis that the abolishment of euroisation in Montenegro would be counterproductive:

- process of macroeconomic stability has been recently established and it is likely that the transition to any other monetary regime would aggravate macroeconomic credibility;
- theories of behaviour suggest that individuals act conservatively in uncertain environment, so some individuals would probably try to obstruct the introduction of a new currency;
- the experience of hyperinflation is still vivid and inflation is on an uptrend, so it is likely that economic entities would try to protect their property in the uncertain environment;
- experience of unofficially dollarized countries has shown that a strong hysteresis effect continues to be present even after the establishment of macroeconomic stability, and this would probably happen in Montenegro as well. This means that one part of transactions would still be in euros, thus contributing to an increase in grey economy and reduced fiscal revenues;
- the introduction of the national currency would be a bad signal to foreign investors who prefer dealing with a hard currency;
- except for the state which would regain its foreign exchange reserves, currency conversion would incur expenses to both the economy and households that would arise from: the exchange rate commissions, costs of software conversions, changes in accounting, and the like;
- in the conditions of monetary stability there are no examples of radical monetary reforms, and the abolishment of euroisation would certainly be a radical monetary reform.

Taking into account all the advantages and weaknesses, as well as the performance of dollarized economies, an open issue remains whether dollarization should be recommended as a monetary policy instrument or

not? Furthermore, any country that would potentially opt for dollarization must be aware of the fact that there are almost no exit strategies for dollarization.

However, the impression is that dollarization could still be recommended if the following restrictive assumptions existed:

- Large disturbances in domestic economy induced by the longstanding hyperinflation, economic instability, a crisis in the financial system, and a slow (a downtrend in) economic growth,
- Total loss of credibility of the creators of economic policy,
- A widespread use of a foreign currency in informal transactions,
- A relatively small country, as for big countries dollarization would mean a loss of foreign exchange reserves,
- A highly open country able to provide stability in the balance of payments in the mid-term.

The aforementioned criteria obviously show that no country in Europe meets these requirements, and the question remains whether any country in the world would be able to meet them.

5 - CONCLUSION

Dollarization is a regime that has been drawing a lot of attention in recent years. Dollarized countries differ by their economic development, geographical position, prevailing economic activity, dollarization history, size, and the like. Such diversification makes drawing of definite conclusions difficult. However, it can be concluded that dollarization brings many benefits, yet incurring numerous costs. The process of dollarization creates a stable and foreseeable business environment, but it cannot be a substitute for economic reforms. A quality currency is a requirement, but not the sufficient condition for an accelerated economic development. This means that dollarization itself cannot instigate economic growth.

With regard to Montenegro, regardless of numerous controversies that followed the introduction of euroisation, today nobody has anything against this regime. With the introduction of euroisation Montenegro gained stability, yet it lost numerous instruments of economic policy. The most important conclusions with regard to dollarization in Montenegro are as follows:

- dollarization leads to the convergence of inflation with the country of primary currency, but only in medium-term,
- in case of any disturbances, the absence of economic policy instruments hinders adjustments,
- dollarization creates stability and prerequisites for economic growth, but cannot be treated as the substitute for economic reforms,
- dollarization itself is not the sufficient condition for the convergence of interest rates,
- dollarization has resulted in a substantial decrease in fiscal deficit in medium-term,
- dollarization stimulates development of the financial system and
- FDI inflow.

REFERENCES

Berg, A., and E. Borenzstein [2000], "The dollarization debate", Finance and development, Vol 37, no 1, 38 - 41.

Bogetić, Z. [2000], "Official Dollarization: Current Experiences and Issues", *Cato Journal*, Vol. 20, no. 2, 179 - 213.

Calvo, G. and V. Carlos [1992], "Currency Substitution in Developing Countries", Working Paper 92/40, IMF: Washington.

Cordeiro, J.L. [2002], "Different Monetary Systems: Costs and Benefits to Whom?", Working paper, Centro de Divulgacion del Conocimiento Economico, Caracas.

Dvorsky, S., T. Scheiber and H. Stix, [2008], "Euroization in Central, Eastern and Southeastern Europe - First Results from the New OeNB Euro Survey", *Focus on European Economic Integration*, Vol. 2/08, 83 - 94.

Edwards, S. [2001], "Dollarization and Economic Performance: An Empirical Investigation", NBER Working paper, No. 8274, Cambridge, Massachutes.

Edwards, S., and I. Magendzo [2001],, "Dollarization, Inflation and Growth", NBER Working paper, no. 8671, Cambridge, Massachutes.

Fabris, N. [2008], *Chief Economist Annual Report*, Central Bank of Montenegro: Podgorica.

Fabris, N. and others [2005], "Economic Policy in Dolarized Economies", Working paper, no 1, Central Bank of Montenegro.

Furstenberg, G. [2000], "Dollarization: Needed Monetary Reconditioning or Expropriation", http://indiana.edu/~vonfurst/G89916.pdf

Gomis-Porquiras, P., C. Serrano, A. Somuano [1997], "Currency Substitution in Latin America: Lessons from 1990s", World Bank Policy Research Working Paper No. 2340, World Bank, Washington.

IMF [2008], *World Economic Outlook*, IMF: Washington

IMF [2008], "Selected Issues - Montenegro", IMF, Washington

Schuler, K. [2000], "Basics of Dollarization", Joint Economic Committee Staff Report, Office of the Chairman, Connie Mack, USA, http://users.erols.com/kurrency/basicsup.htm.

Schuler, K. [2002], "Dollarization at the Intersection of Economics and Politics", Luncheon speech at the conference "Euro and Dollarization", http://users.erols.com/kurrency/fordham.htm

Winkler, A., F. Mazzafero, H. Nerkich, and C. Thimann [2004], "Official Dollarisation/Euroisation: Motives, Features and Policy Implications of Current Cases", Occasional Paper Series, No. 11, European Central Bank, Frankfurt am Main.

UN statistics

MONETARY REGIMES IN POST-COMMUNIST COUNTRIES[1]
SOME LONG-TERM REFLECTIONS

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ABSTRACT:

This article offers an attempt at typologisation of the evolution of monetary regimes in post-communist countries (1990-2008), which is exceptionally varied by character. Two large groups have emerged: type 1 - countries, which started their reforms with a regime of fixed exchange rate and dominating external sources of money supply, and type 2 - countries starting their reforms with a floating exchange rate and predominating internal sources of money supply. The first type is much more successful and appropriate for managing the problems of transition. Some other elements of typologisation have also been suggested based on specific definitions of monetary system and monetary regime. The article also presents various approaches, which can explain the evolution of monetary regimes observed in the former socialist countries.

JEL classification: E5, P2

Keywords: monetary regimes, post-communist countries, comparative economics

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(1) The article is based on a plenary report presented at the «Monetary and Financial Transformations in CEECs» International Conference, Thursday 20th November 2008, Ecole Supérieure du Commerce Extérieur, Paris La Défense. The article reflects a number of comments and notes by participants in the Conference especially from Fabrizio Coricelli, and also to Petar Chobanov and Guergy Ganev.

INTRODUCTION

Almost twenty years have passed since planned economy officially collapsed. The period is long enough to allow a number of theoretical generalisations. The countries have followed different paths, their trajectories diverging at some point in time, converging at others. Yet in spite of the great diversity some of the trends can be captured. A number of typologisations become possible which could enrich not only the "history of transition", but also comparative economics as such. The development of monetary regimes is particularly interesting due to their key role in determining the overall dynamics of post-planned economies. The debate over the optimal monetary and exchange rate regimes has a long history, which is continuously enriched by new historical examples and new theoretical arguments, even in spite of the fact that it does not leave the scope of the traditional cost-benefit approaches and is therefore unable to integrate a number of traits of these economies - institutional, political, or sociological, etc. Of course things are very complex, and it is hardly possible to construct within a short time a whole new theory, or integrate all possible elements and factors into a single uncontroversial theoretical model. My task in this article is a more humble one - to present some of my reflections drawn on the 20 years' history of the post-communist regime and to give some guidelines for future analyses. Clearly, the various approaches to monetary regimes will coexist for quite a long time and in a way the diversity of approaches will continue. The aim is that these compete and mutually enrich each another, rather than eliminate one other.

Thus, I think two large models of monetary regime dynamics have become discernible (*two archetypes* if we can use this term), which we will further discuss below, and which in a sense have determined the success of reforms. The first group, i.e. the *successful archetype*, includes the countries that started with a fixed exchange rate regime and a strict control over money supply (in most cases backed money and money supply tied to balance of payments) and subsequently moved to a floating exchange rate regime, inflation targeting, or those that kept their

fixed exchange rates throughout the period under study. I will call these countries a "fixed-start" type. The second group of countries (the losing archetype) starting with a floating rate and later on introducing rigorous monetary regimes (Bulgaria) or keeping their floating rates (Albania, Romania and others) throughout the period I will call a "floating start". The first group of countries achieved greater success; their transition was much more disciplined and "uncorrupted" while the second group underwent an extremely mafia type of transition (frequently named "crony" transition), with some of them significantly slowing down their development, and only over the last years making an attempt to compensate (for lost opportunities). My purpose here is to reflect below upon possible explanations of this fact. Of course, pure types do not exist; a number of other factors account for the dynamics of development of the individual economies, and some of the countries changed their positions in the course of time (for example Bulgaria and Russia).

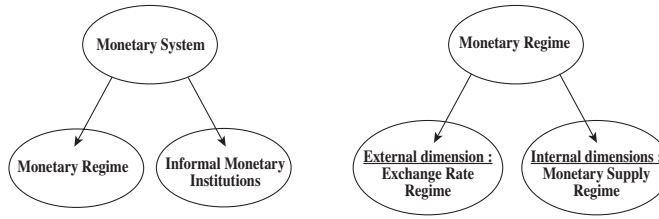
For the two attempts at typology of monetary regimes to become clearer, it would be useful to provide an survey of the key moments in the history of monetary regimes in the different countries. This will allow us to see monetary regimes in the light of the overall economic, political and social dynamics (developments) of the individual economies.

To convey my understanding of monetary system and monetary regime, I have given some short definitions (see Chart 1). In my view a monetary system has two key aspects - the first one is the formal monetary regime, which is established by a set of norms (mainly legal) and the second - the non-formal monetary institutions (practices) and mechanisms of their enforcement. They are often neglected while they are actually important. On the other hand, a country's monetary regime is of two basic dimensions - external and internal. The internal includes the mechanisms of money supply (money supply regime), and the external - the exchange rate regime. The discussion of determining the money supply regime includes the whole range of problems oconcerning covered or uncovered money, monetary rules and monetary discretion, etc., and as regards the exchange rate regime - the various types of exchange rates (floating,

fixed, etc.). Of course, the two dimensions are closely interrelated; however the above distinction is useful as it enables capturing the various combinations between a monetary regime and an exchange rate regime; besides, these combinations provide new analytical possibilities. The latter distinction attracted the attention of researchers (partly within the optimum monetary areas), but I think it has rarely been brought into focus as crucial distinction (exceptions to this are Kurt Schuler and Steve Hanke - Schuler, 1999, 2007, Hanke, 2002).

Chart 1.

MONETARY SYSTEM AND MONETARY REGIME



So let's now switch back to the subject of monetary regimes.

I. MONETARY REGIMES - SHORT HISTORICAL CHRONOLOGY

The crash of planned economy and the restoration of market economy proved a historically unknown process of discovery that was hard to explain and harder still to plan. This could not be achieved either by Marxist theory (which was extremely aggregated, macroeconomic and macrosociological by character), or by neoclassical economics whose microeconomic, equilibrium nature was unable to encompass the large social transformations(2). The case in point was the unprecedented

(2) Signifying in this respect is the evolution of Janos Kornai who has increasingly shifted his attention from the neoclassical interpretation typical of his previous works on the «deficit" under socialism to developing the institutional aspects of the transition. See for example Kornai (2005), Csaba (2007), Chavance (2008). It is interesting to note that in spite of the numerous publications and entire journals discussing transition economy, Nikolay Bukharin's book "The Economics of the Transition Period" is rarely mentioned (Bukharin, 1989, [1920]), which although written on a different occasion and in a different time, suggests very interesting directions of analyses (mostly the transition seen in terms of conflict of interests, etc.).

historical change (a new "Great transformation") for which no theoretical model existed *a priori*. Of course there were a number of intuitions and past practices, mostly drawn on the reforms in Latin America(3) and late socialism, but on the whole solutions were unclear, or those that seemed clear quickly proved to be much more difficult and often led to unexpected outcomes. Some countries had traditions in economics, partially preserved during the period of communism, such as Poland and Hungary; still others were extremely poor and doomed to coping and imitate (such as Bulgaria). As to Russia, a number of economists began recalling the first years of the socialist revolution when an attempt was made to revive market economy (NEP) and the stable money; however they either overestimated this experience, or almost lacked control over the events. Indeed, history could hardly repeat itself and hardly the few years of NEP could serve as a solution in a different historical period.

As regards monetary regimes and the type of monetary system, things were quite the same - no consistent ideas or reform models. The choice of monetary systems was rather accidental (arbitrary) and contingent upon the concrete circumstances and the balance of forces and ideas of the various economic actors. No matter how we view these events, the purpose was clear - to restore the monetary mechanisms in the banking system, which had totally lost their character during the period of planned economy. Today, looking from the distance of time, we can say that symbolically a jump was needed to be down "from Che to Trichet", i.e. from the Ernesto Che Guevara model (Che Guevara was the first governor of the Central Bank of Cuba who identically took the position) to the Jean Claude Trichet model where the European central bank is an independent and conservative authority. This of course is symbolic; still it demonstrates well the jump that the former communist countries had to make from the ruble area to the euro area...

(3) See for instance Commander, ed., (1991).

Despite the common past and overall common ultimate goals, the former socialist block countries demonstrated a large variety of monetary regimes(4). I start with Poland and Hungary, which in a sense were a symbol of resistance against the traditional socialist model and of a number of innovations during that period.

Poland and Hungary

The initial conditions for the reform in *Poland* were relatively bad with a large external debt, high inflation, monetary overhang, weak foreign reserves and a coexisting strongly expanded foreign exchange market. Poland started with a shock therapy (Leshek Balcerowicz's reforms and Jeffrey Sachs's advices) and the so-called "extraordinary politics)". In 1990 the decline in GDP reached 12%. The importance of stable money as an initial anchor of reforms was realized even at the onset of the transition and in 1991 a fixed exchange rate regime was chosen (to a basket of five currencies and following initial zloty depreciation). A stabilization fund of USD 1 billion was formed (with the help of loans from 17 countries), which today we can assess as a money backup mechanism, i.e. a kind of a currency board. The appreciation of the zloty led to capitals inflow. Over time the monetary authorities were compelled to introduce more and more flexibility to the exchange rate to reach 1994 when the first open market operations (reverse repo transactions) were realised. In 1995 the exchange rate was limited within the interval +/- 7%, and in 1998 it was decided to move to inflation targeting which led, from 2000, to a fully floating rate. Today, Poland strives to imitate the ECB monetary policy. I believe Poland should also be remembered as the place where the discussion of unilateral euroisation originated, and indeed it was in Poland where the idea was most exhaustively and consistently promoted already in 1999 (both at the economic and legal level). This was done by Jacek Rostowski, professor

(4) The short historical sketches do not claim exhaustiveness – they note only some major (in my view) stages in the evolution of monetary regimes.

of economics, and a finance minister at present (2008), and Andrzej Bratkowski (Bratkowski and Rostowski, 2000, Rostowski, 2002[5].

In spite of the relatively better initial conditions, *Hungary* too started a regime of a more or less fixed exchange rate fluctuating within a narrow band. Over time, this deepened the conflict between the goal of fighting inflation and the efforts to maintain competitiveness, and after loosening the fiscal policy double deficits occurred. All this was coupled with capitals inflow. In March 1995, Lajos Bokros undertook reforms, which in the area of monetary regime were expressed in a single depreciation of 9% and shifting to a preannounced crawling band of depreciation on a weekly and monthly basis and the forint was pegged to a basket of mark and dollar. In May 2001 the band was expanded to +/- 15%, and in June 2000 Hungary officially introduced a regime of inflation targeting. Later on, the double deficits occurred again, but what we should keep in mind is that like Poland, Hungary too started with a fixed exchange rate and after gradually increasing its flexibility, moved to a regime of inflation targeting[6].

The Czech Republic and Slovakia

After the Velvet divorce of 1993 in the *Czech Republic*, each of the two countries took their own paths. A fixed exchange rate was introduced as early as January 1991. Later on the Czech Republic moved to a monetary aggregate targeting. After a strong capital inflow (debt capital) and a rise in the cost of monetary sterilization of these capital inflows (a point was reached when 80% of the monetary base came from net external assets) in 1996 a shift was made to a greater flexibility of the exchange rate (+/- 7.5%). Nevertheless, the appreciation of the crone continued and the banking crisis in 1997/1998 changed the monetary policy completely.

(5) Regarding Poland see also Kokoszczynski (2001) and Gronkiewicz-Waltz (2003). About the views of Leshek Balcerowicz see Balcerowicz (2006). On euroisation see Schobert (2003).
(6) See for details Frömmel and Schobert. (2006).

Since January 1997 the Czech Central Bank has pursued an inflation target trying to copy the ECB's behaviour. In 1999 a special privatisation account was introduced, aimed to achieve sterilisation of the capital inflow (mostly equity capital)(7).

After some considerations (weighing up) of the forms of reform (during Vladimír Mečiar's term of office) and following the period of mass privatisation (similar to that in the Czech Republic), in 1998 the *Slovak* liberal government of Mikulas Dzuringa came to power (1998-2006). Together with finance minister Ivan Miklos, Dzuringa (sharing a liberal ideology similar to that of his Czech counterpart, Vaclav Klaus) undertook radical tax reforms (a flat tax in 2004) and foreign capital attraction. The country joined the OECD (2000), NATO and EU (in 2004), and since the beginning of 2009 is a member of the euro area (the second country after Slovenia). Both the Czech Republic and Slovakia follow, with some variation, the logics in the evolution of monetary regimes in Poland and Hungary.

The Baltic countries

The Baltic countries (Estonia, Latvia and Lithuania), in spite of the difficulties experienced at present (2008), should be considered extremely "successful stories". Even from the very beginning they strived to break away from the ruble area and from Russia's influence. In the beginning they introduced temporary currencies, and very shortly after their own currency. The most radical in this respect was *Estonia* which from the very start established a currency board arrangement (even against IMF recommendations) in August 1992. Subsequently, the liberal reforms and measures followed one after the other (flat tax, budget surplus and extremely low public debt), and the country experienced unprecedented periods of high growth. The Baltic countries also managed to protect themselves from the Russian crisis in 1998. Estonia is remarkable for its

(7) See Böhm and Ździarský (2004).

liberal politicians such as Mart Laar who became a symbol of reforms and as he himself admits he undertook these reforms because the only book of economics he had read before becoming a prime minister (at the age of 32) was "Free to Choose" by Milton Friedman(8).

After the example of Estonia, *Lithuania* too introduced a currency board (in April 1994), but unlike Estonia its politicians were continuously reconsidering their choice as regards the exchange rate, which reflected on the currency board credibility. Without officially announcing a currency board arrangement *Latvia* also observes its rules (monetary base coverage and a fixed exchange rate). In February 1994 the lat was fixed to SDR, and later, in February 2005, - to the euro. Today, Latvia is a member of ERM 2, with a narrow band of +/-1%.

In general, The Baltic countries started with a fixed exchange rate which they still maintain today. Their geostrategic goal was to break away as quickly as possible from the ruble zone and to integrate themselves into the European and global monetary system (9).

Russia and Ukraine

Russia and Ukraine, as well as most other former Soviet Republics (which I will not discuss here) tell a different story from the one we have seen so far. Of course it is difficult to expose the history of monetary regimes in brief; yet I will mention some turning points of their monetary history. All the more so as discussions of monetary regimes have a tradition in the Russian economic and monetary thought (Goland, 2006, Yurowsky, 2008, [1927], Barnett, (2004).

Following the disintegration of the USSR, officially declared in December 1991, as a result of uncontrolled currency issue (monetary over emission) of the former republics the ruble zone disintegrated. In April 1991, within

(8) In 1994 Mart Laar was blamed for selling the stock of rubles withdrawn from circulation (in 1992) of the Chechen Republic of Ichkeria instead of delivering it to Gosbank.
(9) See for details Nenovsky, Hristov, and Mihailov (2002).

the range of reforms carried out by Egor Gaidar, copying the reforms in Poland, prices were liberated, and later on a model of mass (voucher) privatisation was chosen(10). The banking sector was liberalised very quickly and 1400 new banks were registered in only one year (1991). In 1995/1996 the ruble totally lost its functions and the economy created numerous barter and "virtual money" schemes, which even today are an object of researchers' interest (Volkov, 2005, Yakovlev, 2006). This increase of non-formal economic practices coincided with the formation of the new social structure of the post-Soviet society, and the so-called oligarchs came into existence in this period(11). They had to play the role of new capitalists and of those who later got the whole economy going. Most of them were former party and nomenclature people who managed to convert their power positions into financial and equity capital. These practices were supported by an increase of money supply by the Central Bank. Things went so far that the Duma made an attempt to restrict, though unsuccessfully, the extremely expansionist policy of the Central Bank. At that time it was led by Viktor Gerashchenko, an old Soviet nomenclature and contradictory figure declared by some Western bankers as the worst central banker of all times (the principle that Gerashchenko followed was "The higher the currency issue - the higher the economic growth!"). These, of course, are subjective judgments, but the facts remain. Later on, in August 1998, the country experienced a debt collapse when servicing of the internal debt stopped, the foreign reserves declined to critical lows, inflation and depreciation of the ruble reaching record values.

With Vladimir Putin coming to power a number of changes in Russia's monetary regime started. A fixed exchange rate regime was chosen and in 2001 a flat income tax was introduced. In principle, Putin introduced a number of elements of power centralisation (*„вертикаль власти"*) which led to restoring the functions of the ruble. Favorably, Putin's time

(10) See Gaidar (2007).
(11) See for more Yavlinski (2005), Bunich (2006), Kosals (2007).

coincided with a money supply increase as a result of revenues from petrol and gas, and the Central Bank formed a substantial amount of foreign reserves. Later, several state funds were set up to sterilize the inflow of capitals. The capital inflows however led to increase in investments, which was supported by the low interest rates. Today (2008), Russia is experiencing the difficulties of the global financial crisis and the low petrol prices. Its external and internal corporate debt is extremely large; its foreign reserves are quickly diminishing and the ruble is depreciating smoothly. Since 2007 the ruble is tied up to a euro/USD basket, and today a regime of inflation targeting is officially discussed.

What could happen from now on, we can only guess. Of importance to us from the short and incomplete history presented above are two things: first, Russia maintained a floating exchange rate until the crisis in 1998 and a fixed one after that, and second, the period of a floating exchange rate was the time of initial capital accumulation, the emergence of oligarchs and in general a period associated with banditism and forceful appropriation and redistribution of wealth and resources. .

The developments in *Ukraine* are similar to those in Russia. The transition was extremely "corrupted" and «bandit». I will only mention the case with prime-minister professor Pavlo Lazarenko (1996-1997), who according to various estimations succeeded to misappropriate 0.5 - 1% of the country's GDP and who was sentenced in USA for fraud. I will mention without comments one more case of another economist and ex governor of the Central Bank of Ukraine - Victor Yushchenko (1993-1999) who managed in 1998 to defend a doctor's thesis on the subject of "Money supply and demand in Ukraine" a little before he became president of the country.

Former Yugoslavia

Similar to the USSR, Yugoslavia's monetary system disintegrated with the individual counties each taking a different trajectory, and one of them - today's *Slovenia* (2008) is a member of the euro area. Serbia experienced a period of hyperinflation, which was put under control by means of the stabilization programme of the American professor of Serbian origin

Dragoslav Abramovic (March 1993 - May 1995)[12]. Abramovic's reform based on the principles of a fixed exchange rate and restrictive monetary reform already at the time attracted the attention of economists from other countries also because of its courage and monetary orthodoxality. The war and ethnic conflicts delayed the reforms. In 2002 a bold banking reform was carried out and a great number of banks with bad loans were declared bankrupt. The rehabilitation of banks was carried out at the cost of writing off 60% of the balance-sheet value of banks' assets. Curiously, in this period an adviser to the Yugoslavian government was Mart Laar[13].

Croatia maintained a fixed exchange rate over the whole period of transition and in a way it was close to the principles of currency board operation. Of course, the new generation of currency boards allows a variety of forms of monetary policy. One of them is a change in the reserve requirements for commercial banks and that was exactly the instrument most often used by the Central Bank of Croatia. In a sense, it emerged as a champion of creativity in manipulating reserve requirements (see Winkler, ed., 2008), and subsequently their experience was used by Bulgaria. Even today, typical for Croatia is the high level of currency substitution (Stix, 2008). Interesting and with a moral is the case of the failure of Rijecka bank (the third largest bank in the country), which became victim to a trader's speculation and was not rescued by the parent-bank (Bayerishe Landesbank)[14].

Slovenia, as I mentioned, adopted the euro on January 1, 2008. The transition in Slovenia is often given as an example of successful implementation of a heterodox programme, and it is often mentioned that the country has always followed a monetary discretion regime and a floating exchange rate; however, a more thorough empirical analysis of the facts (such as the study of Frommel and Shobert, 2006) shows that the

(12) See Mladenovic and Petrovic (2000).

(13) An exhaustive historical review of reforms in the banking sector of the post-communist countries is made by Barisitz (2008), and Sevic, ed., (2002).

(14) See Vujčić (2004).

foreign exchange rate has de facto always been targeted, especially after 1997. In 2001 the country's monetary policy began to follow that of the ECB[15].

Macedonia uses a floating exchange rate and currently inflation targeting within an extremely broad range (+/-35%) is discussed. *Montenegro and Kosovo* use the euro (for in-depth discussion of the euroisation in Montenegro see Fabris and al. 2004), while Bosnia and Herzegovina operate a currency board. Without going to extremes we can say that the experience of the Yugoslavian Republics indicates that the sooner a country starts using a fixed exchange rate, the more successful its reforms prove to be.

Albania, Romania and Bulgaria

The other Balkan countries also have an interesting experience and the three of them started with floating rates. While Albania and Romania have retained theirs, Bulgaria had to radically change its monetary policy in mid 1997. A curious fact to mention here is that the currencies of the three countries (lek, leu and lev, respectively) bear the names of the king of animals - the lion.

Albania became a champion of financial pyramids in the period 1996/1997 when 2/3 of the population was drawn into these schemes and whose liabilities were ½ of GDP (see Jarvis, 2000). People sold their homes and property to participate in the financial pyramids with the politicians playing an active role. The country turned into one big Ponzi scheme in the spirit of the popular Charles Kindlerberger's book on financial manias and speculations. In 2000, as a result of the fall of the pyramids there were mass riot outbursts, in which around 2000 people were killed. From 2000 the Central Bank announced a new monetary policy, inflation targeting with a 3% inflation target and +/-1% band. Of the three countries, Albania is the country of the most deeply rooted informal monetary and economic

(15) See Kozamernik (2004).

practices (bandit or not). Although Bulgaria and Romania can not boast on great success, it is a fact that pyramid schemes did not find some enormous place in these countries comparing to Albania.

Nicolae Ceausescu left *Romania* a heritage of lots of problems as well as an extremely low external debt which was one reason why the leu was not fixed and foreign reserves not accumulated. Despite the proclaimed float, similarly to Slovenia, the study of Frommel and Shobert (2006) indicates that *de facto* a crawling peg to basket was followed. From 2005 the Central Bank of Romania moved to an inflation targeting regime and accession to the euro area is planned for 2014/2015. We can mention the largest bank privatisation - in 2005 Banca Comerciala Romana was sold to Erste bank for 3.75 billion euro. As a curious fact I would mention that Romania is among the few countries printing their banknotes on polymer and not on paper. From August 2005 redenomination was carried out at the ratio of 10 000 ROL = 1 RON(16).

Bulgaria started the transition with a bad heritage, high external debt and deeply integrated in COMECOM trade. In spite of the early proposals for orthodox monetary reforms Richard Rahn, Steve Hanke, etc.) until mid 1997, a floating rate and a monetary aggregate targeting was used in the country. The crisis came as a logical ending to the bad trajectory followed and at a time when the monetary policy was monetising the losses of the unrestructured real sector(17). After a period of hyperinflation, banking crisis and drastic reduction of the foreign reserves to below 1 billion euro, as well as under IMF pressure, in July 1997 a currency board was introduced similar to those in the Baltic countries. The Central Bank was subdivided into two departments; Issue Department reduced the monetary base creation only within the scope of increasing foreign reserves and internal assets were taken out of the balance sheet.

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(16) ee some facts about the monetary regime in Romania in Pelinescu and Caraiani. (2006), as well as in: Popa and al. (2002).

(17) See for details Berlemann and Nenovsky (2004), Dobrinsky (2000) and Vutcheva H. (2001), and for extremely interesting analysis of elite and wealth transformation see the voluminous book of Tchalakov and Bundjulov; eds., (2008).

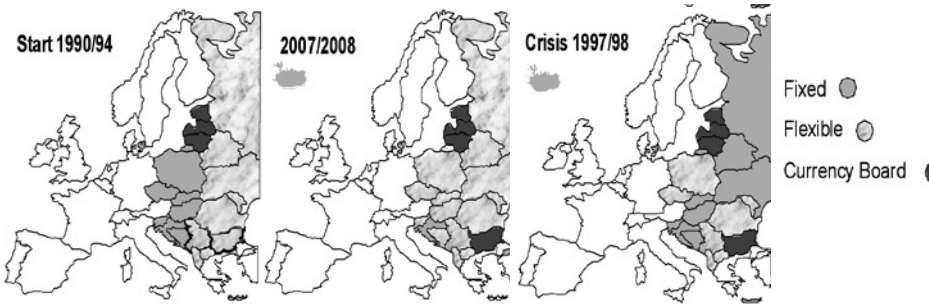
II. ATTEMPTS AT TYPOLOGY OF MONETARY REGIMES

Thus, the overview, regardless of the diversity of developments across countries, allows a number of theoretical generalisations and typologisations of monetary regimes.

Attempt at typology

The trajectory of monetary regimes over the last nearly 20 years (1990-2008) allows us (of course under certain conditionality and with some simplification) to distinguish between two monetary models, or two monetary "archetypes" of behaviour. The first type, Type 1 countries, we can call "**fixed start**" countries. They are characterized by hard budget constraints, to one extent or another, of money supply and a fixed exchange rate. In this group we can include countries that start with a fixed exchange rate, then move to an interim rate and end with a floating rate (Poland, Hungary, the Czech Republic, Slovakia, etc.), as well as those that start with a fixed exchange rate and maintain it over time (Estonia, Lithuania, Latvia and partly Croatia). The second type, Type 2, which I call a "**floating start**", includes the countries starting with a floating exchange rate and a strongly discretionary monetary policy (Russia, Ukraine, Bulgaria), and which subsequently, around mid-1990s, adopted a fixed exchange rate regime, restricted money supply, as well as those that have maintained various forms of floating exchange rate all through the period (Albania, Macedonia, Romania). The evolution of monetary regimes is illustrated in Chart 2.

Chart 2 : EVOLUTION OF MONETARY REGIMES IN THE YEARS OF TRANSITION



Type 1 is characterized by externally orientated monetary regime, and money supply dynamics tied up to the balance of payments position. The countries in that group have from the very beginning aimed to break away from the economic relations with COMECOM and the ruble zone, and quickly redirect to the European Union and in general to integrate into the world economy (this can be clearly seen on the map 1990/94). The best and most logical way to do this is by pegging their currencies to the currencies of advanced countries thereby importing monetary credibility from abroad. At the same time, these countries are characterized by a substantially higher culture and traditions of monetary practices, monetary theory and policy, and in general a lower level of monetary "informality". The fixed exchange rate and strict monetary policy enabled the creation of tough budget constraints, which created conditions for preventing the bandit redistributionary processes. A monetary framework was developed which put restructuring and modernisation on the right track. Conditions were created for attracting foreign capital (later on for participation in the privatisation) with all familiar positive effects. From a sociological perspective this type of monetary regimes created frameworks for debtors and allowed creditors to protect their own rights.

The *Type 2* countries are characterized by processes which are to some extent contrary to those previously discussed. In contrast to the first type, these countries had deeply rooted practices from the past as well as some informal and low-efficient monetary institutions. Floating exchange rates and accommodating monetary policy reproduced the soft budget constraints inherited from the period of socialism and protected the interests of losing industries and debtors and of various groupings and groups that were after the wealth. The state was captured and the economic and monetary practices fell into a range of "institutional traps", analysed by the Russian economist Victor Polterovich(18). Of these institutional traps we can mention the various barter and monetary schemes in Russia

(18) The "institutional trap" (институциональная ловушка) is a stable but inefficient equilibrium of the system where the agents choose a norm of behaviour (institution) among numerous possibilities (see Polterovich, 2008)

during the first half of 1990s, the financial pyramids, etc. In most cases this type of models went hand-in-hand with diverse schemes of mass privatisation, thus creating further channels for redistribution of wealth and losses, and in general for transformation of power resources into ownership and money.

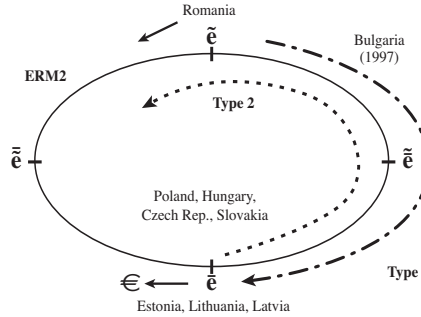
In my view, in spite of some conditionalities, it is possible to suggest certain hypotheses, which of course need further be proved. I have given here some hypotheses as a flow of reasoning. Under these hypotheses it can be claimed that Type 1 was much more appropriate for post-communist economies as it creates tight budget constraints and leads transition along a relatively normal trajectory by significantly restraining the elements of banditism and cronyism. This made it possible for the countries to get out of a number of institutional traps and to build much faster the basic market and monetary institutions. Once these institutions were created and with an *already* clear prospect of euro membership at hand, the euro membership itself became a pulling anchor, which began replacing the coordinating role of the fixed exchange rate. In this train of thought we can argue that the lack of a common social goal at the beginning of the transition and the low level of cooperation (kind of a "prisoner's dilemma") required a fixed exchange rate which resulted, where it existed, to (at least partial) resolution of these difficulties. Whereas the economies that lacked such a goal bifurcated along an extremely bad trajectory and ended in the well known crises of mid-1990s. As I already mentioned, the emergence of a common goal at the end of 1990s, i.e. euro membership, led to closer cooperation and support among economic actors[19].

(19) Without going into details I will note that it is possible to make interesting parallels with monetary stabilisations in these countries in the past and especially between the wars. For instance, between the wars the monetary stabilisation of Alois Rašin in the Czech Republic is the only heterodox stabilisation based on a monetary aggregate rather than on a exchange rate. In fact, Rašin succeeded to cut the Czech currency off the depreciating Austrian currency (1919). The currency split of the Czech Republic in 1993 was also successfully directed, which could be attributed specially (along with many others) to Josef Tosovsky. In Poland, also in the past, reforms were significantly more orthodox and based on an exchange rate (See the reform of Wladyslaw Grabski in 1924, see Głowiński, pod red., (2004)).

A complete idea of the evolution and possibly of the future development we can obtain from the following Chart 3. A few explanations. With $\bar{e}$ we denote a fixed exchange rate; $\tilde{e}$ stands for a floating exchange rate, and $\tilde{\bar{e}}$ for a fixed exchange rate with some fluctuation, while $\tilde{\tilde{e}}$ means an exchange rate floating within a certain range (corridor, band or some other form). ERM 2 is the exchange rate mechanism according to which before joining the euro area (€) a country is required to maintain an exchange rate within a band of at least +/- 15% around a preannounced and preagreed with the European institutions pivot rate.

Chart 3

EVOLUTION OF MONETARY REGIMES IN THE NEW EU MEMBER-STATES



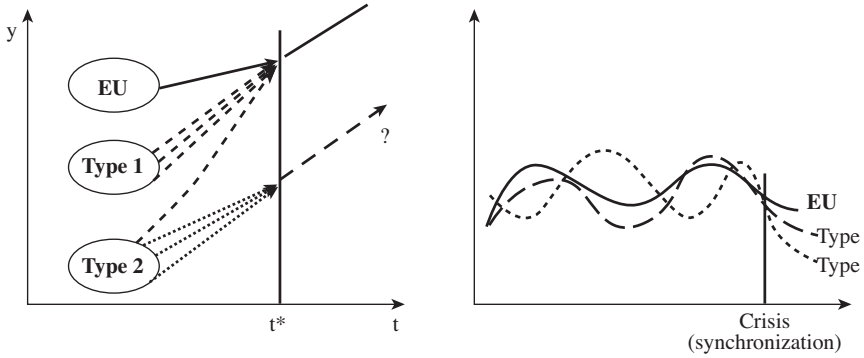
The *Type 1* movement can be illustrated with a red arrow, indicating a movement from fixed to interim exchange rate to floating rate, and now back to the euro area (passing through ERM2). The Baltic countries (from the very start) and Bulgaria from 1997 are positioned "below" with a fixed exchange rate. The Chart 3 shows that most logically would be that they move directly to the euro - at that point the track would be shortest and with the least turbulences. Nevertheless, this variant does not fit into the standard procedure and is not accepted by the ECB and the European Commission. They maintain that the chosen fixed exchange rate level is not a market one, i.e. unoptimal (?). For now, a trade-off alternative has been agreed upon whereby the countries operating currency boards are allowed, under a unilateral arrangement, to cut the long path of the

circle short, yet on the whole things are not fully clarified and uncertainty remains.

Of course, to what extent the various types of regimes are appropriate for a quick convergence (nominal and real) and to what extent they would be able to mitigate today (2008) the effects of the crisis is a subject of a different analysis[20]. The Chart 4 below illustrated a hypothetical model of a conditional real convergence (y is GDP in real terms). Overall, Type 1 countries have more possibilities to catch up with EU incomes, but it is also possible that individual countries leave Type 2. The other Chart (on the right) indicates a possibility for synchronisation of the economic cycle: in this particular instance the possibility for euro adoption is higher with Type 1. It is nevertheless unclear whether the global crisis will lead to synchronisation or divergence of cycles across countries. This requires in-depth analyses.

Chart 4

CONDITIONAL INCOME CONVERGENCE AND SYNCHRONIZATION OF ECONOMIC CYCLES



Theoretical addendum to typology

As I mentioned in the beginning, monetary regime comprises two basic components - external (exchange rate regime) and internal (money supply

(20) See Arratibel, Furceri and Martin (2008), and also Figuet and Nenovsky (2005).

regime). In this case, the analytical division can be used to typologise monetary regimes in order to reflect their complexity.

The Table 1 below shows nine combinations under the condition that three exchange rate regimes and three money supply regimes are involved. In addition to the exchange rate symbols already given, here we have added symbols for money supply: $\overline{m}$ stands for money supply which grows only as a result of increase in net foreign assets (NFA) according to an automatic rule (currency board or some other), and $\overline{\overline{m}}$ — a regime entirely conditioned by increase in net domestic assets (NDA). Similarly to the symbols used for exchange rate, $\widetilde{\overline{m}}$ stands for the interim state where money supply grows either from the two sources (NFA/NDA) or a mixture of automatism and discretion. As I already mentioned, such a division, to my knowledge, is used by Steve Hanke and Kurt Schuler (in some aspects the above view comes close to the ideas of the bipolar view of exchange rate regimes, which has been quite popular in recent years. In my view, the most stable combinations are two: ($\overline{e}$ $\overline{m}$) and ($\tilde{e}$, $\tilde{m}$) because they are the least discretionary (and misjudgments are lowest), and of the highest institutional complementarity. In the first instance, balancing is achieved mainly through money supply, whereas in the second - exclusively through the exchange rate.

Table 1

Configuration of monetary regimes

	$\overline{m}$	$\widetilde{\overline{m}}$	$\tilde{m}$
$\overline{e}$	$\overline{e}$ / $\overline{m}$	$\overline{e}$ / $\widetilde{\overline{m}}$	$\overline{e}$ / $\tilde{m}$
$\widetilde{\overline{e}}$	$\widetilde{\overline{e}}$ / $\overline{m}$	$\widetilde{\overline{e}}$ / $\widetilde{\overline{m}}$	$\widetilde{\overline{e}}$ / $\tilde{m}$
$\tilde{e}$	$\tilde{e}$ / $\overline{m}$	$\tilde{e}$ / $\widetilde{\overline{m}}$	$\tilde{e}$ / $\tilde{m}$

Seen from the perspective of this Table, the most advantageous seem to be the currency board arrangements, on the condition of course that their

rules are observed. Of course, this model can be disputed, and a variety of sophistications or elaborations are possible, etc.(23)

III. IN LIEU OF CONCLUSION

As we have seen, the diversity of monetary regimes is great. Even so, and with regard to some simplifications while taking into consideration the various aspects of monetary system and monetary regimes, it is possible to identify certain types. How could we explain, however, this great diversity and which are the contending theoretical models? I will only try to enumerate the various theoretical approaches.

The problems of monetary regimes are traditionally explained within the scope of the neoclassical cost-benefit approach. Such is the traditional set of instruments of the theory of monetary zones (optimal, endogenous, etc)(22). Within the framework of the traditional approaches are the discussions of "foreign exchange v/s monetary aggregate based stabilisation", as well as the numerous classifications of *de jure* and *de facto* exchange rate regimes (23). Here comes the whole range of problems of time inconsistency, the rules v/s discretion dilemma, credibility and flexibility, etc. Without dismissing the cognitive and especially the quantifying power of the cost-benefit approach, I believe that the 20 years' experience of the monetary regimes of former planned economies gives grounds to explore new approaches and theories (Nenovsky, 2006). Certainly, this is not new. Alternative theories do evolve although not always at the required pace and still as part of the neoclassical approach

(21) See for example the original analysis of Raybaut and Torre (2005).

(22) Here the various econometric VAR simulations, impulse response shocks, variance decomposition etc. are continuously used and (although I am not against their usage) I do not think that these contribute much to the development of economic theory or the theory of monetary regimes. This type of studies are so numerous and so alike that I will not cite all of them (see for example Kočenda, 2001).

(23) See for example Genberg and Swoboda (2005) and recently Tavlas, Dellas and Stockman. (2008).

rather than as its opponents. In this group of expanded neoclassical approach I would note the inclusion of a number of institutional aspects, the problems of initial conditions, inertia, culture, etc.(24) Very often institutional indices are constructed, which are subsequently incorporated into econometric models.

In spite of the adherence to the basic principles of neoclassical economics, in the recent years the new political economy has been developing quite successfully, especially the international political economy with its own journals and discussions. The *International Organisation* journal featured a number of interesting articles by Jeffrey Frieden, David Leblang, Lawrence Broz, and others, who continue the tradition of viewing monetary regimes through the prism of interests and strategies of various groups of actors (among the first to start using this methodology are Charles Kindleberger, Benjamin Cohen and Eric Helleiner, and others). One of the few empirical studies of foreign exchange rates in the economy of transition from the perspective of political economy is that of Frieden, Leblang and Valev (2008). Today, Cohen and Helleiner successfully develop their new geography of money approach, and a number of historians of monetary regimes offer interesting comparisons between the practice and discussions on monetary institutions in the past and the present (Barry Eichengreen, Michael Bordo, Mark Flandreau, etc.).

The sociology of monetary regimes is yet to be developed and the Austrian economic analysis is still not frekenteley applied although its methodology is extremely appropriate and with definite achievements in the theory of money, prices and the economic cycle. I think that all these approaches help throw light on different aspects of the functioning of monetary regimes and none of them in isolation could give a truthful explanation and good practical solution.

In summary. I have attempted to show in this article that in spite of the diversity of monetary regimes there exist theoretical and methodological tools to group these monetary regimes by formulating a number of traits typical for each group. This makes it possible to move one step further (forward) by linking these types (in this particular instance they are

two: "fixed start" and "floating start") with the overall dynamics of the economic development across countries. The very choice of monetary regime, or rather of a monetary regime type, has its own grounds (explanation). Monetary regimes can be explained and recommended within the framework of various theories, but I believe that a diversity of explanations gives the greatest cognitive and practical possibilities.

REFERENCES

Bukharin, N. (1989, [1920]). Economics of the transition period, in: Problems of theory and practice of socialism, Political edition, Moscow [Бухарин, Н. (1989, [1920]). Экономика переходного периода, в: Проблемы теории и практики социализма, Изд. Политической литературы, Москва, с. 94-176.]

Bunich, A. (2006). Oligarch's autumn. The history of prihvarization and the future of Russia, Eksmo, Moscow [Бунич, А. (2006). Осень олигархов. История прихватизации и будущее России, изд. Эксмо, Москва]

Gaidar, E. (2007). The ruin of the empire. Lessons for today Russia, Moscow [Гайдар, Е. (2007). Гибель империи. Уроки для съвременной Росии, РОССПЭН, Москва]

Goland, Y. (2006). Discussions about economic policy during the years of monetary reforms, Moscow [Голанд, Ю. (2006), Дискусии об экономической политике в годы денежной реформы 1921-1924, изд. Экономика, Москва]

Arratibel, O., D. Furceri, R. Martin. (2008). Real Convergence in Central and Eastern European EU Member states: Which Role for Exchange rate volatility?, ECB mimeo

Backė, P., Ch. Thimann, eds., (2004). The Acceding Countries' Strategies Towards ERM II and the Adoption of the EURO: an Analytical Review, ECB, Occasional Paper Series, no.10.

Balcerowicz, L. (2006). Enlargement, the Lisbon Agenda, and the Economic Development of Member States, Atlantic Economic Journal, no.34, pp.261-273.

Barisitz, S. (2008). Banking Transformation (1989-2006) in Central and Eastern Europe - with Special Reference to Balkans, Bank of Greece, Working Paper, no. 78.

Barnett, V. (2004). The Revolutionary Russian Economy, 1890-1940, Ideas, debates and alternatives, Routledge, London.

Beck, TH., L. Laeven. (2005). Institution Building and Growth in Transition Economies, World Bank Policy Research Working Paper, no. 3657.

Berlemann B, N. Nenovsky (2004). Lending of First Versus Lending of Last Resort: The Bulgarian Financial Crisis of 1996/1997, Comparative Economic Studies, v. 46, no 2, pp. 245-271.

Böhm J., V. Źdárský. (2004). Conducting monetary policy in a small open economy under globalised capital markets: the experience of Czech Republic, BIS Papers no 23.

Bratkowski, A., J. Rostowski. (2000). The EU attitude to Unilateral Euroization: misunderstanding, real concerns and ill-designed admission criteria, http://www.case.com.pl/dyn/servFile.php?plik_id=70707

Csaba, L. (2007). The New Political Economy of Emerging Europe. Budapest: Akadémiai Kiadó /Kluwer/.

Daněček, J. (1991). Rašin a Enliš - dvě významné měnové autority prvni republiky, Finance a Uver, v. 41, no 6, pp. 249-256.

Chavance, B. (2008). Formal and Informal Institutional Change: the Experience of Post socialist Transformation, The European Journal of Comparative Economics, vol.5, no.1, pp.57-71.

Commander, S., ed., (1991). Managing Inflation in Socialist Economies in Transition, Economic Development Institute of the World Bank.

Genberg, H., A. Swoboda. (2005). Exchange Rate Regimes: Does What Countries Say Matter?, IMF Staff Papers, vol.52, Special Issue, pp.129-141

Goland, Y. (2003) A Missed Opportunity: on Attracting Foreign Capital, Europe-Asia Studies, vol. 55, No 2, pp. 179-216.

Głowiński, T., pod red., (2004). 80 rocznica reform rządu profesora Władysława Grabskiego 1924-2004, Wrocław 2004

Gronkiewicz-Waltz, H. (2003).Poland and the IMF, http://www.clubmadrid.org/cmadrid/fileadmin/

Dobrinsky, R. (2000). Transition crisis in Bulgaria, Cambridge Journal of Economics, v. 24, pp. 581-602

Fabris, N., D. Vukajlovic-Grba, T. Radunović, H. Janković. (2004). Economic Policy in Dollarized Economies with a Special Review of Montenegro, The Central Bank of Montenegro, Working Paper, no.1.

Feige, Ed., I. Urban. (2008). Measuring Underground (unobserved, non-observed, unrecorded) Economies in Transition Countries: Can we Trust GDP?, Journal of Comparative Economics, no.36, pp. 287-306.

Frieden, J., D. Leblang, N. Valev. (2008). The Political of Exchange Rate Regimes in Transition Economies, mimeo

Frömmel, M., F. Schobert. (2006). Exchange Rate Regimes in Central and East European Countries: Deeds vs. words, Journal of Comparative Economics, no.34, pp.467-483.

Hanke, S. (1999). Reflections on Exchange Rate Regimes, Cato Journal, v. 18, no 3, pp.335-344

Hanke, S. (2002). International Economic and Exchange Rate Policy Hearings, May 1, Speech before the Banking, Housing and Urban Affaires Committee, United States Senate

Hanke, S. (2002). On Dollarization and Currency Boards: Error and Deception, Policy Reform, vol. 5(4), pp.203-222.

Hochreiter, E., G. Tavlas. (2004). On the Road Again: an Assay on the Optimal Path to EMU for the New Member States, Jjournal of Policy Modeling, no.26, pp.793-816.

Jarvis, Ch., (2000). The Rise and Fall of Albania's pyramid Schemes, IMF, Quarterly Magazine, vol.37, no.1.

Kornai, J. (2006). The Great transformation of Central Eastern Europe: Success and Disappointment, Economics of transition, v. 14, issue 2, pp. 207-244.

Kosals, L. (2007). Essays on clan capitalism in Russia, Acta Oeconomica, vol. 57, No 1, pp. 67-85.

Kočenda, E. 2001, Macroeconomic Convergence in Transition Countries, Journal of Comparative Economics Vol29 (1), pp1-23

Kokoszczynski, R. (2001). From Fixed to Floating: other Country Experiences; The case of Poland, IMF seminar, Washington, DC, March 19-20.

Kozamernik, D. (2004). The ERM II - an Interpretation of the Slovenian Approach, Bank of Slovenia, Working paper, XII/I.

Mladenovic, Z., P. Petrovic (2000). Money Demand and Exchange Rate Determination under Hyperinflation: Conceptual Issues and Evidence from Yugoslavia, Journal of Money, Credit and Banking, 2000, v. 32, issue 4, pp. 785-806

Nenovsky, N. (2006). Monetary Convergence on the Road to EMU: Conceptual Issues for Eastern Europe, International Center for Economic Research, Working Paper, N 33.

Nenovsky, N., K. Hristov, M. Mihailov (2002). Comparing institutional and organizational design of Currency Boards in transition countries, Eastern European Economics, vol. 40, pp. 6-35,

Nenovsky N., Y. Rizopoulos (2003). Extreme monetary regime change. Evidence from the Currency Board introduction in Bulgaria, Journal of Economic Issues, 2003, vol. XXXVII, N4, December, pp. 909 - 941

Nenovsky N., Y. Rizopoulos (2004). Peut-on mesurer le changement institutionnel du régime monétaire ?, Revue d'économie financière, vol. 75, pp.17 -36.

Olson, M. (2000). Power and prosperity. outgrowing communist and capitalist dictatorships, New York, Basic Books.

Pejović, S. (2003). Understanding the Transaction Costs of Transition: it's the Culture, Stupid!, The Revue of Austrian Economics Vol16 No4, pp347-361

Pelinescu, E., P. Caraiani. (2006). Does the Inflation Targeting Have a Positive Role Upon the Convergence of the Inflation Rate?, Romanian Journal of Economic Forecasting, no.3.

Polterovich, V. (2008). Institutional trap, (forthcoming) The New Palgrave Dictionary of Economics, second edition

Popa, C., S. Rosentuler, E. Iorga, W. Salater, D. Sasu, A. Codirlasu (2002). Direct inflation targeting. A new monetary policy strategy for Romania, NBR OP no 1.

Raybaut, A., D. Torre (2005). Discipline, confiance et stabilité des régimes de caisses d'émission en transition vers l'euro, Colloque international Marrakech, 16-17 mars 2005

Rostowski, J. (2002). Why Unilateral Euroization makes Sense for (some) Applicant Countries, in: Marek Dabrowski, M., B. Slay, J. Neneman, eds., Beyond Transition: Development Perspectives and Dilemmas, pp. 74-90, Ashgate Publishing, Ltd., 2004

Schobert, F. (2003). Die unilaterale Einführungeiner Fremdwährung. Währungswahl, Seigniorage und Zinsprämieneffekte in mittel- und osteuropäischen Ländern,» Schriftenreihe volkswirtschaftliche Forschungsergebnisse, Verlag Dr Kovac, Hamburg

Schuler, K. (1999). The Problem with Pegged Exchange Rates, Kyklos, v. 52, no 1, pp. 83-102.

Schuler, K. (2007). Classifying Exchange Rates, http://users.erols.com/kurrency

Sevic, Z., ed., (2002). Banking Reforms in South-East Europe, Edward Elgar.

Stix, H. (2008). Euroization: What Factors Drive its Persistence? Household data Evidence for Croatia, Slovenia and Slovakia, ONB, Working Paper Series, no.140.

Tavlas, G., H. Dellas, A. Stockman. (2008). The Classification and Performance of Alternative Exchange-rate Systems, Bank of Greece, Working Paper, no. 90

Tchalakov, I., A. Bundjulov, eds. (2008) Networks of transition. What really happened in Bulgaria after 1989, East-West, Sofia [Чалъков, И., А.Бунджулов, изд. (2008). Мрежите на прехода. Какво всъщност се случи в България след 1989 г., изд. Изток-Запад, София]

Yakovlev, A. (2006). Agents of modernization, HSE, Moscow [Яковлев, А. (2006). Агенты модернизации, изд. ГУ ВШЭ, Москва]

Yavlinski, G. (2005). Questions of economic policy, HSE Economic Journal, N 1 [Явлинский, Г. А. (2005). Вопросы экономической политики, ВШЭ, Экономический журнал, no. 1]

Yurovsky, L.N. (2008, [1927]). Currency Problems and Policy of the Soviet Union, Parsons [Юровский, Л. Н. (2008, [1927]), Денежная политика советской власти (1917-1927), изд. Экономика, Москва]

Volkov, V. (2005). The entrepreneurships of force - socio-economic analysis, HSE, Moscow [Волков, В. (2005). Силовое предпринимательство - экономико-социологический анализ, изд. ГУ ВШЭ, Москва]

Vutcheva H. (2001). Economic Policy in Bulgaria during 1991 - 2000, Stopanstvo, Sofia [Вучева, Х. (2001). Икономическата политика в периода 1991-2000, Изд. Стопанство, София]

Vujčić, B. (2004). Euro adoption: views from the third row, Comparative Economic Studies, vol.46, pp.159-176.

Winiecki, J (2004). Determinants of Catching Up or Falling Behind: Interaction of Formal and Informal Institutions, Post-Communist Economies, v.16, no 2, pp. 137-152.

Winkler, A. ed. (2008). Financial Stability Challenges in Candidate Countries. Managing and Transition to Deeper and more Market-oriented Financial Systems, ECB, Occasional Paper Series, no.95.

ESTIMATING A MONEY DEMAND FUNCTION FOR MONGOLIA

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ABSTRACT:

This study aims to specify a money demand function for a case of Mongolia. Overall, it finds a statistically significant relationship between real M1 and a commercial bank loan rate and industrial output. Also it confirms that the income elasticity of money demand is low for the case of Mongolia, while the commercial bank interest elasticity is high. Moreover, this study does not find any significant relationship between a time deposit rate and real balances, and the Bank of Mongolia's Treasury Bill rate does not influence in either money M1 or M2. Meltzer-Lucas's empirical specification and Goldfeld's specification (a standard money demand specification) are used to find the money demand estimation for Mongolia. The PDL model with AR1 is used to estimate the demand function.

JEL classification: E41, E43, E49, E52

Keywords: money demand, empirical specifications, AR1, PDL Almon lag

INTRODUCTION

Fifteen years have passed since the Mongolian Government announced its transition from a centrally planned economy to a market economy. To implement the transition strategy, the government ambitiously liberalized all prices plus economic and political activity; privatized many state owned enterprises, liberalized trade; allowed a capital market operation, and created a two-tier banking system with state owned commercial banks. Creation of a capital market was expected to be crucial for fostering financial sector

development to provide the necessary funds to firms and individuals. Even though we created every institutional framework that would be necessary to develop a financial sector, we have still experienced two financial crises. The first crisis hit several state owned commercial banks leaving them in bankruptcy at the beginning of the 1990s while the second crisis hit the non-banking financial agents in 2008. In addition, during past transition years, the average financial transaction in the capital market averaged only about 50 million USD per year.

Given this fledgling condition of the current financial sector, this paper aims to specify a money demand equation for Mongolia by testing some empirical models on money demand. Even though the empirical research on money demand has undergone considerable development, this estimation for Mongolia will be quite a new study. Needless to say, even though substantial research has been done theoretically on the issue, without a clear specification of numerical "coefficients" that describe the macroeconomic behavior of the economy, it is worth less in policy formulation. Moreover, specifying the money demand function helps to analyze the following issues. 1) In order to maintain long run price stability in terms of how much the money growth should be. 2) If the price deviates from long run stability, how much it will cost the society (the inflation cost). 3) Using the money demand equation we can predict the monetary policy effectiveness for a certain economy in the short-run. 4) It conveys a message about the current technological development of the existing financial transaction system.

This study is structured as follows. Section I discusses the empirical model and data, section II presents estimation results and section III discusses the empirical findings and conclusion.

1. EMPIRICAL MODEL AND DATA

1.1. Empirical Model

Generally theories on money demand can be classified into two broad classes: transactions theories and asset theories. Empirically, there are four main issues on estimating the money demand function. The first issue is the

definition of money. According to the transaction theory, money is narrowly defined because money is used as an actual means of payment. On the other hand, according to the asset theory, it is argued that money should include liquid substitutes like savings deposits, or many other interest bearing accounts. The second issue is about functional arguments. Transaction theorists argue that transactions are the best measurement while asset theorists argue that wealth is the appropriate measure of money demand. The third issue is the appropriate measure of opportunity costs of holding money, in other words, either a short term interest rate or a long term interest rate is an opportunity cost measurement. Also, there are several types of interest rates in the market and all are subject to researchers' research goals and preferences. The last issue is the lagged variables. Some researchers argue that the lagged variables are a proxy of the incomplete adjustment of money demand in the short run. These issues lead to different types of empirical specification of the demand function. To specify money demand for the case of Mongolia, the following issues are considered. 1) Money is defined in this study as M1 and M2. 2) The Gross Industrial Output is taken as a proxy of Gross National Product. 3) Several types of interest rates, such as a commercial bank loan rate, the Treasury Bill rate of the Bank of Mongolia, and the time deposit rate are considered. 4) Lagged variables of M1 and M2 are taken into consideration.

This study tests empirical specification of Meltzer [1963] and Lucas [1988] and empirical specification of Goldfeld [1973] to estimate the money demand function for the case of Mongolia.

Meltzer and Lucas's empirical specification

Meltzer [1963] showed how wealth or permanent income successfully worked for explaining the money demand function of the US during the period of 1900-1958. Later on Lucas [1988] also confirmed his empirical findings on the US during the period of 1900-1985 and also showed the stability of money demand. In their specification, an interest rate and wealth, permanent income is taken as the arguments and the following money demand equation is specified.

$$Ln\left(\frac{M}{P}\right) = a - b\ln(r) + c\ln(y_p) \qquad (1)$$

where M - nominal money, P-aggregate price level, r- interest rate and yp-permanent income or wealth.

Meltzer took assets and wealth, and the long -term bond rate as arguments and M1, M2, M3 were taken for the definition of money.

In this equation M1 and M2 are considered for nominal money. The Consumer Price Index (CPI) is taken for the aggregate price level, a commercial bank loan rate and the Treasury Bill rate of the Bank of Mongolia are taken for the interest rate, and the Gross Industrial Output is taken for a proxy for permanent income. The arguments are assumed to have polynomial distributed lags (PDL) and the coefficients are assumed to lie along a second order polynomial. The distributed lags include the current and three lagged periods.

Goldfeld empirical specification

Goldfeld [1973] examined a variable specification issue systematically using quarterly data of the US. His specification is known as a standard specification of money demand. In his scale variables he used lagged money, a rate of interest on savings deposit, a short-term market interest rate, and Gross National Product (GNP).

$$Ln\left(\frac{M_t}{P_t}\right) = a_0 + a_1 \ln GNP - a_2 STR + a_3 SAV + a_4 \ln\left(\frac{M_{t-1}}{P_{t-1}}\right) \quad (2)$$

where M-nominal money, P-aggregate price level, GNP - gross national product, STR-a short-term market rate of interest rate, SAV- a rate of interest on savings deposit.

This study specifies M1 and M2 for nominal money, CPI for the aggregate price level, Gross Industrial Output for GNP, a commercial bank loan rate, the Treasury Bill rate of the Bank of Mongolia are taken for a short-run market interest rate and savings rate on time deposit is taken for the rate of savings deposit.

As argued by Judd and Scadding [1982], this equation predicted well the actual real balances until the institutional changes occur (interest rate ceiling on deposit of commercial banks, innovations on short term financial markets associated with improvements in corporate cash management and etc.), and after the changes occur this equation under predicted the actual balances. After redefining money, in other words broadening M1 into including savings accounts related with institutional changes it behaved "normally". However, as Lucas (1988) argued that "… these methods (which include lags) have served to obscure rather than reveal both the sense in which this theory helps to understand recent events and the sense in which it fall short…" This study tests equation (2) without the lagged money.

$$\mathrm{Ln}\left(\frac{M_t}{P_t}\right) = a_0 + a_1 \ln \mathrm{GNP} - a_2 \mathrm{STR} + a_3 \mathrm{SAV} \quad (2')$$

For equation (2') the scale variables are assumed to have polynomial distributed lags (PDL) and the coefficients are assumed to lie along a second order polynomial. The distributed lags include the current and three lagged periods.

1.2. Data

This study uses the gross industrial output for a proxy of GNP because of limited data availability. The regime change and the transition in 1991 made the sample size too small to make statistical inferences. Keeping in mind that the gross industrial output has several setbacks, such as under representing GNP, including intermediate goods and services; it is chosen as the best data available. The real output is calculated as nominal gross industrial output divided by CPI. The base year is 1995. However, even if the GNP were chosen, it has own weakness. For instance, GNP may overstate transactions because it includes some imputed goods and services; the different components of GNP have different payments needs and are "money intensive", for example, the consumption part will generate money demand more than do the other components as argued by Mankew and Summers [1986]. Goldfeld and Sichel [1990] argue that GNP excludes all intermediate goods and services which also generate money demand.

The definition of money, M1 and M2, uses the definition of the Bank of Mongolia. The currency in circulation plus current accounts in banks (checkable deposits) will be used as M1. M1 plus quasi money, which includes deposits in domestic and foreign currencies, will be used as M2. Real money balances is calculated as nominal money divided by CPI. The base year is 1995.

Data on gross industrial output and CPI are taken from the monthly bulletin of the National Statistical office of Mongolia while data on M1, and M2 and interest rates were taken from the monthly bulletin of the Bank of Mongolia. A commercial bank loan rate (RCB), the Treasury Bill rate of the Bank of Mongolia (RMB), and time deposit rate (SAV) are taken as the opportunity cost of holding money. Given the current condition of the financial sector of Mongolia, the long run interest rate is not available for the analysis. The monthly data will be used for the sample covering the period between 2000 and 2006 of the total sample of 84. A three-month (arithmetic) average is used as quarterly data.

2. ESTIMATION RESULTS

Equations (1), (2) and (2') are estimated to find the empirical specification of money demand for the case of Mongolia.

2.1 The estimation result of Meltzer Lucas's empirical specification

The above equations (1) and (2') are used to estimate the money demand equations for the case of Mongolia. A polynomial distributed lag (PDL) model, Almon lag, used by Mankiw and Summers [1986] and Goldfeld [1973] is assumed. Before using PDL, it is necessary to find whether the time series is stationary or not. For that purpose, the unit root test has been done for all real values of the time series. A unit root test was based on the Augmented Dickey-Fuller test using the following equations. Regressing the time series with the lagged variables, and subtracting lagged variables, we will get the following equations:

$\Delta LNRM1t = \beta_0 + \beta_1 t + \theta(LNRM1_{t-1})$ (3);

$\Delta LNRM2 = \beta_0 + \beta_1 t + \theta(LNRM2_{t-1})$ (4);

$\Delta LNROUTPUT = \beta_0 + \beta_1 t + \theta(LNROUTPUT_{t-1})$ (5);

$\Delta LNRRCB = \beta_0 + \beta_1 t + \theta(LNRCBR_{t-1})$ (6);

$\Delta LNRMB = \beta_0 + \beta_1 t + \theta(LNMBR_{t-1})$ (7);

$\Delta LNSAV = \beta_0 + \beta_1 t + \theta(LNRSAV_{t-1})$ (8);

Where, $\theta = \rho - 1$ The null hypothesis is $\rho = 1$, or $\rho = 1$, which means accepting the unit root for the certain time series.
Table 1 shows the unit root test results of equations (3) to (8).

Table 1:
The unit root tests for the series (2000-2006; monthly time series)

Variables	θ (t-stat)	time(t -stat)	Acceptance area of unit root**
ΔLNRM1	-0.26(-3.5)	0.008 (3.04)	0.03
ΔLNRM2	-0.19(-2.9)	0.016(2.9)	0.15
ΔLNOutput	-0.55(-5.3)	0.033 (4.7)	0.00004
ΔLNCBR	0.85(-7.9)	-0.01(-7.1)	0.00
ΔLNRMB	-0.28(-3.62)	0.008(-1.5)	0.028
ΔLNSAV	-0.303(-4.1)	-0.21(-1.4)	0.005
CBR	-0.85(-7.9)	-0.01(-7.9)	0.00
ΔRMB	0.01(0.133)	0.0005(0.03)	0.99
ΔSAV	-0.1(-4.1)	-0.217(-1.4)	0.005

***- The acceptance area of unit root indicates the lower tail area.*

Table 1 shows that the results which include the Treasury Bill rate of the Bank of Mongolia (RMB) without log form and log of real M2 should be explained very carefully, since they have a unit root. Considering the facts about the unit root test, the PDL model has been estimated for equations (1) and (2'). Each monetary aggregate regressed on a time trend, a distributed lag of the interest rate, and a distributed lag of the logarithm of the real output. The coefficients are assumed to lie on a second degree polynomial,

and depend on current and three lagged months. AR(1) is used for a serial correlation correction. Table 2 and 3 report the results for M1 and M2 of equation (1).

Table 2:
Regression results on the equation (1) PDL is assumed
(2000-2006; monthly data, the dependent variable: ln (M1/P)

Constant	RMB	RCB	Output	s.e.e/D-W	Rho/R^2adj.
10.7 (0.94)		-0.94 (0.26)	0.139(0.07)	0.05/1.99	0.76/0.90
9.18 (0.97)	0.06 (0.05)		0.2 (0.09)	0.06/1.98	0.91/0.88
9.06 (0.97)	0.08 (0.07)		0.2 (0.09)	0.06/1.98	0.91/0.88
10.7 (0.91)		-0.36 (0.01)	0.137 (0.07)	0.003/1.98	0.74/0.90-

This table represents the sum of the coefficient estimates. The first two rows show the results when the interest rates are taken with the log form, and the last two rows show the results when the interest rates are taken without the log forms, and standard errors are in parentheses. Both the interest rate and output variable taken as a second order Almon lag on the current and three lagged values. The second degree polynomial constrained to reach zero at the near end.

The result shows that the Treasury Bill rate of the Bank of Mongolia produces a high standard error with an opposite sign as theory predicts while the commercial bank loan rate elasticity produces a small error with a consistent sign as theory predicts. The output elasticity is very low compared to unit elasticity having a small standard error.

Table 3:
Regression results on equation (1) when PDL is assumed
(2000-2006, monthly data, the dependent variable: ln(M2/P)

Constant	RMB	RCB	Output	s.e.e/D-W	Rho/R2adj
11.1(0.93)		-0.59(0.27)	0.17(0.06)	0.08/1.34	0.99/0.97
10.3(0.94)	0.067(0.04)		0.18(0.06)	0.09/1.2	0.99/0.96
10.2(0.94)	0.09(0.05)		0.18(0.06)	0.09/1.2	0.99/0.96
11.1(0.92)		-0.22(0.09)	0.17(0.06)	0.08/1.34	0.99/0.97

-This table represents the sum of the coefficient estimates. The first two rows show the results when the interest rates are taken with the log form, and the last two rows show the results when the interest rates are taken without the log forms, and standard errors are in

parentheses. Both the interest rate and output variables are taken as a second order Almon lag on the current and three lagged values. The second degree polynomial constrained to reach zero at the near end.

When we take M2 as a dependent variable, RMB still produces a high standard error while RCB is consistent with a sign and has a small standard error even though the Durbin-Watson statistics are low indicating a serial correlation. The output elasticity is low having low standard errors.

Tables 4 and 5 show the results of the standard money demand equation for the case of Mongolia. When I add the lagged money and the time deposit rate, the standard money demand equation does not explain well the money demand for the case of Mongolia for either money M1 or M2 cases.

Table 4:

Regression results on equation (2)

(2000-2006, monthly data, the dependent variable: ln (M1/P), OLSQ)

Constant	RMB	RCB	Output	SAV	$(M1/P)_{t-1}$	s.e/D-W	R^2 adj
2.3 (0.75)		-0.07(0.03)	0.03 (0.03)	0.01 (0.07)	0.77 (0.06)	0.06/2.06	0.9
1.08(0.5)	0.02 (0.02)		0.04 (0.03)	-0.03(0.07)	0.85(0.06)	0.06/2.0	0.89
1.1 (0.52)	0.02(0.02)		0.05(0.03)	-0.02(0.05)	0.85(0.06)	0.06/1.99	0.89
2.3 (0.74)		-0.17(0.1)	0.02(0.03)	0.01(0.05)	0.79(0.06)	0.06/2.06	0.9

-The first two rows show the results when the interest rates are taken with the log form, and the last two rows show the results when the interest rates are taken without the log forms, and standard errors are in parentheses.

Table 5:

Regression results on the equation (2)

(2000-2006, monthly data, the dependent variable: ln (M2/P), OLSQ)

Constant	RMB	RCB	Output	SAV	(M2/P)t-1	s.e/D-W	R2 adj
0.29(0.34)		-0.02(0.03)	0.007(0.02)	-0.007(0.04)	0.97(0.02)	0.04/1.77	0.98
0.01(0.16)	0.02(0.01)		0.009(0.02)	-0.02(0.025)	0.99(0.02)	0.04/1.77	0.99
0.01(0.19)	0.02(0.02)		0.001(0.02)	-0.02(0.04)	0.99(0.02)	0.04/1.76	0.99
0.21(0.35)		-0.04(0.08)	0.007(0.02)	-0.01(0.05)	0.98(0.02)	0.04/1.75	0.98

-The first two rows the results when the interest rates are taken with the log form, and the last two rows show the results when the interest rates are taken without the log forms, and standard errors are in parentheses.

Tables 6 and 7 show the results when the lagged money is dropped out from standard equation (2) . When the lagged money is dropped from the standard equation, RCB behaves consistently as theory predicts, while RMB shows high standard errors with a positive sign. The rate of time deposits result shows odd signs and it produces high standard errors. The income elasticity is again low having small standard errors.

Table 6:
Regression results on equation (2') when PDL is assumed
(2000-2006; monthly data, the dependent variable: ln (M1/P)

Constant	RMB	RCB	Output	SAV	s.e.e/D-W	Rho/R2adj.
10.9(0.99)		-1.032(0.28)	0.127(0.07)	0.04(0.18)	0.05/1.99	0.76/0.89
9.04(1.04)	0.05(0.05)		0.21(0.10)	-0.1(0.23)	0.06/1.99	0.9/0.89
9.02(0.98)	0.08(0.07)		0.21(0.1)	-0.07(0.18)	0.06/1.99	0.9/0.88
10.8(0.95)		-0.38 (0.10)	0.12 (0.07)	0.04(0.14)	0.05/1.97	0.74/0.89

-This table represents the sum of the coefficient estimates. The first two rows show the results when the interest rates are taken with the log form, and the last two rows show the results when the interest rates are taken without the log forms, and standard errors are in parentheses. Both the interest rates and output variables are taken as a second order Almon lag on the current and three lagged values. The second degree polynomial constrained to reach zero at the near end.

Table 7:
Regression results on equation (2') when PDL is assumed
(2000-2006; monthly data, the dependent variable: ln (M2/P)

Constant	RMB	RCB	Output	Savings rate	s.e.e/D-W	Rho/R2adj.
10.9(0.96)		-0.54(0.28)	0.18(0.07)	-0.11(0.19)	0.08/1.35	0.99/0.97
10.2(0.92)	0.06(0.04)		0.20(0.07)	-0.16(0.18)	0.08/1.25	0.99/0.96
10.2(0.9)	0.088(0.05)		0.21(0.07)	-0.14(0.14)	0.08/1.25	0.99/0.96
11.02(0.93)		-0.20(0.099)	0.189(0.07)	-0.09(0.14)	0.07/1.35	0.99/0.97

-This table represents the sum of the coefficient estimates. The first two rows show the results when the interest rates are taken with the log form, and the last two rows show the results when the interest rates are taken without the log forms, and standard errors are in parentheses. Both the interest rates and output variable taken as a second order Almon lag on the current and three lagged values. The second degree polynomial constrained to reach zero at the near end.

In the next stage, AR1 is tested without Almon lag, the PDL lags, on equations (1) and (2') on quarterly data for the same time series. Tables 8 and 9 show the results of equation (1) when the dependent variable is taken as M1 and M2 .

Table 8: Regression results on equation (1)

(2000-2006; quarterly, the dependent variable: ln (M1/P), AR1)

C	RMB	RCB	Real Y	D-W	Adj. R2	S.e.e	Rho
10.4 (1.04)		-0.99 (0.29)	0.17(0.07)	2.17	0.83	0.08	0.42
8.7(0.92)	-0.02 (0.04)		0.23 (0.08)	2.2	0.74	0.1	0.82
8.84(0.9)	-0.001(0.06)		0.22 (0.08)	2.3	0.73	0.1	0.84
10.5(1.03)		-0.39 (0.1)	0.16 (0.07)	2.1	0.84	0.07	0.35

-The first two rows show the results when the interest rates are taken with the log form, and the last two rows show the results when the interest rates are taken without the log forms, and standard errors are in parentheses.

Table 9: Regression results on equation (1)

(2000-2006; quarterly data, the dependent variable: ln (M2/P), AR1)

C	RMB	RCB	Real Y	D-W*	Adj. R2	S.e.e	Rho
11.1(1.1)		-0.27(0.36)	0.14 (0.07)	1.4	0.89	0.16	0.98
10.5(0.98)	-0.05 (0.04)		0.16(0.07)	1.38	0.89	0.16	0.99
10.6(0.98)	-0.06 (0.05)		0.16 (0.07)	1.39	0.89	0.16	0.99
11.1(1.1)		-0.11 (0.12)	0.139 (0.07)	1.42	0.89	0.16	0.98

-The first two rows show the results when the interest rates are taken with the log form, and the last two rows show the results when the interest rates are taken without the log forms, and standard errors are in parentheses.

For the quarterly data, when we take M1 as a dependent variable, RCB was found to be significant again, while RMB produces a high error. The income elasticity is again low but statistically significant. When M2 is taken as a dependent variable, again we find the income elasticity to be low with a small error while RMB tends to show higher standard errors. Also, it suffers from a serial correlation. Tables 10 and 11 show the estimation results of equation (2') when the dependent variable is taken as M1 and M2.

Table 10: Regression results on equation (2')

(2000-2006; quarterly data, the dependent variable: ln (M1/P), AR1)

Constant	RMB	RCB	Output	SAV	se.e/D-W	R2 adj.	Rho
10.2 (1.05)		-0.89 (0.3)	0.18(0.07)	-0.2(0.19)	0.08/2.1	0.83	0.4
8.1(0.83)	-0.03 (0.04)		0.3 (0.08)	-0.33 (0.24)	0.09/2.17	0.78	0.65
8.4 (0.82)	-0.01(0.06)		0.29 (0.08)	-0.29(0.18)	0.09/2.2	0.79	0.64
10.5 (1.01)		-.35 (0.1)	0.17(0.07)	-0.16(0.13)	0.07/2.09	0.84	0.36

-The first two rows show the results when the interest rates are taken with the log form, and the last two rows show the results when the interest rates are taken without the log forms, and standard errors are in parentheses.

Table 11: Regression results on the equation (2')

(2000-2006; quarterly data, the dependent variable: ln (M2/P), AR1)

Constant	RMB	RCB	Output	SAV	s.e.e/D-W	R2 adj.	Rho
11.1 (1.15)		-0.28(0.37)	0.13(0.08)	0.04(0.26)	0.16/1.42	0.88	0.98
10.5 (1.00)	-0.05(0.04)		0.17(0.07)	-0.02(0.25)	0.16/1.38	0.88	0.99
10.6 (0.97)	-0.069(0.05)		0.16(0.07)	-0.02(0.19)	0.16/1.39	0.88	0.99
11.1 (1.14)		-0.11(0.13)	0.13(0.08)	0.01(0.2)	0.16/1.42	0.88	0.98

-The first two rows show the results when the interest rates are taken with the log form, and the last two rows show the results when the interest rates are taken without the log forms, and standard errors are in parentheses.

From tables 10 and 11 we will find the same tendency, like a high standard error and inconsistent sign with the time deposit rate, higher standard error with the Treasury Bill rate of the Bank of Mongolia, but statistically consistent commercial bank rate.

3. DISCUSSION

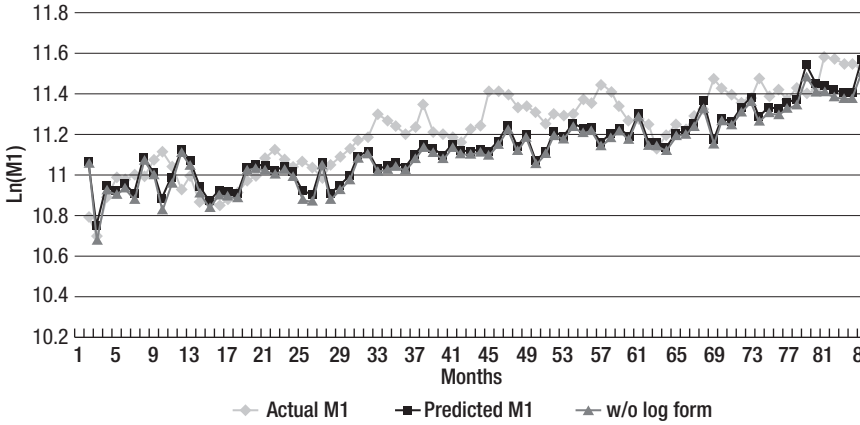
This study has aimed to specify the money demand equation by estimating income (quantity) elasticity and the interest elasticity of money demand for Mongolia. In order to analyze the question, the commercial bank loan rate, the Treasury Bill rate of the Bank of Mongolia, the deposit rate of time savings and gross industrial output are analyzed with M1 and M2 using the some specified money demand equations. The study finds that the income

elasticity of money demand is low and interest elasticity is high for the case of Mongolia. The Treasury Bill rate of the Bank of Mongolia and time deposit rate are found to be insignificant in explaining money demand. Because of the unit roots issue, demand for M2 in this study should be studied further. The specified money demand functions are:

$$Ln\left(M1/P\right) = 10.7 - 0.94Ln(CBR) + 0.13Ln(Yreal) \text{ or } (9)$$

$$Ln\left(M1/P\right) = 10.7 - 0.36CBR + 0.13Ln(Yreal) (10)$$

The next figure shows how the estimated functions predict actual real M1.



Actual M1 is taken from the monthly bulletin of the Bank of Mongolia 2000:1-2006:12

3.1. The discussion of the income elasticity

The one finding of this estimation is that it confirms that the income elasticity of Mongolia is relatively lower than unit suggesting that it should be counted considerably when policy makers achieve long run price stability. The elasticity of the real output is low with consistently statistically significant results throughout the empirical estimations. It is assumed that money demand proportionally increases (decreases) with proportional increases (decreases) of income, however; (Hicks [1952,28-29]), argued that if this is the case, this will represent "…a quite straightforward kind

of stability; a diminished demand for money on the part of some people would rise the prices of capital goods and securities, and this would rise the demand for money on the part of the owners of those securities…", which does not necessarily hold all the time in reality, except in steady state.

Slok [2000] has also found that the income elasticity of Mongolia is low, around 0.5. As he argued it may indicate the level of economic development. On the other hand, it may be low income elasticity simply because the study period covers short periods. In some empirical studies such as Goldfeld [1973], the long-run output elasticity is three times higher than the short run elasticity for the case of the US. Because of data availability, the long run income elasticity was not considered here.

3.2. The discussion of the interest elasticity

Finding high interest elasticity suggests that the inflation rate above long run price stability generates more welfare costs to Mongolia. To estimate interest elasticity, the commercial bank loan rate, the Treasury Bill rate of the Bank of Mongolia and the time deposit rate were considered. The time deposit rate shows very inconsistent results throughout the empiric estimations and showed to be statistically insignificant when introduced to the money demand function. The Treasury Bill rate of the Bank of Mongolia results should have been explained carefully, since it tends to have a unit root in the case of without log forms. Even if we ignore the regression results without a log form of the Treasury Bill rate of the Bank of Mongolia, the estimation results show that it has a little role in explaining the money demand. As for the commercial bank loan rate, it shows the best results when we take reall M1 as a dependent variable. It shows a consistently negative relationship with money demand, as the theory predicts and it produces sustainable standard errors when real M1 is taken as a dependent variable. When real M2 is taken, the results tend to show high standard errors, however, the unit root test for M2 is not rejected at the less than 10% significance level. Considering this fact, the interest rate, the opportunity cost of money, is well represented by the commercial bank loan rate for the case of Mongolia. The following table summarizes the regression estimation results for the commercial banks loan rate.

Table 12:
The summary of the estimation results of the interest elasticity

(Estimation results on commercial bank loan rate)

The elasticity (with the log form, s.e.e in parentheses	The elasticity (without the log form, s.e.e in parentheses	Specifications	The dependent variable
-0.99(0.29)	-0.39(0.10)	Eq(1)	realM1
-0.27(0.36)	-0.11(0.13)	Eq(1)	realM2
-0.89 (0.03)	-0.35(0.1)	Eq(2')	realM1
-0.28(0.37)	-0.11(0.13)	Eq(2')	realM2
-0.07(0.03)	-0.17(0.1)	Eq(2)	real M1
-0.02(0.03)	-0.04(0.08)	Eq(2)	real M2
The elasticity (with the log form, s.e.e in parenthesis)	The elasticity (without the log form, s.e.e in parenthesis)	Specifications (with Almon lag polynomial degree of 2 and 4 lags)	The dependent variable
-0.94 (0.26)	-0.36(0.01)	Eq(1)	realM1
-0.59(0.27)	-0.22(0.09)	Eq(1)	realM2
-1.032 (0.28)	-0.38 (0.10)	Eq(2')	realM1
-0.54 (0.28)	-0.2 (0.099)	Eq(2')	realM2

From table 12, the interest elasticity for real M1 is around -0.9 when we take the interest rate with log form and -0.3 without the log form.

Since we have estimated income and interest elasticity, we can define the slope of the LM curve for the case of Mongolia. As a simple standard theory, LM curve can be obtained directly by combining the demand curve for real balances and the fixed supply of real balances. For money market equilibrium, money demand has to be equal to money supply; namely:

$$\text{Ln}\,\frac{\overline{M}}{P} = c - \delta \ln i + \eta \ln Y \qquad (11)$$

where, δ is the interest elasticity and η is income elasticity. Or,

$$\frac{\eta}{\delta} = \frac{0.2}{0.9} = 0.2 \qquad (12)$$

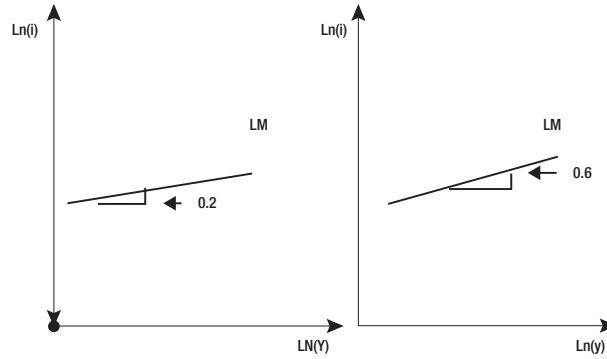
Where the last part of the right hand side of equation (10) is a constant in a given time period. Most of the income elasticity results in this study can be approximated to 0.2. Taken as income elasticity, then the slope of the LM curve when the demand curve for real balances in log -log form becomes:

$$\frac{\eta}{\delta} = \frac{0.2}{0.9} = 0.2 \qquad (13)$$

The slope of the LM curve when the demand curve for real balances is in semi log form:

$$\frac{\eta}{\delta} = \frac{0.2}{0.3} = 0.6 \qquad (14)$$

From equations (13) and (14), the LM curve for the case of Mongolia is very flat reflecting the high fiscal policy effect rather than the monetary policy effect.



3.3 Discussion on the technological development of the financial transaction system

If we recall questions (9) and (10) by setting the interest rate to zero, then we will get equations (9') and (10') in the following form:

$$Ln\left(M1/P\right) = 10.7 + 0.13Ln(Yreal) \text{ or} \qquad (9')$$

$$Ln\left(M1/P\right) = 10.7 + 0.13Ln(Yreal) \qquad (10')$$

It means that if the interest rate were zero, then equations ((9') and (10') show us how much money will be demanded in the economy to make transactions. If output growth is zero, then money demanded will be equal to the constant of money demand specification which shows how much money will be demanded in a static economy. The amount of money which will be demanded in such economy is large for Mongolia, which implies that every transaction in the economy requires more cash. It may also hint that the current transactions technology requires a large amount of cash.

CONCLUSION

This study has estimated the money demand function for Mongolia using monthly data 2000-2006. The income and interest rate elasticity are estimated using regression analysis. AR1 is used to correct a serial correlation, and Almon lag is used for scale variables. Overall, this study finds a statistically significant relationship between real M1 and a commercial bank loan rate and industrial output. Also, it confirms that the income elasticity of money demand is low for the case of Mongolia, while the commercial bank interest elasticity is high. Moreover, this study does not find any significant relationship of time deposit with any type of money, and the Treasury Bill rate of the Bank of Mongolia does not influence in either money M1 or M2.

One main lack of this study is that it ignores the stability test of demand for the money function, due to being a short time period sample.

REFERENCES

Almon. S, [1965[, "The Distributed Lag between Capital Appropriations and Expenditures", *Econometrica*, 33, 178-96.

Cochrane.D., and G..H.Orcutt, [1949], "Application of Least Squares Regression to Relationships Containing Autocorrelated Error Terms," *Journal of the American Statistical Association*, 44, 32-61.

Cheng, K.C, [2003], "Growth and Recovery in Mongolia During Transition", *IMF working paper*, WP/03/217.

Friedman, M. [1956] "The quantity theory of money: A restatement", pp.3-24, in:M.Friedman,ed., Studies in the quantity theory of money. Chicago: *Chicago University Press*.

Goldfeld,S. and D. Sichel, [1990], "The Demand for Money", pp.300-356, *Handbook of Monetary Economics*, Vol 1, Elsivier Science Publishers.

Goldfeld, S.M, [1973], "The demand for money revisited", *Brookings papers on Economic Activity*.3, 577-638.

Hicks, J.R, [1952], "A Suggestion for Simplifying the Theory of Money", pp.13-32, reprinted in F.Lutz and L.Mints (eds), *Readings in Monetary Theory*, New York: Blakiston .

Judd.J and J. Scadding, [1982], "The Search for a Stable Money Demand Function: A Survey of the Post-1973 Literature", *Journal of Economic Literature*, XX, 993-1023.

Khulan, A, [2006] "Velocity of Money in Mongolia" *Research Bulletin*, Mongol Bank .

Lucas. R, [1988], "Money Demand in The United States: A Quantitative Review", *Carnegie-Rochester Conference Series on Public Policy* 29, 137-168.

Mankiw, M. and L.Summers, [1986], "Money demand and the effects of Fiscal Policies", *Journal of Money*, Credit, and Banking, 18, 415-429.

Meltzer. A, [1963], "The Demand for Money: The Evidence from the Time Series", *Journal of Political Economy*, 71, 219-245.

Monthly Bulletin, [2000-2006], Mongol Bank, Mongolia.

NSOM, [2003], Statistical Yearbook 2003, National Statistical Office of Mongolia.

NSOM, [2006] Statistical Yearbook 2006, National Statistical Office of Mongolia .

Sandagtsengel.Ts, [2002], "Money demand for Mongolia", Master thesis, Tokyo University.

Slok.T, [2000], "Monetary Policy in Transition: The Case of Mongolia", *IMF working paper*, WP/00/21.

Ueno. H, [2000], "Assessing Transition Policies: the Case of Mongolia", *Journal of International Cooperation Studies*, 8, 127-168.

Wooldrigde.J, [2003], Introductory Econometrics, Thomson South Western.

PENSION FUNDS' PERFORMANCE IN STRONGLY REGULATED INDUSTRIES: EVIDENCE FROM EASTERN CENTRAL EUROPEAN COUNTRIES(1)

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ABSTRACT:

This paper presents an analysis of pension funds' performance in Poland and Hungary, as Eastern Central European countries characterized by strong regulation of their private pension fund industries. In the theoretical literature it is argued that investment limits and performance regulations may have a negative influence on the performance of funds. In

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particular for Poland, our empirical findings do not support this prediction. Consequently, strict regulations do not necessarily influence the performance of the pension funds negatively. The article also presents various approaches, which can explain the evolution of monetary regimes observed in the former socialist countries.

JEL classification: G23, G28

Keywords: Pension fund management, investment and performance regulation, performance measurement, Eastern Central European stock markets, Emerging Markets.

INTRODUCTION

Following the proposal of the World Bank (1994), pay-as-you-go pension systems in Eastern Central European (ECE) countries have been complemented by a capital market based element in the form of privately managed pension funds in the end of the 1990s. Contributions made by future retirees on their accounts in pension funds, successfully invested in capital markets, should facilitate accumulation of future pensions and thus reduce the fiscal burden resulting from excessive pension liabilities.

The introduction of private pension funds in ECE markets came along with the implementation of strict regulatory frameworks. Although their intensity differs among the ECE countries, the reasons for imposing strict regulations are identical. The transfer of contributions to a defined contribution system exposes future pensions to a number of market-related and agency risks (OECD (2006)). Since investment in private pension funds is mandatory, regulations are imposed to avoid losses of contributed money and guarantee future pension payments. In addition, investment limits and performance regulations should facilitate trust and acceptance of the new pension system. Also, pension funds operating under strict regulation may contribute to stabilizing the developing financial markets of their countries. However, economists point to potential negative effects of strict regulations implying a substantial reduction in returns and

performance. In finance literature it is argued that pension funds facing more liberal regulation regimes are more likely to perform better than pension funds facing stricter investment regimes (Chan-Lau (2005), Davis (2002)).

There is scarce, mostly speculative empirical literature discussing the effects of investment and performance regulations of pension funds on their investment behavior and portfolio performance. The earlier studies rely on simple descriptive statistics of pension funds' portfolio returns and thus do not account for exposure of the funds to various types of risk, which may affect the conclusions regarding the funds' performance (World Bank (2000a,b)). As to the best of our knowledge, the empirical analysis on Polish pension funds by Stanko (2003) is the first study of a strongly-regulated ECE market considering these factors. However, none of the mentioned studies performs a cross-country comparison of pension fund performance in the ECE region.

The paper thus contributes to the existing literature in the following ways: First, it complements the available evidence on performance of pension funds operating in lax regulatory environments and guided by "prudent man" laws by analyzing the performance of pension funds acting under much stricter regulations. Second, this paper is the first to perform a cross-country comparison of privately-managed pension funds' performance in the ECE countries. Third, since in some of the ECE countries' regulations are stricter than in others, the paper will provide a more nuanced evidence on the relationship between performance and regulation. Finally, the paper's findings will have important implications for policy makers and pension fund managers in the ECE countries.

The structure of the paper is as follows. Section 2 presents the pension fund industry and the regulations in Poland and Hungary. In section 3 the methodology used to investigate portfolio performance is outlined. Section 4 describes the data, while section 5 reviews and interprets the empirical findings. Section 6 summarizes and concludes.

1. PENSION FUND INDUSTRY AND REGULATORY FRAMEWORK IN POLAND AND HUNGARY

As pointed out by Chan-Lau (2005), the main determinants of pension funds' investment performance may be grouped into three categories: investment regulations, investment practices and the ability to diversify the portfolios abroad. Below we review those factors in the context of mandatory pension funds acting on the Polish and Hungarian markets.

The first transfer of money to Polish pension funds took place on May 19, 1999. Due to organizational, as well as financial problems, the majority of Polish pension funds started their activity on the market in June 1999. As of October 1999, the number of active funds rose from 15 to 21. Due to acquisitions and a merger it was reduced to 15 again, as of December 2004. The Polish pension fund market is highly concentrated. In terms of market share, as measured by net assets, the market can be divided into three groups: very large funds (market share higher than 20%), large funds (market share between 5% and 20%) and small funds (market share below 5%). In August 2007, the funds Commercial Union (27%) and ING (23%), representing the group of largest funds, jointly held 50% of the market share. Approximately a further quarter was held by the group of large funds that included PZU (14%) and AIG (8%). The remaining quarter of the market was distributed between 11 small funds with market share below 5%. In August 2007 Polish pension funds held about 49 billion US-$ of net assets, amounting to 12% of the Polish GDP in 2007 (www.knf.gov.pl).

In addition to the prudent man rules, Polish pension fund managers have to follow quantitative investment limits regulated in the Law on Organisation and Operation of Pension Funds from August 28, 1997. Here we focus on quantitative limits imposed on investment in particular types of assets and do not review the regulations restricting the concentration of holding securities of the same issuer. The overall investment in bonds and bills issued by Treasury and National Bank of Poland is not subject to constraints. A maximum of 40% of the accumulated assets under management may be invested in shares of domestic listed companies,

in addition, no more than 25% in investment funds. The investment in bank deposits and foreign assets is limited to a maximum of 20% and 5%, respectively. According to Polish law, investments into derivatives may only be permitted by the Council of Ministers in exceptional cases. During the present sample period pension funds were banned from investing in such assets. Investing into real estate is prohibited (OECD (2006)).

Table 1 provides data on the quantitative limits faced by the Polish pension funds and their actual portfolio composition for the period between April 2002 and August 2007. The quantitative regulations are deemed responsible for the distribution of shares versus bonds in the funds' portfolios of about 31% to 64%. The remaining marginal fraction of the portfolios is dispersed across other asset categories. Table 1 reveals that Polish pension funds diversify less than they are allowed by the quantitative investment limits. In particular, the fraction of investment in foreign assets is substantially lower than the legal limit of 5% (www.knf.gov.pl).

To guarantee future pension payments, the pension funds' performances are observed, evaluated and compared with the industry's average return on a regular basis by the Insurance and Pension Funds Supervisory Commission (KNF). Pension funds are required to guarantee a minimum rate of return on their investments. The Polish law defines this mandatory minimum as «the rate of return lower by 50% than the weighted average rate of all funds established for a given period, or the rate of return four percentage points lower than the aforesaid average, whichever is lower». The measure is calculated and announced on a quarterly basis for the previous 36-month period. A rate below the required threshold should be made up from pension funds' reserve account. If these assets will not suffice to cover the deficit, it has to be financed by the so-called Guarantee Fund, which was introduced to secure future pension payments(2) (www.knf.gov.pl).

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(2) Such performance regulations in combination with the high concentration of the pension fund industry in Poland can be seen as reasons for herding behaviour by Polish pension funds and to similar composition of the funds' portfolios. Voronkova and Bohl (2005) investigate this typical feature of the Polish pension fund market in detail.

Table 1
Portfolio Limits on Pension Fund Investment in Selected Asset Categories

	Poland		Hungary	
Asset category	Investment limits	Actual portfolio share	Investment limits	Actual portfolio share
Equity	40.00	31.57	50.00	9.86
Real Estate	0.00	0.00	5.00 directly, 10.00 together with real estate investment funds	0.00
Government Bonds	No Limit	63.79	No Limit	75.20
Investment Funds	25.00	0.32	50.00	6.43
Loans	Equal to the investment in the shares of the borrower	0.13	0.00	0.00
Bank Deposits	20.00	3.03	No Limit	0.00
Foreign Assets	5.00	0.57	30.00	N.a.1

Note: The table shows the quantitative investment limits and actual shares of assets in the portfolio for Polish and Hungarian pension funds, indicated as % of the pension funds' investment portfolios. The quantitative investment restrictions refer to 2006 for Polish mandatory (open) pension funds and to 2004 for Hungarian mandatory pension funds (OECD (2006). The actual shares of assets in the portfolios of Polish pension funds are calculated using data provided by www.knf.gov.pl. The shares of assets in Hungarian pension funds portfolios are calculated using the arithmetic average for all pension funds for the period of 1998 to 2004 given in the dataset provided by the PSZAF. 1 Data on investments in foreign assets by Hungarian pension funds is not available.

Mandatory pension funds in Hungary were introduced in January 1998 as a second tier within the new three-tier pension system (World Bank (2007)). Four funds started their activity on the market during the first quarter of 1998. Since 2001 18 mandatory private pension funds are active on the market, which accumulated about EUR 2.5 billion in assets under management. The concentration of the Hungarian pension fund market is similar to the one in Poland. Using the earliest available data, on December 31, 2005 one very large and four large Hungarian pension funds, holding about 80% of assets, dominated the market, whilst the very

large fund held 25% on its own. The remaining 20% of the market was held by 13 small funds. In the fourth quarter of 2004 Hungarian pension funds held about 5 billion US-$ of assets (at market value), amounting to 4% of the Hungarian GDP in that year (www.pszaf.hu). The oligopolistic structure of the Polish and Hungarian pension fund markets is similar to the one in the UK, where 50% of voluntary pension fund assets were held by five managing houses in 2002 (Blake and Timmermann (2002)).

Investment limits in Hungary are somewhat less strict than those in Poland. Holdings in government bonds and bank deposits are not limited. Investment in domestic stocks and investment funds is limited to 50% each, investment in foreign assets is limited to 30\% and investment in real estate may reach a maximum of 10%. It is prohibited for pension fund managers to invest in loans (OECD (2006)). Despite the less restrictive limits Hungarian pension fund managers diversify their portfolios even less, which becomes apparent from the data provided in Table 1. More than 75% of assets are invested in government bonds, while only 10% of assets are held in stocks. As is the case of Polish pension funds, only a minor fraction of the overall portfolios are invested in foreign assets.

In order to ensure the security of future pensions the Hungarian Financial Supervisory Authority (HFSA) monitors the pension funds' performance. Funds are expected to achieve a minimum rate of return, which is defined as 85% of the return on long-term government bonds. Funds failing to achieve the performance target for three consecutive years may be subject to a government enquiry. However, in contrast to Poland, the Hungarian pension fund managers cannot be held liable for not delivering a minimum rate of return since their assets are not kept segregated from the participants' assets. Unlike in Poland, pension funds in Hungary are subject to long-term performance regulations: the pensions that they disburse should be at least at the level of 25% of a comparable public pension benefit on the retirement at the statutory pension age. In particular, after 15 years of participation in a pension fund, the total pension from the first and the second pillar should reach 92% of a corresponding old-style pension.

Similar to the Polish pension funds, Hungarian ones suffer from a lack of sufficiently liquid stock market. The number of stocks listed on Budapest Stock Exchange fluctuated between 49 and 66 during the sample period. However, the five most traded shares accounted for over 80% of the stock market capitalization and around 90% of its turnover (Budapest Stock Exchange (2006)). This, in combination with the present investment and performance regulations, has resulted in a very high fraction of domestic bonds in the Hungarian pension fund portfolios, which amounted to about 70% during our sample period (Hungarian Financial Supervisory Authority (2005)). This effectively negates the opportunity to invest up to 50% of the portfolio into equities.

Analysis of the portfolio compositions of the pension funds in the two countries shows that pension fund managers heavily invest in government bonds. Pension funds in both countries underutilize limited opportunity to invest in stocks and their investments in other allowed financial instruments are minor. Our analysis so far suggests that investment regulations do influence portfolio choices of the pension funds managers and may therefore affect the performance of the pension funds.

2. PERFORMANCE MEASURES

To provide a first insight into the investment performance of the pension funds and their ranking Sharpe (1966) and Treynor (1965) ratios are calculated. While the Sharpe ratio considers the total risk of a portfolio, the Treynor ratio takes the systematic risk into account. A well diversified portfolio features a total risk equal to the systematic risk. Thus, through a comparison of the two ratios, a rough estimate of the diversification capability of the managers is possible. An identical ranking of the performance measures indicates a high diversification capability.

Detailed information about the portfolio structure of the individual funds is available for a limited period due to the access to general public information only. Therefore, the analysis is constrained to established unconditional performance measures based on the CAPM. Jensen's (1968) regression:

(1) $r_{it}-r_{ft}=\alpha_i+\beta_i(r_{mt}-r_{ft})+\epsilon_{it}$

is used to model the unconditional market model. r_{it} is the return of pension fund i at time t, r_{ft} the risk-free rate and r_{mt} the return of the market portfolio. The coefficient α_i indicates Jensen's α of fund i , the coefficient β_i denotes its beta. While a positive and significant α indicates a superior risk-adjusted performance of a fund, a negative value reports an inferior performance assuming that the fund manager potentially does not show stock selection ability, but timing ability (Cesari and Panetta (2002)). Stock selection ability refers to the allocation of funds' assets within different investment instruments, whereas market timing concerns changes of the funds' asset allocation across those instruments.

In addition to stocks, pension funds' portfolios contain bonds which have to be taken into account. This can be achieved by estimating a two-index model, including stock and bond returns:

(2) $r_{it}-r_{ft}=\alpha_i+\beta_{1i}(r_{mt}-r_{ft})+\beta_{2i}(r_{bt}-r_{ft})+\epsilon_{it}$

The structure of the two-index model can be justified using two different considerations. If a fund is composed out of three portfolios (stocks,

bonds and risk-free assets), its return is the weighted average of the returns given by the previously defined portfolios. $\beta_{1i}(\beta_{2i})$ indicates the sensitivity of fund i excess return to a change of the excess return of the stock index (bond index). Given the two beta coefficients the return of a fund is interpreted as its excess return compared to the combination of the stock and bond excess returns. α_i indicates the additive value achieved through active management compared to a passive investment strategy, subject to the same risk (Elton et al. (1993)). Yet, the model may also be seen as a two-factor equilibrium model, with the stock benchmark and the bond benchmark being the factors.

In both models (1) and (2), Jensen's α is affected by the information available to the manager. Exclusive availability of security-specific information leaves the measure unbiased. However, if the management resorts to timing information its value is generally biased downwards (Cesari and Panetta (2002)). In order to capture possible market timing ability of fund managers we apply the approaches by Treynor and Mazuy (1966) and Henriksson and Merton (1981). The Treynor-Mazuy approach is based on the idea that managers are able to predict the market trend and the extent of future excess returns. Thus, a fund manager adapts the beta of the fund continuously to his forecasted market trend. The fraction of the market portfolio held by the managers increases (decreases) when they expect the general stock market to rise (fall). In order to capture the timing ability, Treynor and Mazuy (1966) add the squared excess return of the market portfolio to the basic Jensen regression:

$$(3) \quad r_{it}-r_{ft}=\alpha_i+\beta_i(r_{mt}-r_{ft})+\gamma_i(r_{mt}-r_{ft})^2+\epsilon_{it}$$

$\hat{\gamma}_i=0$ indicates no timing ability, and $\hat{\gamma}_i>0$ that the manager has access to and successfully uses timing information, while α_i measures the share of the fund's performance achieved through selectivity. The contribution to the performance of a fund achieved by timing ability corresponds to the product of the γ coefficient and the variance of the excess market return σ^2_{erm}. The sum of the selection contribution and the timing contribution is

equal to the total performance. The Treynor-Mazuy approach may only detect timing ability, the structure of the estimated model complies with the managers' timing ability. Using a multi-beta-strategy or the three-factor model by Fama and French (1993) may solve this shortcoming (Prather and Middleton (2006)).

The Henriksson-Merton approach (1981) is based on the idea that managers use forecasts of excess market return for the following period, and adjust the beta accordingly. The product of the excess market return and a dummy variable is added to the basic Jensen regression:

$$(4) \quad r_{it}-r_{ft}=\alpha_i+\beta_i(r_{mt}-r_{ft})+\gamma_i(r_{mt}-r_{ft})D_t+\epsilon_{it}$$

The dummy variable D_t takes the value 0 if $(r_{mt}-r_{ft})>0$ and -1 if $(r_{mt}-r_{ft})\leq 0$. A positive value of $\hat{\gamma}_i$ indicates that the manager has timing ability. The Henriksson-Merton approach regards time-varying beta-factors of the Jensen model as evidence for timing activity. However, an instability of this risk-measure is not necessarily due to timing activities. Another critical assumption of the approach is that managers only take the forecasted trend of the market return into account and not the absolute level of the excess return in order to determine the beta. The performance achieved by timing and selectivity may be biased, if their behavior does not correspond to the assumptions of the model.

Since we are not interested in the fund-specific performance of the pension funds, but rather in the performance of the whole sector the models are estimated using pooled ordinary least squares (OLS). Given the small samples, pooling information across funds has the potential advantage of gaining power compared to estimates based on a fund-by-fund analysis (Chevalier and Ellison (1999)). We correct the standard errors by using the method proposed by Newey and West (1987) with a lag length of three in order to account for possible heteroscedasticiy and serial correlation. The statistical inference is strengthened by calculating bootstrapped standard errors, based on a resample of the residuals with 10,000 replications.

3. DATA

Our empirical investigation is based on two samples containing panel data of Polish and Hungarian private pension funds. The sample covering portfolio returns of Polish pension funds runs from June 1999, the time the majority of funds entered the market, to August 2007. The data for the 52-week t-bill yield, which proxies the risk-free-rate, is available up to April 2007. The estimations are adjusted accordingly if necessary. The 21 Polish pension funds can be classified into survived and discontinued funds. The group of survivors, containing 15 pension funds, includes those funds active on the market during the whole sample period. The group of discontinued funds contains those six funds entering the market late and quitting it before the end of the sample period. The classification of the pension funds allows us to identify the influence of discontinued pension funds on the aggregate results. In addition, we may draw conclusions on the behavior of pension funds with respect to mergers and acquisitions.

The returns of the pension funds, provided by Analizy Online under www.analizy.pl, are measured as the monthly change in pension funds' unit value. The end-of-month data of the Polish total return index WIG and the price index WIG20 are used as proxies for the Polish stock market portfolio. We use the WIG20 in addition to the WIG, as we expect pension fund managers to invest heavily in blue chips as a consequence of the existing investment constraints and performance regulation. In order to incorporate a benchmark for the returns on bonds held by the funds, the end-of-month data of the Morgan Stanley Capital International index (MSCI) for Poland, a total return index, is used.

The choice of the benchmark is decisive, as it is difficult to distinguish between benchmark inefficiency and abnormal returns due to the interdependence between performance evaluation and the choice of the benchmark (Lehmann and Modest (1987), Grinblatt and Titman (1994), Blake et al. (2002)). The use of different benchmarks provides a possibility to check the robustness of the estimations. We include the MSCI as an explanatory variable into the two-index model, in order to proxy the profitability of investing in government bonds, and the corresponding

interest income of the funds. Using the MSCI as a benchmark is important, as managers invest mainly into local government securities. The risk-free rate as well as the benchmark indices are obtained from Thomson Financial Datastream.

Concerning the sample of Hungarian private pension funds, data are provided by the Hungarian Financial Supervisory Authority (HFSA). The dataset contains quarterly annualized net rates of returns of 18 mandatory private pension funds from the first quarter of 1998 until the last quarter of 2004. Due to the fact that some pension funds only started their activity on the market after the first quarter of 1998 and due to additional missing values, the set of data is fragmentary. The names of the pension funds are not provided by the HFSA. Instead, pension funds are identified by numbers. As a proxy for the risk-free-rate, we use the one-year t-bill rate. The market portfolio benchmark is proxied by the Budapest stock index (BUX). In order to incorporate a benchmark for the returns on bonds held by the funds, the total return index MSCI for Hungary is used. The t-bill-rate is obtained from Global Financial Data (www.globalfindata.com). The BUX and the MSCI are obtained from Thomson Financial Datastream. For the purpose of the empirical analysis continuously compounded rates of return are used.

4 EMPIRICAL FINDINGS AND COMPARISON WITH EXISTING LITERATURE

Sharpe and Treynor ratios for the Polish pension funds are presented in Table 2. As the returns of the pension funds are similar to the level of the t-bill rates, the absolute values of the performance ratios are small. The ratios are mainly positive and have similar rankings. Indeed, they differ in some cases, but those minor differences may be neglected since the correlation between the ranking values is high. This result suggests diversification ability of fund managers. By comparing the survived and the discontinued funds it becomes apparent that all discontinued funds performed worse than the survived funds. The Treynor ratios based on the WIG and the WIG20 are highly correlated indicating robust results.

Table 2

Sharpe- and Treynor-Ratios of Polish Pension Funds

	Sharpe			Treynor		
Pension Fund		Rank	WIG20	Rank	WIG	Rank
Survived Pension Funds, Market Share in %						
Commercial Union, 26.65	0.1628	**6**	0.1650	**9**	0.1413	**8**
ING NNP, 23.44	0.1675	5	0.1669	**7**	0.1454	5
PZU, 13.73	0.1709	3	0.1809	3	0.1489	3
AIG, 8.29	0.1425	12	0.1444	12	0.1238	12
AXA, 4.30	0.1580	**10**	0.1588	11	0.1377	11
Generali, 3.68	0.1684	**4**	0.1685	**5**	0.1429	**6**
Nordea, 3.52	0.1750	2	0.1896	2	0.1586	2
Bankowy, 3.09	0.1027	15	0.1101	15	0.0976	15
Skarbiec – Emerytura, 2.52	0.1272	13	0.1302	13	0.1146	13
Allianz Polska, 2.46	0.1531	**11**	0.1619	**10**	0.1418	**7**
AEGON, 2.19	0.1592	**7**	0.1660	**8**	0.1411	**10**
Pocztylion, 2.02	0.1250	14	0.1256	14	0.1082	14
Pekao, 1.62	0.1582	**9**	0.1711	4	0.1455	4
DOM, 1.53	0.1592	**8**	0.1684	**6**	0.1413	**9**
Polsat, 0.96	0.2278	1	0.2381	1	0.2000	1
Average	0.1572		0.1630		0.1392	
Discontinued Pension Funds						
Arka Invesco	-0.2884	20	-0.3797	20	-0.3260	20
Epoka	-0.4007	21	-0.6869	21	-0.5865	21
Kredyt Banku	-0.0306	18	-0.0342	18	-0.0287	18
Rodzina	0.0363	16	0.0865	16	0.0604	16
ego	-0.0207	17	-0.0252	17	-0.0204	17
Pioneer	-0.0523	19	-0.1848	19	-0.1336	19
Average	-0.1261		-0.2041		-0.1724	
All Pension Funds						
Average	0.0762		0.0581		0.0502	

Note: The maximum length of the sample period is June 30 1999 until August 31 2007. Bold figures indicate a change in the ranking of Sharpe- and Treynor-ratios. Survivors are sorted according to their market share in August 31 2007.

All Sharpe ratios and a substantial number of Treynor ratios of Hungarian pension funds, presented in Table 3, are negative. Those Treynor ratios

that are positive result from negative β -factors. A negative β -factor results from a negative covariance between the excess return of the pension fund and the excess return of the market portfolio. This indicates a counter-cyclical investment strategy. The rankings of the Sharpe and Treynor ratios of all but one Hungarian pension fund differ substantially, suggesting a lack in managers' diversification ability.

The considerable difference in Polish and Hungarian Sharpe and Treynor ratios indicates that Polish pension funds perform better than Hungarian ones, despite facing a stricter regulatory framework.

Table 3
Sharpe- and Treynor-Ratios of Hungarian Pension Funds

	Sharpe		Treynor	
Pension Fund		Rank	BUX	Rank
1	-0.3349	**1**	0.5654	**12**
2	-0.9032	**12**	-4.0950	**14**
3	-2.4869	**18**	94.8481	**1**
4	-0.6509	**6**	1.2730	**9**
5	-0.7673	**9**	-9.4016	**16**
6	-0.7737	**10**	-1.9371	**13**
7	-0.5448	**4**	3.1133	**3**
8	-1.1744	**13**	1.7182	**5**
9	-0.6757	**7**	1.6192	**6**
10	-1.5921	15	-4.1980	15
11	-0.8883	**11**	2.1686	**4**
12	-0.5967	**5**	1.5404	**8**
13	-0.3686	**3**	0.9318	**10**
14	-0.3400	**2**	0.7472	**11**
15	-1.2894	**14**	-12.9053	**18**
16	-1.5941	**16**	1.5648	**7**
17	-0.7616	**8**	-9.4526	**17**
18	-1.9346	**17**	6.0912	**2**
Average	-0.9821		-1.2151*	

Note: The maximum length of the sample period is 1998q1 until 2004q4. All pension funds are considered. For the calculation of the Treynor ratio the BUX is used as market portfolio. Bold figures indicate a change in the ranking. The Treynor ratio of pension fund three is an outlier. This results

*from a covariance of the excess return of this funds and the corresponding excess return of the market portfolio being close to 0. * indicates the average of the Treynor ratios calculated excluding the ratio of fund three. Including this ratio leads to an average of 4.1218.*

The estimated performance measures for Polish pension funds based on the CAPM, presented in Table 4 in Panel (A), support the conclusions drawn from the Sharpe and Treynor ratios. The estimated α coefficients of the Jensen model are positive and significant, indicating that the funds' management created an additional value compared to a passive investment strategy. The funds outperform the market by 3.71% and 2.11% per annum using the WIG20 and the WIG, respectively(3). The coefficients of the two-index model largely support the above findings. As the WIG does account for dividends, while the WIG20 does not, the difference in the estimates is not only due to the included stocks.

Table 4

Pooled Estimates for the CAPM-Based Models by Group of Polish Pension Funds

	Model	$\hat{\alpha}$	$\hat{\beta}_1$	$\hat{\beta}_2$	$\hat{\gamma}$
(A) All Pension Fund					
WIG20	Jensen	0.0371***	0.2520***		
	Two-index, MSCI	0.0335***	0.2354***	0.3302***	
	Treynor-Mazuy	0.0369***	0.2520***		0.0002
	Henriksson-Merton	0.0404***	0.2475***		-0.0087
WIG	Jensen	0.0211***	0.2968***		
	Two-index, MSCI	0.0187***	0.2772***	0.3157***	
	Treynor-Mazuy	0.0070*	0.2984***		0.0206***
	Henriksson-Merton	0.0064	0.3195***		0.0444**
(B) Survived Pension Funds					
WIG20	Jensen	0.0393***	0.2621***		
	Two-index, MSCI	0.0350***	0.2449***	0.3387***	
	Treynor-Mazuy	0.0349***	0.2623***		0.0050
	Henriksson-Merton	0.0368***	0.2656***		0.0067

(3) The estimation of the Jensen model by single funds supports the findings, and indicates a low dispersion of the performance measures. We find that a high value of net assets does not guarantee the highest performance. The estimations for single funds are not reported but available upon request.

WIG	Jensen	0.0211***	0.3059***		
	Two-index, MSCI	0.0180***	0.2856***	0.3336***	
	Treynor-Mazuy	0.0056	0.3069***		0.0234***
	Henriksson-Merton	0.0035	0.3329***		0.0539**
(C) Discontinued Pension Funds					
WIG20	Jensen	0.0091	0.1948***		
	Two-index, MSCI	0.0106	0.1835***	0.2587***	
	Treynor-Mazuy	0.0338**	0.1929***		-0.0201
	Henriksson-Merton	0.0495**	0.1463***		-0.0917
WIG	Jensen	0.0084	0.2409***		
	Two-index, MSCI	0.0093	0.2274***	0.2099***	
	Treynor-Mazuy	0.0108	0.2400***		-0.0032
	Henriksson-Merton	0.0260	0.2130***		-0.0496

*Note: The table presents the pooled OLS estimates of the CAPM regressions based on the WIG20 and the WIG as benchmarks for each model and group. All models are estimated with Newey-West standard errors. The partitioning into groups is the following: In (A) all funds are included, in (B) only survived funds including late-starters are considered and in (C) only funds that started their activity later than June 1999 and quit the market prior to July 2005 are considered. *,**,*** represent estimates significant at 10%, 5%, 1 %, respectively.*

The empirical results for the Treynor-Mazuy and Henriksson-Merton model in Panel (A) display inconsistent results, depending on the chosen benchmark. Results based on WIG20 suggest that Polish pension fund managers do not possess any timing ability, while their selectivity ability remains stable with respect to the findings of the Jensen and two-index models. When estimated with the WIG, both models indicate timing ability, but no selectivity ability. Thus, pension fund managers show a selectivity ability with respect to "blue chip" stocks and show basically no such ability concerning stocks of smaller companies. Managers tend to hold stocks of "blue chip" companies, while they trade those of small and medium size companies. Their intention is to profit by a long-term-investment in "blue chips" and by timing the rising and falling prices of the remaining stocks of small and medium size companies, simultaneously. This finding is in line with the fact that "blue chips" constitute a significant proportion of the funds' portfolios. Such portfolio structure is attributed to the existence of minimum required rate of return and the resulting security orientation of the managers (KNF (2007)).

The estimation results for the groups of survived and discontinued Polish pension funds in Panel (B) and (C) of Table 4 support our findings by the Sharpe and the Treynor ratio evidencing a worse performance of discontinued pension funds. While the estimated performance measures for survived pension funds are similar to those of the whole market, the performance measures of the discontinued funds are different. According to the Jensen and the two-index model, discontinued funds are not able to beat the market. In addition, the results of both timing models deny the managers of discontinued funds any timing ability.

We do not find evidence for Polish pension funds confirming the statement by Chan-Lau (2005) and Davis (2002) that the performance of pension funds is adversely affected by the strict regulatory framework. Although our sample period is larger, our estimation results for the Polish pension fund market are in line with the findings of Stanko (2003). Thus, our results seem to be robust with respect to the sample length. We cannot find evidence of underperformance of Polish pension funds in the long-run(4).

When looking at the Table 5, the estimations of the Jensen model, Hungarian pension funds were not able to beat the market in the observed period. In fact, they underperform the market by 5% per annum. The estimations of the two-index model lead to a minor increase in the $\hat{\alpha}$ estimate compared to the Jensen model, still indicating that Hungarian pension funds are not able to beat the market. The estimation results for the Treynor-Mazuy and the Henriksson-Merton model indicate no timing ability of Hungarian pension fund managers, as the values of $\hat{\gamma}$ -coefficients are close to zero and not significant. This outcome is similar to the estimations for the Polish market when the WIG20 is used, as BUX and WIG20 are official blue-chip stock indices although they differ in terms of size and number of stocks included.

(4) We estimated the time-varying beta model developed by Fabozzi and Francis (1979) in order to test for differences in the performance of the funds during bull and bear periods, using the dummy variable definitions proposed by Bhardwaj and Brooks (1993) and by Kao et al. (1998). The results suggest that the Jensen's alpha estimates do not depend on bull and bear periods. Results are not reported but available upon request.

Table 5
Pooled Estimates for the CAPM-Based Models by Group of Hungarian Pension Funds

	Model	$\hat{\alpha}$	$\hat{\beta}_1$	$\hat{\beta}_2$	$\hat{\gamma}$
All Pension Funds					
BUX	Jensen	-0.0503***	-0.0176**		
	Two-index, MSCI	-0.0459***	-0.0340***	0.1501***	
	Treynor-Mazuy	-0.0535***	-0.0093		0.0075
	Henriksson-Merton	-0.0570***	0.0020		0.0295

*Note: The table presents the pooled estimation results of the CAPM-models for the Hungarian pension funds with the BUX used as benchmark. All models are estimated with Newey-West standard errors. *,**,*** represent estimates significant at 10%, 5%, 1%, respectively.*

A number of reasons may cause this evidence of underperformance by Hungarian pension funds. The relatively short sample period and the dynamics of the t-bill rate might lead to the negative and insignificant α-estimates. The reason for Hungarian pension funds coming off so badly here can be seen in the dynamics of the t-bill rate. Unfavorable monetary and fiscal conditions over the sample period exerted pressure on the government securities markets and caused the Hungarian t-bill rate to be higher than in other Central European countries(5). Hungarian pension fund managers face an illiquid and small stock market, which limits their diversification opportunities. The usage of returns on government bonds as a benchmark in the Hungarian performance regulation further affects the portfolio diversification, as it keeps security oriented managers from investing into assets other than bonds. As a result, Hungarian pension fund members do not benefit from the profit opportunities available on their domestic stock market (Hungarian Financial Supervisory Authority, 2007). Such an investment strategy may contribute to a reduction of the fund returns. Finally, the legislative framework itself has been subject to numerous changes, providing additional uncertainties for managers and participants (World Bank, 2007). We therefore cannot rule out that performance regulations, although they might have had an adverse effect on the performance of the funds operating on the Hungarian market, were one of the reasons behind fund underperformance in this market.

A comparison of the performance of pension funds active in the strongly regulated markets of Poland and Hungary with such active in less regulated markets shall give evidence on whether investment limits and performance regulations in fact harm the performance of pension funds. We chose the UK market for a comparison, as UK pension fund managers face probably the fewest externally imposed constraints. This market is, similar to the Polish market, highly concentrated, providing a proper basis for a reasonable comparison.

Blake et al. (2002) analyze the portfolio composition and performance of UK pension funds during 1986-1994 using the Jensen regression. UK pension fund managers face no constraints in regard to their investment decisions. This is reflected in the portfolio structure of the funds, holding a larger portfolio weight in equities and a lower part in bonds than pension funds in Poland and Hungary. Blake et al. (2002) present a cross-sectional distribution of unconditional α-estimates, which ranges from -4.59% per annum to 4.68% per annum. Compared to the present estimates for Polish pension funds, the range of the values is smaller, regardless of the chosen market portfolio. Less than 50% of the observed UK pension funds achieve a positive α, whereas the ratio of positive α-parameters of Polish pension funds is higher than 85%. On average, UK pension funds have an α estimate of -0.047% per annum. This indicates, that UK pension funds tend to underperform the market in general.

The US market is also much less regulated than the Polish and Hungarian ones. The empirical findings by Christopherson et al. (1998) and Lakonishok et al. (1992) on the performance of pension funds operating on the US market support our findings. Despite US pension funds face a less regulated framework, they show a poor performance in comparison to Polish pension funds. Our findings on Polish pension funds that a large amount of net assets does not necessarily guarantee the highest performance, are in line with the results of Blake et al. (2002) and Lakonishok et al. (1992) for the UK and the US market, respectively. A comparison of the empirical findings for the UK, US, Polish and Hungarian pension fund markets with respect to the regulatory framework supports

our previous finding. The argument of Chan-Lau (2005) and Davis (2002) of regulations having a negative effect on the funds' performances cannot be confirmed.

CONCLUDING REMARKS

The aim of this paper is to investigate the performance of mandatory defined-contribution pension funds on strictly regulated ECE markets and provide a cross-country comparison of pension fund performance. We apply established performance measures for a comparative analysis. We find evidence of outperformance by Polish pension funds and underperformance by Hungarian pension funds, although Hungarian pension funds face less restrictive investment limits than their Polish counterparts. Investment limits and performance regulations influence the investment decisions of pension funds. The impact on a fund's performance, however, depends on the type of the performance evaluation benchmark used by the regulation. In Poland it leads to similar portfolio compositions of the managers, while in Hungary it leads to an exceeding investment into government securities. The low liquidity and small size of the Hungarian equity market, inferior skills of managers and the instability of the regulatory framework in Hungary are possible further factors inducing the weak performance of Hungarian pension funds.

The international comparison suggests that Polish pension funds, despite facing the strictest regulatory framework compared to Hungary, the UK and the US, outperform the market, while pension funds active on the compared markets are, in general, not able to beat the market. Thus, the argument given in Chan-Lau (2005) and Davis (2002) that pension funds facing no investment restrictions are more likely to perform better than funds facing stricter regulations cannot be supported, relying on our empirical findings.

REFERENCES

BHARDWAJ, R. and L. BROOKS (1993), "Dual Betas form Bull and Bear Markets: Reversal of the Size Effect," *Journal of Financial Research*.

BLAKE, D., B. LEHMANN, and A. TIMMERMANN (2002), "Performance Clustering and Incentives in the UK Pension Industry," *Journal of Asset Management*, 3, 173-194.

BLAKE, D. and A. TIMMERMANN (2002), "Performance Benchmarks for Institutional investors: Measuring, Monitoring and Modifying Investment Behavior," in: J. Knight and S. Satchell (eds.), *Performance Measurement in Finance: Firms, Funds and Managers*, Oxford.

BUDAPEST STOCK EXCHANGE (2006), "Annual Report 2005", and earlier years, www.bse.hu.

CESARI, R. and F. PANETTA (2002), "The Performance of Italian Equity Funds," *Journal of Banking and Finance*, 26, 99-126.

CHAN-LAU, J. A. (2005), "Pension Funds and Emerging markets," *Financial Markets, Institutions and Instruments*, 14(3), 107-133.

CHEVALIER, J. and G. ELLISON (1999), "Are Some Mutual Fund Managers Better Than Others? Cross-sectional patterns in behavior and performance," *The Journal of Finance*, 54(3), 875-899.

CHRISTOPHERSON, J. A., W. E. FERSON, and D. A. GLASSMAN (1998), "Conditioning Manager Alphas on Economic Information: Another Look at the Persistence of Performance," *The Review of Financial Studies*, 11(1), 11-142.

DAVIS, E. P. (2002), "Pension Fund Management and International Investment – a Global Perspective," The Pensions Institute – Discussion Paper PI – 0206.

ELTON, E., M. GRUBER, S. DAS, and M. HALAVKA (1993), "Efficiency with Costly Information: A Reinterpretation of Evidence from Managed Portfolios" *The Review of Financial Studies*, 6, 1-22.

FABOZZI, F. J. and J. C. FRANCIS (1979), "Mutual Fund Systematic Risk for Bull and Bear markets: An Empirical Examination," *The Journal of Finance*, 34(5), 1243-1250.

FAMA, E. F. and K. R. FRENCH (1993), "Common Risk Factors in the Returns on Bonds and Stocks," *Journal of Financial Economics*, 33, 3-53.

GOVERNMENT DEBT MANAGEMENT AGENCY (AKK) (2004), "Debt Management Report", and earlier years," http://www.akk.hu.

GRINBLATT, M. and S. TITMAN (1994), "A Study of Monthly Mutual Funds Returns and Performance Evaluation Techniques," *Journal of Finacial and Quantitative Analysis*, 29, 419-44.

HENRIKSSON, R. and R. MERTON (1981), "On Market Timing and Investment Performance. Part II. Statistical Procedures for Evaluating Forecasting Skills," *Journal of Business*, 54, 513-533.

HUNGARIAN FINANCIAL SUPERVISORY AUTHORITY (2005), "Annual Report 2004" and earlier years, www.pszaf.hu.

HUNGARIAN FINANCIAL SUPERVISORY AUTHORITY (2007), "The Operation and Risks of the Supervised Sectors," www.pszaf.hu.

IMF (2006), "Hungary: 2006 Article IV Consultation – Staff Report; Staff Supplement and Public Information Notice on the Executive Board Discussion," October 2006, *IMF country report* 06/379, http://www.imf.org/external/pubind.htm.

JENSEN, M.C. (1968), "The Performance of Mutual Funds in the Period 1945-1964," *The Journal of Finance*, 23, 389-416.

KAO, G. W., L. T. W. CHENG, and K. C. CHAN (1998), "International Mutual Fund Selectivity and Market Timing During Up and Down Market Conditions," *The Financial Review*.

KNF (2007), "Open Pension Funds Market in 2006," ww.knf.gov.pl.

LAKONISHOK, J., A. SHLEIFER, and R. VISHNY (1992), "The Structure and Performance of the Money Management Industry," *Brookings Papers: Microeconomics*, 339-391.

LEHMANN, B. and D. MODEST (1987), "Mutual fund performance: A comparison of benchmarks and benchmark comparisons," *The Journal of Finance*, 42, 233-265.

NEWEY, W. K. and K. D. WEST (1987), "A Simple, Positive Semi-Definite, Heteroscedasticity and Autocorrelation Consistent Covariance Matrix," *Econometrica*, 55(3), 703-708.

OECD (2006), Survey of Investment Regulations of Pension Funds, and Earlier Years," www.oecd.org.

PRATHER, L. and K. MIDDLETON (2006), Timing and Selectivity of Mutual Fund Managers. An Empirical Test of the Behavioral Decision Making Theory," *Journal of Empirical Finance*, 13, 249-273.

SHARPE, W. F. (1966), "Mutual Fund Performance," *Journal of Business*, 39, 119-138.

STANKO, D. (2003), "Polish Pension Funds. Does the System Work? Cost, Efficiency and Performance Measurement Issues," The Pension Institute Birbeck College, University of London, Discussion Paper PI-0302, 1-32.

TREYNOR, J. L. (1965), "How to Rate Management of Investment Funds," *Harvard Business Review*, 43, 63-75.

TREYNOR, M. and K. MAZUY (1966), "Can Mutual Funds Outguess the Market," *Harvard Business Review*, 44, 131-136.

VORONKOVA, S. and M. BOHL (2005), "Institutional Traders' Behavior in an Emerging Stock Market: Empirical Evidence on Polish Pension Fund Investors," *Journal of Business Finance and Accounting*, 32, 1537-1560.

WORLD BANK (1994), "Averting the Old-Age Crisis: Polices to Protect the Old and Promote Growth," New York: Oxford University Press.

WORLD BANK (2000a), "Portfolio Limits. Pension Investment Restrictions Compromise Fund Performance," *World Bank's Pension Reform Primer*, www.worldbank.org/pensions, 1-7.

WORLD BANK (2000b), "Regulating Private Pension Funds' Structure, Performance and Investments: Cross-Country Evidence," *World Bank Social Protection Discussion Paper Series* No. 0113, 1-52.

WORLD BANK (2007), "Pension Reform and the Development of Pension systems: An Evaluation of World Bank Assistance," IEG Working Paper 39145.

A DISCUSSION ON NEW CULTURAL VARIABLES AND IFRSS' IMPLEMENTATION
EMPIRICAL STUDY ON CEECS

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ABSTRACT:

In the context of a growing literature on the connection between culture and accounting, the general objective of paper is to provide a theoretical discussion and empirical evidence on the recent trends in financial reporting in a sample of CEECs. The specific objectives of the paper are: 1) to provide an operational definition of culture; 2) to advance a set of cultural variables relevant for the interactions between culture and the implementation of accounting regulations; 3) to test four hypotheses based on the empirical pool data. The main thesis is that the culture is relevant for the national characteristics of IFRS implementation in the sample countries.

JEL classification: C23, M41, M48

Keywords: cultural variables, financial reporting, IFRSs, world values survey, CEECs

INTRODUCTION

Starting with the influential work of Harrison And Mckinnon [1986] and Gray [1988], a growing literature addresses the issue of the connections

between the cultural variables and the accounting regulations and attempts to explain and predict by using such variables the international differences in accounting systems. Several studies have tested GRAY's hypothesis including Pourjalali And Meek [1995] which identifies a match between changes in cultural dimensions and the accounting environment in Iran following the revolution. On the other hand, Amat, Blake, Wraith And Oliveras [1999] link the national culture to the characteristics of the Spanish accounting environment. Also, Dunn [2002] concludes that cultural and political barriers are some of the most important limitative factors for the international accounting harmonization.

Thus, the general objective of this paper is to provide a simple theoretical framework and some empirical evidence within the fervent debate over the recent developments in Central and Eastern European countries' (CEECs) financial reporting. The paper is organized as it follows: *Section 1* provides an operational definition of culture as the dominant collective mental model that individualizes a society from another by being the subject of a learning and inter-generational transmission process. Moreover, this section advances a set of cultural variables that we consider relevant for the interactions between culture and the implementation of accounting regulations in general and more specific in CEECs, by identifying also some particularities of the accounting regulations in the sample countries; *Section 2* attempts to provide an empirical support for the thesis that there are some significant connections between the cultural variables and the accounting reporting in the sample countries by testing four hypotheses based on the empirical pool data; *Section 3* includes derived comments and (auto) critics.

Therefore, the main output of the paper consists in the thesis that the culture is relevant for the national characteristics of IFRS implementation in the sample countries.

1. THE CONCEPTUAL BACKGROUND

1.1. An Operational Definition of Culture

According to the Merriam-Webster Dictionary, culture is "the act of developing by education, discipline, and social experience" or "training or refining of the moral and intellectual faculties". In a different view, Cozzi [1998] understands by culture a "social asset" whose acquisition by an agent generates no individual utility but has positive external effects. UNESCO [1992][(1)] had described culture as follows: «... culture should be regarded as the set of distinctive spiritual, material, intellectual and emotional features of society or a social group, and that it encompasses, in addition to art and literature, lifestyles, ways of living together, value systems, traditions and beliefs». Such definitions are more focused on the static aspects of the culture as given social artifacts. But cultural characteristic are changing over time; the content of the shared intellectual products does not rest the same over long time spans. Societies are reacting to the variation of the external and internal environment. So that, a more comprehensive view of cultural paradigm admits that its architecture is "stable" only in a "short enough" time horizon.

However, we agree with the definition of ***cultural paradigm*** provided in Talpoş Et Al. [2005, p. 20]: "Through paradigm we understand the dominant collective mental model that individualizes a society from another. This paradigm represents a societal integration factor, by offering common values and goals for the members of the society. Also, this represents the subject of some learning and inter-generational transmission process, which slowly modifies itself, in <<long cycles>>".

Hence, we consider the cultural paradigm as representing "something much more" then a set of "shared values". This way, one could remark that an interesting definition for the culture as "shared values" is given by Kroeber And Kluckhohn [1952] (cited in Adler [1986]). According to

(1) Universal Declaration on Cultural Diversity.

them, culture consist of patterns, explicit and implicit of and for behaviors acquired and transmitted by symbols, constituting the distinctive achievement of human groups, including their embodiment in artifacts; the essential core of culture consists of traditional (i.e., historically derived and selected) ideas and especially their attached values; culture systems may, on the one hand, be considered products of action, on the other conditioning elements of future action.

In consequence, culture is:

- Something that is shared by all or almost all members of some social group;
- Something that the older members of the group try to pass on to the younger members; and,
- Something (as in the case of morals, laws and customs) that shapes behavior, or structures one's perception of the world.

From this point of view, our vision is much closer to HOFSTEDE [1991] who defines culture as "the collective programming of the mind which distinguishes the members of one group or category of people from another". Like him, we emphasize that culture is, at least partially, learned, and not only inherited.

1.2. How Does Culture Interfere With Accounting?

The purpose of this section is to how culture was linked during the years to the research on the accounting differences among countries. Thus, we will make reference to HOFSTEDE's cultural dimensions model (HOFSTEDE [1980, 1991, 2001]), then to GRAY's accounting values and in the end we shall present our own version of cultural variabiles with impact on financial reporting.

1.2.1.Hofstede and the key cultural dimensions

Considered to be the father of the cultural dimensions modelling, GEERT HOFSTEDE [2001, p.1] specified that culture "manifests itself not only in values, but in more superficial ways: in symbols, heroes, and rituals". Beginning from such a premise, HOFSTEDE created a model in which

cultural differences and their consequences on national, regional and international level can be described. Based on an attitude survey of a multinational entitty's employees (IBM) in 66 countries during the 1970s, HOFSTEDE developed country-based indices corresponding initially to four dimensions of national culture for each and every country surveyed, later on adding a further dimension (HOFSTEDE AND BOND [1988]) - which all were meant to reflect Eastern and Western values alike.

These key dimensions may be described as follows:

- *Power distance* - represents the extent to which the less powerful members of a society accept that power is unequally distributed;
- *Individualism* - describes individualistic societies as communities where there are few ties beyond those of the nuclear family, while the opposite societies - collectivist - are characterised by stronger cohesive in-group ties;
- *Masculinity* - opposes "masculine" societies and "feminine" societies. In the first case, men are confident, tough, and more concerned with material and professional success, while women are modest, tender and more concerned in the quality of life, by being. In the other case, both men and women are equally concerned with quality of life;
- *Uncertainty avoidance* - reflects the extent to which people feel threatened by unknown/uncertain situations;
- *Long-term pragmatism* - represents the extent to which people favor a pragmatic vision over a short-term thinking. In order to design this dimension Hofstede undertook a Chinese Value Survey.

In spite of the long time success of the model and of the numerous business-related and psychological research studies based on it or validating it (HOPPE [1990]; SONDERGAARD [1994]; BARKEMA AND VERMEULEN [1997]; DING, JEANJEAN AND STOLOWY [2004]), this cultural dimensions model has been constantly challenged respectively critisized by several researchers (BOND [1988]; SMITH, DUGAN AND TROMPENAARS [1996]; respectively by GERNON AND WALLACE [1995]; BASKERVILLE [2003]). For instance, whereas SMITH, DUGAN AND TROMPENAARS [1996] analysed the replicability of

HOFSTEDE's methodologies, GERNON AND WALLACE [1995] debated over the application of HOFSTEDE's cultural dimensions.

Among the criticisms brought to the HOFSTEDE's approach there are: the survey was referring to one organization and may not be applicable to other circumstances (GERNON AND WALLACE [1995, p. 85]); "the embeddedness of the four dimensions in the social, political or economic measures indicates that the dimensions […] describe characteristics of different nations, most of which could be identified as socio-economic in origin" (Baskerville [2003]); the IBM data are now obsolete. To the last of these criticisms, HOFSTEDE [2001, p. 73] replied that because the dimensions were supposed to have centuries-old roots, only the stable data from his suerveys had been kept.

1.2.2. Gray and the accounting values

Based on HOFSTEDE's model, GRAY [1988] introduced the first four cultural dimensions into accounting, by creating the next accounting values:

- *Professionalism versus statutory control* - refers to a preference for the use of individual professional judgment and the preservation of professional self-regulation over the option to comply with the regulatory requirements and statutory control;
- *Uniformity versus flexibility* - implies a preference for the enforcement of standardized accounting practices and the consistent use of these over time versus a preference for flexibil practices in accordance with the particular circumstances in which an individual company may operate;
- *Conservatism versus optimism* - opposes a preference for a cautious approach to measurement which will allow a company to handle easier uncertain future events, versus a risk-taking approach.
- *Secrecy versus transparency* - describes a preference for disclosure of financial information only to those closely involved with the management of the respective company, seldom resulting in a restricted access for the other interesed categories as opposed to a more transparent, open and publicly accountable approach.

As Gray [1988] linked his accounting values to Hofstede's cultural dimensions model, numeorous researchers get inspired to attempt to provide empirical evidence on the subject (Belkaoui [1989]; Perera [1989]; Perera and Mathews [1990]; Chow, Chau and Gray [1995]; Hussein [1996]; Macarthur [1996]; Roberts and Salter [1999]). While Others Like Salter and Niswander [1995] have tried to test Gray's theory for a sample of 29 countries, but the study revealed serious problems in the measurement of the accounting values, the outcomes including a negative relationship between uniformity and uncertainty avoidance, in contrast to Gray's prediction. On the other hand, Chanchani And Willet [2004] have tested the accounting values among the uses of financial statements in India and New Zeeland and their results validated somehow Gray's hypotheses referring to professionalism and uniformity.

1.2.3. Building a new set of cultural variabiles

In the attempt to create our own set of cultural variables - that can be seen as relevant for the interactions between culture and the implementation of accounting regulations - we leave from the premise that *culture plays an important role in shaping the accounting standards and practices of a particular country* (similar to Perera [1994]).

Thus, we have turned our attention towards the World Values Surveys (WVS). In 1981, Jan Kerkhofs and Ruud de Moor - leaders of the European Values Survey group (EVS) - launched a study which will turn into today's World Values Surveys. Because of the success of the EVS' surveys carried out in ten West European societies, the project was replicated in 14 additional countries. The findings of these surveys suggested that "predictable cultural changes were taking place".

Nowadays, The World Values Survey(2) is organized as a network of social scientists brought together by a common interest: "to understand ongoing social changes that are transforming peoples' worldviews and

(2) All the information about the history and organization of WVS are from WVS's website.

basic motivations". It is coordinated by a central body, the World Values Survey Association, which is a non-profit association seated in Stockholm, Sweden. Also, the WVS's data have become increasingly renowned in recent years, and have been used in hundreds of publications in more than twenty languages.

To monitor the cultural changes, four waves of Values Surveys were carried out in 1981, 1990-1991, 1995-1996 and 1999-2001, while a fifth wave took place in 2005-2006. The World Values surveys were designed to test the hypothesis that economic and technological changes are changing the basic values and motivations of the people. This data base allows the examination of relationships between public values and economic growth; or between environmental pollution and mass attitudes toward environmental protection; or that between political culture and democratic institutions. The usefulness of these data has grown as the surveys are now providing more complete coverage of the world's societies, and as the time series covered grew longer. The last wave includes more than 80 independent countries covering almost 85% of the world's population.

In our paper we are referring to the fourth wave of surveys carried out in 1999-2001 in 65 societies, many African and Islamic societies being included in the survey for the first time. Hence, we have considered as a ground for the proposed cultural variables some of the WVS (*Table A1* The World Values Survey questions).

Based on the specificity of these questions, we have grouped them, proceeding at building a specific set of cultural variables with impact on financial reporting:

1. ***Freedom of initiative*** - estimates the relative importance of free individual initiatives on personal level and within economic structures. The variable is defined as " the individual initiative is NOT important" and is measured as:

$$nofreedom = 0.33 * \ln\left(\frac{100}{A173}\right) + 0.33 * \ln\left(\frac{100}{C016}\right) + 0.33 * \ln\left(\frac{100}{C034}\right) \quad (1)$$

2. ***Work significance*** - takes into account the relative importance of work during the individual life time. It could be noticed that this variable is more focussed on "importance" of work and less on "work ethics". The variable is computed as "work is NOT important":

$$\text{nowork} = \ln\left(\frac{100}{A005}\right) \quad (2)$$

3. ***Social hierarchy significance*** - describes the relative acceptance of social hierarchy defined as "In society and in economic entities DOES NOT prevail the hierarchical managerial style":

$$\text{nohierachy} = \ln\left(\frac{100}{C\,061}\right) \quad (3)$$

4. ***Social justice significance*** - intents to capture the importance that justice and "follow the rules" behaviour have in the social game. The variable is defined as "The social justice and the social norms and rules are NOT important" and computed as follows:

$$\text{nojustice} = 0.25 * \ln\left(\frac{100}{F\,114}\right) + 0.25 * \ln\left(\frac{100}{F\,116}\right) + 0.25 * \ln\left(\frac{F\,145}{100}\right) + 0.25 * \ln\left(\frac{F\,146}{100}\right) \quad (4)$$

In our opinion, the first cultural variable might have a corresponding accounting value similar to GRAY's, as it can stand for "the use of professional judgment is not important", whereas the other three are in some way representative for the accountants' behaviour in accepting the legal requirments and norms (more uniform than flexible), and in companies' attitude of restricting the disclosure of financial information to several categories of users.

The main thesis is that if the social subjects are operating inside a "close" cultural paradigm with highly rigid social structures, relative preference for formal norms and rules and less attention payed to the de facto equality of chances, then there will be a higher preference for less transparent financial statements, restricted access to financial information and ambigous definitions of the "game's rules". Even more,

such variables could be linked to the relative power of the "civil society" since the professional auto-regulation autonomous to the State is a critical component of a "free" civil society.

We consider that the main differences to GRAY's approach consist not only in "different labels / different contents" but mainly in the construction of these variables based on the World Value Surveys' components - which are significanly less "Western-centered" that the HOFSTEDE's ones and more able to capture "true" universal cultural dimensions. Of course, this is debatable since IAS/IFRSs (and US GAAPs) have their roots in the "Anglo-Saxon" perspective. Still, the importance of having a set of "framework-independent" cultural and accounting variables consists in an increased capacity of testing how could these be implemented in "non Anglo-Saxon" (and "non-Western") cultures.

1.3. The particularities of IFRS implementation in the European Union

The European accountancy undertakes the most significant revolution since the issuance of the IVth Directive in 1978. Since 2005, IAS Regulation (Regulation No.1606/2002/EC) has required European companies listed in a European securities market to use ***International Financial Reporting Standards*** (IFRSs) for preparing their consolidated financial statements. This requirement affected almost 8000 European listed companies. In addition, Article 5 of the IAS Regulation allows Member States to permit or require the unlisted entities to draw up their individual and consolidated financial statements according to IAS.

There is no doubt that IAS Regulation and the subsequent Directives on financial reporting share a common vision on the link between international accounting harmonization/ convergence and globalization. The first concept could be perceived as an internationalization of accounting by promoting accounting standards in which the global interest prevails in front of the national one (VOLKER [2000]; COOKE [2001]). The evolution of a more and more real and nominal integrated global

economy, the changes in the architecture of the international financial system, the predominance of multinational entities, the consequences of technological and informational transfers - all these require an increased harmonization of the accounting practices. Thus, IFRSs arise as a product of the globalization forces, becoming the best choice for many national authorities in ensuring transparency and comparability of the financial information. The main reason for this consists in the fact that a "symbolic economy" implies uniform mechanisms for efficiency estimation, since the economic subjects are in a certain sense "detached" from the objects of their decisions.

Some years ago became obvious that a choice must be made between **US GAAPs** and, respectively, **IAS/IFRSs**. However, in the last decade, IFRSs have gained a wider acceptance, so that nowadays almost 110 countries around the world have adopted the issued version or plan to adopt or converge with this set of standards with some different modifications / limitations. In this context, FASB and IASB are determined to find a mutual compromise of adopting compatible and high quality solutions for present and future accounting issues. For this purpose, two memorandums of understanding were signed during the years (2002 - *Norwalk Agreement*; 2006). Still, the convergence process is far from being complete and there is not a clear short-run perception for a single international set of standards compatible with both sets of standards.

For the proposed analysis, the identification of IFRSs' main characteristics is essential. Thus, we have structured some of the features as follows:

- A formal set of regulations with a clearly structural internal organization of the information and a uniform prescription of the accounting treatments to be applied;
- A "multi-authority" decisional result since a large number of bodies is involved (IASC Foundation that names the members of the Board and IFRIC, IASB which issues the standards, IFRIC responsible with the issuance of standards' interpretations, SAC which provides advisory support - all these being separate but interlinked structures; the European Commission with its entire network of bodies with analysis

and advisory duties - EFRAG, TEG, SARG, ARC, Contact Committee, roundtable; the national regulators and so on);
- A product of a specific cultural and business environment - the Anglo-Saxon one - destined to be assimilated in various other environments characterized by different cultural paradigms;
- The IFRSs appliance is a "work in progress" under a significant time horizon so that there are some limitations of the "short-run" argument.

If these postulates stand, it should be noted that in the particular case of the CEE countries which are EU Member States, a discriminate analysis is applicable only for domestic unlisted entities since all the listed companies are required to use IFRSs. In this context becomes obvious that the decision of the CEE countries - UE Member States - to permit or require the domestic unlisted entities to draw up their individual financial statements according to IAS/IFRS is still question to the cultural particularities of each state.

2. AN EMPIRICAL ANALYSIS: THE CEECS

2.1. Selecting the sample countries

The role of this section is to provide an empirical explanation on how culture interferes with individual countries' decision to permit/require/prohibit IFRSs' use for the individual financial stantements of the domestic unlisted entities.

The first step in our empirical analysis consisted in determining the sample countries. Since we have considered the EU membership status as a guarantee of the implementation of the acquis communitaire, the sample countries were selected amongst the CEE countries, as defined by the OECD[3], and simultaneously fulfilling the criteria:

(3) http://www.oecd.org/document/45/0,2340,en_2649_34291_1963117_1_1_1_1,00.html accessed on July 16, 2008, 11.50 a.m.

- These are all CEE countries and share common socio-economic historical background;
- Each of these countries has national cultural specificity;
- These are all, at the present time, EU Member States;
- There are enough available data for constructing the cultural variables based on World Values Survey's questions.

Thus, from the fifteen CEECs, only nine fulfill the entire set of criteria, as presented in the table below:

Table 1
The countries' cross section identifiers set

Bulgaria	Hungary	Poland
Czech Republic	Latvia	Romania
Estonia	Lithuania	Slovakia

There are some issues we would like do address in order to provide a more meaningful explanation of our further presented statistical results. Thus, the first issue that we consider relevant in our analysis is that the evolution of accounting regulations in the sample CEECs had suffered external influences determined by other national financial reporting systems. There can be noticed several external influences, such as:

- Austrian and German commercial code influenced the accounting regulations in Czech Republic, Hungary and Poland;
- A French influence is obvious in Romania's case;
- A dual French and German influence is detected in Slovakia's case (PWC [2004]);
- Latvian accounting was strongly influenced by Danish regulations that meet in general the EU's Directives;
- Lithuanian accounting regulations makes reference to IAS version before 2001.

The fact is that all the sample countries have elaborated in the early '90 national laws on accounting and auditing separated by the company law. Most of these regulations have been subject of a series of modifications in

order to align them to the political, social and economic objectives of each country. In the majority of the states the essential changes intervened in 2004 - 2005 as a reflection of the IAS Regulation adopted by the European Union and were performed by the state through its main representative, the Ministry of Finance.

Actually, nowadays, the *Ministry of Finance* may take several positions such as (Bogdan and Cristea [2008]):

- to continue to establish the domestic accounting regulations (like in Romania);
- to decide to issue domestic accounting standards. For example, Czech Accounting Standards are prepared and published by the Ministry. In this case, the role of the National Accounting Board is to comment on exposure drafts, provide interpretations and lobby the relevant parties;
- to delegate some if its responsibilities including that of issuing accounting standards to independent bodies. For example, Hungarian Accounting Standards Board has recently been established to take over the responsibility for setting Hungarian Accounting Standards from the Ministry of Finance. The Board was established by Government Decree 202/2003 under the authority of the Accounting Act.

Many of the countries in our sample have established an apparently independent body to issue domestic accounting standards (Czech Republic, Estonia, Hungary, Poland, Latvia and Lithuania). However, the extent of the *accounting profession* in the elaboration process is not quantifiable and some organization (official website of FITA) support the idea that in some countries such as Bulgaria, Czech Republic, Hungary, Poland and Romania the "accountants associations have some difficulties to get organized, because of the importance of the State in the accounting system".

All this issues reflect the national diversity within the sample countries as well as a possible qualitative explanation of our cultural variabiles such as social hierarchy significance, freedom of initiative and social justice significance.

2.2. Hypotheses and statistical results

The next step was that, based on the cultural variables established in the previous section and on our previous theoretical considerations to test certain hypotheses about the connections between these variables and the option to use IFRSs in the individual financial statements of the unlisted entities from the sample countries. These hypotheses could be summarized as follows:

H1:	A low level of individual initiative is susceptible to stimulate the adoption of IFRS;
H2:	A low work significance is compensated by an "exogenous" implementation of the international standards;
H3:	A strong preference for a rigid social hierarchy is translated in a higher preference for IFRSs' adoption;
H4:	A superior social justice orientation will lead to a greater preference for regulations, since this ensures "equal treatments" for economic entities.

For testing these hypotheses, the *methodology* implied:

1. The construction of a fuzzy score variable able to capture the "permitted/ required" IFRS adoption of the domestic unlisted companies. A possible codification system for the construction of this variable is presented in the *Table A2*.

This variable takes values in a scale between:

- "0" - meaning that the use of IFRSs is prohibited and
- "2" - reflecting the situation of IFRSs' requirement;

2. The running of a pool data regression between the score variable as endogenous and the cultural variables as exogenous:

$$score_i = X'_i\beta + \gamma_i + \varepsilon_i \quad (5)$$

where X' represent the cultural variables, γi signify the cross-section effects and εi are the error terms.

3. The data set with the specific values for the score variable and the cultural ones is presented in the *Table A3*.

It could be noticed the fact that these data are covering a quite wide spectrum of values and, as a consequence, these are describing different

situations on the level of IFRSs' adoption. The main statistics for the stacked data are displayed in the *Table A4*.

The discriminant analysis, along with the scatter plots, suggest that there are some significant differences between the components of the analysed sample due to the non-uniform regulatory policies (*Table A5; Figure A1 and A2*).

In this context, by applying the above mentioned methodology to the sample countries, we have obtained the results displayed in the *Table A6*.

According to these results, we can draw several conclusions:

- *All the H1 - H4* hypotheses are confirmed with different degrees of statistical significance;
- The most significant statistical association is the one between the score variable and the *work significance* and the *social hierarchy significance*;
- The lowest statistical association is the one corresponding to the connection between the score variable and the *freedom of initiative*;
- There can be noticed some *important differences between the countries in the sample*:
  - ♦ More exactly, one could distinguish, at one extreme, a sub-group 1 composed by ***Poland***, and the ***Baltic countries*** (especially Latvia) - with greater work significance, a higher freedom of individual initiative, a medium level of social hierarchy significance and a relative important focus on social justice - sub-group which has done relative few things in the direction of IFRSs requirement;

For example, Poland - country with the most developed financial market in the region, Warsaw SE succeeds in having an almost 16 times Bulgarian SE's market capitalization - is more focused on permitting IFRSs in the individual financial statements of companies that have applied for stock exchange listing or whose parent uses IFRSs; by prohibiting the use of IFRSs in the separate financial statements of rest of unlisted companies. Similar to the other countries entering sub-group 1, Poland has established an independent body to issue domestic accounting standards: the Polish

Accounting Standards Committee set in 2002 issued until January 1, 2007 three standards and two standpoints (on accounting for emission rights and on conversion costs for balance sheet valuation).

Alternatively, Latvia has created Latvian Accounting Board which adopted domestic accounting standards in 1999. Nowadays, there are eight standards in force and all the standards have an international corresponding standard. The unlisted entities, except the unlisted financial institutions, are not permitted to use IFRSs and formats of main financial statements are prescribed by the law.

Thus, Poland and Latvia, by showing more freedom of initiative and a medium level of social hierarchy significance, intend to create domestic sets of standards for the unlisted entities.

- At the other extreme, a sub-group 2 - formed by ***Bulgaria*** and ***Slovakia*** with medium work significance, lower freedom of individual initiative, greater significance of well-defined social hierarchies and medium focus on social justice - took more actions for imposing the IFRSs to the unlisted entities.

For instance, Bulgaria requires the use of IFRSs for the unlisted financial institutions and all large unlisted limited liability entities, while other unlisted entities are permitted to use IFRSs. The lower freedom of initiative and the greater social hierarchy significance is proven by the fact that the accountants association (Institute of Certified Public Accountants of Bulgaria - ICPAB) has some difficulties in getting organised and less opportunities in creating an independent standard setter. This situation is proven also by the relative acceptance of the social norms and rules.

Therefore, our main finding resides in the fact that the ***more "closed" a society is, in terms of lower work significance, the clearer defined social hierarchies, greater social justice significance and lower freedom of initiative, the greater is the probability to require the use of IFRSs.***

CONCLUSIONS

The results presented in the previous section reveal that on a "median" level the cultural variables and the characteristics of the regulatory set for the IFRSs adoption are significant linked. More generally, the proposed analysis is affected by some important limitations both on the theoretical as well as on the empirical level. Among these limitations, one could note:

Theoretical "white spots"

- How could be "culture" measured?
  The appeal to the Hofstede's cultural variables could be criticized due to the fact that these have obviously a certain self-referential in the "occidental" culture and are not able to sustain a more accurate distinction between the characteristics of the cultural artifacts. But isn't the same situation for the *World Values Surveys variables*? In our opinion, the fact that the questions are based on a "valorization approach" for some universal human values, addresses at least partially this issue.
- What is specific for the national differences in the **IFRSs** adoption?
  There are quite few details about the intrinsic mechanisms of adopting / supervising / punishing the non-follows of the regulations for **IFRSs** and is not very clearly if in fact all the required conditions implied by the global decisional framework are fulfilled in this particular case and even more there is not enough highlighted the decisional particularities.

o Where are the "accounting" variables?
  Despite the references to Gray's variables, it is not clear if the proposed variables can be directly compared to those, since ours are referring to "culture" and not to "accounting". In other words, issues such as "professionalism", "uniformity", "transparency", "similar treatments in similar situations" and many others could not be immediatly explained by the proposed variables.

- What is specific for Central and Eastern European countries?
  It could be noticed the fact that there are relative few details about the institutional regulatory frameworks and mechanisms of the CEECs and even less about the linkages between the proposed set of variables and the specific accounting systems'architecture.

Empirical estimation problems

Not only the theoretical but also the empirical part of the paper is affected by imperfect clarifications. Some of them are connected with:

- The stability of the regression models and the quality of the results (for instance, in terms of properties of the residuals variables);
- The identification problems for the involved parameters;
- The possible existence of non-linear interactions between the variables and the effects of such interactions;
- The insufficient number of observation and the absence of an explanation for the composition of the samples;
- The fact that the pool data are not constructed based on individual time-series so that there is no possibility for cross-section analysis, etc.

Therefore, despite all these caveats, we argue that the paper could be seen as a small breakdown into the usual manner to deal cultural variables and accounting related consequences in general and with the **IFRSs** topic in particular. The human species is not motivated in its fight for control over the natural and artificial environment only by "rational" motifs. Instead, the emotions could balance the logic and fear, solidarity, empathy and hope twins could shape the way in which people are doing business and are living together in the same social realm.

APPENDIX

Table A1.

The World Values Survey questions

Code of Question	FORMULATION	DATA REPRESENTS
A005	Please say, for each of the following, how important it is in your life-Work	Very important
A173	Some people feel they have completely free choice and control over their lives, while other people feel that what they do has no real effect on what happens to them. Please use this scale where 1 means «none at all» and 10 means «a great deal» to indicate how much freedom of choice and control you feel you have over the way your life turns out.	None at all
C016	Here are some more aspects of a job that people say are important. Please look at them and tell me which ones you personally think are important in a job?-An opportunity to use initiative	Not mentioned
C034	How free are you to make decisions in your job?	None at all
C061	People have different ideas about following instructions at work. Some say that one should follow one's superior's instructions even when one does not fully agree with them. Others say that one should follow one's superior's instructions only when one is convinced that they are right. With which of these two opinions do you agree?	Follow instructions
F114	Tell me for each of the following statements whether you think it can always be justified, never be justified, or something in between, using this card. Claiming government benefits to which you are not entitled	Never justifiable
F116	Tell me for each of the following statements whether you think it can always be justified, never be justified, or something in between, using this card. Cheating on taxes if you have a chance	Never justifiable
F145	According to you, how many of your compatriots do the following?-Claiming state benefits to which they are	Almost all
F146	According to you, how many of your compatriots do the following?-Cheating on tax if they have the chance	Almost all

(Source: http://www.worldvaluessurvey.org/; 2008)

Table A2

The codification system for the domestic unlisted companies- the use of IFRSs

(Individual financial statements - IFS)

WEIGHT	TYPE of entity	THE IFRSS ARE:		
0.5	Financial institution	Required=2	Permitted=1	Not permitted / Not mentioned =0
0.3	Large	Required=2	Permitted=1	Not permitted / Not mentioned =0
0.2	Small and medium	Required=2	Permitted=1	Not permitted / Not mentioned =0

(Source: inspired by Use of IFRS by Jurisdiction updated at 17 June 2008, http://www.iasplus.com/country/useias.htm)

Table A3 : The data set

COUNTRY	Score	Not Freedom	Not Work	Not Hierarchy	Not Justice
Bulgaria	1.8	1.847	0.486	1.027	-1.259
Czech Republic	0	2.497	0.635	1.187	-1.220
Estonia	1.5	2.327	0.666	1.556	-1.030
Hungary	1	2.031	0.566	0.844	0.033
Latvia	1	1.576	0.361	1.321	-1.577
Lithuania	1	1.558	0.612	1.650	-1.265
Poland	0	2.073	0.247	1.366	-1.051
Romania	0	2.034	0.348	1.061	-0.793
Slovakia	2	2.182	0.486	1.091	-0.919

Table A4 ::The variables' statistics for the stacked data

	Score	Not Freedom	Not Work	Not Hierarchy	Not Justice
Mean	0.922222	2.013885	0.489677	1.233750	-1.009052
Median	1.000000	2.034202	0.486133	1.187444	-1.051448
Maximum	2.000000	2.497453	0.665532	1.650260	0.032814
Minimum	0.000000	1.557805	0.247180	0.843970	-1.576511
Std. Dev.	0.777460	0.314597	0.145038	0.262046	0.452359
Skewness	-0.065023	-0.146807	-0.366632	0.239426	1.313631
Kurtosis	1.626039	2.093450	1.841671	2.011332	4.347074
Jarque-Bera	0.714256	0.340515	0.704776	0.452537	3.268917
Probability	0.699683	0.843447	0.703007	0.797504	0.195058
Sum	8.300000	18.12496	4.407089	11.10375	-9.081465
Sum Sq. Dev.	4.835556	0.791772	0.168289	0.549345	1.637026
Cross sections	9	9	9	9	9

Table A5 : The discriminant analysis - Group Statistics

Score		Mean	Std. Deviation	Valid N (listwise)	
				Unweighted	Weighted
.00	notfreedom	2.2014	.25707	3	3.000
	notwork	.4101	.20113	3	3.000
	nothier	1.2051	.15335	3	3.000
	notjustice	-1.0215	.21498	3	3.000
1.00	notfreedom	1.8678	.32374	5	5.000
	notwork	.5382	.11896	5	5.000
	nothier	1.2796	.34237	5	5.000
	notjustice	-1.0196	.61957	5	5.000
2.00	notfreedom	2.1816	.(a)	1	1.000
	notwork	.4861	.(a)	1	1.000
	nothier	1.0906	.(a)	1	1.000
	notjustice	-.9189	.(a)	1	1.000
Total	notfreedom	2.0139	.31460	9	9.000
	notwork	.4897	.14504	9	9.000
	nothier	1.2338	.26205	9	9.000
	notjustice	-1.0091	.45236	9	9.000

a. Insufficient data

Tests of Equality of Group Means

	Wilks' Lambda	F	df1	df2	Sig.
notfreedom	.696	1.308	2	6	.338
notwork	.817	.671	2	6	.546
nothier	.939	.194	2	6	.828
notjustice	.994	.017	2	6	.983

Pooled Within-Groups Matrices (a)

		notfreedom	notwork	nothier	notjustice
Covariance	notfreedom	.092	.032	-.011	.053
	notwork	.032	.023	.006	.011
	nothier	-.011	.006	.086	-.092
	notjustice	.053	.011	-.092	.271
Correlation	notfreedom	1.000	.692	-.127	.335
	notwork	.692	1.000	.133	.141
	nothier	-.127	.133	1.000	-.599
	notjustice	.335	.141	-.599	1.000

a. The covariance matrix has 6 degrees of freedom.

Covariance Matrices (a,b)

score		notfreedom	notwork	nothier	notjustice
.00	notfreedom	.066	.049	-.001	-.047
	notwork	.049	.040	-.011	-.027
	nothier	-.001	-.011	.024	-.017
	notjustice	-.047	-.027	-.017	.046
1.00	notfreedom	.105	.023	-.016	.103
	notwork	.023	.014	.014	.030
	nothier	-.016	.014	.117	-.129
	notjustice	.103	.030	-.129	.384
Total	notfreedom	.099	.014	-.018	.042
	notwork	.014	.021	.007	.008
	nothier	-.018	.007	.069	-.070
	notjustice	.042	.008	-.070	.205

a. The group covariance matrix for group 2.00 cannot be computed because there is insufficient data.

b. The total covariance matrix has 8 degrees of freedom.

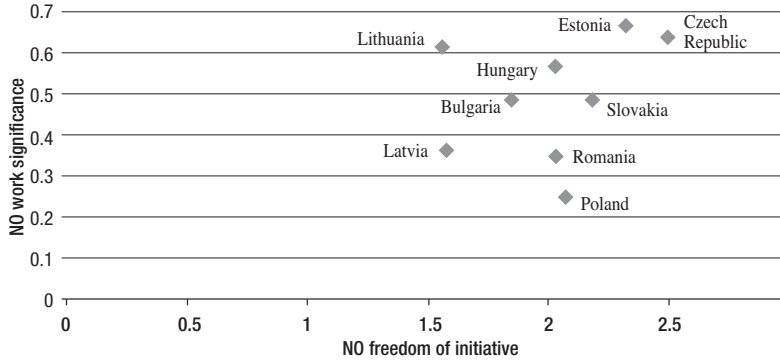
Table A6:
Pooled One-Stage estimations for score variable

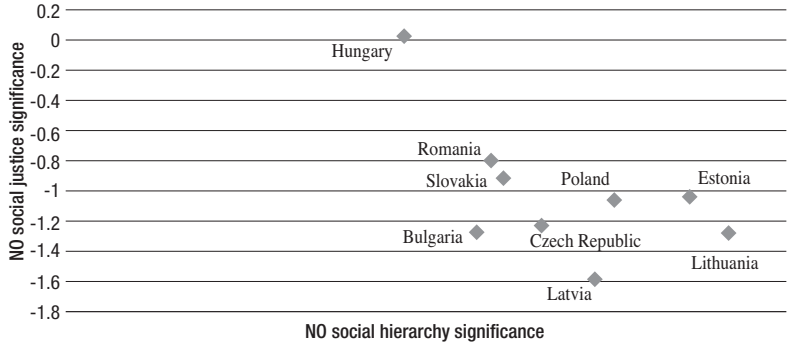
Dependent Variable: Score variable	Cross-sections included: 9
Method: Pooled Least Squares	Total pool (balanced) observations: 9
Included observations: 1	White diagonal standard errors & covariance (degree of freedom. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
No freedom of initiative	0.438234	0.141115	3.105500	0.0145
No importance of work	1.884807	0.490021	3.846382	0.0049
No hierarchical management style	0.714377	0.196730	3.631255	0.0067
No importance of social justice	-0.783122	0.228900	-3.421236	0.0091

Figure A1 and A2

THE SCATTERPLOTS FOR CULTURAL VARIABLES





REFERENCES

BARKEMA, H.G. AND VERMEULEN, F. [1997], "What differences in the cultural backgrounds of partners are detrimental for international joint ventures?", *Journal of International Business Studies*, 28(4), 845-864

BASKERVILLE, R.F. [2003], "Hofstede never studied culture", *Accounting, Organizations and Society*, 28(1), 1-14

BELKAOUI, A. [1989], "Cultural determinism and professional self-regulation in accounting: A comparative ranking", *Research in Accounting Regulation*, 3, 93-101

BOGDAN, V. AND CRISTEA, Ş. [2008], "Rules (or Laws) vs. Standards. Research regarding the accounting regulation trends in Eastern and Central European countries", *Accounting and Management Information Systems Journal* [OT: Revista *Contabilitate şi Informatică de Gestiune*], 25, 72-92

BOND, M.H. [1988], "Finding universal dimensions of individual variation in multicultural studies of values: The Rokeach and Chinese value surveys", *Journal of Personality and Social Psychology*, 55(6), 1009-1015

CHANCHANI, S. AND WILLET, R. [2004], «An empirical assessment of Gray's accounting value constructs», *International Journal of Accounting*, 39(2)

CHOW, L. M., CHAU, G. K. AND GRAY, S. J. [1995], "Accounting reforms in China: Cultural constraints on implementation and development", *Accounting and Business Research*, 26(1), 29-49

COZZI, G. [1998], "Culture as a Bubble", *Journal of Political Economy*, 106(2), 376-394

DUNN, P. [2002], "International Accounting Standards", *Journal of Accounting Literature*

GERNON, H. AND WALLACE, R.S.O. [1995], "International accounting research: A review of its ecology, contending theories and methodologies", *Journal of Accounting Literature*, 14, 54-106.

GRAY, S.J. [1988], "Towards a Theory of Cultural Influence on the Development of Accounting Systems Internationally", Abacus, 24(1), 1-15

HARRISON, G.L. AND MCKINNON J.L. [1986], "Culture and Accounting Change: A New Perspective on Corporate Reporting Regulation and Accounting Policy Formulation", *Accounting, Organisations and Society*, 11(3), 233-252

HOFSTEDE, G. & BOND, M.H. [1988], "The Confucius connection: From cultural foots to economic growth", *Organisational Dynamics*, 16(1), 5-21

HUSSEIN, M.E. [1996], "A comparative study of cultural influences on financial reporting in the U.S. and the Netherlands" *The International Journal of Accounting*, 31 (1), 95-120

KROEBER, A.L. AND KLUCKHOHN, C. [1952], "Culture. A critical review of concepts and definitions", *Peabody Museum Papers*, 47(1)

MACARTHUR, J. B. [1996], "An investigation into the influence of cultural factors in the international lobbying of the international accounting standards committee: The case of E32, comparability of financial statements", *The International Journal of Accounting*, 31(2), 213-237

PERERA, H. [1989], "Towards a framework to analyze the impact of culture on accounting", *The International Journal of Accounting*, 24, 42-56

PERERA, H. [1994], "Culture and international accounting: Some thoughts on research issues and prospects", *Advances in International Accounting*, 7, 267-285

PERERA, M.H.B. AND MATHEWS, M.R. [1990], "The cultural relativity of accounting and international patterns of social accounting", *Advances in International Accounting*, 3, 215-251

POURJALALI, H. AND MEEK, G. [1995], «Accounting and Culture: The case of Iran", *Research in Accounting in Emerging Economies*,. 3, 3-17

ROBERTS, C.B. AND SALTER, S.B. [1999], "Attitudes towards uniform accounting: Cultural or economic phenomena?", *Journal of International Financial Management and Accounting*, 10 (2), 119-142

SALTER, S. B. AND NISWANDER, F. [1995], "Cultural influence on the development of accounting systems internationally: A test of Gray's [1988] theory", Journal of International Business Studies, 26(2), 379-397

SONDERGAARD, M. [1994], "Hofstede's consequences: A study of reviews, citations and replications", *Organization Studies*, 15(3), 447-456

SMITH, P. B., DUGAN, S. AND TROMPENAARS, F. [1996], "National culture and the values of organizational employees: A dimensional analysis across 43 nations", J*ournal of Cross-Cultural Psychology*, 27(2), 231-264

ADLER, N. [1986], *International Dimensions of Organizational Behavior*, Kent Publishing Company

HIRSHLEIFER, J. [2001], *The Dark Side of the Force: Economic Foundations of the Conflict Theory*, Cambridge University Press

HOFSTEDE, G. [1980], *Culture's consequences*, Sage Publications

HOFSTEDE, G. [1991], *Cultures and Organizations, Software of the Mind: Intercultural Cooperation and its Importance for Survival*, McGraw-Hill Book Company Europe

HOFSTEDE, G. [2001], *Culture's consequences: Comparing values, behaviors, institutions and organizations across nations*, Second, Sage Publications, London

HOPPE, M. H. [1990], *A comparative study of country differences in work-related values and learning and their implications for management training and development*, University of North Carolina at Chapel Hill

INGLEHART, R. [2008], *Inglehart-Welzel Cultural Map of the World*

DING, Y., JEANJEAN, T. AND STOLOWY, H. [2004], «Why do national GAAP differ from IAS? The role of culture», Discussion Paper at European Accounting Association Congress, Athens

TALPOŞ, I., DIMA, B., MUTAŞCU, M. AND ENACHE, C. [2005], "Agency, associations and culture: a tale of state and society", Discussion Paper at Public Choice Society Annual Meeting, New Orleans, March 10-13

ORIOL, A., BLAKE, J., WRAITH, P. AND OLIVERAS E. [1999], «Dimensions of National Culture and the Accounting Environment - The Spanish Case», Economics Working Papers 394, Department of Economics and Business, Universitat Pompeu Fabra

EUROPEAN VALUES STUDY GROUP AND WORLD VALUES SURVEY ASSOCIATION [2006], *European and World Values Surveys Four-Wave Integrated Data File*, 1981-2004, v.20060423. Aggregate File Producers: Análisis Sociológicos Económicos y Políticos (ASEP) and JD Systems(JDS), Madrid, Spain/Tilburg University, Tilburg, The Netherlands. Data Files Suppliers: Analisis Sociologicos Economicos y Politicos (ASEP) and JD Systems (JDS), Madrid, Spain/Tillburg University, Tillburg, The Netherlands/ Zentralarchiv fur Empirische Sozialforschung (ZA), Cologne, Germany:) Aggregate File Distributors: Análisis Sociológicos Económicos y Políticos (ASEP) and JD Systems (JDS), Madrid, Spain/Tillburg University, Tilburg, The Netherlands/ Zentralarchiv fur Empirische Sozialforschung (ZA) Cologne, Germany.

PRICEWATERHOUSECOOPERS [2004], *Doing Business and Investing in the Slovak Republic*

THE CENTRAL AND EAST EUROPEAN CAPITAL MARKETS: SOMETHING NEW HAS HAPPENED ON THE EAST FRONT

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ABSTRACT:

The aim of this paper is the analysis of some of the capital markets from Central and Eastern Europe in terms of efficiency, interconnections and volatility. A Component ARCH(1,1) (with threshold) and Generalized Error for errors distribution is used to detect the structural changes in the indexes volatilities and a construction methodology for an individual covariance index is proposed. The main results show: a weak sense of informational efficiency, some still important institutional, structural and functional deficiencies; important differences in the annual evolutions; a weak integration between markets.

JEL classification: E12, G15, G32, O52)

INTRODUCTION

The financial crises over the last decades have shaken profoundly the developing economies in the 1990's and 2000's. Over the past dozen years, there has been quite a lot of empirical work analyzing the evolutions and

the causes of the financial crises in the emergent markets, the transmission mechanisms to other economies and which economies would be most affected by the particular transmission on contagion mechanisms.

Detailed analysis of some of the evolutions in the emergent capital markets from Central and Eastern Europe could be seen in CLAESSENS, KLINGEBIEL AND SCHMUKLER [2002], KOKE AND SCHRODER [2003].

Starting from the questions asked by MINSKY [1982] who discussed the possibility of recurrence of depression in United States' case, a lot of other researchers have supported the idea that the financial markets are intrinsically unstable (see SKOTT[1995], KREGEL[1998], SCHROEDER [2003]). In the stable growth phases riskier investment practices and shakier financial structures will develop. As a final result the boom period will be followed by a boom on the financial markets. ARORA and CERISOLA [2001], ANDERSON [2005], GOLDSTEIN [2005] present sums of different indicators in order to asses the vulnerability of individual emerging economies to various shocks. ONARAM [2006 and 2007] analyses the fragility of the new member states in the Central Eastern and South Eastern Europe to the turbulences in the global economy and the changes in the direction of the international capital flows. He argues that on the long run, the EU anchor will not be enough for Eastern Europe. Financial regulations along with industrial policy are the only long-run policy options to prevent financial fragility and the potential causes of a future crisis.

Starting from this, the aim of this paper is to create an analysis of the latest evolutions in the Central and Eastern European capital markets as a basis for understanding the future expected changes in their dynamics and volatility. The paper starts with a short presentation of the structural transformations in the Central and Eastern Europe and the implications of the global financial turmoil over the emerging market from this part of Europe (section 2), followed by a general analysis of the capital markets from the selected countries (section 3). The fourth part represents the main core of the paper in which we offer an analytical framework for

the latest evolutions in the selected countries, able to offer a basis for the conclusions drawn in the fifth part.

1. THE STRUCTURAL TRANSFORMATION IN CENTRAL AND EASTERN EUROPE WITHIN THE GLOBAL FINANCIAL TURMOIL

Mainly, with specific particularities in which country, the structural transformation in Central and Eastern Europe was concretised in introducing market mechanisms, disappearance of the centralised economical system, privatisation of the public owned firm, private investment stimulation and the use of the monetary, fiscal and financial leverages in order to consolidate the market economical system.

Some of the institutional changes led to large scale problems which will also generate effects in the next years. There are significant differences between states: in the Czech Republic, Poland and Hungary the privatisation was a real success, so in the present a large part from the gross domestic product comes from the private owned enterprises. In Bulgaria and Romania the degrees are smaller but increasing (for instance in Romania over 60% comparing with only 16% in 1990). The banking system and the stock exchanges had different evolutions and, for some of the states, there are still problem sectors.

Analysed as an ensemble, the Central and Eastern European countries were characterised by a positive economical growth. The efforts they made for the adhesion to the European Union was positively reflected over the next period. For instance, during 2002-2003 the EE-3 economies (Poland, Hungary and Czech Republic) had a faster growth than the western countries. In this context, the direct investment in the candidate countries did not overtake 1.5%-2% from the total world investments even if at the beginning of the new decade a total amount of 11 billion dollars had been invested in Poland, Hungary, Czech Republic, Estonia and Slovenia.

Unfortunately the Central and Eastern European countries were not spared from the global turbulences in the world economy especially in the last period, after May-June 2006. A lot of investors, as a result of the rise in

the US interest rates, redirected their investments, generating a massive flee from the emerging markets. This hit especially Hungary but Poland and Slovakia were also affected.

But May-June 2006 is only the beginning of the crisis, since the fear that the slowdown in the US economy will upset the fragile harmony of the global economy is only one of this turmoil's determinants. The evolution of the global economy itself was too long supported by risky funds so the US crisis is just the drop which filled up the glass. In the last years the absence of severe recessions made the investors more confident and increased the appetite for new risky financial instruments and for a high degree of debt/asset ratio. Theoretically, the banks could transfer the risk towards hedge funds; this is what they tried to do when the crisis struck, but the hedge funds had relied on cheap credit to refund their risky investments across the globe, as well as large takeovers and leveraged buyouts. In this context, due to the crisis on the sub-prime mortgage markets in the spring of 2007 (loans to people without income and job asset), the riskiest mortgage backed securities' prices have fallen and some hedge funds started to have serious liquidity problems. It is true that the impact this crisis had on emergent countries was softer than the one recorded in some more developed countries like Japan.

After the Federal Reserve Bank cut the interest, the investors returned back partially due to the bigger profitability of the emergent countries and partially because these did not appear as affected by the US crisis as the rest of the more developed countries. As an effect, the International Monetary Fund reported that the net inflows of private capital to emerging economies had increased to almost 4% of their gross domestic product on average in 2007, going beyond the peak of the previous wave in the first half of the 1990's, and the net inflows to emerging European economies are even higher (the Economist, July 2007).

Even if as a result of the crisis there had been some adjustments in all economies such as the re-pricing of risk or increasing credit spreads, the emerging European economies are still vulnerable due to a sum of factors such as tighter liquidity, relatively higher spreads, substantial current

account deficits, relatively high inflation rates, external borrowing by the banks, soaring domestic credit and property bubbles. Of course, the vulnerability degree is different for each of the countries from the region depending of its specific condition.

2. PAST AND PRESENT IN THE CENTRAL AND EASTERN EUROPEAN CAPITAL MARKETS

This study uses four capital markets as an analysis sample: Bucharest Stock Exchange, Sofia Stock Exchange, Prague Stock Exchange and Warsaw Stock Exchange. In order to create a perspective and to further extend the analysis, the proposed approach starts with the history of each exchange and continues with the recent events and evolutions.

2.1.Bucharest Stock Exchange

The Bucharest Stock Exchange (BSE) was founded in 1882 with Greek traders among the founders. The stock exchange activity was step by step affected by the social economical events in the history. In 1907 the quotations crashed as a result of the popular revolts and the beginning of the First World War led to the cease of the exchange. The period between the two World Wars, until 1926, remained in history as the "period of the great stock exchange movement". The quotations were continuously rising starting with the transport companies, followed by the banks and insurances companies. In 1929 the capital market is reorganised and the stock exchanges' turnover increased at 1.3 billion lei in 1929 and at 6 billion lei in 1936. Unfortunately, like the other Eastern European countries that chose the centralised planning system, the stock exchange was shut down for almost 50 years and returned to operation only on April 21, 1995.

Studying the BSE's evolution, one could reveal the existence of some development stages: the initial stage (1995-1996) that led to the high growth in the first part of 1997; the second one starting from the second part of 1997 to 1999, when the BSE regressed; the third stage starting

from 2000, when the falling stopped and the BSE started to develop a long term solid foundation. After 2000 the evolution of the BSE was relatively favourable with a high peak (see the two graphics below[(1)]) in 2004-2005 (in 2005 the holdings limit for the Financial Investments Societies had increased and the largest Romanian bank was privatised) and the lowest point in 2006 when the BET index had the smallest return in the last six years[(2)].

Figure 1

THE EVOLUTION OF MARKET CAPITALISATION ON BSE IN 2001-2007

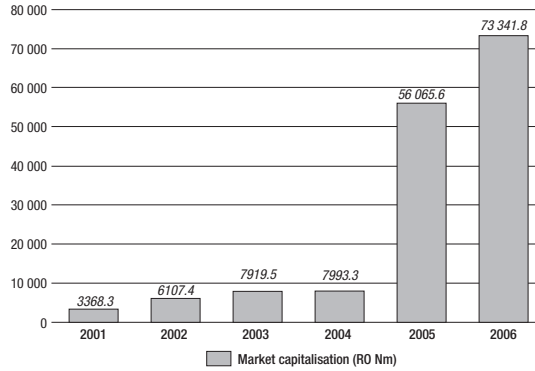
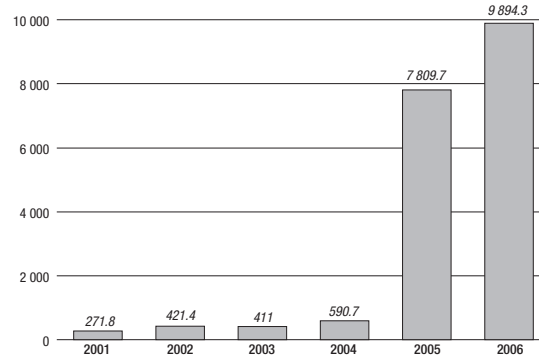


Figure 2

THE EVOLUTION OF TRADE'S VOLUME ON BSE IN 2001-2007



(1) The data are from www.bnro.ro

(2) www.kmarket.ro

Of course these positive evolutions could be appreciated only if we compare them with the previous years because on the international scene BSE remains a minor presence due to the small turnover, reduced liquidity and the lack of some diversified financial instruments.

2.2. Sofia Stock Exchange

One could speak about the Bulgarian capital market starting from 1907 when the first stock exchange law was adopted and concerned the structure and functions of securities and commodities. After the First World War the stock exchanges activities were restarted in 1920 and a high turnover during the 1930s could be noticed. Under the communist regime, as in other Eastern countries, the exchange was shut down and its re-establishment did not take place until 1991 when the regime collapsed and a new trade law was enacted.

During the 1992-1994 period almost every major Bulgarian city had its own exchange. All these markets operated without any regulation until 1995 when all Bulgarian capital markets were consolidated to create the Bulgarian Stock Exchange. The year 1995 marked the establishment of the Capital Market Commission and the drafting of preliminary legal framework for quoting firms on the exchange. The massively privatised companies were listed on the so-called "Free Market" and until 1998 this was the place the trades took place. Starting from 1998 a lot of other firms were listed on the exchange's "Official Market", which by the end of 1999, counted 32 companies(3).

After 2000 the evolutions of the Sofia Stock Exchange were generally positive. The last five years have shown a important rise due to the country's monetary and fiscal stability combined with the anticipation of its accession in the European Union and its internal gradual maturity of its capital market. As one can se in the next two graphics(4) market capitalisation increased from 2003 to 2007 with almost 800%. Also the

(3) Exchanging in the Balkans in "The Bridge", Issue 8-Q1/2008

(4) Report of Bulgarian Stock Exchange-Sofia for 2007 – www.bse-sofia.bg

market capitalisation /GDP ratio increased from less than 8% in 2003 to more than 50% in the 2007.

Figure 3

THE EVOLUTION OF MARKET CAPITALISATION ON SOFIA STOCK EXCHANGE IN 2001-2007

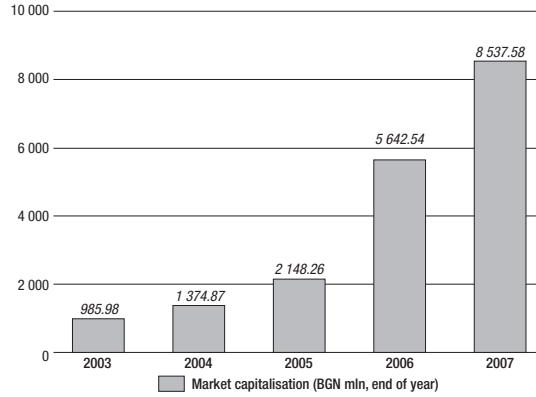
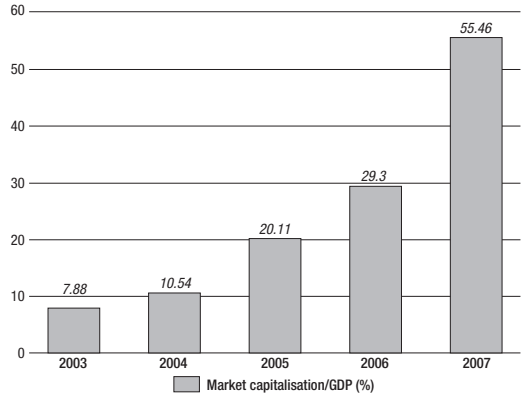


Figure 4

MARKET CAPITALISATION/GDP RATIO



The evolution of Bulgaria's capital market in the last years became sensitive to the one of the international markets. If in the beginning of 2007, 41.67% of the market capitalisation had been held by foreign

investors, in the end of 2007 the aggregate share in the capital of public companies held by foreign investors dropped to 22.56%(5).
Despite the generally positive perspective of the market evolution one could also notice its weakness. The lack of market liquidity and depth, the preference for the unsupervised "Free" market instead of the regulated one, the lack of an entrepreneurial and general capital market culture are just some of them.

2.3.Prague Stock Exchange

There were several attempts to organize a stock exchange, starting from the reign of the Empress Maria Theresa, but the creation of the Prague Exchange was achieved only in 1871. For start, the Prague Exchange enjoyed great success trading sugar, becoming the key market for the whole Austro-Hungarian Empire but after the First World War there was a certain decline of this type of transaction and only securities were traded. Similar with other countries from this part of Europe, the interwar period became the era of its greatest boom and the Prague Exchange even surpassed the Vienna Exchange in regards of importance. However, this period of prosperity was interrupted by the Second World War which set back the Prague Exchange with 60 years.

The modern history of the Prague Stock Exchange (PSE) began with the first trades made on the renewed exchange in April 1993.

The evolutions in the 2000s were relatively stable, growing, excepting 2001 when the market capitalisation receded from 442.9 billion CZK in 2000 to 340.3 billion CZK(6). This situation has at least two causes. On the one side, in the 2001 strict criteria were imposed for registration of securities on organised markets, which resulted in illiquid issues being withdrawn from the Exchange market and the introduction of informational disclosure regulations regarding all registered securities. On the other side, trading on the PSE was influenced in 2001 to a large

(5) Analysis of Bulgaria's capital market and strategy of BSE for its development by 2010 – www.bse-sofia.bg
(6) Source of data: Annual Report 2001-Prague Stock Exchange :www.pse.cz

extend by the situation on foreign markets. The most significant fall in the Exchange's main indices occurred in September, after the terrorist attacks on the United Stated. The next year the reforming of the Czech capital market was continued and in May 1st 2003 new laws were imposed: Capital Markets Undertaking Act, Bond Act and Collective Investment Act[7]. As a result, all the market indicators were in a continuous increase as we can see in the next two graphics[8]:

Figure 5

THE EVOLUTION OF MARKET CAPITALISATION ON PSE IN 2001-2006

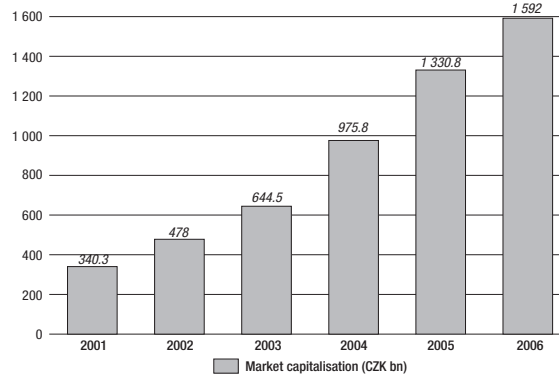
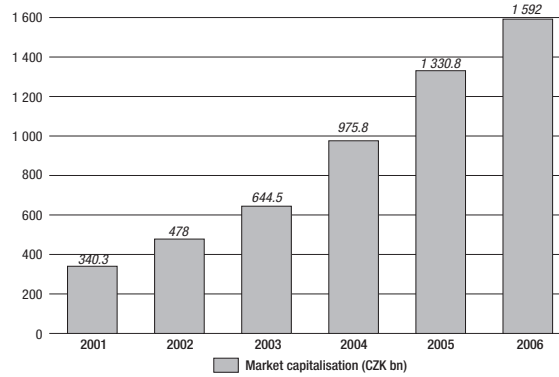


Figure 6

THE EVOLUTION OF TRADE'S VOLUME ON PSE IN 2001-2006



(7) Annual Report 2003-Prague Stock Exchange

(8) Source of data:Annual Report 2001-2006 –Prague Stock Exchange

One could notice that the year 2006 marked two important achievements at PSE.: derivatives were successfully launched on 5 October 2006, the total trade value of future contracts reached CZK 32.2 million(9); on 4 October 2006 the Exchange began trading with investments certificates allocated to a single specialist.

2.4.Warsaw Stock Exchange

The Warsaw Stock Exchange (WSE) is the oldest and largest exchange analysed in our paper. It opened on May 12, 1817, initially mostly for bonds and other debt instruments. Trading in equity started to develop in the second half of the 20th century. Due to the change of political and economic systems, capital markets could not be re-created after the end of the Second World War. The WSE began its present activity on April 16, 1991 and is at the present the largest stock exchange in Central and Eastern Europe.

The last year's evolutions could be split in two main periods: 2000-2002 and 2003-2008. In 2000 the signs of the future crisis were already visible even if one could notice the spectacular development of the futures market(10), which situated the WSE on the seventh position in Europe on turnover, value and volume in futures contracts. 2001 and 2002 were very difficult years for investors, companies and capital market intermediaries due to internal factors like poor results of listed companies, high interest rates discouraging investments, Polish budgetary crisis, but also enforced by a difficult political and economic situation worldwide.

2003 was the point of change. One could notice the successful introducing of options, the first listing of a foreign company and the implementation of corporate governance best practices. The trend continued in the next years, each of them breaking the record of the former one. Besides the good values in financial indicators one could notice that in 2004 a lot of new companies were quoted on the WSE, partially due to the admission of

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(9) Annual Report 2006-Prague Stock Exchange

(10) Fact Book 2001 –Warsaw Stock Exchange:www.polishworld.com/wse

Poland in the European Union as a full member. The next three years were by far the best years in history as shown in the next two graphics(11). Each of them were years of records: the highest turnover in history, the indices setting continuously new all-time highs, record market capitalisation and dividends paid out by listed companies.

Figure 7

THE EVOLUTION OF MARKET CAPITALISATION ON WSE IN 2001-2007

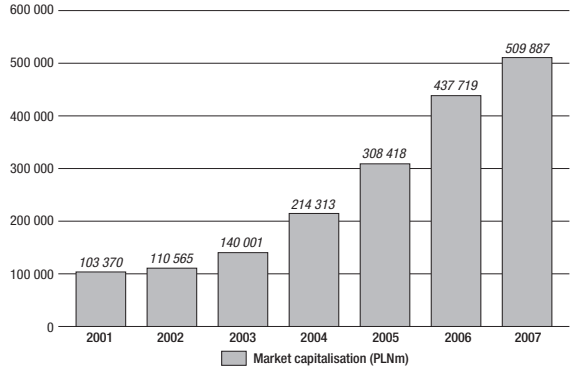
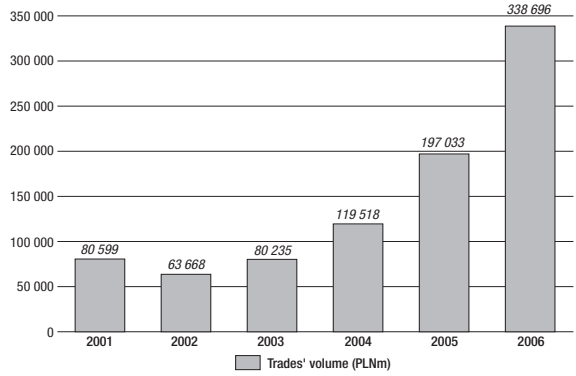


Figure 8

THE EVOLUTION OF TRADE'S VOLUME ON WSE IN 2001-2007



(11) Source of data: Fact Books 2001-2008 –Warsaw Stock Exchange

3. THE ANALYTICAL FRAMEWORK

The evolution of the Central and East European capital markets is characterised by a mix of specific elements for emergent markets in general as well as of particular local evolutions. In order to reflect some of these we are proposing an analysis based on:

- The global statistics description focused especially on the changes in markets' indexes distributions;
- The search of the "structural breaking points"- the periods of dynamic pattern changes;
- The inter-linkages between the markets under the impact of endogenous capital inflows and external driving forces;
- The volatility analysis as a support for a further study of the financial (in)stability in the area.

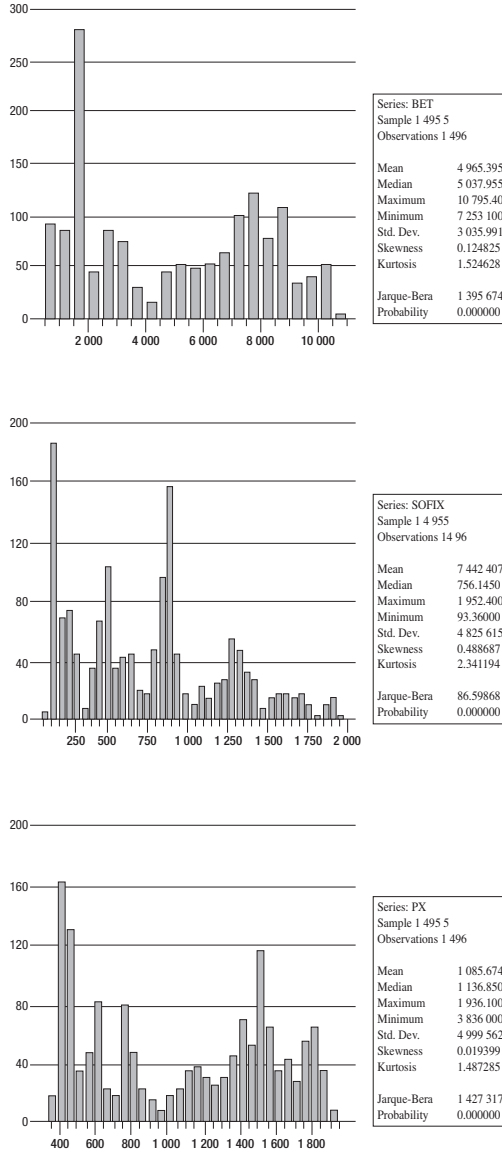
As we mentioned before the analytical set is formed by four local capital markets: Bucharest Stock Exchange, Sofia Stock Exchange, Prague Stock Exchange and Warsaw Stock Exchange. The indexes considered as markets descriptors are: BET, SOFIX, PX and WIG20.

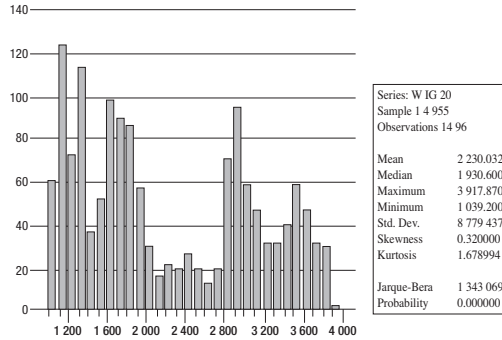
The analysis period is: 11/26/2001-6/2/2008 (daily data[12]). The starting point is represented by the indexes histograms (Graphic 9). The main objective is to see if there could be identified or not a "close to normal" distribution of the indexes. The implicit postulate consist in the idea that such a distribution could be seen as a "first sign" of a sort or other of "market informational efficiency".

(12) The source of the data is: www.stooq.com

Figure 9

INDEXES HISTOGRAMS





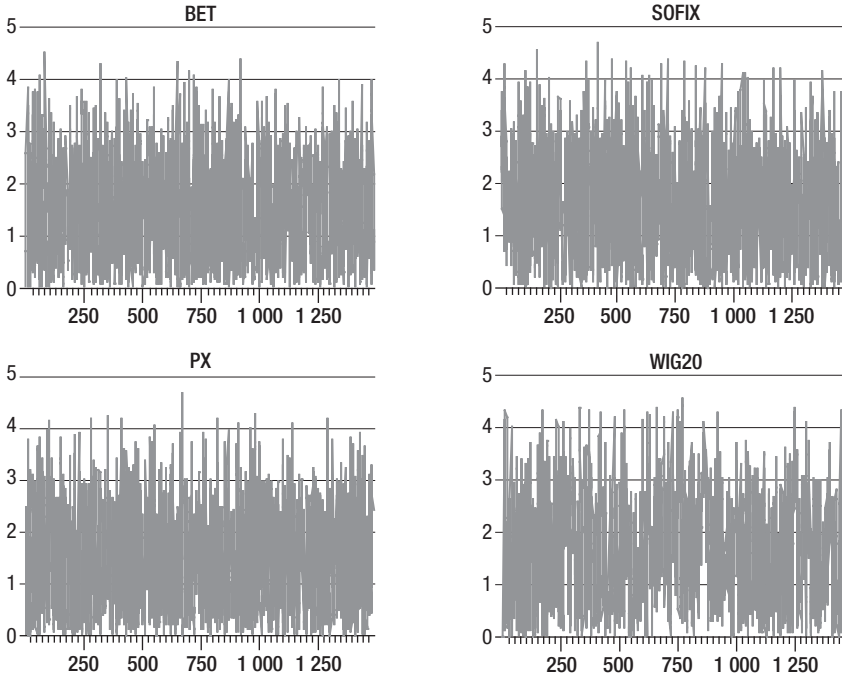
The indexes histograms suggest that all of them display a *long right tail* and "flat" *(platykurtic)* distribution relative to the normal one. The distribution could be seen as a sign of the market efficiency so that this preliminary analytical step indicates that the involved markets are affected by different levels of "inefficiency". Of course, this is only a very rough estimation and further analyses are required. One critical requirement consists in the necessity to identify the different shifts in the distributions according to the markets' evolution. In this sense, it could be computed a global distribution parameter based on the deviations of the individual *Skewness* and *Kurtosis* from their values characteristic for the normal distribution as:

$$(1) \quad GLOBDP_t = \frac{\left(skew(P_{t-k}, P_t)\right)^2 + \left(kurt(P_{t-k}, P_t) - 3\right)^2}{9}$$

In order to illustrate how this works, below are displayed the values of the parameter for :

Figure 10

THE DISTRIBUTION PARAMETER



It could be noticed the fact that the distribution parameter change itself over the analysis period as a expression of the markets' mechanisms modifications without coming closer to "zero" (the baseline value for the normal distribution).In other words, there are no evidences that the considered markets has reached the "informational efficiency frontier" yet. Of course, these results are not enough to reach a solid conclusion in this sense.

For instance, it is necessary to test if the *random walk* model is an accurate description of the market prices evolution. In other words, is necessary to proceed at check of:

(2) $P_t = \alpha + P_{t-1} + \varepsilon_t$

with P, α, ε_t the level of market index, an arbitrary drift parameter and respectively a "white noise shock".

Table 1
The random walk (with drift) indexes tests

A) BET

Included observations: 4955				
Valid observations: 1496				
	Coefficient	**Std. Error**	**z-Statistic**	**Prob.**
C(2)	9.135677	0.018435	495.5734	0.0000
C(3)	4.820628	2.522866	1.910774	0.0560
	Final State	**Root MSE**	**z-Statistic**	**Prob.**
SV1	24625.57	5666.634	4.345715	0.0000
Log likelihood	-8963.136	Akaike info criterion		11.98548
Parameters	2	Schwarz criterion		11.99258
Diffuse priors	1	Hannan-Quinn criter.		11.98812

B) SOFIX

Included observations: 4955				
Valid observations: 1496				
	Coefficient	**Std. Error**	**z-Statistic**	**Prob.**
C(2)	4.869881	0.014541	334.9102	0.0000
C(3)	0.765414	0.297680	2.571267	0.0101
	Final State	**Root MSE**	**z-Statistic**	**Prob.**
SV1	3888.594	671.4587	5.791263	0.0000
Log likelihood	-5772.265	Akaike info criterion		7.719605
Parameters	2	Schwarz criterion		7.726705
Diffuse priors	1	Hannan-Quinn criter.		7.722250

C) PX

Included observations: 4955				
Valid observations: 1496				
	Coefficient	**Std. Error**	**z-Statistic**	**Prob.**
C(2)	5.393109	0.015432	349.4720	0.0000
C(3)	0.854689	0.390491	2.188755	0.0286
	Final State	**Root MSE**	**z-Statistic**	**Prob.**
SV1	4642.325	872.2415	5.322293	0.0000
Log likelihood	-6163.767	Akaike info criterion		8.243003
Parameters	2	Schwarz criterion		8.250103
Diffuse priors	1	Hannan-Quinn criter.		8.245649

D) WIG20

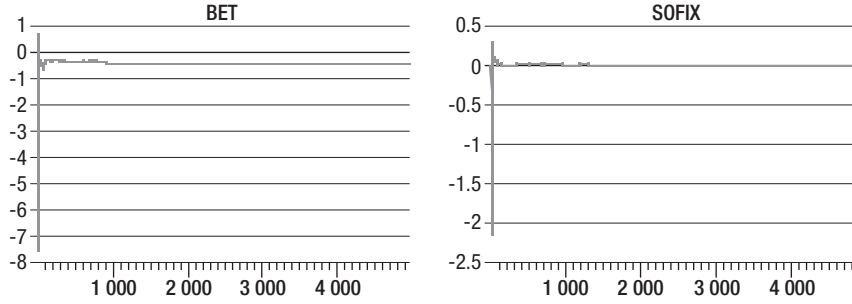
Included observations: 4955				
Valid observations: 1496				
	Coefficient	**Std. Error**	**z-Statistic**	**Prob.**
C(2)	7.180868	0.022534	318.6709	0.0000
C(3)	1.088066	0.940682	1.156678	0.2474
	Final State	**Root MSE**	**z-Statistic**	**Prob.**
SV1	6656.939	2132.277	3.121986	0.0018
Log likelihood	-7500.912	Akaike info criterion		10.03063
Parameters	2	Schwarz criterion		10.03773
Diffuse priors	1	Hannan-Quinn criter.		10.03328

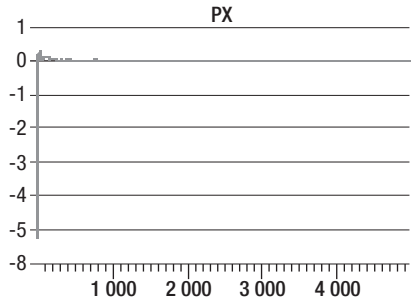
It could be noticed the fact that for all indexes the *random walk* variables are statistically significant. The same results for the drift component (with the possible exception of the *WIG20* index) are appearing. Based on this, it could be preliminary conclude that the considered markets displays some *informational efficiency* at least in a weak sense.

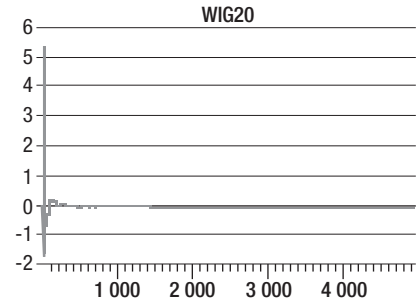
Of course, this is only a global judgment and it does not take into account possible "structural changes" from institutional and functional point of view. For instance, by running a simple autoregressive model on prices first order difference it could be observed that the AR parameter fluctuates significant over the first part of the analysis period and becomes "stables" in the last one.

Figure 11

THE AR(1) DYNAMIC PARAMETER FOR THE INDEXES FIRST ORDER DIFFERENCE







In fact, the entire period could be decomposed in three main sub-periods (11/26/2001-1/6/2003; 1/7/2003-1/3/2007; 1/4/2007-6/2/2008) each of them with its own distinct characteristics (Table 2). More exactly, with a significant lower level for the Bucharest Stock Exchange's index, the null of no structural changes from the ***Chow Breakpoint Test*** could not be sustained.

Table 2

Chow Breakpoint Test: 11/26/2001-1/6/2003; 1/7/2003-1/3/2007; 1/4/2007-6/2/2008

Null: No structural changes

A) BET

F-statistic	0.228755	Probability	0.795551
Log likelihood ratio	0.458459	Probability	0.795146

B) SOFIX

F-statistic	3.961206	Probability	0.019241
Log likelihood ratio	7.917436	Probability	0.019088

C) PX

F-statistic	3.563923	Probability	0.028569
Log likelihood ratio	7.125269	Probability	0.028364

D) WIG20

F-statistic	2.340886	Probability	0.096596
Log likelihood ratio	4.683940	Probability	0.096138

The structural changes could be detected not only in indexes levels but also in their volatilities. In order to illustrate this aspect, an *Component ARCH(1,1) (with threshold) and Generalized Error for errors distribution* could be involved for the volatility simulation. This method combines the component model with the asymmetric TARCH model, introducing asymmetric effects in the transitory equation and estimates models of the form:

$$y_t = x'_t\pi + \varepsilon_t$$

$$(3)\quad m_t = \omega + \rho(m_{t-1} - \omega) + \varphi(\varepsilon^2_{t-1} - \sigma^2_{t-1}) + \theta_1 z_{1t}$$

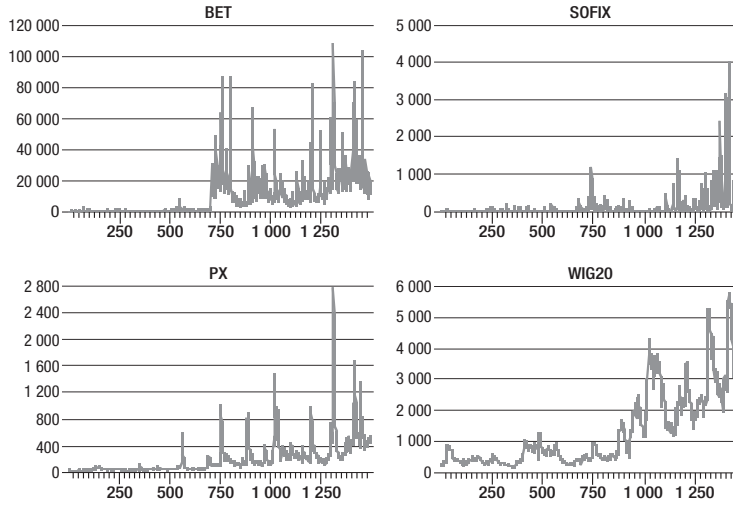
$$\sigma^2_t - m_t = \alpha(\varepsilon^2_{t-1} - m_{t-1}) + \gamma\alpha(\varepsilon^2_{t-1} - m_{t-1})d_{t-1} + \beta(\sigma^2_{t-1} - m_{t-1}) + \theta_2 z_{2t}$$

where z are exogenous variables and d is the dummy variable indicating negative shocks. A $\gamma > 0$ parameter indicates the presence of transitory leverage effects in the conditional variance.

It could be noticed that there is a tendency of volatility increase especially for 2007-2008 when the estimations displays important "peaks".

Figure 12

THE COMPONENT ARCH MODEL FORECAST OF VOLATILITIES



A further analytical step consists in taking into account the possible inter-linkages between the markets. This could be done based on a JOHANSEN co-integration test able to capture the "co-movements" between two or more non-stationary series. More exactly, Engle and Granger [1987] pointed out that a linear combination of two or more non-stationary series may be stationary. If such a stationary linear combination exists, the non-stationary time series are said to be co-integrated. The stationary linear combination is called the co-integrating equation and may be interpreted as a "long-run" equilibrium relationship among the variables.

Table 3:The ADF Test

I. The hypothesis of (trend-)stationarity for the level of indexes based on Augmented Dickey-Fuller (ADF) Test (*Null Hypothesis: the variable has a unit root; Exogenous: Constant, Linear Trend; the choice of lag length is based on "Modified Hannan-Quinn" procedure*)

A) BET

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.501665	0.8290
Test critical values:	1% level	-3.964194	
	5% level	-3.412819	
	10% level	-3.128392	

**MacKinnon (1996) one-sided p-values.*

B) SOFIX

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.269092	0.4502
Test critical values:	1% level	-3.964223	
	5% level	-3.412833	
	10% level	-3.128400	

**MacKinnon (1996) one-sided p-values.*

C) PX

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.001855	0.5993
Test critical values:	1% level	-3.964194	
	5% level	-3.412819	
	10% level	-3.128392	

**MacKinnon (1996) one-sided p-values.*

D) WIG20

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.874927	0.6670
Test critical values:	1% level	-3.964194	
	5% level	-3.412819	
	10% level	-3.128392	

**MacKinnon (1996) one-sided p-values.*

The ADF tests suggest that all the four indexes could be described as "unit root processes". So that:

Table 4
The Johansen Co-Integration Test

II. The Johansen Co-Integration test (intercept and no trend in CE-no intercept in VAR)

Included observations: 1489 after adjustments
Trend assumption: No deterministic trend (restricted constant)
Series: WIG20 PX SOFIX BET
Lags interval (in first differences): 1 to 6

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	5 Percent Critical Value	1 Percent Critical Value
None *	0.020665	58.00915	53.12	60.16
At most 1	0.008479	26.91650	34.91	41.07
At most 2	0.006285	14.23685	19.96	24.60
At most 3	0.003251	4.848344	9.24	12.97

Trace test indicates 1 co-integrating equation(s) at the 5% level
Trace test indicates no co-integration at the 1% level
**(**) denotes rejection of the hypothesis at the 5%(1%) level*

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	5 Percent Critical Value	1 Percent Critical Value
None *	0.020665	31.09265	28.14	33.24
At most 1	0.008479	12.67965	22.00	26.81
At most 2	0.006285	9.388503	15.67	20.20
At most 3	0.003251	4.848344	9.24	12.97

Max-eigenvalue test indicates 1 co-integrating equation(s) at the 5% level
Max-eigenvalue test indicates no co-integration at the 1% level
**(**) denotes rejection of the hypothesis at the 5%(1%) level*

The test identifies a "weak" co-integration equation (at a 5% level) but there is no clear evidence for its stability. Still, this is enough to build up a Vector Errors Correction (**VEC**) to describe the possible interactions between the markets by drawing the "impulse reaction" functions designed to simulate the evolution of an individual market under the impact of unit shocks located in the others.

Table 5

The VEC model

Sample (adjusted): 8 1496
Included observations: 1489 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Co-integration Restrictions:				
B(1,1)=1				
A(1,1)=0				
A(2,1)=0				
A(3,1)=0				
Restrictions identify all co-integrating vectors				
LR test for binding restrictions (rank = 1):				
Chi-square(3)	0.492953			
Probability	0.920437			
Co-integrating Equation	CointEq1			
WIG20(-1)	1.000000			
PX(-1)	7.561518			
	(1.59507)			
	[4.74055]			
SOFIX(-1)	-1.763984			
	(0.84572)			
	[-2.08578]			
BET(-1)	-1.284524			
	(0.25513)			
	[-5.03469]			
C	-2672.699			
	(495.279)			
	[-5.39635]			
Error Correction:	D(WIG20)	D(PX)	D(SOFIX)	D(BET)
CointEq1	0.000000	0.000000	0.000000	0.019572
	(0.00000)	(0.00000)	(0.00000)	(0.00355)
	[NA]	[NA]	[NA]	[5.51396]
D(WIG20(-1))	0.049924	0.049151	0.013393	0.238815
	(0.03190)	(0.01296)	(0.00957)	(0.08158)

	[1.56487]	[3.79378]	[1.39899]	[2.92753]
D(WIG20(-2))	0.022518	0.036227	0.009791	0.053525
	(0.03210)	(0.01303)	(0.00963)	(0.08207)
	[0.70157]	[2.77930]	[1.01649]	[0.65218]
D(WIG20(-3))	-0.056263	0.001730	0.010749	0.084668
	(0.03217)	(0.01306)	(0.00965)	(0.08225)
	[-1.74918]	[0.13247]	[1.11358]	[1.02945]
D(WIG20(-4))	0.007677	0.026070	-0.004861	0.107625
	(0.03206)	(0.01302)	(0.00962)	(0.08198)
	[0.23946]	[2.00242]	[-0.50527]	[1.31288]
D(WIG20(-5))	0.032447	0.035314	-0.003370	-0.031246
	(0.03201)	(0.01300)	(0.00961)	(0.08185)
	[1.01361]	[2.71648]	[-0.35086]	[-0.38173]
D(WIG20(-6))	-0.028540	-0.020000	0.023640	-0.018854
	(0.03191)	(0.01296)	(0.00958)	(0.08159)
	[-0.89438]	[-1.54335]	[2.46868]	[-0.23107]
D(PX(-1))	-0.104074	-0.049649	0.083424	0.587748
	(0.08038)	(0.03264)	(0.02412)	(0.20554)
	[-1.29472]	[-1.52094]	[3.45841]	[2.85952]
D(PX(-2))	0.054647	-0.073224	-0.059369	-0.453475
	(0.08062)	(0.03274)	(0.02419)	(0.20615)
	[0.67782]	[-2.23653]	[-2.45391]	[-2.19975]
D(PX(-3))	0.195168	-0.019949	0.042328	0.028207
	(0.08090)	(0.03285)	(0.02428)	(0.20686)
	[2.41244]	[-0.60720]	[1.74355]	[0.13636]
D(PX(-4))	-0.008857	-0.030590	0.006253	-0.131269
	(0.08119)	(0.03297)	(0.02436)	(0.20759)
	[-0.10909]	[-0.92782]	[0.25668]	[-0.63234]
D(PX(-5))	-0.047827	-0.093190	0.022180	-0.010308
	(0.08094)	(0.03287)	(0.02429)	(0.20695)
	[-0.59092]	[-2.83526]	[0.91322]	[-0.04981]
D(PX(-6))	0.070022	0.037510	-0.059436	-0.140287
	(0.08096)	(0.03288)	(0.02429)	(0.20700)
	[0.86494]	[1.14095]	[-2.44654]	[-0.67770]
D(SOFIX(-1))	-0.046842	-0.029536	0.160296	-0.103991
	(0.08749)	(0.03553)	(0.02626)	(0.22372)
	[-0.53538]	[-0.83127]	[6.10524]	[-0.46483]
D(SOFIX(-2))	-0.029518	0.069728	-0.028948	0.767872
	(0.08863)	(0.03599)	(0.02660)	(0.22663)
	[-0.33305]	[1.93728]	[-1.08839]	[3.38823]
D(SOFIX(-3))	0.069972	0.012239	0.057303	1.038881
	(0.08909)	(0.03618)	(0.02673)	(0.22780)
	[0.78541]	[0.33829]	[2.14338]	[4.56046]

D(SOFIX(-4))	0.188017	0.071030	-0.004367	-0.544966
	(0.08958)	(0.03638)	(0.02688)	(0.22905)
	[2.09889]	[1.95255]	[-0.16244]	[-2.37921]
D(SOFIX(-5))	0.196198	0.152476	0.069850	1.071703
	(0.08964)	(0.03640)	(0.02690)	(0.22921)
	[2.18868]	[4.18851]	[2.59661]	[4.67556]
D(SOFIX(-6))	-0.003480	-0.028825	0.138385	0.181091
	(0.08820)	(0.03582)	(0.02647)	(0.22553)
	[-0.03945]	[-0.80474]	[5.22833]	[0.80295]
D(BET(-1))	-0.030746	-0.000151	0.004401	0.025665
	(0.01068)	(0.00434)	(0.00321)	(0.02732)
	[-2.87751]	[-0.03486]	[1.37256]	[0.93938]
D(BET(-2))	0.004732	-0.002115	0.006824	-0.026594
	(0.01069)	(0.00434)	(0.00321)	(0.02734)
	[0.44268]	[-0.48718]	[2.12709]	[-0.97290]
D(BET(-3))	0.019778	0.003223	0.000925	-0.015329
	(0.01068)	(0.00434)	(0.00320)	(0.02730)
	[1.85270]	[0.74344]	[0.28887]	[-0.56158]
D(BET(-4))	-0.025598	-0.008716	0.003525	-0.033025
	(0.01064)	(0.00432)	(0.00319)	(0.02720)
	[-2.40608]	[-2.01743]	[1.10421]	[-1.21398]
D(BET(-5))	0.003634	0.001213	-0.004155	-0.063098
	(0.01062)	(0.00431)	(0.00319)	(0.02716)
	[0.34209]	[0.28123]	[-1.30349]	[-2.32319]
D(BET(-6))	-0.012275	-0.007395	0.003464	0.003818
	(0.01050)	(0.00426)	(0.00315)	(0.02685)
	[-1.16916]	[-1.73435]	[1.09941]	[0.14223]
R-squared	0.032279	0.046509	0.121655	0.104737
Adj. R-squared	0.016414	0.030878	0.107256	0.090061
Sum sq. residuals	1901062.	313512.4	171193.5	12429476
S.E. equation	36.03526	14.63379	10.81367	92.14163
F-statistic	2.034673	2.975417	8.448780	7.136398
Log likelihood	-7437.511	-6095.677	-5645.221	-8835.427
Akaike AIC	10.02352	8.221191	7.616146	11.90118
Schwarz SC	10.11260	8.310275	7.705230	11.99026
Mean dependent	1.085030	0.861652	0.764278	4.836595
S.D. dependent	36.33470	14.86509	11.44483	96.59388

Determinant residuals covariance (degree o freedom adj.)	1.66E+11		
Determinant residuals covariance	1.55E+11		
Log likelihood	-27635.06		
Akaike information criterion	37.25999		
Schwarz criterion	37.63415		

In order to check for the model's quality, below are listed the roots of the characteristic polynomial as well as VEC Residual Serial Correlation LM Tests:

Table 6
Roots of Characteristic Polynomial

Endogenous variables: WIG20 PX SOFIX BET
Exogenous variables:
Lag specification: 1 6

Root	Modulus
1.000000	1.000000
1.000000	1.000000
1.000000	1.000000
0.973563	0.973563
0.832486	0.832486
-0.387771 + 0.645863i	0.753329
-0.387771 - 0.645863i	0.753329
0.369031 + 0.641852i	0.740377
0.369031 - 0.641852i	0.740377
-0.651644 - 0.046487i	0.653300
-0.651644 + 0.046487i	0.653300
-0.171948 - 0.616706i	0.640228
-0.171948 + 0.616706i	0.640228
0.423232 + 0.438941i	0.609750
0.423232 - 0.438941i	0.609750
0.486824 + 0.345967i	0.597236
0.486824 - 0.345967i	0.597236
0.284187 - 0.458793i	0.539679
0.284187 + 0.458793i	0.539679
0.535159	0.535159
-0.219050 - 0.476615i	0.524542
-0.219050 + 0.476615i	0.524542
-0.521322	0.521322
-0.431050 - 0.247786i	0.497195
-0.431050 + 0.247786i	0.497195
0.049124 - 0.442926i	0.445642
0.049124 + 0.442926i	0.445642
-0.160660	0.160660

VEC specification imposes 3 unit root(s).

Table 7
VEC Residual Serial Correlation LM Tests

H0: no serial correlation at lag order h
Sample: 1 1496
Included observations: 1489

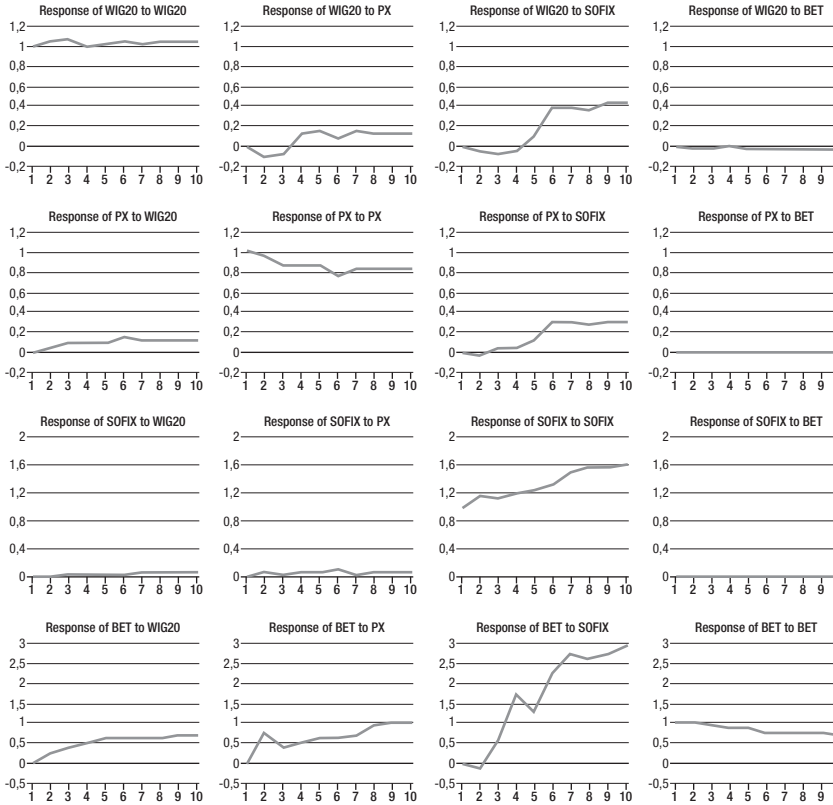
Lags	LM-Stat	Probability
1	28.43523	0.0280
2	31.04660	0.0133
3	26.73740	0.0445
4	37.28929	0.0019
5	40.56364	0.0006
6	19.88385	0.2255
7	43.84017	0.0002
8	32.28914	0.0092
9	28.83411	0.0251
10	26.92242	0.0424
11	24.51374	0.0789
12	31.03072	0.0133

Probabilities from chi-square with 16 degrees of freedom

Both tests suggest that the VEC model is acceptable stable (despite the presence of some autocorrelations at the residuals level). Based on these results, it is possible to draw the impulse response functions to capture the effects of "one shock" in an individual index induced over the others' dynamic.

Figure 13

THE IMPULSE FUNCTIONS (RESPONSE TO NON-FACTORIZED ONE UNIT INNOVATIONS)



According to this simulation, the larger impacts of one unit shocks in the individual dynamics to markets volatilities are:

- The impact of SOFIX on BET;
- The influences of PX and WIG20 on SOFIX;
- The effects of BET on the other indexes.

But in order to characterize the "co-movement" in the markets (the trend) co-integration is not enough since their "covariance" could have an equal importance in the general description. In order to capture the different

connexions between the markets covariances, we proposing a construction methodology for *an individual covariance* index such as:

(4)
$$ICOV_{it} = \frac{\sum_{j=1}^{N=1} \frac{\sum_{s=t-k+1}^{k} \left(P_{is} - \bar{P}_i\right)\left(P_{js} - \bar{P}_j\right)}{k}}{\sum_{i=1}^{N-1}\sum_{j=1}^{N=1} \frac{\sum_{s=t-k+1}^{k} \left(P_{is} - \bar{P}_i\right)\left(P_{js} - \bar{P}_j\right)}{k}} * 100 \text{ with } i \neq j$$

Based on this index, there could be building up a measure of *the relative contribution of the each market to the "group global covariance"* as:

(5) $$IContribution_i = \frac{Nr\ cases\ ICOV_i > trash}{Total\ number\ of\ cases} * 100$$

By setting k - 6, *trash* = 70% it results:

Figure 14

THE COVARIANCE INDEXES

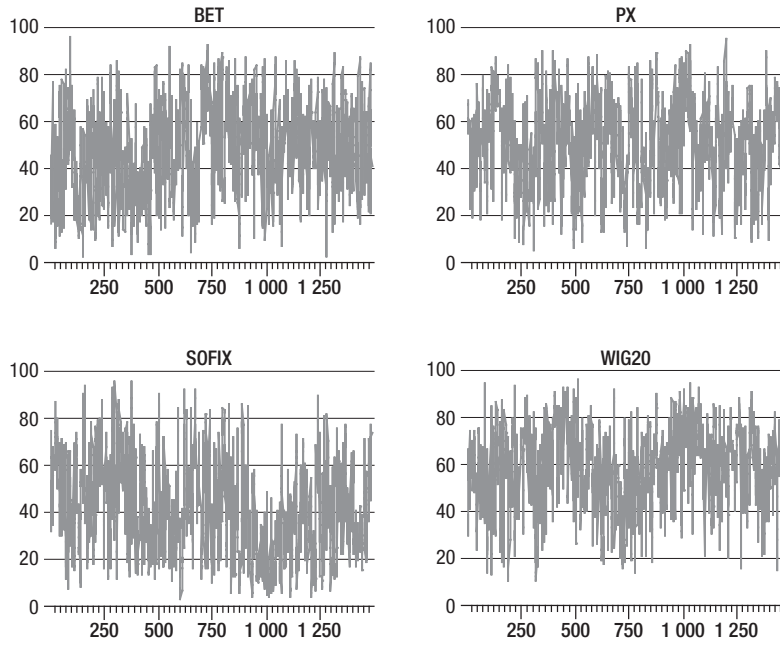


Table 8
Indexes features

	Maximum	Minimum	Average	Standard deviation	(Number of cases in which indexes >70%)*100/(Total number of cases)
BET	96.75	2.51	48.87	19.42	16.04
SOFIX	95.54	2.11	41.62	20.34	10.07
PX	95.43	5.52	50.72	17.93	14.97
WIG20	96.80	5.31	58.79	17.03	28.12

These results suggest that the greatest contribution to the "global covariance" could be attributed to the WIG20. Of course, this conclusion is affected by a large degree of subjectivity since the methodology is highly sensitive to the parameters. Even more, there is no clear enough how could be explained such a result since there is no way to distinguish between a "functional" contribution of an individual series and an exogenous drive one. However, due to the relative large tail and the characteristics described in the previous section of the Poland capital market there are some chances to reformulate it in a "weak" sense: if there are "functional" determinants for the markets indexes covariances, the Poland capital market volatility could be one of the most important.

4. COMMENTS AND (SELF) CRITICISMS

The findings of the previous section could be resumed as follows:

- The distribution and the random walk tests indicates that the considered markets evolution is characterized by a sort of weak sense informational efficiency (especially for the last part of the analysis interval) but there are still important institutional, structural and functional deficiencies;
- In the markets evolutions could be identified three main sub-periods (11/26/2001-1/6/2003; 1/7/2003-1/3/2007; 1/4/2007-6/2/2008) each of them with quite distinctive characteristics. The 2007-2008 one is clearly differenced by an increased volatility (with high "peaks" and a greater rhythm of growth) and large intervals of downward trends.

Such an evolution could be attributed, at least partially, to the external driving forces of United States and European capital markets crisis;

- The Central and East European markets are still weak integrated but there are some evidences of incipient inter-linkages;
- One of the larger sources of the area's volatility appears to be the Poland capital market fact which is also due to its comparative large scale and regional importance.

The global image contoured by the proposed analysis is one of an evolving group of regional markets with a shifting development pattern, still weak integrated and affected in a certain measure by external shocks. Of course, these results could be ample criticised since the underline analytical framework have a large number of weakness. Between these:

(1) Why these markets?

The proposed analysis is addressing the issue of the recent evolutions in a certain financial area but does not provide any arguments (others that the "long enough" tactical argument) to sustain the idea that the selected markets are the representative ones and their take into account is sufficient to obtain a global accurate picture.

(2) Distribution and efficiency: what are the connections?

The background hypothesis for the distribution part of the analysis consists in the thesis that distribution could be seen as an expression of "informational efficiency": the closer is the normal one the more "efficient" are the markets. But: a) there is no provided any argumentation to support this thesis and (b) there is no evolved any method to measure "how far" is the empirical distribution from the normality;

(3) "Structural breakpoints": what leads to the shifts?

The three main sub-periods identified are not discriminate by their major determinants and no explanation is given for understanding the differences between them;

(4) ***"Weak co-integration": why?***

The appliance of the Johansen procedure comes to the conclusion that the markets are integrated only at a "weak" level. But nothing is done

to analyse the causes of the "semi-close" character of their evolution. This could be seen as a particular peculiar result since there are important real sectors connections. Even more, the Johansen procedure itself could be criticised due to its particular assumption about the form of the co-integration equations;

(5) What means "group volatility" and how the consequences of the individual volatility transmitted?

The proposed methodology of the relative contribution of the each market to the "group global covariance" index is based on the hypothesis that there is a "common" source of (co)variance for the markets (in other words, there is a "transmission mechanism" suppose based on "portfolio substitution" effects generated by the uncertainty increase at the level of an individual market). But there are no explanations and / or descriptions for the "transmission mechanisms" and even worst there do not result with clarity the methodological presumption on which is the index based. Also, there is no way to deal with the index sensitivity in respect of the choice of the involved parameters.

Despite these caveats (and many others not specified) we consider that such type of analysis could highlight the profound transformations of the Central and East European capital markets and could supply some empirical support to argue that indeed "something new has happened on the Eastern front".

REFERENCES

1. ARORA.V AND M. CERISOLA, 2001, "How does US monetary policy influence sovereign spreads in emerging markets", IMF Stall Papers 48, no.3/2001, 56-92

2. ENGLE, R.F. AND C.W.J GRANGER,1987, "Co-integration and Error Correction: Representation, Estimation, and Testing", Econometrica, 55/1987, 251-276.

3. FAMA, E. F. AND M.R. GIBBONS, 1982," Inflation, Real Returns, and Capital Investment" Journal of Monetary Economics, 9/1982, 297-323.

4. JOHANSEN, S. -*Estimation and Hypothesis Testing of Cointegration Vectors in Gaussian Vector Autoregressive Models*, Econometrica, 59/1991, 1551-1580.

5. ANDERSON,J, 2005,"The one number to watch this year", UBS Investment Research, Hong Kong

6. JOHANSEN, S,1995, "Likelihood-based Inference in Cointegrated Vector Autoregressive Models",Oxford University Press, Oxford

7. ONARAN,O., 2006, "Speculation –let growth and fragility in Turkey: Does EU make a difference or "can it happen again", pp. 199-226, in E.Hein, A.Heise and A.Truger editors, *Macroeconomics and Macroeconomics Policies-Alternatives, Approaches to European Policies*, Metropolis-Verlag, Marburg

8. SKOTT,P, 1995,"Financial innovation, deregulation and Minsky cycles", pp.159-185, in G. Epstein and H.M Gintis, *Macroeconomic Policy after the Conservative Era*, Cambridge University Press, Cambridge

9. CLAESSENS,S., D.KLINGEBIEL AND S. SCHMUKLER, 2002," Explaining the migration of stocks from exchanges in emerging economies to interational centres",CEPR Discussion Paper no.3301/2002 www.cepr.org/pubs/dps/DP3301.asp

10. GOLDSTEIN,M, 2005, "What might the next emerging market financial crisis look like?" Institute for International Economics, Working Paper series , no.WP05-7

11. KOKE,J AND M.SCHRODER, 2003,"The prospects of capital markets in central and Eastern Europe", ZEW Discussion paper no.02-57

12. KREGEL,A, 1998, "Yes, it did happen again –a Minsky crisis happened in Asia", Jerome Levy Economics Institute Working Papers, no.234

13. ONARAN,O, 2007,"International financial markets and fragility in the Eastern Europe: "can it happen here?" Department of Economics Working Paper Series, Vienna University of Economics &B.A, working paper no.108

14. SCHROEDER,S, 2003,"A Minskian analysis of financial crisis in developing countries", University of Bremen, Bremen Contributions to institutional and Social Economics, no.50

15. *Analysis of Bulgaria's capital market and strategy of BSE for its development by 2010* - www.bse-sofia.bg

16. Annual Report 2001-2006 -Prague Stock Exchange : www.pse.cz

17. *Exchanging in the Balkans* in "The Bridge", Issue 8-Q1/2008

18. Fact Book 2001 –Warsaw Stock Exchange: www.polishworld.com/wse

19. The Economist-*Worrying about a crash*, July 7,page 29

20. Report of Bulgarian Stock Exchange-Sofia for 2007: www.bse-sofia.bg

PRESSURE ON THE EURO: COUNTRY RISK OF CROATIA, LATVIA AND THE EURO ZONE

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ABSTRACT:

We apply the FINK scoring model [1981, 1993, 1995], a signaling approach attributing a heavy weight to debt outstanding, to meet the need for independent assessment of country risk. Our analysis reveals an ambiguous picture for the 2008-2012 period, with decreasing ratings for Croatia and Latvia but an improving assessment of the Euro zone. These results are driven by current account (im)balances and external debt levels. We argue that a renewed appreciation of the euro against the USD is hardly sustainable for countries tied to the Euro and may also lead to deteriorating results for the Euro zone.

JEL classification: F4

Keywords: country risk, debt burden, current account deficit

INTRODUCTION

The aims of this paper are the assessment and comparison of the country risk of two European countries, viz. Croatia, whose accession negotiations with the European Union (EU) have opened in 2005, and Latvia, which entered the EU in May 2004. In addition, the respective country risk of these countries will be compared to the Euro zone's risk for further analysis, updating FINK ET AL [2007]. By this combination, we intend to investigate the adverse consequences of the euro's appreciation for the country risk of the Euro zone, as well as for related countries. In order to achieve these goals, the FINK scoring model [1981, 1993, 1995] was applied. Nowadays, there is need for such independent tools that facilitate the understanding of emerging sovereign risk as rating agencies more and more perceive themselves as facilitators for capital flows into emerging economies (KIM AND WU [2008]).

The countries under investigation were chosen so as to allow for a specific analysis of various indicators influencing country risk. While the Euro zone is a fairly large economic area with an important internal market shared among sixteen countries, both Croatia and Latvia are relatively small and export-oriented economies that depend on the Euro zone and have a euro oriented monetary regime. For a broader overview see BREUSS ET AL [2004] or FINK ET AL [1998]. For a related investigation of Bulgaria and Romania, see FINK ET AL [2008].

Since the end of 2004, Latvia has pegged its exchange rate closely to the euro and in May 2005 finally joined the Exchange Rate Mechanism (ERM), committing "to keep the exchange rate of the lats within a ± 1% fluctuation band around the central rate" (EUROPEAN COMMISSION [2008, p. 17]). Due to its high inflation rate, the country does not meet the price stability requirement(1) and is thus not yet eligible to join the Euro

(1) The price stability criterion requires that the average rate of inflation over a certain period of time must not exceed the average of the three best-performing EU members by more than 1.5 percentage points. According to the European Commission's Convergence Report 2008, Latvia's inflation rate exceeded the reference rate of 3.2% by far as it averaged 12.3% between March 2007 and March 2008 (see EUROPEAN COMMISSION [2008, p. 16]).

area (see EUROPEAN COMMISSION [2008, p. 18]). As far as Croatia is concerned, the Croatian National Bank has been intervening regularly on the foreign exchange market through auctions since 1994 in order to stabilize the kuna against the euro (German mark prior to 1998) in a band of ± 2% (EGERT [2006, pp. 4/5]). Now, the issues are whether such small economies, dependent on the Euro zone, as well as the Euro zone itself, could sustain a renewed appreciation of the European common currency against the USD. As the current financial crisis damaged the dollar's position, this issue is of particular importance.

We adopt a signaling approach to assess the country risk of Croatia, Latvia and the Euro zone if their current status quo is retained. On the one hand, a risk rating can be an important source of information for companies or individuals wanting to invest in, or do business with, a particular country. On the other hand, it may be helpful for the countries' institutions to determine adequate policies to improve their current situation and to obtain a better rating in the future. Our analysis is based on the application of the FINK scoring model [1981, 1993, 1995] that uses a medium size set of macroeconomic variables to assess the economic risk of a country and attributes a heavy weight to debt outstanding. The assessment is followed by a group wise comparison of the indicators used in the country risk model for Croatia, Latvia and the Euro zone. Based on debt, trade and currency movements, we conclude that if – the euro starts to appreciate again – the outlook for the years 2008 to 2012 will not be bright for the two individual countries, but shows a positive development as far as the Euro zone is concerned.

At the beginning, a brief literature review provides an overview of studies dealing with the assessment of country risk. Then, the methodology of the applied scoring model will be explained in more detail and information on the used data is given. The main part of the paper comprises the application of the model and the analysis of the respective country risk of Croatia, Latvia and the Euro zone, as well as a comparison of the individual results. Finally, the paper concludes with possible recommendations and a summary.

Additional information is summarized in tables A1 to A3 that can be found in the Appendix.

1. LITERATURE REVIEW

According to SAINI AND BATES [1984], the origins of country risk analysis can be traced back to studies conducted by multi- and bilateral institutions prior to the first oil price shock in 1973/74. As these organizations were lending funds to developing countries, factors affecting the latter's ability and capacity to repay these debts were of particular interest. In the subsequent years, commercial bank lending to developing countries increasingly gained in importance, thus leading to an intensified assessment of country risk on the part of these lenders, for the first time by means of economic indicators. As these methods were not exempt from flaws, new models using various statistical techniques were introduced. Although differing in approach, the common goal was to identify the main indicators affecting a country's debt servicing capacity (see SAINI AND BATES [1984, pp. 342/343]). In 1991, COSSET AND ROY succeeded in replicating the ratings of *Euromoney* and *Institutional Investor*, two leading publications in the range of country risk assessment. On the one hand, the authors found a country's GNP per capita and its propensity to invest, as well as the ratio relating net foreign debt to exports to be significant in determining creditworthiness. On the other hand, COSSET AND ROY revealed a high correlation between the two ratings, even though the journals apply a different methodology (see COSSET AND ROY [1991, pp. 138/139]). CANTOR AND PACKER conducted another study dealing with rating providers in 1996. Examining the sovereign credit ratings provided by *Moody's* and *Standard and Poor's*, two leading rating agencies, they first identified six indicators that mainly influence these rating (e.g. per capita income, GDP growth or external debt and default history). This result is supported by AFONSO [2003]. Secondly, the authors found that rating announcements induce changes in market spreads, whereas the impact is stronger when the statements deal with speculative-grade sovereigns (see CANTOR AND PACKER [1996,

p. 49]). Similarly, research effected at the *Organization for Economic Co-operation and Development* showed that rating announcements for emerging-market sovereign bonds influenced significantly dollar bond spreads (see LARRAÍN ET AL [1997, p. 18]). As far as criticism aimed at rating agencies or ratings is concerned, various issues are raised. OETZEL ET AL [2001], for example, arrived at the conclusion that country risk measures failed to predict periods of considerable changes in currency values(2) between 1980 and 1998. The authors conclude that "[there] is a widespread misconception that country risk measures are based on 'hard fact' (…)" (OETZEL ET AL [2001, p. 143]). Likewise, SAINI AND BATES [1984] argue that rankings provided by *Euromoney* and *International Investor* lagged debt servicing problems and showed "deterioration only after a country's problems [had] become evident" (SAINI AND BATES [1984, p. 354]). In addition, HAQUE ET AL [1997] and ELKHOURY [2008] emphasize the influence of subjective judgment on behalf of the rating analysts affecting the assigned ratings, as well as the rather opaque methodology applied by rating agencies(3) (see HAQUE ET AL [1997, p. 11] and ELKHOURY [2008, p. 4]). In one of the recent studies, KIM AND WU [2008] find that long-term foreign currency sovereign credit ratings are important for encouraging financial intermediary development and for attracting capital flows. Their findings indicate that sovereign ratings by the rating agencies are designed to rather encourage capital flows than to control for risks arising. We thus argue that alternative signaling approaches, which focus on the *true* country risk, are necessary.

To sum up, country risk analysis has been a growing issue since the seventies. Studies seem to either deal with possible determinants of country risk, or to analyze the work of rating agencies and assess the effectiveness of the issued ratings. Comparisons should be handled

(2) Defined by the authors as currency depreciations by 10% or more or by 40% or more, as well as currency appreciations of 10% or more in one month (OETZEL ET AL [2001, pp. 134/135]).

(3) Examples include unavailable information on assigned weights or on a formula combining individual scores to determine the final rating (see ELKHOURY [2008, p. 4]).

with care as studies generally use various statistical methods, different dependant variables or periods, serve different intentions and may face some data availability problems.

2. METHOD

Methods for assessing country risk are as manifold as its definitions. LICHTLEN [1997], for example, distinguishes between qualitative, qualitative-quantitative, quantitative-qualitative and quantitative methods (see LICHTLEN [1997, p. 63]). A variety of methods are used by both recognized and non-recognized rating agencies to assess the creditworthiness of sovereigns and countries(4). In this paper, we use a scoring model developed by FINK [1981, 1993, 1995] in order to assess country risk. Generally speaking, scoring models are the epitome of qualitative-quantitative methods, which are characterized by a subdivision into a qualitative pre-analysis and a quantitative main analysis (see GORBACH [2005, p. 37]). Our model is a calibrated model based on particular variables that were found to be significant determinants of financial crises during the eighties. The number of variables was reduced at the beginning of the nineties so as to allow for lower costs and more transparency between analysts and decision makers (see FINK [1995, p. 457]). It includes macroeconomic indicators that relate to the competitiveness of nations, but also debt service, international liquidity and net capital flows (transfer quota). For an application and discussion of the predictive power of the individual indicators see for example FINK [1993], FINK [1995], CIARLONE/TREBESCHI [2005] and KAMINSIKY ET AL [1998].

Based on economic data for each country under investigation, certain indicators are derived and grouped into four key ratios, viz. domestic economy, external economy, liquidity and transfer quota. The various indicators are assessed by means of certain weighting functions that

(4) According to ELKHOURY [2008], rating agencies can be classified into recognized and non-recognized agencies, depending on whether they are recognized by regulatory agencies in the individual countries or not (e.g. by the US Securities and Exchange Commission) (see ELKHOURY [2008, p. 1]).

attribute a score of zero to 100 points to them, the former being the worst, the latter the best assessment. After the indicators have been weighted, an overall rating for each country's risk, as well as ratings focusing on its economic power, economic stability, debt burden and transfer quota, are compiled(5).

In general, the assigned weights depend on the explanatory power of the individual variables in econometric models, i.e. variables with high explanatory values are weighted higher than those with lower values or those that were identified to be lagging indicators. Later studies, for example by KAMINSKY [1998, 2000], supported the allocation of weights within our model as the same variables were identified to be leading indicators of currency crises. Research effected at *UniCredit Bank Austria, e.g.* under the direction of Werner Schicklgruber, was likewise important and supportive. In general, the results are not highly dependent on the weighting. Still, the signaling effect is more pronounced if more emphasis is put on the current account deficit and the debt service ratio than it would be if the budget deficit, the GDP growth and inflation rates were assigned more weight.

In this paper, the key ratios of debt burden represent more than 50% of the weighted score as "it can be assumed that they have the greatest predictive power of an economic instability or crisis" (FINK ET AL [2007, p. 740]). The debt service ratio denotes the most important indicator of all as it depends on all of the influencing factors, including the duration of credits and the interest level, and is therefore assigned the highest weight (see FINK [1995, p. 458]). Furthermore, this ratio is a significant liquidity indicator. If it increases, the willingness of foreign lenders to extend credit or grant new loans to the respective country diminishes.

The inclusion of a transfer quota also accounts for possible future liquidity problems. In the long run, foreign debt is only sustainable if interest rates do not exceed the growth rate of exports. If interest rates remain higher

(5) Again: the higher the score, the better.

than the growth of exports, an increasing share of revenue from exports has to be used for interest payments. The short-term transfer quota reflects the availability of new capital inflows. As long as interest payments are smaller than the current account deficit, a debt policy makes additional resources available for domestic use. When interest payments exceed the current account deficit, a country is probably in a debt trap when the current account deficit is large.

The FINK scoring model [1981, 1993, 1995] is designed to give signals. Therefore, in addition to ex post analysis, we employ projection, not forecasts or predictions. We assume that a country's general conditions and its economic policies remain unchanged. Thus, the basic pattern of its economic development stays the same. More precisely, we extrapolate the data with the last observed growth rates (or rates of change) up to a certain future point in time. This implies a ceteris paribus condition: growth of incomes, rate of inflation, interest rates, changes in real exchange rate, price and income elasticity are assumed to remain constant throughout the projection period. The projected exports and imports define the projected current account deficit, which in turn adds to the cumulated debt stock. Based on these projections, it is possible to assess whether status quo is sustainable or whether a crisis is looming if economic policy remains unchanged(6).

Table 1

Weights assigned to the indicators used in the FINK scoring model [1981, 1993, 1995]

	weights		weights
domestic economy		external economy	
GDP per capita in US $	0.02	external debt/GDP	0.05
GDP, real change in %	0.05	external debt/exports	0.10
inflation rate	0.05	debt service ratio	0.25
investment/GDP	0.04	export/import	0.10
budget deficit/GDP	0.04	current account/GDP	0.05
liquidity		transfer quota	
forex reserves (excl. gold)/imports	0.10	interest rates/growth rate of exports	0.08
		short-term transfer quota	0.07
sum of weights			1.00

(6) For more information on the projection technique see FINK [1993] and FINK [1995]. While institutional weaknesses in the financial sector can amplify speculative bubbles (see ELLER AND HAISS [2003]), we concentrate on economic fundamentals in the following.

3. DATA

Data for the years 1997 to 2007 (for Croatia and Latvia) was taken from various databases(7), whereas certain figures for the last few years represent estimates made by the responsible organization. The projection starts as of 2008. To satisfy the special characteristics of these two countries, the parameters for the following indicators of our model had to be adapted in order to take the higher debt burden into account: debt/ GDP (if 100% or higher, 0 points), debt/ exports (if 200% or higher, 0 points) and debt service ratio (if 50% or higher, 0 points). Due to data availability reasons, the scoring model for the Euro zone covers a shorter time horizon (from 2001 to 2007, projection as of 2008). The monetary union was treated as a single country for the purpose of this analysis, which is based on the former Euro zone, i.e. data from 2001 to 2006 covers 12 countries, Slovenia is included in the dataset for 2007.

While data for most indicators was retrieved from the above-mentioned databases, the following two datasets need further explanation:

- Deposit and lending rates for the former Euro member countries were added up for each year of the analysis and the respective annual averages were calculated. These figures were used as deposit and lending rate averages for the assessment of the Euro zone.
- Data for each Euro country's short-term and total liabilities to BIS banks was taken from the Joint BIS-IMF-OECD-WB External Debt Hub database for the years 2001 to 2007. Consequently, annual sums for both indicators were calculated and annual shares were determined. These figures were used as proxies for the indicator "external debt due within a year".

An interest rate of 8% was assumed for the determination of the interest payments during the projection period and the maturity distribution was calculated using an average maturity of eight years. In the process

(7) European Central Bank (Statistical Data Warehouse), Economist Intelligence Unit (Country Data), International Financial Statistics, the Joint BIS-IMF-OECD-WB External Debt Hub.

of gathering necessary data for the scoring model, data consistency for the Euro zone and across its members became an issue. We thus tried to standardize data definitions as much as possible. Another issue is the time horizon of the analysis, which is up to 2012/2013 in the underlying model. As the scoring model extrapolates the data, future changes are not taken into consideration (e.g. the strong appreciations of the Euro relative to the USD in the first half of 2008).

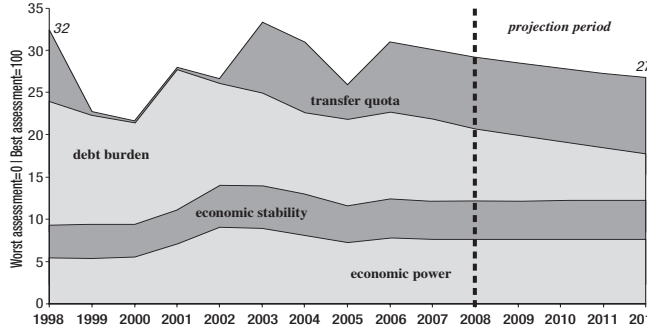
4. COUNTRY RISK ANALYSIS

4.1 Country risk of Croatia

As illustrated in figure 1, Croatia's country risk was assessed with 32 points in the first year of the analysis. The main factor for this initially rather positive assessment was the good rating of the debt burden (15 points) compared to the ratings focusing on the transfer quota or the country's economic power and stability. After an increase in country risk, its rating reached its low of 22 points in 2000. Until 2003, Croatia witnessed a rather volatile development of its rating before its country risk reached the lowest level in the years under investigation (and thus the highest assessment of 33 points). However, the situation has deteriorated slightly since. Although the ratings for stability and economic power will stabilize at a certain level as of 2006 and 2007, respectively, those for transfer quota and debt burden will gradually decrease, finally resulting in an overall rating of 27 points in 2012.

Figure 1

ASSESSMENT OF THE COUNTRY RISK OF CROATIA | 1998-2012



ECONOMIC POWER

The assessment of economic power (see figure 2) includes four key ratios that developed very differently in the period under investigation. The key ratio investment/GDP performed best, achieving the highest possible rating of 100 points in each year. This development testifies to a constant increase in investments to Croatia and can be best illustrated by the following figures: Amounting to 25.26% in 1998, the investment/GDP ratio nearly doubled in ten years and finally reached 45.99% in 2007. Secondly, GDP per capita also contributed positively to the country's economic power. After a slight decrease in the first years of the analysis, the rating for this ratio increased constantly as of 2000 and finally stabilized at 82 points. This positive rating represents Croatia's rise in GDP per capita from USD 4513 in 1998 to USD 7540 in 2007. According to the model's projection, this positive trend will continue, with GDP per capita amounting to slightly above USD 8000 in 2012. Although Croatia's GDP increased constantly, the real GDP growth changed permanently throughout the years showing a volatile development. The rating of zero points in 1998 and 1999 represents a considerably negative real change in GDP (i.e. the economy decreased). The tide turned several times in the following years, first leading to a peak of the real GDP growth rate at 3.83% in 2002 and eventually to a stabilization at 1.16% (represented by the constant rating of 40 points). Finally, the export/import ratio's negative performance needs consideration, as it is the most important indicator of the economic power of a country. Its rating of zero points can be explained by the fact that Croatia has constantly imported more goods than it exported. As of 2001, the country's imports grew faster than its exports, leading to a constant rise in the goods account deficit from USD -4093 million in 2001 to USD -13371 million in 2007. Furthermore, figure 3 shows that our analysis projects imports to increase at a higher level than exports, thus leading to constant deficits in the goods account. Taking the services sector into consideration, the picture looks rosier as it accounts for constantly rising surpluses as of 1999. However, they are not able to offset the above-mentioned deficits, thus resulting in an overall

negative and deteriorating current account balance. Given the importance of tourism to Croatia, we may have to account for the services sector in developing the scoring model further. Being influenced by all specified developments, Croatia's economic power reached its peak in 2002 and 2003 with a rating of 61 points, before deteriorating to settle at 55 points.

Figure 2

KEY RATIOS OF ECONOMIC POWER | CROATIA | 1998-2012

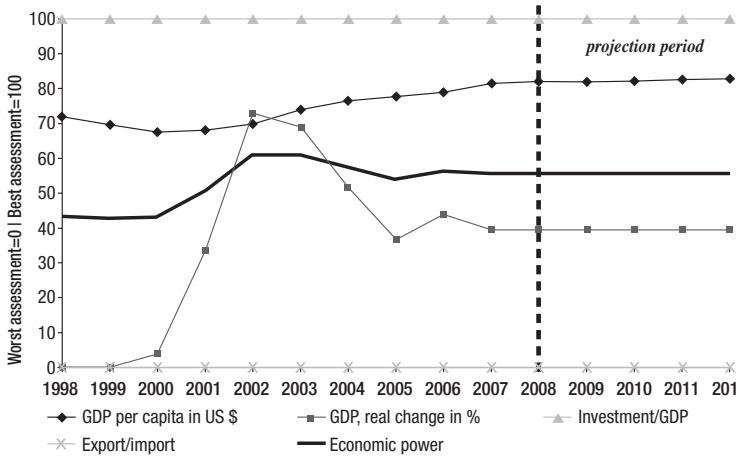
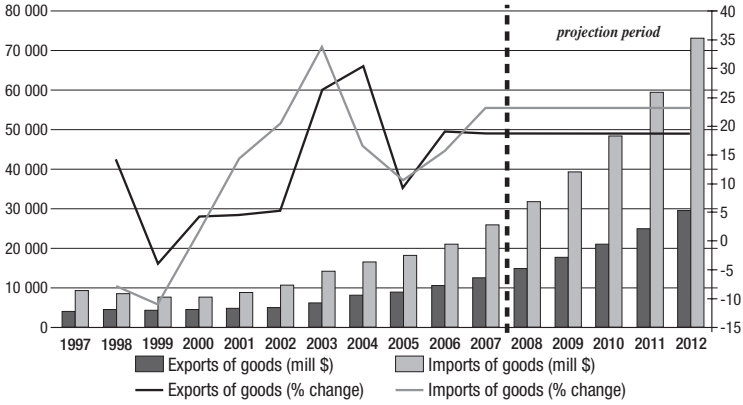


Figure 3

EXPORT AND IMPORT OF GOODS | CROATIA | 1997-2012



ECONOMIC STABILITY

A country's economic stability is composed of its inflation rate, as well as the two ratios budget deficit/GDP and current account/GDP. As illustrated in figure 4, Croatia's economic stability developed fairly constant between a high of 33 and a low of 27 points. According to the FINK scoring model [1981, 1993, 1995], it is projected to stabilize at a level of 32 points.

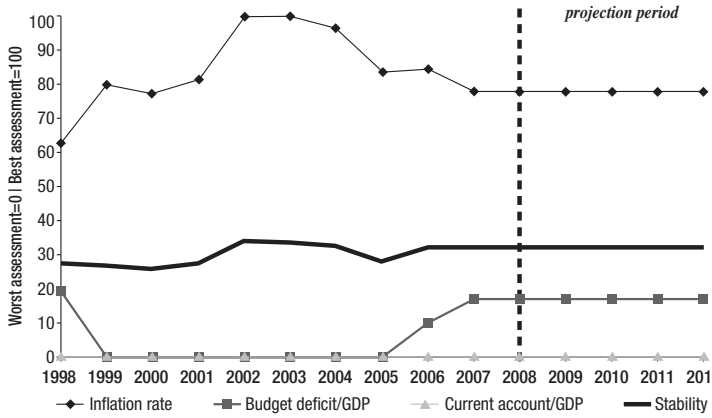
In the first years of the analysis, Croatia's inflation rate evolved unsteadily before reaching very low levels in 2002 and 2003 (1.68% and 1.76%, respectively). As low inflation rates are linked positively to a country's economic stability, a score of 100 points is assessed.

Furthermore, figures 2 and 4 are interconnected with each other by the negative correlation between inflation rate and economic growth rate: Croatia's economy suffered from negative growth in years of high inflation (e.g. in 1998 and 2000), whereas it witnessed (rather) high economic growth in 2002 and 2003.

The inflation rate is assumed to settle at 4.50%, represented by the constant rating of 78 points. The ratio budget deficit/GDP showed a disappointing development, especially between 1999 and 2005. In these years, Croatia's budget deficit was worse than - 5% of GDP, the benchmark for a positive rating. Despite a slight improvement, the country's budget deficit is projected to stay negative, amounting to -3.99% of GDP. Croatia's economic stability was even more weakened by the negative development of its current account, which registered substantial deficits in each year under investigation and is projected to increase constantly, finally amounting to USD -30263 in 2012.

Therefore, the ratio current account/GDP was assessed a score of zero points throughout the whole period.

Figure 4
KEY RATIOS OF ECONOMIC STABILITY | CROATIA | 1998-2012



DEBT BURDEN

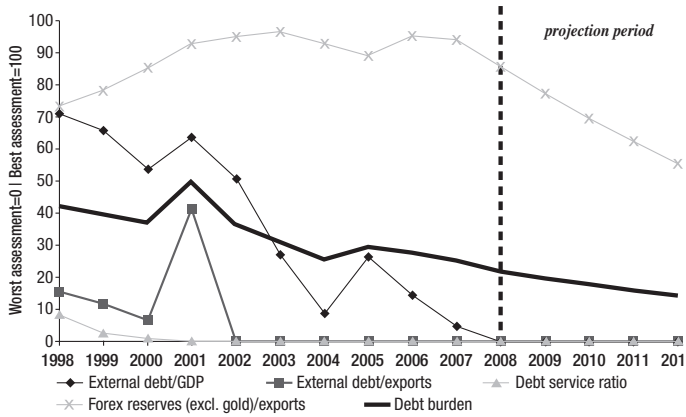
Being the crucial part of the country risk assessment, accounting for 50% of the weighted scores, and considering Croatia's already very precarious debt situation, the analysis of the country's debt burden, as illustrated in figure 5, demands special attention. Except for the years 2001 and 2005, which saw an improvement in the rating of Croatia's debt burden, the latter developed very negatively and registered a real slump in its rating, falling from 42 points in 1998 to 25 points in 2007. According to the Fink scoring model [1981, 1993, 1995], the rating is projected to decrease even further to reach a low of 14 points in 2012.

Although the ratio foreign exchange reserves to imports evolved positively until 2006, peaking in 2003 when its rating reached 96 points, the outlook is not very rosy. The ratio's rating is expected to drop by almost 40 points. Furthermore, the development of external debt/GDP is of special interest as it clearly illustrates Croatia's growing debt problem. The country's external debt rose from 43.13% of GDP in 1998 to 96.31% of GDP in 2007, and there is no prospect of improvement as the external debt is assumed to amount to 342.51% of GDP in 2012. This extremely

negative development is reflected in a constantly worsening rating. In addition, the assessment of the ratio relating Croatia's external debt to its exports is even more pessimistic, with external debt exceeding 200% of exports in each year as of 2002 (represented by a rating of zero points). Finally, the debt service ratio accounted for the worst development of all debt indicators. Being the most important indicator of all, it relates the effected debt service, comprising interest and principal payments, to the export of goods, and is thus of paramount importance to Croatia's country risk. Except for the first three years of the analysis, the debt service ratio constantly exceeds the model's benchmark for a positive rating as of 2001 and was therefore assessed a rating of zero points. In 2012, the country's debt service is projected to amount to 78% of its exports.

Figure 5

KEY RATIOS OF DEBT BURDEN | CROATIA | 1998-2012



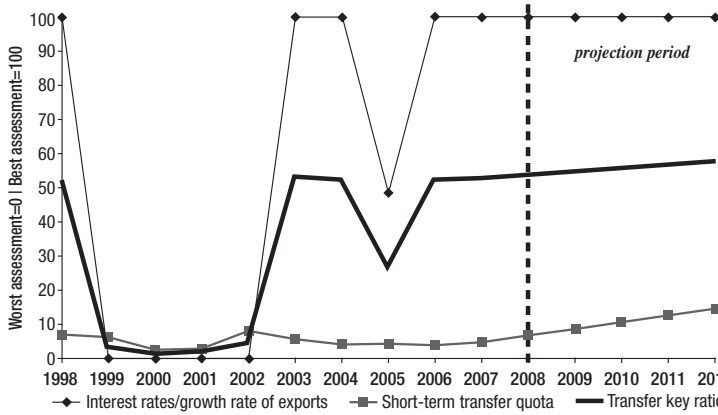
TRANSFERS

The rating for the transfers' key ratios, illustrated in figure 6, developed very negatively at the beginning of the analysis as it dropped from its peak of 54 points in 1998 to a low of one point in 2000. With a steep rise to 53 points in 2003, the rating started to improve and is projected to remain rather stable at around 51 points.

The ratio interest rate to growth rate of exports had a particularly interesting influence on the country's transfers. In all years but one, the indicator was either assessed with the worst or the best score. After negative assessments at the beginning of the analysis, the interest rate in % of the growth rate of exports started registering low levels and amounted to 0.38% in 2007. As these are assumed to persist, the overall rating is positively influenced. Secondly, the short-term transfer quota developed quite steadily between 1998 and 2007, with its rating fluctuating at around five points. According to the FINK scoring model [1981, 1993, 1995], a slight but continuous improvement is projected, leading to a slowly rising rating.

Figure 6

KEY RATIOS OF TRANSFERS | CROATIA | 1998-2012



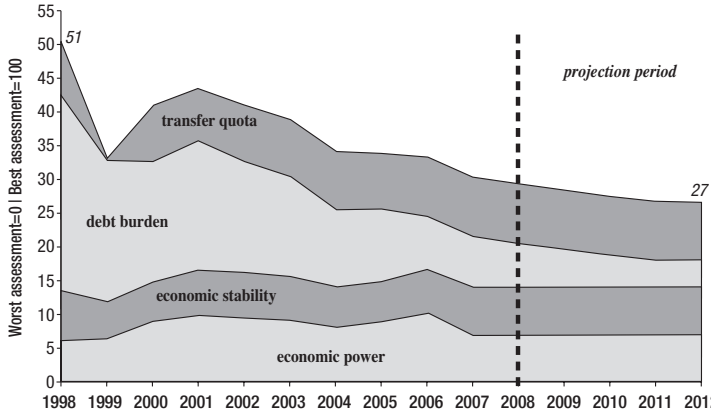
4.2 Country risk of Latvia

The assessment of Latvia's country risk between the years 1998 and 2012 is shown in figure 7 and gives an overview of the development of the scores of the main categories. In the first year of the analysis, the country's risk was assessed with a moderate score of 51 points. Subsequently, there was a sharp drop to 33 points in 1999. After an increase in the following two years, the score decreased again from 2001 to 2007. According to the model, this decrease will continue in the future, resulting in a score

of just 26 in 2012. Thus, the country risk of Latvia is worsening, which means that there will be a higher country risk in the future that is mainly due to the worsening assessment of debt burden. In the following, the development of the main categories will be explained in further detail.

Figure 7

ASSESSMENT OF THE COUNTRY RISK OF LATVIA | 1998-2012



ECONOMIC POWER

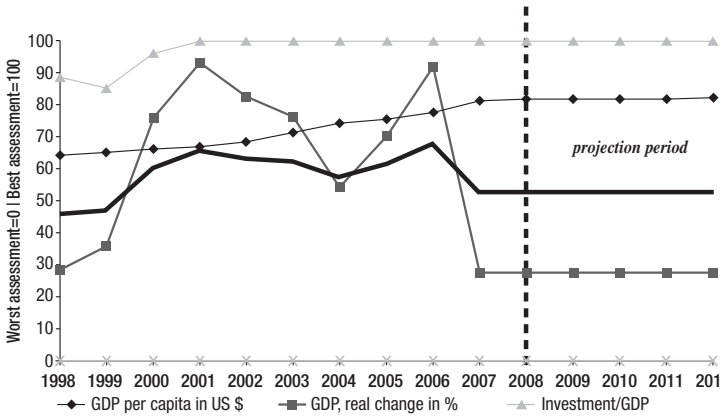
All in all, the assessment of economic power has developed rather positively, as illustrated in figure 8. Starting with a point score of 45 in 1998, it increased to 65 points by 2001 and peaked at 67 points in 2006 after a short downturn period. Due to adverse developments of certain indicators, Latvia's economic power decreased in 2007 and is projected to stay constant at the level of 52 points in the coming years.

As far as the single ratios are concerned, the investment/GDP ratio has been developing very positively. Starting at nearly 15%, it has increased to above 50% by the year 2007, which is represented by the highest score of 100 points. GDP per capita, amounting to USD 3013 in 1998, increased to USD 7443 by 2007 and shows a continuously positive trend in the projection, resulting in more than USD 7700 in 2012. By contrast, the development of the real change of GDP was rather volatile. Increasing sharply at the beginning of the analysis and peaking at 5.45% in 2001, a

drop to 2.34% followed in 2004. After a second increase up to 2006, real change of GDP slumped to 0.18% in 2007 and is projected to stay at this low level, represented by a score of just 27 points. Finally, the score of the country's export/import ratio is assessed at the level of zero during the whole period due to the high level of imports relatively to exports (in 2007 import exceeded export of goods by 82%). Naturally, this figure lowers the total score of economic power.

Figure 8

KEY RATIOS OF ECONOMIC POWER | LATVIA | 1998-2012



ECONOMIC STABILITY

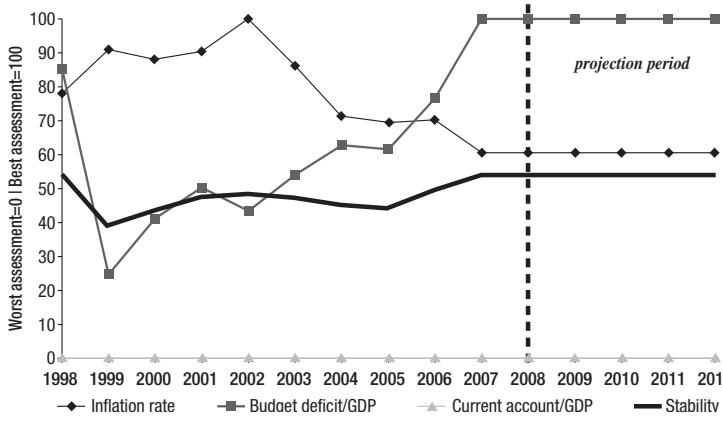
The development of the assessment of economic stability is shown in figure 9. All in all, it has been quite stable in the last few years. It started with a score of 54 in 1998 but fell to a low of 39 by the next year. After slight up- and downward movements, Latvia's economic stability was assessed with its second-highest score of 53 points in 2007 and is projected to remain constant in the future.

Even though the budget deficit/GDP ratio deteriorated sharply in 1999, it improved over the following years and thus exerted a positive influence on the overall assessment. In 2007 it even turned positive and amounted to 1.08%, represented by the assessment of 100 points. This figure is projected to persist. Latvia's inflation rate and current account/GDP ratio

adversely affected the country's economic stability. The former reached a low of 1.78% in 2002 but increased afterwards and eventually peaked at 10.11% in 2007. This inflation level is assumed to remain constant between the years 2008 and 2012. Secondly, the country's current account/ GDP ratio has developed that negatively that it has been assessed with zero points throughout the whole period. The ratio reached -39% in 2007 and is projected to amount to -135% by 2012. This bad performance is mainly due to increasing current account deficits, which are in turn fueled by rising imports relatively to exports.

Figure 9

KEY RATIOS OF ECONOMIC STABILITY | LATVIA | 1998-2012



DEBT BURDEN

The assessment of Latvia's debt burden shows an ongoing deterioration that is illustrated in figure 10. Starting with a high score of 71 points in 1998, it plummeted to 19 points in 2007. Our analysis projects a further decline to nine points by 2012 and even a drop to zero before the year 2015 if no measures are taken. Consequently, Latvia may soon be confronted with a crisis.

Going into further detail, the assessment of all key ratios of debt burden (i.e. external debt/GDP, external debt/exports, debt service ratio, foreign reserves (excl. gold)/ imports) has been worsening dramatically. The

ratios external debt/GDP and external debt/exports witnessed the sharpest declines and have consequently been assessed with the lowest rating of zero as of 2002 and 2006, respectively. Additionally, the debt service ratio, being the most important ratio of all, is also evaluated with the lowest score from 2007 on.

TRANSFERS

Finally, figure 11 shows that the score of transfers fluctuated between 50 and 56 between 1998 and 2007. 1999 represents the only exception with a point score of three. The projection suggests a constant development at 55 points.

The assessment of the transfers' two key ratios is quite different. The ratio interest rate to growth rate of exports is assessed at a very high level near, or of, 100 points in each year of the analysis except for 1999, which is due to a decrease in exports compared to previous years. By contrast, the short-term transfer quota ratio is assessed at very low levels of around eight points during the whole period. Consequently, the overall assessment of transfers is at a level between the assessments of the two ratios.

Figure 10

KEY RATIOS OF DEBT BURDEN | LATVIA | 1998-2012

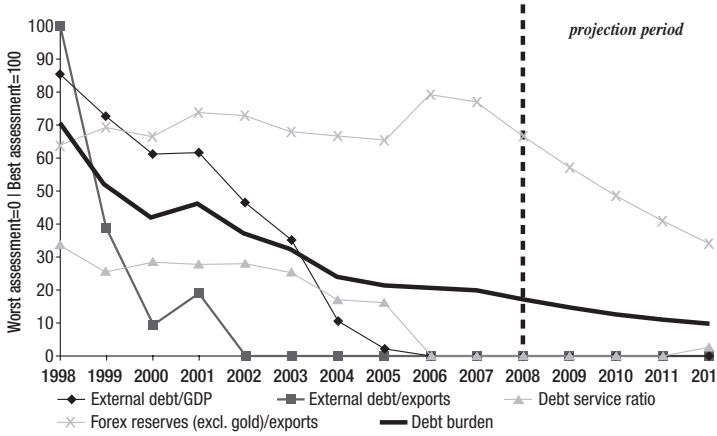
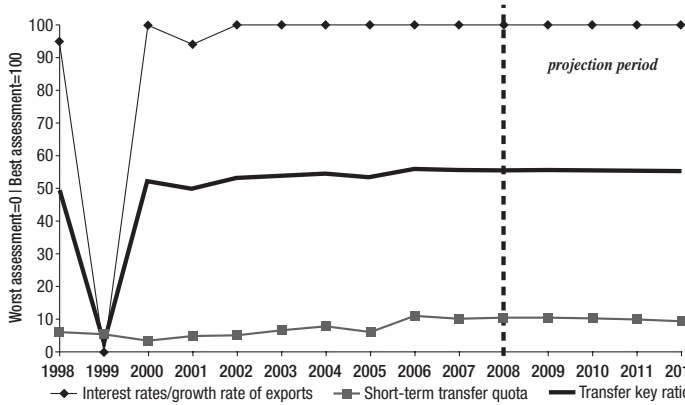


Figure 11

KEY RATIOS OF TRANSFERS | LATVIA | 1998-2012



4.3. Country Risk of the Euro zone

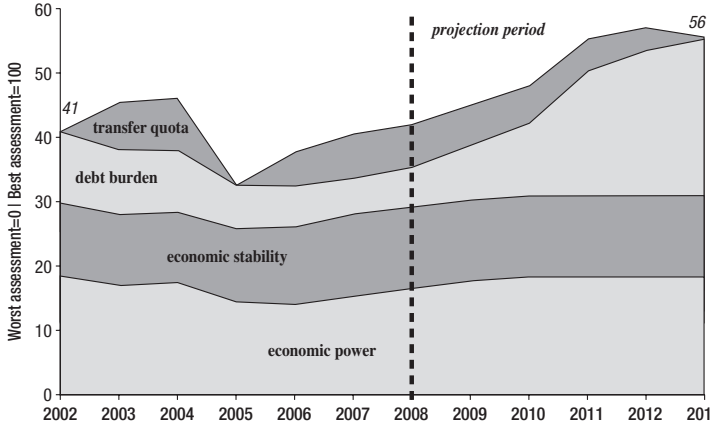
Although the Euro zone is not a country but a group of countries, the risk of the Euro zone will be named country risk in the following (the data is a sum of the data of the individual member states; for a model that relies on aggregate data on the supra-national level, see DREGER/MARCELLINO [2007])(8). Unlike Latvia's and Croatia's assessment, the analysis of the country risk of the Euro zone starts in 2002.

As shown in figure 12, the Euro zone's country risk initially developed quite positively and accounted for an improving rating that reached its (temporary) high of 46 points in 2004. After a short slump to a low of 33 points in 2005, the monetary union's continuously decreasing country risk has led to a constantly rising rating, which is projected to peak at 57 points in 2011. The positive development of the debt burden as of 2007 is mainly responsible for this good assessment. However, the FINK scoring model [1981, 1993, 1995] expects a deterioration of the Euro zone's country risk for the last year of the analysis.

(8) In the following, we draw on FINK ET AL [2007].

Figure 12

ASSESSMENT OF THE COUNTRY RISK OF THE EURO ZONE | 2002-2013



ECONOMIC POWER

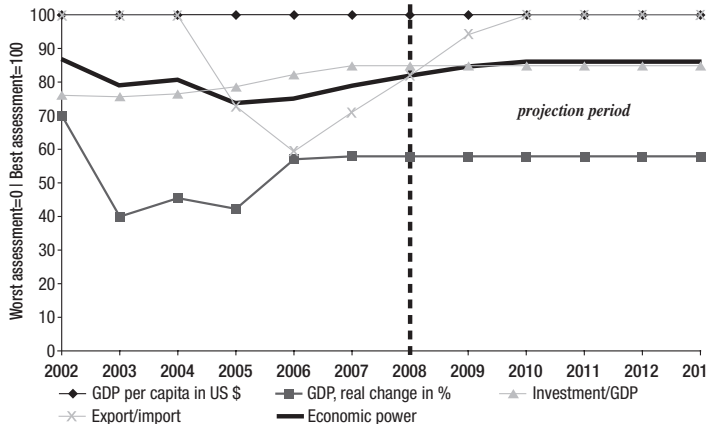
As illustrated in figure 13, the assessment of the Euro zone's economic power started at a high of 87 points. On average, 79 points were assessed between the years 2002 and 2007. As the model projects the economic power to strengthen, the rating is expected to increase and to eventually settle at 86 points.

The ratio GDP per capita developed extremely positively and accounted for the highest possible rating in each year of the analysis. This upbeat performance is due to a constant increase in GDP per capita in the Euro countries, rising from USD 22194 in 2002 to USD 38128 in 2007 and finally reaching a projected level of USD 41971 in 2013. Moreover, investments in % of GDP accounted for a similar positive and stable development, although not at such a high level. After a low of 75 points in 2003, its rating increased to 85 points up to 2007 and is predicted to stabilize at this level, representing a ratio of 21.98% (up from 20.24% in 2002). After falling from its peak of 70 points to a low of 40 points within the first two years of the analysis, the real growth rate shows a rather volatile development. As of 2007, however, it is expected to stabilize at a level of 2.64%, represented by a moderate rating of 58 points. Finally, the

export/import ratio accounts for an overall positive development. After the ratio had been assessed 100 points from 2002 to 2004, its rating plunged to 60 points in 2006 before regaining momentum. According to the FINK scoring model [1981, 1993, 1995], the export/import ratio's assessment will again amount to 100 points from 2010 onwards. Data suggests that the monetary union has exported more goods than it imported in each year of the analysis, but the varying gaps between exports and imports have resulted in varying ratings. At its low, for example, the export/import ratio amounted to 101.91%, whereas it is projected to increase by 17 percentage points to 118.92% by 2013.

Figure 13

KEY RATIOS OF ECONOMIC POWER | EURO ZONE | 2002-2013



ECONOMIC STABILITY

After a rather restrained start, the Euro zone's economic stability (shown in figure 14) started improving considerably as of 2005. So did its rating, increasing from 78 to 89 points in 2007. The model suggests stabilization at this high level.

The economic stability of the Euro zone has been positively influenced by the good performance of its current account/GDP ratio. Between 2002 and 2006 it developed rather moderately around 1.27%. As of 2007, though, the FINK scoring model [1981, 1993, 1995] projects it to

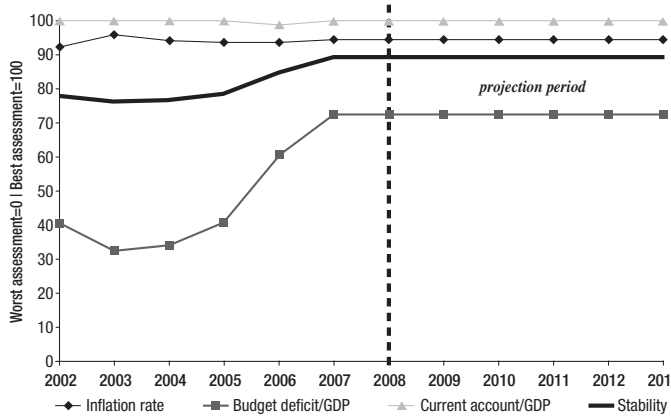
increase considerably from 1.26% to 8.05% in 2012 and to 10.62% in 2013, respectively. This hike results from a constantly increasing current account surplus, which is in turn due to the improving export/import ratio as explained above. As the Euro countries are expected to continue to export more than they import, their current account surplus is predicted to amount to USD 1.5 trillion in 2013. Yet, these figures should be handled with care. As mentioned above, the FINK scoring model [1981, 1993, 1995] projects future developments based on the last available data, in this case represented by annual data for 2007. Thus, the strong appreciations of the euro relative to the USD in the first term of 2008(9), which will most likely adversely affect the Euro zone's exports, are not taken into account. In the future, a high or further appreciating euro may lead to a deterioration of the monetary union's competitiveness and consequently to less positive results than projected by the model.

Returning to the present results, the Euro zone's inflation rate evolved likewise satisfactorily, averaging 2.17% and thus accounting for high ratings of over 90 points between 2002 and 2007. For the years to come, it is projected to remain stable at 2.14%. By contrast, the budget deficit in % of GDP developed negatively at the beginning and fell to a low of -3.05% in 2003. Due to declining budget deficits (from Euro -229464 million in 2004 to Euro -56358 million in 2007), the ratio improved to -0.64% by 2007 and is projected to stay at this level, represented by a score of 73 points.

(9) Between January 2007 and July 2008, the euro appreciated on average by approximately 14% relative to its main trading partners (see DE GRAUWE [2008]).

Figure 14

KEY RATIOS OF ECONOMIC STABILITY | EURO ZONE | 2002-2013



DEBT BURDEN

The situation of the Euro zone's debt burden is illustrated in figure 15. Whereas its rating gradually deteriorated during the first six years of the analysis, the FINK scoring model [1981, 1993, 1995] predicts an improvement as of 2007. Increasing rather slowly at first, the rating is projected to rise more rapidly to reach a score of 60 points in 2013 (up from its low of 21 points in 2007).

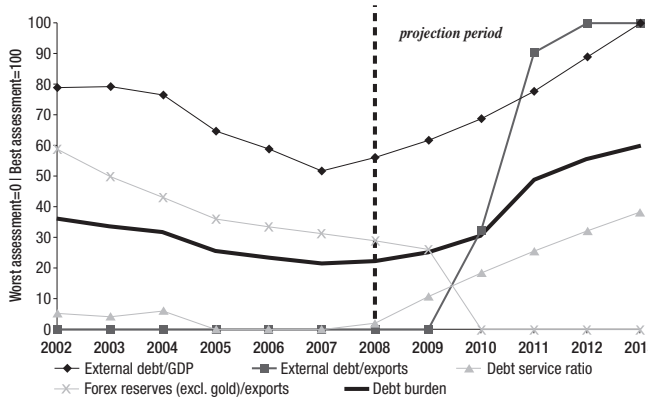
Overall, the external debt/GDP ratio represents the best-rated indicator even though it registered a fall in its rating from 79 points in 2000 to 52 points in 2007. From then on, its rating is expected to improve and to reach even 100 points by 2013. This trend reversal is due to a projected decline in the Euro zone's debt/GDP ratio from 58.6% in 2007 to 17.43% in 2013. Similarly, external debt in % of exports accounted for extremely high figures until 2007 and its ratio was thus assessed zero points. After a restrained start, the pace of improvement is assumed to accelerate and to lead to low external debt/exports figures (44.74% in 2013 compared to 342.70% in 2007). This is justified by both the projected increase in exports, as well as the projected decline in debt. In addition, the debt service ratio accounted for a very low, or even the worst, assessment

between 2002 and 2007 as it partly exceeded 50%. Due to diminishing external debt, the ratio is expected to decrease gradually and to be assessed more than 30 points in 2012 and 2013, respectively.

Merely the ratio relating foreign exchange reserves to imports accounted for a completely negative development. Since this ratio has plunged from 17.09% in 2002 to 6.44% in 2007 and since this negative trend is predicted to continue, with foreign exchange reserves amounting to just 3% of imports in 2013, its rating plunged from 59 to zero points. This dampens the positive developments resulting from the projected decline in external debt.

Figure 15

KEY RATIOS OF DEBT BURDEN | EURO ZONE | 2002-2013



TRANSFERS

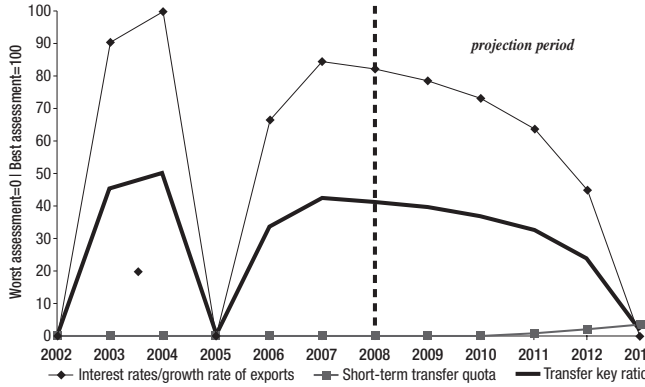
As shown in figure 16, the key ratios for the Euro zone's transfers have experienced a rather volatile development throughout the analysis. Except for three years, the overall rating averaged a moderate score of 38 points.

The interest rate in % of the export growth rate amounted to less than one percent in each year but two between 2002 and 2007. Its rating peaked in 2004 when the interest rate represented 0.47% of the growth rate of exports. The ratio is projected to deteriorate as of 2007 but is expected to stay below one percent until 2012. In the last year of the analysis, the interest rate is assumed to surpass the growth rate of exports.

Finally, the short-term transfer quota accounted for an entirely negative development up to 2007, indicating that – due to high interest payments – more capital flew out of the Euro zone than in. This negative trend is initially predicted to continue before it will start improving slightly as of 2011.

Figure 16

KEY RATIOS OF TRANSFERS | EURO ZONE | 2002-2013



5. COMPARISON OF THE RESULTS

Figure 17 shows the development of the country risk assessment for Latvia and Croatia between 1998 and 2012, and for the Euro zone between 2002 and 2013. Up to 2005, the average decline amounted to 10 points, whereas Latvia accounted for the worst drop. As far as the latter and Croatia are concerned, the negative trend continued until 2007 and is projected to do so in the future. Although Latvia performed better than Croatia before 2007, the rating for both countries is expected to decrease gradually and to amount to a similarly low level in 2012. By contrast, the Euro zone's country risk is decreasing. According to the FINK scoring model [1981, 1993, 1995], the gap between the rating of the monetary union and the ratings of Croatia and Latvia will amount to 30 points in 2012. If it is correct to assume – as our model does – that half of a country's risk score

can be explained by debt burden, the results are not surprising. Between 2007 and 2012, gross debt is projected to increase by 195% and by more than 220% in Croatia and Latvia, respectively. On the contrary, the Euro zone is expected to witness a decline by 63% in the same period. Figure 18 illustrates these two different paths. Whereas Croatia and Latvia are both projected to face an increasing debt burden and thus steadily deteriorating ratings between 2008 and 2012, the Euro zone is expected to witness a hike in its rating due to a decrease in debt obligations. Although the monetary union was assessed worse than Croatia between 2005 and 2007, the former's rating of debt burden will be almost four times higher than the latter's in 2012 according to our results, and even 9 times higher than that of the Baltic country. As far as economic power and stability are concerned, the Euro zone outperformed Croatia and Latvia throughout the whole period. On average, the union's ratings are 25 (25) and 53 (31) points higher than those of the former (latter), respectively. By contrast, Croatia and Latvia perform better than the Euro zone in terms of transfers in all years of the analysis. As of 2007, the southeastern country will witness a slight but gradual improvement in its rating, whereas that of Latvia is expected to stabilize and that of the Euro zone to decline slowly.

Figure 17

KEY RATIOS OF DEBT BURDEN | EURO ZONE | 2002-2013

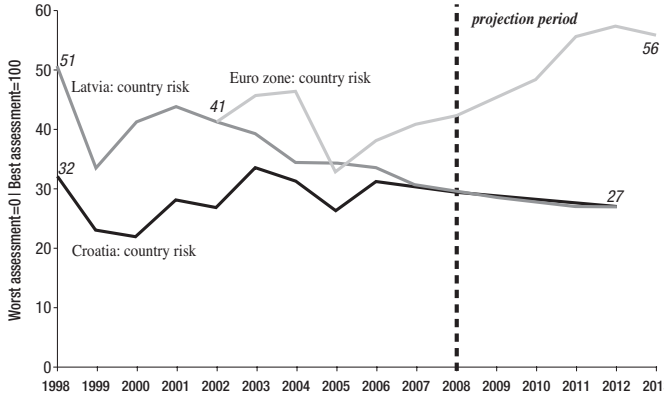
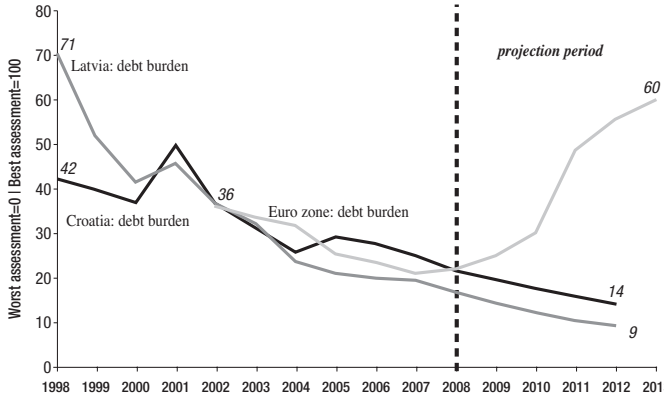


Figure 18
COMPARISON OF COUNTRY RISK | CROATIA, LATVIA AND THE EURO ZONE | 1998-2013



CONCLUSIONS AND RECOMMENDATIONS

Based on analyzing the fundamentals over the 1998-2007 period, Croatia and Latvia will be confronted with a higher country risk in the future, which is primarily caused by their worsening debt burden and widening current account deficits. Current financial market developments worsen this outlook. On the other hand, the Euro zone is projected to face an improvement in its country risk due to an increase in its current account surplus and a decline in debt. However, the rise of the euro against the USD and short-term budgetary measures currently undertaken to overcome the current financial market crisis will play a major role in either case. As the country risk will be worsening if no measures are taken, it is highly recommendable – particularly for Croatia and Latvia – to implement adequate measures to improve the situation in the future.

As far as Croatia is concerned, an ambiguous picture is revealed. On the one hand, the country's high GDP per capita and the very good development of its investment/GDP ratio positively influence its economic power, as well as its overall country risk. Especially the latter ratio's good performance is a sign of Croatia's perceived attractiveness by foreign

direct investors. In particular, Austrian and Hungarian investors have been very active in exploiting the country's investment opportunities(10). Since foreign direct investments contribute positively to the economic development (e.g. by enhancing productivity or generating employment), Croatia should focus on its role as an attractive investment target and try to lure even more investors, for example by offering investment incentives in the form of tax allowances. Moreover, the country's inflation rate has been developing quite positively, hence offering a certain degree of stability. On the other hand, the country still has to face several severe problems. First of all, Croatia's current account deficit is widening as the country's imports exceed its exports by far. According to the FINK scoring model [1981, 1993, 1995], this trend will continue. However, unlike the current situation of a weakening goods account, the model predicts a strengthening balance of services with increasing surpluses in the future. Hence, Croatia needs to focus on its traditionally strong services sector by constantly improving its offer (e.g. with respect to tourism). Additionally, the country should try to curb down its imports and simultaneously improve the quality and competitiveness of its products in order to be able to export more. Finally, the country's most serious problem is its high level of external debt as exemplified by its soaring external debt per GDP and per exports ratios, which are expected to amount to more than 340% and 400%, respectively, in 2012. Since these developments affect Croatia's country risk in an extremely negative way, the country is urged to take action. The measures taken by the Croatian National Bank regarding the reserve requirements on banks' foreign liabilities are a first step towards improvement but will certainly not be enough. In particular, the private sector needs to be more disciplined. In summary, we recommend to give priority to the reduction of external debt by amplifying the measures initiated by the Croatian National Bank; to reduce current account deficits

(10) Austria and Hungary are the highest-ranked neighboring countries to invest in Croatia as measured by data from 1993 to the first quarter of 2008 (see CROATIAN NATIONAL BANK [2008]). Austrian investment is particularly high in the financial sector (see HAISS ET AL [2007]).

by improving the export/ import ratio; and to balance the budget by more austere budgetary policies.

In the case of Latvia, GDP growth was strong between the start of the new millennium and 2006, putting pressure on prices to rise. Subsequently, the booming domestic demand has led to a rise in imports relatively to exports, larger current account deficits and higher external debt. To improve the situation, it is recommended to decrease external debt; reduce current account deficits by improving the export/import ratio; balancing the budget; and boosting investor confidence using credible plans to realize the adoption of the Euro as national currency as soon as possible. The current financial market situation worsens Latvia's ability to implement such measures. Another severe issue is the country's high inflation rate, which is projected to stabilize at 10.11% as of 2007. In order to handle this problem, the Latvian government introduced an anti-inflation plan in March 2007 (see ASSOCIATION OF LATVIAN COMMERCIAL BANKS [2007, p. 2)]. Finally, large transfers from the EU amounting to 3 to 4% of GDP are expected to flow into the new member countries between 2008 and 2015. Depending on the way they are invested, these transfers may have a considerable impact on the GDP of these countries and hence represent an opportunity for Latvia to increase its productivity. Still, inflationary pressures need to be monitored closely (see ALLARD [2008, p. 142]).

As opposed to the results of the first two analyses, almost all indicators of the Euro zone's country risk show a positive development of fundamentals. Whereas the ratings for economic power and stability are expected to stabilize at high levels, the debt burden will account for an improving assessment in the years to come based on the 2002-2007 development. Current short-term rescue packages for the member countries' financial and automotive sectors, however, will provide a medium-term rise in their debt burden. The performance of the transfers' rating, on the other hand, is going to decrease as of 2007 according to our model. Overall, the results for the monetary union are very positive, especially compared to the expected negative developments in Croatia and Latvia. Nevertheless, some

restrictions do apply. On the one hand, annual data from 2007 provides the basis for our projections and the analysis of what happens if status quo is maintained. As mentioned above, the strong appreciations of the euro relative to the USD in the first six months of 2008 and the subsequent decline in the 3rd quarter are not taken into account. The inclusion of these figures could lead to more negative results and a more pessimistic outlook (the economy may generally slow down due to a decline in exports and rising debt levels). On the other hand, data availability problems that led to the "self-calculation" of certain figures may have distorted the results(11).

SUMMARY

The main purpose of our paper is to provide an assessment of country risk for the Euro area and related countries independent from rating agencies. A number of studies focus on the identification of main determinants and on the assessment of providers of country risk measures. As far as the latter are concerned, criticism concerning their opaqueness, lagging analyses and perception as facilitators for capital flows rather than true sovereign risk assessments call for alternative and independent signals. The scoring model as developed by FINK [1981, 1993, 1995] represents a key advantage over other approaches. On the one hand, it offers objectivity by using indicators that were found to be significant determinants of country risk and by weighing these according to their identified importance. On the other hand, a signaling approach is applied that allows for an ex ante identification of possible crises. Consequently, an overall rating, as well as ratings focusing on economic power, stability, debt burden and transfer quota are provided for Croatia, Latvia and the Euro zone.

We find that based on 1998-2007 fundamentals, the country risk of Latvia is worsening due to the aggravation of the country's debt burden. The rating of Croatia's country risk witnessed a rather volatile development

(11) The lack of publications of the ECB on the actual level of short-term external debt for the Euro zone was of particular concern. Therefore, we had to estimate proxies from the existing data for individual member states.

in the years under investigation. Although the ratings for stability and economic power will stabilize on a certain level as of 2007, the debt burden will develop negatively. This structural issue will be amplified by current efforts to combat the financial crisis that imply higher debt levels in the medium term. As far as the Euro zone is concerned, its country risk has decreased persistently, leading to a constant improvement in its rating. The main reasons for this development are an increase in the union's current account surplus, as well as a decline in debt prior to the 2008 financial and automotive sector rescue packages. Due to a temporary deterioration in these parameters, the Euro zone's country risk rating witnessed a decline of more than 10 points in just one year and consequently reached its lowest score of 33 points in 2007. As the general conditions are projected to improve based upon the fundamentals (particularly as far as debt burden is concerned), the monetary union's country risk is projected to decrease again.

The comparison of the individual results reveals two different paths. On the one hand, Croatia and Latvia are expected to account for a similarly negative development in terms of overall country risk. On the other hand, the Euro zone will evolve positively and will thus – with the exception of transfers – perform best according to the results of the projection.

As Croatia and Latvia's country risk will be worsening if no measures are taken (mainly due to the high level of external debt and widening current account deficits), it is highly recommendable to implement adequate measures to improve the situation in the future. Consequently, our recommendations for the two countries aim at decreasing the level of external debt, as well as at improving the export/import ratio. Hence, balancing the budget and trying to reduce the budget deficit should be of paramount importance to the responsible governments. Short-term public spending to calm the contagion from the 2008 global financial crisis runs counter these mid-term stabilization measures.

Although the results for the Euro zone are positive, possible renewed appreciations of the common currency relative to the USD may reduce the monetary union's international competitiveness. Expensive exports

could lead to a decline in the current account surplus or even to a deficit, which would in turn increase the need for borrowing. Finally, current developments in the financial markets are not to be neglected as they may – among other things – adversely affect the union's productivity, its GDP growth and the general stability of the economy. Thus, the more important are sovereign risk assessments that model country risk independent from possibly biased evaluations by rating agencies.

Appendix

Table A1

Selected studies on country risk assessment

(Information taken from the respective studies. The list does not claim completeness.)

Study	Year	Aim	Results	Restrictions
Saini & Bates	1984	Analysis of the development of studies dealing with country risk.	The study has become more sophisticated and respectable.	Determination of the dependent variable, data availability, statistical techniques, model specifications and inability to forecast.
Cosset & Roy	1991	Replication of Euromoney's and Institutional Investor's country risk ratings.	GNP per capita, propensity to invest and net foreign debt to exports are found to be significant. High correlation between ratings.	Market participants are provided with little informational value.
Cantor & Packer	1996	Analysis of the determinants and impact of the sovereign credit ratings assigned by Moody's and Standard and Poor's.	Per capita income, GDP growth, inflation, external debt, level of economic development and default history are found to be significant. Bond yield movements follow rating announcements.	The assigned ratings have a largely predictable component.
Haque, Mathieson & Mark	1997	Evaluation of the most widely used commercially available ratings.	The country's growth rate, the inflation rate, nongold foreign exchange reserves/imports and current account balance/GDP are found to be significant. Regional location and the type of export goods are also important.	Influence of subjective judgments by rating analysts.
Larraín, Reisen & von Maltzan	1997	Analysis of the announcement effect when the ratings of Moody's and Standard and Poor's are put on review.	Two-way causality between ratings and yield spreads. Highly significant effect of negative rating announcements. Thus, rating agencies are able to dampen excessive private capital inflows.	Results are sensitive to the chosen period. No information on whether negative rating announcements would be provided in time.
Oetzel, Bettis & Zenner	2001	Assessment of the usefulness of country risk measures.	Country risk measures often fail to predict economic or political changes.	Currency fluctuations are not a perfect proxy for overall country risk.
Afonso	2003	Analysis of the determinants used for sovereign credit ratings by Moody's and Standard and Poor's.	GDP per capita, external debt in % of exports, level of economic development, default history, real growth and inflation rate are found to be significant.	Political risk not included.
Elkhoury	2008	Assessment of credit rating agencies and their influence on developing countries.	The role of credit rating agencies has been expanding. They help to reduce information asymmetries, but lack transparency, provide only scarce information on methodologies and their ratings lag markets.	
Kim & Wu	2008	Analysis of the influence of sovereign credit ratings provision on domestic financial sector development and international capital inflows to emerging countries.	Sovereign credit rating measures affect financial intermediary sector develpments and capital flows.	Results depend on wheter ratings are long- or short-term, local- or foreign-currency ratings.

Table A2

Most common providers of country risk analyses

(The distinction follows Elkhoury 2008. The individual information was taken from the respective homepages. The list does not claim completeness.)

Name of Rating Agency	Type of Rating Agency	Rating description	Methodology	Number of rated sovereigns
Moody's	Recognized	The respective agency's *opinion* about the creditworthiness of an issuer of an issued obligation. Local and foreign currency ratings are provided.	A multitude of variables are weighted and combined into a final rating. Fixed weights or formulas are not used. The final decision is incumbent upon a committee.	100
Standard & Poor's	Recognized			110
Euromoney	Non-recognized	A country's creditworthiness (i.e. willingness and ability to service financial obligations in due time) is assessed.	Weighted assessment of nine different categories of variables. The latter include debt, economic and political indicators, as well as access to different types of funds. Fixed weights are used for each of the nine categories.	185
Institutional Investor	Non-recognized		Country credit surveys that are based on information provided by economists and sovereign-risk analysts are conducted. No weights or formulas.	177
Economist Intelligence Unit	Non-recognized	Assessment of the risk of sovereign debt default.	Final rating is influenced by political, economic policy, economic structure and liquidity risk. Fixed weights.	120
International Country Risk Guide	Non-recognized	Composite country risk rating, as well as ratings for economic, financial and political risk are provided.	Allocation of points and weights to a fixed number of individual variables.	140
Coface	Non-recognized	@rating reflects short-term non-payment risk of companies in a particular country.	Assessment of macroeconomic indicators, the business environment and the company's payment behavior.	165

Table A3

Important indicators | Croatia, Latvia and the Euro zone | 2000-2012

									projection period				
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Croatia													
GDP, real change in %	-1.67	0.69	3.83	3.52	2.15	0.93	1.51	1.16	1.16	1.16	1.16	1.16	1.16
Exports (in the broadest sense), change in %	7.35	12.17	9.33	39.57	20.00	7.06	14.21	19.30	16.28	16.45	16.60	16.73	16.84
Imports (in the broadest sense), change in %	-1.32	13.39	19.02	35.01	15.13	9.04	14.49	21.85	20.76	21.23	21.65	22.01	22.33
Current Account Balance, change in %	-34.83	21.16	76.13	18.35	-5.86	19.94	15.90	34.14	40.04	38.32	36.84	35.55	34.43
Gross Debt, change in %	9.01	1.81	31.74	54.40	27.87	-7.55	23.09	23.53	18.95	22.04	24.71	26.86	28.46
Foreign Exchange Reserves, change in %	16.51	33.45	25.13	39.18	6.93	0.48	30.54	19.03	0	0	0	0	0
Latvia													
GDP, real change in %	4.10	5.45	4.61	4.13	2.34	3.62	5.37	0.18	0.18	0.18	0.18	0.18	0.18
Exports (in the broadest sense), change in %	12.15	7.43	10.05	23.89	28.84	27.63	18.85	35.15	31.01	32.01	32.81	33.46	33.97
Imports (in the broadest sense), change in %	5.03	11.44	10.96	30.95	37.88	21.54	36.54	34.37	30.87	31.16	31.36	31.50	31.60
Current Account Balance, change in %	-24.20	35.80	15.32	63.29	69.31	5.42	93.24	32.83	30.58	29.44	28.38	27.36	26.32
Gross Debt, change in %	19.55	9.03	28.62	29.29	44.37	14.14	57.15	47.10	25.87	26.60	26.98	27.06	26.90
Foreign Exchange Reserves, change in %	-2.42	35.00	8.07	15.39	33.48	16.74	95.04	27.56	0.00	0.00	0.00	0.00	0.00
Euro zone													
GDP, real change in %			3.59	1.20	1.63	1.40	2.57	2.64	2.64	2.64	2.64	2.64	2.64
Exports (in the broadest sense), change in %			6.53	18.11	21.57	12.42	16.65	20.17	15.05	15.64	16.18	16.66	17.10
Imports (in the broadest sense), change in %			1.41	19.25	19.88	15.28	18.05	18.98	12.73	13.10	13.44	13.75	14.04
Current Account Balance, change in %			286.85	1.73	49.88	-26.02	-12.87	54.07	66.10	53.44	46.15	41.40	38.04
Gross Debt, change in %			2.75	19.99	18.97	26.86	15.47	26.35	-3.47	-5.51	-8.53	-13.18	-20.95
Foreign Exchange Reserves, change in %			5.21	-9.72	-5.01	-12.86	6.65	9.42	0	0	0	0	0

REFERENCES

AFONSO, A. [2003], "Understanding the determinants of sovereign debt ratings: Evidence for the two leading agencies", *Journal of Economics and Finance*, 27 (1), 56-74.

ALLARD, C. [2008], "Large EU transfers could speed catching-up process", *IMF Survey magazine*, 37 (9), 142. [http://www.imf.org/External/Pubs/FT/SURVEY/2008/093008.pdf, accessed on September 20, 2008].

ASSOCIATION OF LATVIAN COMMERCIAL BANKS [2007], "Latvia Economic Outlook", No.1, August 2007, 1-4. [http://www.bankasoc.lv/lka/MEA_08-2007(eng).pdf, accessed on September 30, 2008].

BREUSS, F., FINK, G. AND P. HAISS [2004]. "How well prepared are the New Member States for the European Monetary Union?", *Journal of Policy Modeling*, 26 (7), 769-791.

CANTOR, R. AND F. PACKER [1996], "Determinants and impact of sovereign credit ratings", *Federal Reserve Bank of New York Economic Policy Review*, October 1996, 37-53.

CIARLONE, A., AND G. TREBESCHI [2005], "Designing an early warning system for debt crises", *Emerging Markets Review*, 6, 376-395.

COSSET, J-C. AND J. ROY [1991], "The determinants of country risk ratings", *Journal of International Business Studies*, 22 (1), 135-142.

DE GRAUWE, P. [2008], "The bank must act to end the euro's wild rise", *FT.com*, September 4, 2008. [available at http://www.ft.com/cms/s/0/d224ecfe-7a82-11dd-adbe-000077b07658.html?nclick_check=1, accessed on September 30, 2008].

DREGER, C. AND M. MARCELLINO [2007], "A macroeconometric model for the Euro economy", *Journal of Policy Modeling*, 29 (1), 1-13.

EGERT, B. [2006], "Central Bank Intervention, Communication and Interest Rate Policy in Emerging European Economies", OeNB Working Paper 134. [http://www.oenb.at/de/img/wp134_tcm14-51029.pdf, accessed on April 20, 2007].

ELKHOURY, M. [2008], "Credit rating agencies and their potential impact on developing countries", *United Nations Conference on Trade and Development*, Discussion Paper No. 186, 1-24.

ELLER, M. AND P. HAISS [2003], „Strukturschwächen im Finanzsektor der Bewerberstaaten als Verstärker spekulativer Blasen: Implikationen für die EU-Erweiterung", *Bankarchiv*, 51 (4), 253-264.

EUROPEAN COMMISSION, EC [2008], "Convergence Report 2008 – European Economy 3|2008", 15-18. [http://ec.europa.eu/economy_finance/publications/publication12574_en.pdf, accessed on September 30, 2008].

FINK, G. [1981], "Economic Risk in Eastern Europe". paper presented at the conference on „Assessing Country Risk", *AMR International/Euromoney* Publications, London Press Centre, Nov. 12-13.

FINK, G. [1993], „Unternehmenswert der Banken und Länderrisiko", *Bankarchiv*, 8, 599-613.

FINK, G. [1995], „Kreditrationierung mittels Länderrisikoanalyse", *Bankarchiv*, 6, 455-464.

FINK, G., HAISS, P., ORLOWSKI, L. AND D. SALVATORE [1998], "Central European Banks and Stock Exchanges: Capacity Building and Institutional Development", *European Management Journal*, 16 (4), 431-446.

FINK, G., HAISS, P, OEBERSEDER, M. AND W. RAINER [2007], "Dollar depreciation—Euro pain", *Journal of Policy Modeling*, 29 (5), 739-763.

FINK, G., HAISS, P., RAINER, W. AND M. OEBERSEDER [2008], "Monetary Integration and Country Risk of Bulgaria and Romania", 217-241, in: D. Stavárek and S. Polouček (eds.), *Consequences of the European Monetary Intergration on Financial Markets*, Cambridge Scholars Publishing: Newcastle, ISBN 978-1-4438-0068-6.

GORBACH, O. [2005], „Länderrisiko, Ratingagenturen und das Country Risk Assessment Model der OECD", Masters' Thesis, Institute for International Economics and Development, Vienna University of Economics and Business Administration, Vienna, Austria.

HAISS, P., PICHLER, A. AND K. STEINER [2007], „Internationalization Strategies of Austrian and Spanish Financial Institutions: Continued Regional Ties?", 257-279, in: H. Zschiedrich and U. Christians (eds.), *Banken in Mittelosteuropa im Spannungsfeld von Transformation und Innovation*, Hampp Verlag, Munich.

HAQUE, N.U., MATHIESON, D. AND N. MARK [1997], "Rating the raters of country creditworthiness", *Finance and Development*, March 1997, 10-13.

KAMINSKY, G.L., LIZONDO, S. AND C.M. REINHART [1998], "Leading indicators of currency crises", *IMF Staff Papers*, 45 (1), 1-48.

KAMINSKY, G.L. [2000], "Currency and banking crises: The early warnings of distress", George Washington University, July 2000. [http://www.gwu.edu/~clai/working_papers/Kaminsky_Graciela_07-00.pdf].

KIM, S.J. AND E. WU [2008], "Sovereign credit ratings, capital flows and financial sector development in emerging markets", *Emerging Markets Review*, 9 (1), 17-39.

LARRAÍN, G., REISEN, H. ADN J. VON MALTZAN [1997], „Emerging market risk and sovereign credit ratings", *Organization for Economic Co-operation and Development*, Working Paper No. 124, 1-30.

LICHTLEN, M.F. [1997], *Management von Länderrisiken*, Paul Haupt: Bern, Stuttgart, Wien.

OETZEL, J.M., BETTIS, R.A. AND M. ZENNER [2001], „Country risk measures: How risky are they?", *Journal of World Business*, 36 (2), 128-145.

SAINI, K.G. AND PH.S. BATES [1984], "A survey of the quantitative approaches to country risk analysis", *Journal of Banking and Finance*, 8 (1984), 341-356.

ONLINE SOURCES:

CROATIAN NATIONAL BANK [2008], "Foreign Direct Investments statistics" (by country of origin), last update 14 July 2008. [http://www.hnb.hr/statistika/strana-ulaganja/e-inozemna-izravna-ulaganja-u-rh.xls?tsfsg=2700bb4b2ffaf86a325a62d35af88e53, accessed on September 30, 2008].

ECONOMIST INTELLIGENCE UNIT, EIU [2008], "Country Data", last accessed on August 27, 2008.

EUROPEAN CENTRAL BANK, ECB [2005], "Monthly Bulletin December - Euro Area Statistics", 63. [http://www.ecb.eu/pub/pdf/mobu/mb200512en.pdf, accessed on August 28, 2008].

EUROPEAN CENTRAL BANK, ECB [2008], "Monthly Bulletin August - Euro Area Statistics", 63. [http://www.ecb.eu/pub/pdf/mobu/mb200808en.pdf, accessed on August 27, 2008].

INTERNATIONAL MONETARY FUND, IMF [2008], "International Financial Statistics Online", last accessed on August 31, 2008.

JOINT EXTERNAL DEBT HUB [2008], data on liabilities to BIS banks, last accessed on August 28, 2008. [available at http://ddp-ext.worldbank.org/ext/DDPQQ/member.do?method=getMembers].

THE QUALITY OF ELIGIBLE COLLATERAL AND MONETARY STABILITY
AN EMPIRICAL ANALYSIS

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ABSTRACT:

The subprime crisis has shown that a weak collateralization of credits may have massive economic implications. This paper focuses on central bank lending and investigates to what extent the quality of eligible collateral (QEC) is able to explain inflation. For the period 1990 to 2003 and a sample of 62 countries a robust negative and statistically significant correlation between QEC and average inflation is found. Collateralisation of the issuance of money can be seen as necessary condition for achieving monetary stability. Good central bank money should be backed by the liable property of creditors to safeguard monetary stability.

JEL classification: E58, E42, B59

INTRODUCTION

Monetary stability is the overriding goal of central banks and represents a condition for continuous economic growth(1). Based on the works of Nobel

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(1) Cf. LEVINE [1997].

laureates KYDLAND AND PRESCOTT, the central banking literature regards central bank independence and a transparent monetary policy as best suited to achieve and safeguard monetary stability. The empirical literature, however, failed in establishing a solid ground for this consensus. This paper sheds new light on the empirical evidence on determinants of monetary stability. Moreover, this paper expands the current research agenda by considering a factor that has so far been neglected in the central banking literature: The quality of eligible collateral.

The use of collateral is pervasive: More than two thirds of all credit contracts in developed countries are secured by collateral, see BIGUS ET AL. [2004]. Yet, only in exceptional times does collateral make the headlines(2). However, if it does – as in the recent crisis in the international banking system – even central banks need to act vigorously to prevent the whole system from collapsing. In recent years collateral has also become a subject of mainstream economic analysis. But collateral also plays a vital role in the theory of Property Economics developed by HEINSOHN AND STEIGER [2002; 2006 and 2007b]. In the literature on the theory of the central bank, however, collateral has received only very little attention, see BANK FOR INTERNATIONAL SETTLEMENTS [2001, p. i]. This paper aims at joining the theory of the central bank and Property Economics by investigating to what extent the quality of collateral eligible at central banks is able to explain inflation. In doing so, hypotheses derived from the theory of Property Economics are tested drawing on the first comprehensive dataset suitable to assess the significance of the quality of eligible collateral for monetary stability provided in LEHMBECKER AND MISSONG [2008]. Moreover, the explanatory power of central bank independence and other potential determinants of inflation are assessed against the one of the quality of eligible collateral. The results of this paper establish the quality of eligible collateral as one pivotal element of a theory of central banking as it 'trumps' all alternative explanations of average inflation.

(2) Cf. LEVINE [1997].

The paper proceeds as follows: Part two gives an overview of the literature on central banking and collateral. In part three hypotheses on the effects of the quality of eligible collateral on inflation are generated based on the theory of Property Economics. Results of econometric analyses are presented in part four and part five discusses the implications of this study. Part six concludes.

2. REVIEW OF THE LITERATURE

This paper investigates to what extent the quality of eligible collateral is able to explain cross country differences in average inflation. An evaluation of this potential explanation of inflation calls for an overview of how the literature explains inflation. Monetary policy has witnessed major developments during the last thirty years. The discourse on the characteristics of an optimal monetary policy was strongly influenced by the debate on *rules versus discretion*(3). During the 1980s the paradigm of an independent central bank was developed. Central banks' monetary policy should be free from political pressures to be able to achieve the goal of price stability. The early 1990s saw just another innovation in monetary policy as inflation targeting was introduced in a number of countries. When more and more central banks were granted independence from their respective governments it became evident that the traditionally highly opaque monetary policy of many central banks would have to be adjusted to allow for greater central bank accountability(4). Section 2.1 reviews the literature on monetary policy frameworks. A short review of the macroeconomic and microeconomic literature on collateral is offered in section 2.2.

1.1 The 'rules versus discretion' debate and its proposals

The debate on rules versus discretion led to major changes of monetary policy frameworks: During the 1980s many central banks were regarded as

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(3) Cf. BOFINGER ET AL. [2001].

(4) See VAN DER CRUISEN AND DEMERTZIS [2005, p. 2] who argue that greater central bank transparency is justified by "[r]easons of democratic legitimacy […]".

mere divisions of the treasury and central bank's communication with the public was considered as somewhat undesirable(5). Nowadays this picture has changed completely as the following statement on the EUROPEAN CENTRAL BANK's (ECB) homepage reveals:

"The independence of the ECB is conducive to maintaining price stability. Theoretical analysis and empirical evidence show this." (EUROPEAN CENTRALBANK'shomepage:http://www.ecb.de/ecb/orga/independence/ html/index.en.html) "Today, most central banks, including the ECB, consider transparency as crucial. This is true especially for their monetary policy framework. The ECB gives a high priority to communicating effectively with the public." (EUROPEAN CENTRAL BANK's homepage: http://www.ecb.de/ecb/orga/transparency/html/index. en.html)

GERAATS [2002], summarising these developments, regards central bank independence and transparency as the new paradigm in monetary policy.

The theory behind this paradigm is based on KYDLAND AND PRESCOTT's [1977] "Rules Rather than Discretion: The Inconsistency of Optimal Plans". A monetary policy bound by a fixed rule is justified on the grounds of a general dynamic time inconsistency of monetary policy. Monetary policy is assumed to have no effect on unemployment in the long run(6). In the short run, however, a certain negative (positive) interrelation between the level of unemployment (economic activity) and the rate of inflation prevails. A level of inflation above the one expected by economic agents would cause unemployment to decrease. A microeconomic explanation is that producers interpret the rise in the price of 'their' good as a real increase in demand for 'their' good – being unable to distinguish whether all prices rise or only 'their' good's price – and raise production accordingly(7).

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(5) Cf. CUKIERMAN AND MELTZER [1986] as well as data on central bank independence provided in CUKIERMAN ET AL. [1992a]

(6) Empirical work by LUCAS [1973] established the idea that a natural rate of unemployment exists, which in the long run is only affected by structural factors.

(7) Cf. LUCAS [1973]

In KYDLAND AND PRESCOTT's model the central bank is always tempted to boost the economy in the short run by unexpected inflation. The resulting decrease of unemployment is welcomed by both private agents and central bankers. However, economic agents know the goals and conditions under which the central bank takes its decisions. Under rational expectations economic agents, therefore, adjust their expectations of future inflation accordingly and expected inflation turns out to be always higher than it would be if the central bank were able to commit credibly to a policy of zero inflation. The reason for this finding is that a credibly rule bound monetary policy allows policy makers to keep inflation at low levels whereas a discretionary monetary policy allows for a reduction of unemployment below its natural rate but at the cost of potentially excessive inflation rates(8). The problem of time inconsistency of monetary policy triggered a broad discussion on how to solve it.

BARRO AND GORDON [1983b] were among the first to propose remedies for the presumed time inconsistency of a discretionary policy. A central bank's reputation or credibility is supposed to make up for a missing rule bound monetary policy. A central bank's reputation is said to have an effect on economic agents' formation of inflation expectations: The stronger the public's confidence in a central bank that promises to fight inflation effectively, the smaller expectations of inflation and therefore actual inflation would turn out to be. A central bank creating surprise inflation with the aim of pushing unemployment below its natural rate would thus jeopardise such reputation. If economic agents become aware of the game the central bank is playing, agents will – assuming rational expectations – presume that the central bank will always induce agents to increase employment. The corollary of such monetary policy would be rising inflation expectations, resulting in higher actual inflation and a loss of reputation for the central bank. The following two subsections illustrate the main proposals to create and maintain such credibility.

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(8) A discretionary policy is defined as taking the decision concerning the optimal policy in each period anew while in a rule bound setting this decision is only taken once and for all future periods. Cf. KYDLAND AND PRESCOTT [1977, p. 477-480].

1.1.1 Transparency as means to build reputation

CUKIERMAN AND MELTZER [1986] advanced the reputation approach of BARRO AND GORDON [1983b]. In their model the central bank has private information regarding its goals. This entails that economic agents are unable to infer reliably the central bank's goals from policy results. The greater the central bank's control of inflation, however, the faster and more reliable economic agents' conclusions regarding central bank's goals would be. It follows that central banks might deliberately choose rather rough monetary policy instruments, since the resulting imprecise control of inflation offers the advantage – from the central bank's point of view – of obscuring surprise inflation. The use of suboptimal monetary policy instruments might therefore avoid any damages to a central bank's reputation that would otherwise result from surprise inflation. Studying the Federal Reserve Board GOODFRIEND [1986] came across such behaviour: Neither the precise goals of monetary policy nor the Board's decision process were transparently communicated to the public. The papers by BARRO AND GORDON, CUKIERMAN AND MELTZER and GOODFRIEND mark the beginning of a debate on transparency in monetary policy.

At the beginning of the 1990s the idea that an improved reputation could be achieved by a more transparent form of monetary policy was taken up by a couple of central banks, which introduced a new framework for monetary policy – inflation targeting(9). The concept of inflation targeting comprises publicly announced targets for future inflation and a commitment to low and stable inflation as primary and overriding goal. Furthermore, inflation targeting entails an increased communication with the public: Targets for future inflation are not only announced but the central bank explains in publications and official speeches why the announced target was chosen. Precisely this form of public relations in connection with an inflation target renders it virtually impossible for

(9) Cf. BERNANKE AND MISHKIN [1997].

a central bank to shirk itself from the responsibility for actual inflation. Thus, inflation targeting offers the advantage of an increased credibility(10). In addition theoretical foundations of inflation targeting are supported by empirical work: MISHKIN AND SCHMIDT-HEBBEL [2001] review the literature on inflation targeting and conclude that it is a success story.

The main empirical study on central bank transparency's effect on inflation was conducted by CHORTAREAS ET AL. [2002b]. Their results support the thesis that the more detailed the explanations of central bank's forecasts are the lower the inflation rate will be. POSEN [2002] regards central bank transparency as determinant of inflation but criticises CHORTAREAS ET AL.'s paper for employing average inflation as dependent variable. According to POSEN the theoretical literature on central bank transparency focuses on inflation expectations and thus on the persistence of inflation.

POSEN [2003] finds no evidence that an increased central bank transparency implies a stronger accountability on the side of the central bank. Most notably, the newly gained independence of many central banks did not increase central banks' accountability although these central banks became significantly more transparent. A review of the literature on central bank transparency by GERAATS [2002] reaches a similar conclusion. Though it is often argued that an independent central bank necessitates – for reasons of democratic legitimacy – an increased transparency to guarantee the central bank's accountability vis à vis the public, this argumentation is not supported by empirical findings. GERAATS concludes that despite a lot of progress in the theoretical literature a consensus on the economic desirability of a transparent monetary policy is still missing.

Little remains to be added to GERAATS' conclusion. More transparency is generally a good thing for central banks' monetary policy. But transparency of monetary policy alone does not imply central bank accountability in the

(10) Cf. WOODFORD [2005].

sense that a well informed public controls an independent central bank. BLINDER [2000] shows that a central bank acting as announced and successfully fighting inflation is considered the best method to build and preserve credibility while central bank independence is seen as second best solution to achieve higher credibility. This raises the question whether central bank independence is able to limit central banks' alleged inflation bias.

1.1.2 Central bank independence: Safeguard against political pressure

The two papers by BARRO AND GORDON [1983a; 1983b] represent the origin of the discussion on central bank independence. Their central thesis is that governments tend to force central banks to issue as much currency as possible. The thus increased central bank profits would help government to finance a good portion of its budget. Due to higher inflation the value of government debt would shrink and a decrease of unemployment levels could be beneficial for government's chances in the next elections. As an increased issuance of money causes inflation, governments are generally to be regarded as possessing an inflationary tendency. Accordingly inflation rates should be lower in those countries where central banks are able to conduct monetary policy independently from governments.

FORDER [2000] offers a review of the literature that challenges the typical rationalisation of central bank independence. He believes that "[…] much of the advocacy of central bank independence is attributable to cynicism about democracy."(11) FORDER argues that BARRO AND GORDON's thesis has at its centre simply a central bank governor, not an elected governor. Thus, elections have no role in the time inconsistency problem, and hence establishing politically independent central banks should hardly solve the problem. Therefore, FORDER rejects proposed remedies to the problem of time inconsistency, like central bank independence, 'conservative' central bank governors and contracts between central bank

(11) See FORDER [2000, p. 183].

governors and the government[12]. Similarly, BLINDER vigorously rejects BARRO AND GORDON's credibility justification: "Much fascinating theory to the contrary, I do not know a shred of evidence that supports it."[13] This verdict calls for a closer look at the empirical findings.

CUKIERMAN ET AL. [1992a] were among the first to empirically test whether central bank independence has any effect on inflation. They construct a central bank independence index. This index is based on the formal legal dimension of central bank independence and possesses a statistically significant negative correlation with the level of average inflation among developed countries. This legal independence index possesses, however, no effect on inflation among developing countries. In view of the empirical observation that more independent central banks tend to be in politically more stable countries the survey by CUKIERMAN ET AL. [1992b] supports these results: Political instability promotes a government practice that relies considerably on central bank seigniorage income to finance the government's budget. Their argument is based on the idea that an inefficient tax system constrains government's collection of revenues and that such inefficiency is welcomed by political opponents, particularly in politically more instable countries. This constraint on their finances would thus force governments to rely more heavily on seigniorage revenues, which should affect inflation.

Another very influential paper stems from ALESINA AND SUMMERS [1993] who investigate the effect of central bank independence on the level and variability of several macroeconomic variables. They find cross country evidence for 16 developed countries and the period 1955 to 1988 that the level of inflation and its variability are both negatively correlated with central bank independence indices while central bank independence has no effect on real variables. This suggests, they argue, that money is neutral and central bank independence reduces inflation

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(12) On the issues of 'conservative' central bank governors and contracts between central bank governors and the government see the papers by ROGOFF [1985] and WALSH [1995].

(13) See BLINDER [1998, p. 45]. See also MCCALLUM [1997].

without causing costs in terms of real macroeconomic performance. POSEN [1998] examines the thesis that a central bank's independence enhances its credibility at such a rate that inflation expectations sink fast enough to allow for disinflations with relatively small output losses. His results suggest rather the contrary: Independent central banks cause higher costs of disinflation than relatively dependent central banks. ROMER [1993] investigates the effect of a country's openness to trade on inflation in a monetary policy framework like the one proposed by BARRO AND GORDON. His model predicts that a country's degree of openness positively affects the costs of high inflation, due to depreciation of exchange rates. Thus, more open countries should tend to have lower inflation. ROMER finds a robust and statistically significant negative relationship between openness and inflation among developing countries.

There are several studies questioning the robustness of the presented results on the effects of central bank independence(14). FUJIKI [1996] argues that results presented by, for instance, CUKIERMAN ET AL. [1992a] and ALESINA AND SUMMERS [1993] do not provide a reliable foundation for policy proposals. Their results are found to be not robust to the inclusion of control variables and depend on the periods covered and the samples employed – in particular there is no significant correlation between central bank independence and inflation in the period 1980 to 1989. FUJIKI thus challenges the robustness of ALESINA AND SUMMERS' results.

The evidence on determinants of average inflation delivered by – among others – CUKIERMAN ET AL. [1992a] and ROMER [1993] is reconsidered in the study by CAMPILLO AND MIRON [1997]. Their methodology is largely analogous to CUKIERMAN ET AL.'s. Yet, CAMPILLO AND MIRON include additional control variables like GDP per capita in the same model. Thus, for the first time in the literature on determinants of average inflation competing concepts are compared

(14) Cf. FUJIKI [1996], FUHRER [1997] and CAMPILLO AND MIRON [1997].

directly. CAMPILLO AND MIRON find that central bank independence possesses no effect on average inflation while political stability and a country's openness to trade both possess a statistically significant negative effect on average inflation. Their contribution is of utmost importance as it sheds light on the robustness of previous survey's results leading them to the "inescapable" conclusion that central bank independence possesses no effect on inflation(15). BERGER ET AL. [2001] review the empirical literature that investigates central bank independence's influence on inflation. The results of those 35 studies covered are rather ambiguous: Less than every second study finds a robust negative correlation in the spirit of BARRO AND GORDON. Most of these studies (30 of 35) use CUKIERMAN ET AL.'s legal index. Overall the results of CUKIERMAN ET AL. are confirmed by these studies(16).

The literature on central banking following KYDLAND AND PRESCOTT [1977] can be summarised as follows: There is a consensus on the optimal characteristics of the institutional framework. A central bank should be independent and implement a transparent monetary policy in order to best suit the goals of monetary stability and a stable financial system (17). This consensus, however, is not unequivocally supported by empirical evidence:

i) Greater transparency can generally be considered as beneficial even in light of the scant empirical evidence. However, central bank transparency does not help to strengthen a central bank's accountability in the sense that a well informed public could control a central bank unrestrained by democratic checks and balances.

ii) The correlation between central bank independence and inflation is not robust to the inclusion of control variables and periods covered: While the most influential surveys, ALESINA AND SUMMERS [1993] and CUKIERMAN ET AL. [1992a], – suggesting that central

(15) Cf. CAMPILLO AND MIRON [1997] p. 356.

(16) A more recent review of this literature is provided by ARNONE ET AL. [2006a].

(17) Cf. CUKIERMAN [2002] p. 15, BERGER ET AL. [2001] p. 3 f. and MISHKIN [1999] p. 580.

bank independence possesses an effect on inflation – did not test the robustness of these results, the evidence on the missing robustness provided inter alia by FUJIKI [1996], FUHRER [1997] and CAMPILLO AND MIRON [1997] is substantial.

iii) There is no empirical evidence to support BARRO AND GORDON's thesis that central bank independence increases central bank credibility. To the contrary, POSEN [1998] finds that independent central banks cause higher costs of disinflation than dependent central banks.

Therefore, the current consensus on central banks' institutional framework, central bank independence and transparency, has to be regarded as standing on shaky ground. Advocates of the theory of central banking following KYDLAND AND PRESCOTT must be criticised for holding on to an incomplete theory. The third part of this paper presents an alternative to a central banking theory à la BARRO AND GORDON, the theory of Property Economics by HEIHSOHN AND STEIGER. They regard the quality of eligible collateral as crucial for monetary stability – an issue not addressed in the covered literature.

1.2 Collateral in the economic literature

One of the first economic analysis that assigns collateral a role in economic analysis stems from STIGLITZ AND WEISS [1981]. The macroeconomic strand of the literature following STIGLITZ AND WEISS searches an explanation for the magnitude of changes in investment due to business cycle movements. Proposed explanations include the financial accelerator as well as a balance sheet and a bank lending channel(18). A review is offered by REICHLIN [2004]: This literature regards collateral as a key factor in explaining the business cycle. In these analyses, however, the central bank represents merely the exogenous source of interest rate shocks triggering the transmission mechanism. An analysis of central banks with regard to changes in collateral values is thus lacking.

(18) Cf. BERNANKE AND BLINDER [1992], BERNANKE AND GERTLER [1995] and BERNANKE ET AL. [1996].

HUBBARD [1998] describes the microeconomic literature on collateral as concerned with informational imperfections in credit markets. A review of the theoretical literature on the collateralisation of credit is offered by BIGUS ET AL. [2005]. They note that the existence of collateral in credit contracts is due to a lack of information on the part of creditors since collateral is irrelevant in a perfect neoclassical world. There are two main reasons identified in the literature why collateral is beneficial for creditors and debtors: The first rests on the assumption that creditors cannot identify the riskiness of a potential borrower – resulting in adverse selection, the second is based on the idea that borrowers might default strategically – referred to as moral hazard. Summarising the predictions of theoretical models BIGUS ET AL. note that to avoid adverse selection it should be the safer borrowers pledging collateral whereas to avoid moral hazard on the part of borrowers the more risky borrowers should pledge collateral. If adverse selection and moral hazard problems are analysed combined in one model the results are less clear and depend heavily on model specifications.

Furthermore, BIGUS ET AL. highlight a rather neglected issue in the literature on collateral: Most papers do not differentiate between internal and external collateral(19). Internal collateral represents assets of the firm, which – if the credit defaults – the creditor can sell in any case to satisfy his claims irrespective of whether assets have been pledged as collateral or not. Contrary to internal collateral, the pledging of external collateral implies an incentive on the part of the debtor to repay since external collateral represents claims on the debtor's private assets. This differentiation is crucial since theoretical models are predominantly concerned with the effects of external collateral without, however, mentioning this explicitly. Only in cases where a defaulting debtor has several creditors and the firm's assets are insufficient to satisfy all claims internal collateral might serve to rank claims in the sense that collateralised claims are satisfied before uncollateralised ones.

(19) An exception is the paper by MANOVE AND PADILLA [1999]. See also POZZOLO [2004].

BIGUS ET AL. [2004] review the empirical literature on the collateralisation of credit. Their findings can be summarised as follows: The probability of collateral being pledged is higher the smaller and younger potential debtor firms are, the longer the credit period and the larger credit volumes are, the weaker the competition among banks is and the worse overall economic conditions are. In general, the results of empirical studies do not support the thesis that collateral helps to mitigate adverse selection. Somewhat little empirical support receives the thesis that collateral limits moral hazard. The thesis that creditors demand collateral consisting in firm assets if they expect conflicts of interest with other creditors receives the broadest empirical support. Finally, 70% to 90% of all credits are found to be collateralised establishing the importance of collateral for credit markets.

Overall, the microeconomic literature on collateral has to be regarded as rather inconsistent. The literature focuses on the effects of external collateral but fails in most empirical surveys to differentiate between internal and external collateral. This somewhat invalidates many empirical findings as internal collateral is found to be used considerably more frequently than external collateral(20). Moreover, collateral is not discussed in connection with central banks' monetary policy(21).

Another strand of literature discusses collateral in the context of central banks: The literature on central banks' raison d'être (22). This literature regards the lender of last resort (LOLR) as representing a necessary condition for a banking system's capability to withstand financial crises and thus representing a central banks' primary raison d'être (23). FREIXAS ET AL. [2002] review the LOLR literature and define LOLR as discretionary provision of liquidity by the central bank to financial institutions. Such provision of liquidity has to represent a response to a

(20) See BIGUS ET AL. [2004] and POZZOLO [2004].

(21) Cf. for instance COCO [2000].

(22) See GOODHART [1985; 1999] and FRIEDMAN AND SCHWARTZ [1986].

(23) For an exemplary statement of this thesis see BUITER [2004] p. 42 f.

shock, which entails a rising demand for liquidity that cannot be provided by private participants in the money market. This consensus, however, is not yet accounted for in an international context: Despite increasing internationalisation in the banking sector there is neither an international LOLR nor does the Eurosystem possess a Eurozone wide LOLR. BEGG ET AL. [1998] as well as SPETHMANN AND STEIGER [2005] note, moreover, that national central banks in the Eurosystem possess a certain freedom to accept rather dubious assets as eligible collateral and that it is not clear, which institution would have to cover potential losses from such operations.

The issuance of currency and with it monetary policy has nowadays become the defining characteristic of a modern central bank but does not – at least in this strand of literature – represent its raison d'être(24). Collateral enters considerations insofar as it is understood that all central bank credit – including LOLR credits – must be collateralised(25). However, BAGEHOT's [1873] notion of 'good collateral' is generally not discussed with regard to the qualities good collateral must possess to be regarded as such (26).

2. HYPOTHESES OF THE THEORY OF PROPERTY ECONOMICS

The following argumentation shows how the quality of assets eligible for the issue of money by a central bank affects the long term level of inflation. The quality of an eligible asset generally depends on the creditworthiness of its issuer and on the liquidity or marketability of the asset(27). Two hypotheses are developed, in which collateralisation and the quality of eligible assets affect inflation: i) The collateralisation of a central bank's

(20) This view is reinforced by those authors who prefer monetary laissez faire. Cf. WHITE [1984], SELGIN AND WHITE [1994; 2005], and RITTER [1995].

(25) Cf. BAGEHOT [1873], BEGG ET AL. [1998] and GOODHART [1999].

(26) Exceptions are the papers by BEGG ET AL. [1998] and SPETHMANN AND STEIGER [2005].

(27) Cf. BANK OF JAPAN [2003] p. 1-3. See also EUROPEAN CENTRAL BANK [2007] p. 93-109.

issuance of money as a general protection against an unlimited issuance of money and ii) Eligible assets of a quality sufficient to prevent a financing of public debt by 'printing money'. These hypotheses are based on the Theory of Property Economics by HEINSOHN AND STEIGER [1996; 2000; 2005; 2006; and 2007a].

2.1 Property Economics' theory of money and central banking

For HEINSOHN AND STEIGER [2005], property's most important feature is its role in the emergence of money. According to HEINSOHN AND STEIGER, good money represents a claim to the property of the issuer of money. Money is created in a credit contract. Such a contract is signed by two proprietors. The creditor issues money by handing out documents to a debtor. Each of these documents (notes) represents a claim to a part of the creditor's property. Therefore, money is backed by the property of the issuer. The debtor receives the issued money if he pledges a part of his property to collateralise the loan. He is furthermore obliged to repay the loan plus interest. Why is money created exactly in this way? First of all, such money represents claims to property, i.e. an asset, even though the money itself, for instance a banknote, might be without any intrinsic value. Secondly, the issuer has to insure herself against the risk that her money could be presented for redemption out of her property if the debtor does not repay the loan. Insurance against this risk is achieved by demanding collateral from the debtor: In case the debtor defaults, the pledged property of the debtor becomes the property of the creditor. This is the reason why both parties entering into a credit contract have to be proprietors. If the debtor does not pledge his property explicitly, the creditor usually has the right to execute her claims against the debtor into his property. Issuers of money are thus forced not to endanger their property by permitting claims on their property to become reality without adequate collateral. How to achieve that redeemable money is not presented for redemption will be the subject of the next paragraphs.

Nowadays, money is issued in a two tiered banking system by a central bank that holds a monopoly on the issuance of money. In such a system,

STEIGER [2005] argues, the central bank is not obliged to redeem its notes vis à vis the non bank public, but only vis à vis its counterparties, i.e. the commercial banks. The obligation to redeem can only be satisfied if the central bank permanently holds property respectively equity, immediately available. Commercial banks presenting banknotes for redemption surely represents no everyday occurrence. This, however, does not affect the fact, that the central bank has to be able to absorb surplus money if it deems this necessary. The absorption of surplus money is feasible only if the central bank holds assets that can be sold against such surplus money.

Commercial banks can only obtain money if they pledge good securities to the central bank to collateralise the credit and if they promise to repay the loan plus interest(28). It has to be considered here, that repo operations, i.e. operations with repurchase agreements, make up the bulk of today's liquidity providing operations. These repo operations are in essence nothing else than collateralised credits. Since every good security represents property, such banking system can only exist in countries where an effective legal system is present that protects property rights. Furthermore, central banks are not permitted to accept assets from counterparties that issued or guaranteed those assets(29). The same rule applies to counterparties that have close ties with the issuers of assets. It is these rules that constitute the difference between monies that are easily accepted as medium of exchange and others, which represent nothing else than IOU notes, that have to be expected to be presented for redemption. For some banknote to be accepted as money, that is not hastily presented for redemption, two conditions must be met: i) The intrinsically worthless piece of paper has to represent something of value, i.e. the banknote must be backed by assets; and ii) it must be guaranteed that the ratio of the backing asset's value and its representations remains more or less constant. That is, an over issue of banknotes relative to their property base

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(28) Cf. BANK OF JAPAN [2003] p. 1.

(29) In the Guidelines of the SWISS NATIONAL BANK [SNB] on Monetary Policy Instruments [2007] p. 3 [http://www.snb.ch/en/mmr/reference/repo_mb6/source/repo_mb6.en.pdf] this rule reads as follows: "The SNB does not accept a counterparty's own securities or those issued by persons or companies that form an economic entity with the counterparty."

must be excluded. The mechanisms that guarantee that, for instance, the Swiss franc meets these conditions will be sketched next.

A central bank's counterparties, i.e. commercial banks, have to assume liability for defaulting collateral. This implies that commercial banks have to cover the losses in case their pledged assets, which are debt instruments of other institutions, default. In this way good money is always backed by the property of at least three proprietors: The central bank's property (creditor to a commercial bank), the commercial bank's property (debtor to the central bank but at the same time creditor to its debtors), and the property of the commercial bank's debtors. In other words, good money is "creditor's money", i.e. it is backed by the property of creditors(30). Thereby the first condition is satisfied, since an issue of money on the basis of good collateral guarantees that the issued banknotes represent assets. This, however, is only the obvious condition, since everyone issuing an IOU note can likewise claim to have his notes backed triply by property. The mechanism, ensuring that an over issue of banknotes relative to their property base is excluded, is elaborated in the following.

The demand for central bank credit is generally limited by the commercial bank's willingness to accept liability with their property vis à vis the central bank for debt instruments of the commercial bank's debtors. If this basic principle of creditor liability is disregarded, an arbitrarily growing money base with an inherent tendency towards worthless paper money, i.e. debtor's money, will be the result. A debtor's money becomes reality as soon as the government decides that its own debt instruments will be directly eligible collateral at the central bank. In such a case, the debtor government uses its self issued assets as collateral to obtain a credit. It is therefore already a matter of bad money if the central bank's debtors do not have to pledge assets as creditors but are permitted to pledge assets issued by themselves, i.e. as debtors, since IOU notes can generally be issued infinitely(31). This would be nothing else than financing the government's

(30) See HEINSOHN AND STEIGER [2002] p. 5.

(31) In the Guidelines of the SWISS NATIONAL BANK [SNB] on Monetary Policy Instruments [2007] p. 3 [http:// wwwCf. HEINSOHN AND STEIGER [2002] p. 5. Bad money is also referred to as debtor's money.

deficit by 'printing money'. If, however, public debt instruments first have to take what seems to be a 'loop way' across the asset market to become proper eligible collateral, this loop way will be the best safeguard against an inflationary currency. Only government is treated here as a potential originator of a debtor's money, since only government is able to enforce the circulation of a money that tends to be worthless(32).

What is the reason that good collateral has to take the loop way across the asset market? A debtor is only liable for his own debt instruments, while a creditor, as a central bank's debtor, is liable vis à vis the central bank for the pledged collateral even if the pledged debt instrument defaults. Accordingly, a creditor will scrutinise the creditworthiness of her debtors to protect her property. Debt instruments that are traded on the asset market are by definition marketable and usually represent eligible collateral. Contrary to marketable debt instruments, nonmarketable debt instruments, are usually not eligible as collateral at a central bank. The marketability of a debt instrument has to be proven on the market, i.e. the combination of risk and price has to be seen as acceptable for purchase by market participants. Thus, it can be stated that the creation of good money, i.e. creditor's money, is influenced by operations on the asset market. An over issue of money seems impossible under these circumstances, while an avoidance of the asset market will almost inevitably lead to the creation of a worthless debtor's money(33).

Some remarks on Property Economics are in order here. Property Economics as an alternative to the neoclassical theory of a general equilibrium is not limited to the notions presented above. In fact, Property Economics sets out to explain the emergence of markets and other real world phenomena that cannot be explained, for instance, in classical or neoclassical economics as these theories simply postulate their existence. Property Economics is not a theory supposed to be valid for all times and

(32) Cf. STEIGER [2006].

(33) See HEINSOHN AND STEIGER [2000; 2006; and 2007a].

places – like neoclassical economics – but only for those societies that are characterised by an effective legal system protecting property(34).

2.2 Hypotheses derived from the theory of Property Economics

Central banks are usually obliged by law to grant credits only if these are sufficiently collateralised. Even though today there exists no comprehensive study on the collateralisation of central banks' credit. KOPCKE [2002], BANK FOR INTERNATIONAL SETTLEMENTS [2001], BLENCK ET AL. [2001], BORIO [2001] and EUROPEAN CENTRAL BANK [2007] offer some overview on the practices of some industrialised countries. The issuance of money by central banks is commonly administrated by granting credits to commercial banks. This implies that a central bank's issuance of money is not independent from the demand for credit by commercial banks(35). MARTINEZ-RESANO [2004] notes that issuance of banknotes is initiated by commercial banks and that this demand for currency can be quite volatile. The accuracy of this thesis can be substantiated with reference to Japan: Interest rates were at an extremely low level after the crisis of the early 1990s but even so the BANK OF JAPAN was not able to issue money in dimensions that would have freed the economy from fears of deflation. In the light of a generally limited stock of assets, which always represents scarce property, a requirement to collateralise central bank credit means that the issuance of money is strictly finite. After all, a good is not scarce because it can be found only in relatively small quantities but because someone is the proprietor of that good(36). In industrialised countries the availability of eligible collateral represents usually no binding restriction. This, however, does not necessarily hold in exceptional circumstances and possibly even less so in developing countries.(37)

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(35) Cf. BOFINGER ET AL. [2001].

(36) Cf. DEMSETZ [1998] p. 151 f. See also HEINSOHN AND STEIGER [1996] p. 259.

(37) Cf. BORIO [2001] p. 18.

What happens if the collateralisation of the issuance of money is missing and instead faith is put only in the power of interest due? The experiences of some transition countries feature the best object lesson. The normal case is runaway and speedily further accelerating inflation(38). The collateralisation of the issuance of money can therefore be expected to act upon the latter as a restriction, and hence also as a check against inflation. The first hypothesis reads accordingly:

[H1] *The collateralisation of a central bank's issuance of money directly limits inflation through the scarceness of eligible assets.*

Of greater relevance for monetary stability, however, is the principle of creditor's money or rather the principle of creditor's liability. As illustrated above, the banking system's liquidity is strictly limited by the commercial banks' willingness to accept liability vis à vis the central bank with their property for debt instruments that serve as collateral. In essence, the argument boils down to a comparison of different qualities of eligible collateral: Eligible collateral represents debt certificates, mostly government bonds(39). The crucial feature of 'good' collateral is, however, neither directly linked to the quality of the debt certificate itself nor to the creditworthiness of the issuer. Since claims against oneself can in principle be issued infinitely and debt certificates represent in this regard nothing else than IOUs, the scarceness of debt certificates cannot be secured by the issuers of such titles. Rather, the scarceness of eligible collateral is secured by those who buy these titles on the asset market as this guarantees that titles possess an observable positive price, which – economically speaking – signifies scarceness. Therefore, good collateral must take the scarceness guaranteeing loop way across the asset market or, in other words, good collateral has to be marketable.

The standards for the quality of eligible collateral as laid down in the thesis of creditor's money, however, are still unsatisfied as the marketability of

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(38) Cf. ULF HEINSOHN cited in HEINSOHN AND STEIGER [1996] p. 278 f. on Vietnamese experiences. The average annual inflation rate in Vietnam for the period 1986-1995 amounted to approximately 100 percent.

(39) Cf. MARTINEZ-RESANO [2004] p. 22.

an eligible asset alone is insufficient to guarantee a genuine anchor for the issuance of money. The quality of an eligible asset consists in the buyer's readiness to accept liability for potential losses from an asset, the occurrence of which generally cannot be influenced by the buyer. Good central bank money, creditor's money, is thus based on the property of liable creditors. The crucial point to note is the fixation of the issuance of money to a base that is not arbitrarily augmentable and hence scarce, i.e. collateral representing scarce property. It is this anchor that would be eliminated if government had the option to directly pledge self issued debt instruments to the central bank. Therefore, a second hypothesis reads as follows:

[H2] *Ensuring the preservation of the principle of creditor's liability in the collateralisation of the issuance of money limits in particular government's demand for credit in such a way that a threat to monetary stability can be ruled out.*

Summarising, [H1] demands that issued money be backed by assets while [H2] requires that eligible collateral always proves its quality on the asset market. A final point to note is that standards of eligible collateral do not form part of central banks' monetary policy but of the framework of monetary policy like central bank independence and transparency since changes of collateral frameworks depend rather on efficiency considerations than on the stance of monetary policy. Therefore, the quality of eligible collateral has to be understood as affecting the quality of the monetary policy framework just like central bank transparency and central bank independence.

3. METHODOLOGY AND RESULTS OF DATA ANALYSIS

Cross country data are employed to test the prediction of property economics that inflation will be higher in countries whose central banks do not issue currency in compliance with the principle of creditor's money. As both, the literature on central bank independence and transparency as well as the above hypothesis, attempt to explain average inflation with

the help of institutional characteristics, this literature's modus operandi is taken as a blue print for this analysis(40). Moreover, doing so allows for comparing the explanatory power of determinants proposed by Property Economics with those suggested in the literature on central banking and transparency. Hypotheses are tested using multivariate linear regressions and are based on the survey on the quality of eligible collateral conducted by LEHMBECKER [2008]. In 2006, 148 national central banks were asked to answer an online questionnaire. 62 of them returned completed forms. Answers to the following items of the questionnaire were used to construct an Index of the Quality of Eligible Collateral (IQEC): i) Whether central banks exceptionally dispense with collateral when providing liquidity (binary), ii) whether assets from institutions possessing close ties with the issuers of these assets are accepted as collateral (binary), iii) the minimum percentage of a credit that has to be collateralized (ordinal scale), iv) the minimum degree of creditworthiness that issuers of assets eligible as collateral have to satisfy (ordinal scale following the classification of international rating agencies), v) the percentage of central banks' bad debts (share) and vi) the amount of banknotes in circulation as a percentage of total assets (share).

Based on these items an index employing equal weights is constructed. Details of the index construction are substantiated in LEHMBECKER AND MISSONG [2008]. Moreover, index values for the sample of 62 central can be retrieved from this paper. The higher the numerical index value, the poorer is the quality of eligible assets. Hence, a low index value stands for high standards concerning collateral. In multivariate regression analyses, it is checked whether the IQEC significantly affects monetary stability as measured by the consumer price inflation (CPI(41). The empirical analysis aims at determining whether the IQEC possesses explanatory power with respect to inflation when compared

(40) Cf. CUKIERMAN ET AL. [1992a; 1992b], LOUNGANI AND SHEETS [1997], BERGER ET AL. [2001] and ARNONE ET AL. [2006a] regarding exemplary surveys on central banks' independence and CHORTAREAS ET AL. [2002a] and FRY ET AL. [2000] for a survey on central banks' transparency.

(41) Data are taken from the WORLD BANK's [2006] development indicators.

with indicators used in empirical studies on institutional aspects of monetary policy. As numerous potential explanatory variables come into consideration, both manual specification of the estimation equations and an automated stepwise selection are used. STIER [1996, p. 248 f.] discusses advantages and disadvantages of the stepwise selection routine. Relying rigidly on significance levels, this routine helps to circumvent the problem of 'arbitrary' results in multivariate regressions as it provides small and readily interpretable models by incorporating the statistically most important explanatory variables. The problem of 'arbitrary' results is due to potentially strong reactions of explanatory variables' significance levels to changes in the model, depending on which group of independent variables is employed(42). However, both manual specification of the estimation equations and the automated stepwise selection did not lead to diverging results.

Model 1 (see table 1) comprises the dependent variable CPI as a measure of average inflation, the independent variable IQEC as a measure of the quality of eligible collateral as well as six other explanatory variables generally expected to possess an effect on average inflation. The variable PS is supposed to measure the degree of political stability or rather political violence in a country. Index averages are based on annual data collected by KAUFMANN ET AL. [2006]. According to CUKIERMAN ET AL. [1992b] political stability possesses a negative influence on inflation. The variables RL, RQ and GE are supposed to measure respectively the degree of the rule of law, the degree of regulatory quality and the degree of government effectiveness prevalent in a country. Index averages are based as well on annual data collected by KAUFMANN ET AL. These three variables are expected to possess a negative influence on inflation and are considered here, to find out whether the IQEC actually measures the quality of eligible collateral or if it represents merely a good instrument to detect different degrees of these three variables. The variables LGDP and

(42) See CAMPILLO AND MIRON [1997] for an example of this effect concerning the variable GDP per capita..

GDP are supposed to represent an overall measure of a country's stage of development[43]. More precisely, GDP measures average GDP per capita and LGDP is the average of the log of GDP per capita. GDP per capita was introduced by CAMPILLO AND MIRON [1997] as a control variable to assess the explanatory power of central bank independence indices and is expected to possess a negative influence on inflation. The log of GDP per capita represents a frequently employed transformation to lessen the influence of extreme values[44].

Using the stepwise selection routine to reduce the number of potential explanatory variables, IQEC and PS emerge as the sole independent variables to form model 1. Their coefficients are statistically significant while none of the other potential explanatory variables can significantly contribute to explain average inflation over and above that, which is 'explained' by IQEC and PS. These results correspond to the predictions made in part 3, namely that a low (high) standard of eligible collateral – equivalent to a high (low) value of the IQEC – tends to go with high (low) average inflation. A positive correlation between average inflation and the IQEC thus implies a negative correlation between average inflation and the quality of eligible collateral.

In model 2 the variables IQEC, OPEN and LGDP enter as explanatory variables. OPEN is supposed to measure the degree of a country's openness to trade and represents annual averages of imports of goods and services as percentage of GDP. OPEN could not be included in model 1 due to missing data for one country, the Bahamas. According to ROMER [1993] this variable possesses a negative influence on inflation. Only IQEC possesses a significant negative effect on average inflation while OPEN and LGDP cannot significantly contribute to the explanation of inflation in this model.

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(43) Data are taken from the WORLD BANK's [2006] development indicators.

(44) See for example BERGER ET AL. [2001] and CAMPILLO AND MIRON [1997].

The sample of 62 countries for the period 1998 to 2003 includes three high inflation countries – Romania, Tajikistan and Turkey feature pronounced above average inflation – that might possess an inadmissibly strong effect on the results presented so far. These three outliers are therefore excluded from the sample. Model 3 contains CPI as dependent and IQEC, PS and GDP as independent variables to assess the explanatory power of IQEC after the exclusion of outliers and in the presence of its strongest explanatory variable rivals. For this task the stepwise selection routine is employed as exercised above. The estimated equations confirm the general result that the quality of eligible collateral and political stability both possess a statistically significant effect on average inflation. The size of coefficients, however, decreases distinctly as the maximum average inflation in the sample drops from more than 50% per year to roughly 15%.

Table 1 :OLS results (45)

Model	Included variables	adjusted R2	Coefficient	Standard Error	t-Value
Dependent variable: CPI, n = 62, period: 1998-2003, Method: Stepwise selection			Explanatory variables:	IQEC, PS, RL, RQ, GE, LGDP, GDP	
Model 1	IQEC PS Constant	0.294	22.600*** -3.312** 0.601	8.085 1.316 2.837	2.796 -2.517 0.212
Dependent variable: CPI, n = 61, period: 1998-2003			Explanatory variables:	IQEC, OPEN, LGDP	
Model 2	IQEC OPEN LGDPConstant	0.216	25.724** -0.019 -0.939 7.251	10.137 0.046 0.966 11.033	2.538 -0.420 -0.972 0.657
Dependent variable: CPI, n = 59, period: 1998-2003, Method: Stepwise selection			Explanatory variables:	IQEC, PS, GDP	
Model 3w	IQEC PS Constant	0.319	11.148** -1.314** 1.652	4.458 0.534 1.344	2.501 -2.459 1.229
Dependent variable: CPI, n = 46, period: 1995-1999, Method: Stepwise selection			Explanatory variables:	IQEC, PS, RL, RQ, GE, GDP, LGDP, CBI, CBT, CBDF	
Model 4w	IQEC PS Constant	0.470	51.086*** -9.130 0.977	13.330 5.803 6.702	3.832 -1.573 0.146
Note: ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels respectively. w indicates heteroskedasticity consistent standard errors.					

Model 4 contains in addition to the variables included in model 1 the variables CBI, CBT and CBDF. These variables are supposed to measure the degree of a central bank's independence from government, the limits on a central bank's financing of the government deficit and the transparency of a central bank's monetary policy respectively. Index values are taken from the dataset on central bank monetary policy frameworks provided by FRY ET AL. [2000]. According to CUKIERMAN ET AL. [1992a] central bank independence possesses a negative influence on inflation. According to FRY [1998] and C CHORTAREAS ET AL. [2002a] CBDF's expected influence on inflation is negative. Finally, according to GERAATS [2002] and CHORTAREAS ET AL. [2002a] central bank transparency possesses a negative effect on inflation. The use of these three variables largely determined the period 1995 to 1999 and the sample size(46). As before IQEC and PS emerge as the sole independent variables to form the model. Their coefficients reveal the expected relationships and are statistically significant – while none of the other potential explanatory variables can significantly contribute to explain average inflation over and above that, which is explained by IQEC and PS – representing this paper's main result(47). To assess the validity of this result, several alternative model specifications have been analysed, all of which support the robustness of our findings(48).

i) The result is essentially unaffected by the vector of weights used for the IQEC' elements. Neither employing the squared IQEC has a noteworthy effect on significance levels nor employing a version with weights

(45) Variables measure the following constructs: CBDF/Central bank deficit finance, CBI/Central bank independence, CBT/Central bank transparency, GDP/Gross domestic product per capita, CPI/Consumer price inflation, GE/Government effectiveness, IQEC/Index of the quality of eligible collateral, LGDP/Log of gross domestic product per capita, OPEN/Openness, PS/Political stability, RL/Rule of law, RQ/Regulatory Quality.

(46) The sample represents the intersection of the data provided by FRY ET AL. [2000] and LEHMBECKER AND MISSONG [2008].

(47) All models are checked for heteroskedasticity using the White test and calculating heteroskedasticity consistent standard errors according to WHITE [1980] if heteroskedasticity is detected. In model 4 this procedure leads to statistical insignificance of PS.

(48) See LEHMBECKER [2008] for details of robustness analyses.

derived from principal components analysis, using an alternative standardisation of the index components[49].

ii) The dependent variable, average inflation, has been operationalised in a way that corresponds to this paper's research question as different ways of operationalising the dependent variable had no effect on results. The measure of average inflation matters only in the sample of high income countries for the period 1995 to 1999.

iii) The results are valid for the main samples as well as for subsamples of high income and developing countries respectively.

iv) The results depend not unduly on a few influential observations, i.e. there is no outlier problem except for the developing countries samples adjusted for outliers for the periods 1995 to 1999 and 1990 to 1997.

v) Additional explanatory variables, i.e. control variables, were incorporated to reveal the explanatory power of the IQEC relative to other potentially relevant independent variables. The IQEC' statistical significance is robust to the inclusion of all control variables except for the log of GDP per capita in some samples of the period 1990 to 1997.

vi) Finally, the result that the IQEC possesses a statistically significant effect on average inflation is robust to variations of examined periods as significant correlations are found in all three periods, i.e. 1998 to 2003, 1990 to 1997 and 1995 to 1999.

Therefore, a robust, clearly negative and statistically significant correlation between the quality of eligible collateral and average inflation has been established for the period 1990 to 2003. Variables that contribute to the explanation of average inflation over and above that, which is explained by the quality of eligible collateral, are political stability, GDP per capita and central bank transparency. However, political stability, GDP per capita and central bank transparency possess no subsample validity. Moreover, the correlations of these three variables are in numerous cases

(49) See LEHMBECKER AND MISSONG [2008] for details on using weights calculated based on factor analysis.

not robust to the inclusion of the IQEC and lack therefore robustness with regard to control variables. Variables that measured the degree of a country's openness to trade, the degree of the rule of law, the degree of government effectiveness, the degree of regulatory quality, the degree of a central bank's independence from government and the degree to which the financing of the government deficit by the central bank is limited did all not contribute to the explanation of average inflation over and above that, which is explained by the quality of eligible collateral.

4. DISCUSSION OF RESULTS

This survey's results provide new evidence on the significance of institutional determinants of inflation. These results, however, have to be interpreted with regard to the usual problems of cross section analyses(50). The sizes of the samples employed are sufficiently large to be considered representative. To interpret the results in terms of a universal validity seems not indicated though. The sample might be biased in the sense that predominantly those central banks contributed to this survey that recently have had some success in fighting inflation. Moreover, it can generally not be ruled out that the control variables employed managed to deliver only crude measures of what was intended to be measured. These caveats, however, apply to all cross section analyses – including the literature on institutional determinants of inflation. The following illustrates the results' significance with regard to the theory of Property Economics and the current theory of central banking.

4.1 Implications of results for the theory of Property Economics

According to the major result of part four, there is a robust negative and statistically significant correlation between the quality of eligible collateral and average inflation, which supports hypotheses [H1] and [H2] and therefore the theses of Property Economics. For hypothesis [H1] this

(50) Cf. CAMPILLO AND MIRON [1997] p. 355.

indicates that a central bank that secures its issuance of money, limits its room for an expansionary monetary policy by the scarceness of assets needed for the collateralisation and thereby ultimately limits inflation. Evidence supporting the validity of this interpretation can also be found in the trend of transition countries' inflation rates from the early 1990s. The twelve transition countries in the sample experienced some years of extreme inflation at the beginning of the 1990s and all of these except for Romania and Tajikistan – featured single digit inflation rates at the beginning of this decade(51). These countries are – in this respect – representative of most high inflation countries in the 1990s that managed to achieve disinflation. Transition countries' inflation performance, however, is particularly indicative: Central bank officials in these countries conducted monetary policy for the first time in a capitalist environment at the beginning of the 1990s. Not surprisingly, central bank officials were rather inexperienced, resulting in ill suited early monetary frameworks: The survey data reveal that often collateralisation of central bank credits was not required at the beginning of the 1990s. Moreover, inflation performances of these countries seem to reflect the trends of learning curves. Slovenia, for instance, adapted very quickly to the new rules of the game and features a low value in the IQEC, indicating a high quality of eligible collateral, whereas countries like Romania and Tajikistan show a low quality of eligible collateral and still suffer from high inflation.

Suboptimal inflation records, however, might also be due to a lack of developed markets for government bonds. This could explain the inadequate collateralisation of central bank credits observed in many transition countries during the 1990s. Moreover, the pervasive trend that central banks are to a certain extent involved in the development of government debt markets might also represent an attempt to secure an adequate collateralisation of the issuance of money since currency is usually backed by government bonds(52).

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(51) These transition countries comprise China, Croatia, Czech Republic, Estonia, Hungary, Kazakhstan, Latvia, Macedonia, Mongolia, Romania, Slovenia, and Tajikistan.

(52) Cf. MARTINEZ-RESANO [2004].

Hypothesis [H2] puts the quality of eligible collateral at centre stage. The readiness of a central bank's counterparty to accept liability with its property for potential losses of a not self issued debt instrument pledged to the central bank as collateral represents the pivotal quality of an eligible asset. If this quality is missing, i.e. government possesses the option of using its own self issued debt instruments as collateral to acquire credit directly from the central bank, the scarceness of eligible assets existing under normal circumstances is eliminated. As highlighted by the corroboration of [H1] it is exactly the fixation of the issuance of money to a basis that is not arbitrarily augmentable and thus scarce, i.e. collateral representing scarce property, which would be eliminated if government had the option to directly pledge self issued debt instruments to the central bank. This is due to the fact that debt instruments, i.e. the issuance of claims against oneself, are in principle infinitely augmentable. The scarceness of debt instruments cannot be secured by the issuers of such titles but only by those who buy these titles on the asset market. That is the reason why all collateral and especially the one originally issued by government must take the scarceness guaranteeing loop way across the asset market. However, the standards for the quality of eligible collateral go still one step further: The marketability of an eligible asset alone, i.e. the existence of a potential buyer for that asset, is not sufficient to guarantee a genuine anchor for the issuance of money. The quality of an eligible asset consists in the readiness of its buyer to accept liability for potential losses from an asset, the occurrence of which generally cannot be influenced by the buyer. Therefore, good central bank money, creditor's money, is based on the property of liable creditors. Given this survey's results it has to be concluded that only Property Economics' creditor's money can guarantee monetary stability.

4.2 Implications of results for the theory of central banking

There exists a broad consensus in the central banking literature on the institutional framework that should be in place to ensure a stable financial system and monetary stability: Central banks ought to be independent and

follow a transparent monetary policy. The empirical evidence supporting this latter consensus, however, is rather weak: The reported correlations between central bank independence and inflation are typically not robust to the inclusion of control variables and periods covered. The most influential surveys, e.g. by CUKIERMAN ET AL. [1992a] and ALESINA AND SUMMERS [1993], suggesting that central bank independence possesses an effect on inflation did not test for the robustness of their results. The evidence on the missing robustness of these surveys' results is substantial(53). Surveys on the effects of central bank independence cover the period 1950 to 1995. More recent data to test for the effect of central bank independence on inflation exist, but are surprisingly either not used to test for effects on inflation or are ignored as in the case of the most comprehensive survey on monetary policy framework characteristics to date(54). The two comprehensive reviews on central bank independence, BERGER ET AL. [2001] and ARNONE ET AL. [2006a] do not even mention the BANK OF ENGLAND's survey by FRY ET AL. [2000], which covers almost 100 central banks. Therefore, the current consensus on the institutional framework of central banks' independence and transparency has to be regarded as not well founded.

In this paper three variables have been found to contribute to the explanation of average inflation over and above that, which is explained by the IQEC: Political stability, GDP per capita and central bank transparency. The results of CUKIERMAN ET AL. [1992b] concerning political stability's negative effect on inflation are thus confirmed(55). This statement needs to be qualified, however, as political stability is neither significant in several of the subsamples tested nor consistently robust to the inclusion of the IQEC. Nevertheless, political stability can

(53) Cf. inter alia FUJIKI [1996], FUHRER [1997] and CAMPILLO AND MIRON [1997].

(54) Cf. ARNONE ET AL. [2006b] as well as FRY ET AL. [2000].

(55) It has to be mentioned here that the index of political instability employed in this survey does not measure the same construct as the one used in CUKIERMAN ET AL. [1992b]. Notwithstanding, a strong correlation between the two indices of political instability can be assumed. See KAUFMANN ET AL. [2006] and GOLDSTONE ET AL. [2000].

be regarded as one of the determinants of inflation alongside the quality of eligible collateral. The effect of central bank transparency on average inflation could only be assessed for the period 1995 to 1999 due to data constraints. The results of CHORTAREAS ET AL. [2002b] are largely confirmed, i.e. central bank transparency possesses a significant negative effect on average inflation. Again, however, this result is not very robust as central bank transparency possesses neither subsample validity nor is it consistently robust to the inclusion of the IQEC. Nonetheless, central bank transparency can be regarded as one of the determinants of inflation alongside the quality of eligible collateral. GDP per capita is found to possess a negative effect on average inflation, which largely confirms the results of CAMPILLO AND MIRON [1997]. This result is, however, not robust to the inclusion of the IQEC, lacks subsample validity and crucially depends on the log transformation.

Variables that measured the degree of the rule of law, the degree of government effectiveness, the degree of regulatory quality and the degree of a central bank's independence from government did not contribute to the explanation of average inflation over and above that, which is explained by the IQEC. The results strengthen the position of those who doubt that central bank independence is the key to monetary stability. Furthermore, the findings of this survey challenge the result of ROMER [1993] regarding the negative effect of openness on inflation. The variable measuring a country's openness to trade is, just like central bank independence, not robust to the inclusion of control variables like the IQEC, indices of political stability and GDP per capita. Based on the results of this survey the negative correlation between inflation and central bank independence as established by ALESINA AND SUMMERS [1993] as well as CUKIERMAN ET AL. [1992a] can therefore not be confirmed. Given the unambiguity of results it even seems prudent to regard the thesis that central bank independence possesses a negative effect on average inflation as refuted by the data for the years since 1990. Finally, it should be noted that apart from central bank transparency and the quality of eligible collateral no institutional variable remains that possesses

a demonstrated effect on inflation and can be regarded as a potentially adjustable parameter(56).

A last point to note is that the findings of the literature on collateral are somewhat inadequate with regard to the collateralisation of central bank credits. The microeconomic literature on collateral considers collateral only in some cases as an optimal ingredient of credit contracts and, if it does so, thinks of external collateral. By contrast, in this paper full collateralisation of all central bank credits is shown to represent best practice with regard to monetary stability. In addition, commercial banks pledge only internal collateral to the central bank. Central banks, however, do not demand internal collateral to be able to enforce their claims first in case of default since central banks credit contracts commonly rank the creditor central bank first in this respect.

CONCLUSIONS

The results of this paper enhance the evidence on the influence of the institutional framework of monetary policy on inflation. The findings establish the quality of eligible collateral as one pivotal element of a theory of central banking. Collateralisation of the issuance of money and the elimination of financing the government deficit directly via the central bank can be seen as necessary conditions for achieving monetary stability. The crucial quality of eligible collateral consists in the readiness of a central bank's counterparty to accept liability with its property vis à vis the central bank for potential losses stemming from pledged assets. Good central bank money should therefore be backed by the liable property of creditors to safeguard monetary stability.

Central bank independence and transparency represents the consensus in the literature following KYDLAND AND PRESCOTT. This consensus is shown to stand on shaky ground. Evidence on central bank independence

(56) Arguably, political stability and the level of GDP per capita cannot be regarded as parameters adjustable for the purposes of monetary stability.

relies primarily on data for the period 1960 to 1989. Monetary stability, however, represents a current challenge and thus deserves more up to date evidence. This paper uses such evidence and shows that the quality of eligible collateral 'trumps' all alternative explanations of average inflation.

This finding can be utilized by policy makers especially in less developed and transition countries on their way towards a more stable economic development. In addition, adapting monetary policy frameworks accordingly would represent a rather minor reform compared to the time and effort necessary to make a central bank independent from government. Given the robustness of our results, further research on eligible collateral seems promising. In any case it can be stated that the theory of Property Economics has successfully passed the first comprehensive empirical test.

Finally, the recent crisis of the international banking system has shown that the quality of eligible collateral is a current and most eminent issue. In the course of this liquidity crisis central banks all over the world were forced to act as lender of last resort. The crisis had been triggered by the default of so called subprime mortgages, i.e. credits to low income individuals who have no capital. Alarmingly, the FED felt forced to accept mortgage backed securities as collateral for its emergency credits(57). Thus, the FED accepted assets as collateral that are based on those that had triggered the crisis. Whether such collateralisation still deserves its name seems questionable and shows that the quality of eligible collateral is still not fully understood even by central bankers.

(57) Cf. ECONOMIST [2007b].

REFERENCES

ALESINA, A., and L. H. SUMMERS. [1993], "Central Bank Independence and Macroeconomic Performance: Some Comparative Evidence," *Journal of Money*, Credit, and Banking, Vol. 25(2), 151–62.

ARNONE, M., B. J. LAURENS, and J.-F. SEGALOTTO [2006a], "The Measurement of Central Bank Autonomy: Survey of Models, Indicators, and Empirical Evidence," International Monetary Fund Working Paper 06/227.

ARNONE, M., B. J. LAURENS, and J.-F. SEGALOTTO [2006b], "Measures of Central Bank Autonomy: Empirical Evidence for OECD, Developing, and Emerging Market Economies," International Monetary Fund Working Paper 06/228.

BAGEHOT, W. [1873], *Lombard Street. A Description of the Money Market*, Hyperion Print: Westport, 1979.

BAILEY, M. J. [1998], "Property Rights in Aboriginal Societies," pp. 155–158 in: P. Newman (ed.), *The New Palgrave Dictionary of Economics and the Law*, Macmillan: London.

BANK OF JAPAN [2003], "The Bank of Japan's Eligible Collateral Framework and Recently Accepted Collateral," *Bank of Japan Quarterly Bulletin*, Vol. 11(2), 245–253.

BARRO, R. J., and D. B. GORDON [1983a], "A Positive Theory of Monetary Policy in a Natural Rate Model," *Journal of Political Economy*, Vol. 91(4), 589–610.

BARRO, R. J., and D. B. GORDON [1983b], "Rules, Discretion and Reputation in a Model of Monetary Policy," *Journal of Monetary Economics*, Vol. 12(1), 101–121.

BEGG, D., P. DE GRAUWE, F. GIAVAZZI, H. UHLIG, and C. WYPLOSZ [1998], "The ECB: Safe at Any Speed?," Center for Economic Policy Research Working Paper: London.

BERGER, H., J. DE HAAN, and S. C. W. EIJFFINGER [2001], "Central Bank Independence: An Update of Theory and Evidence," *Journal of Economic Surveys*, Vol. 15(1), 3–40.

BERNANKE, B. S., and A. S. BLINDER [1992], "The Federal Funds Rate and the Channels of Monetary Transmission," *American Economic Review*, Vol. 82(4), 901–921.

BERNANKE, B. S., and M. GERTLER [1995], "Inside the Black Box: The Credit Channel of Monetary Policy Transmission," *Journal of Economic Perspectives*, Vol. 9(4), 27–48.

BERNANKE, B. S., and F. S. MISHKIN [1997], "Inflation Targeting: A New Framework for Monetary Policy?," *Journal of Economic Perspectives*, Vol. 11(2), 97–116.

BERNANKE, B. S., M. GERTLER, and S. GILCHRIST [1996], "The Financial Accelerator and the Flight to Quality," *Review of Economics and Statistics*, Vol. 78(1), 1–15.

BIGUS, J., T. LANGER, and D. SCHIERECK [2004], "Wie werden Kreditsicherheiten in der Praxis eingesetzt? – Ein Überblick über empirische Befunde," *Zeitschrift für Bankrecht und Bankwirtschaft*, Vol. 16, 465–480.

BIGUS, J., T. LANGER, and D. SCHIERECK [2005], "Warum gibt es Kreditsicherheiten?," *Kredit und Kapital*, Vol. 38(4), 573–617.

BANK FOR INTERNATIONAL SETTLEMENTS [2001], *Comparing Monetary Policy Operating Procedures Across the United States, Japan and the Euro Area*, Bank for International Settlements: Basel.

BLENCK, D., H. HASKO, S. HILTON, and K. MASAKI [2001], "The Main Features of the Monetary Policy Frameworks of the Bank of Japan, the Federal Reserve and the Eurosystem," pp. 23–56 in: Bank for International Settlements, *Comparing Monetary Policy Operating Procedures Across the United States, Japan and the Euro Area*, Bank for International Settlements: Basel.

BLINDER, A. S. [1998], *Central Banking in Theory and Practice*, MIT Press: London.

BLINDER, A. S. [2000], "Central-Bank Credibility: Why Do We Care? How Do We Build It?," *American Economic Review,* Vol. 90(5), 1421–1431.

BOFINGER, P., J. REISCHLE, and A. SCHÄCHTER [1996], *Geldpolitik – Ziele, Institutionen, Strategien und Instrumente*, Franz Vahlen: Munich.

BOFINGER, P., J. REISCHLE, and A. SCHÄCHTER [2001], *Monetary Policy: Goals, Institutions, Strategies, and Instruments*, Oxford University Press: Oxford.

BORIO, C. E. V. [2001], "A Hundred Ways to Skin a Cat: Comparing Monetary Policy Operating Procedures Across the United States, Japan and the Euro Area," pp. 1–22 in: *Comparing Monetary Policy Operating Procedures Across the United States, Japan and the Euro Area*, Bank for International Settlements: Basel.

BUITER, W. H. [2004], "A Small Corner of Intertemporal Public Finance – New Developments in Monetary Economics: Two Ghosts, Two Eccentricities, a Fallacy, a Mirage and a Mythos," National Bureau of Economic Research Working Paper 10524.

CAMPILLO, M., and J. A. MIRON [1997], "Why Does Inflation Differ across Countries?," pp. 335-357 in: C. D. Romer and D. H. Romer (eds.), *Reducing Inflation. Motivation and Strategy*, University of Chicago Press: London.

CHORTAREAS, G., D. STASAVAGE, and G. STERNE [2002a], "Monetary Policy Transparency, Inflation and the Sacrifice Ratio," *International Journal of Finance and Economics*, Vol. 7(2), 141–155.

CHORTAREAS, G., D. STASAVAGE, and G. STERNE [2002b], "Does It Pay To Be Transparent? International Evidence from Central Bank Forecasts," *Federal Reserve Bank of St. Louis Review*, Vol. 84(4), 99–118.

COCO, G. [2001], "On the Use of Collateral," *Journal of Economic Surveys*, Vol. 14(2), 191–214.

CUKIERMAN, A. [2002], "Are Contemporary Central Banks Transparent About Economic Models and Objectives and What Difference Does it Make?," *Federal Reserve Bank of St. Louis Review*, Vol. 84(4), 15–35.

CUKIERMAN, A., and A. H. MELTZER [1986], "A Theory of Ambiguity, Credibility, and Inflation under Discretion and Asymmetric Information," *Econometrica*, Vol. 54(5), 1099–1128.

CUKIERMAN, A., S. B. WEBB, and B. NEYAPTI [1992a], "Measuring the Independence of Central Banks and Its Effect on Policy Outcomes," *World Bank Economic Review*, Vol. 6(3), 353–398.

CUKIERMAN, A., S. EDWARDS, and G. TABELLINI [1992b], "Seigniorage and Political Instability," *American Economic Review*, Vol. 82(3), 537–555.

DEMSETZ, H. [1967], "Toward a Theory of Property Rights." *American Economic Review*, Vol. 57, 347–59.

DEMSETZ, H. [1998], "Property Rights," pp. 144–155 in: P. NEWMAN (ed.), *The New Palgrave Dictionary of Economics and the Law*, Macmillan: London.

EUROPEAN CENTRAL BANK [2007], "The collateral frameworks of the Federal Reserve System, the Bank of Japan and the Eurosystem," *Monthly Bulletin*, Vol. 10, 85–100.

ECONOMIST [2007a], "Risk and the new financial order: Surviving the markets," August 18, 9.

ECONOMIST [2007b], "A liquidity squeeze: Bankers' mistrust," August 18, 60.

FORDER, J. [2000], "Central Bank Independence and Credibility: Is there a Shred of Evidence?: Review," *International Finance*, Vol. 3(1), 167–185.

FREIXAS, X., C. GIANNINI, G. HOGGARTH, and F. SOUSSA [2002], "Lender of Last Resort: A Review of the Literature," pp. 27–53 in: C. A. E. Goodhart and G. Illing (eds.), *Financial Crises, Contagion, and the Lender of Last Resort*, Oxford University Press: Oxford.

FRIEDMAN, M., and A. J. SCHWARTZ [1986], "Has Government Any Role in Money?," *Journal of Monetary Economics*, Vol. 17(1), 37–62.

FRY, M. J. [1998], "Assessing Central Bank Independence in Developing Countries: Do Actions Speak Louder Than Words?" *Oxford Economic Papers*, Vol. 50(3), 512–529.

FRY, M. J., D. JULIUS, L. MAHADEVA, S. ROGER, and G. STERNE [2000], "Key Issues in the Choice of Monetary Policy Framework," pp. 1–216 in: L. Mahadeva and G. Sterne (eds.), *Monetary Policy Frameworks in a Global Context*, Routledge: London.

FUHRER, J. C. [1997], "Central Bank Independence and Inflation Targeting: Monetary Policy Paradigms for the Next Millennium?," *New England Economic Review*, Vol. 3(1–2), 19–36.

FUJIKI, H. [1996], "Central Bank Independence Indexes in Economic Analysis: A Reappraisal," *Monetary and Economic Studies*, Vol. 14, 79–101.

GERAATS, P. M. [2002], "Central Bank Transparency," *Economic Journal*, Vol. 112, F532–F565.

GOLDSTONE, J. A., T. R. GURR, B. HARFF, M. A. LEVY, M. G. MARSHALL, R. H. BATES, D. L. EPSTEIN, C. H. KAHL, P. T. SURKO, J. C. ULFELDER, Jr., and A. N. UNGER [2000], *State Failure Task Force Report: Phase III Findings*, Science Applications International Corporation: McLean, Va.

GOODFRIEND, M. [1986], "Monetary Mystique: Secrecy and Central Banking," *Journal of Monetary Economics*, Vol. 17(1), 63–92.

GOODHART, C. A. E. [1985], "The Evolution of Central Banks. A Natural Development?," Suntory-Toyota International Centre for Economics and Related Disciplines Occasional Paper 8, London School of Economics and Political Science: London.

GOODHART, C. A. E. [1999], "Myths about the Lender of Last Resort," *International Finance*, Vol. 2(3), 339–360.

HEINSOHN, G., and O. STEIGER [1996], *Eigentum, Zins und Geld: Ungelöste Rätsel der Wirtschaftswissenschaft*, Metropolis: Marburg, 2004.

HEINSOHN, G., and O. STEIGER [2000a], "The Property Theory of Interest and Money," pp. 67–100 in: J. Smithin (ed.), *What is Money*?, Routledge: London.

HEINSOHN, G., and O. STEIGER [2000b], "Geldnote, Anleihe und Aktie: Gemeinsamkeiten und Unterschiede dreier Wertpapiere," Institut für Konjunktur- und Strukturforschung Discussion Paper 22.

HEINSOHN, G., and O. STEIGER [2002], "The Eurosystem and the Art of Central Banking," *Studi Economici: rivista quadrimestrale*, Vol. 76(1), 5–30.

HEINSOHN, G., and O. STEIGER [2005], *Eigentumsökonomik*, Metropolis: Marburg.

HEINSOHN, G., and O. STEIGER [2006], "Interest and Money: The Property Explanation," pp. 490-507 in: P. Arestis and M. C. Sawyer (eds.), *A Handbook of Alternative Monetary Economics*, Edward Elgar: Cheltenham, UK and Northampton, MA.

HEINSOHN, G., and O. STEIGER [2007a], "Money, Markets and Property," pp. 59–78 in: A. Giacomin and M. C. Marcuzzo (eds.), *Money and Marktets: A Doctrinal Approach*, Routledge: London.

HEINSOHN, G., and O. STEIGER [2007b], "Collateral and Own Capital: The Missing Links in the Theory of the Rate of Interest and Money," pp. 181–222 in: O. Steiger (ed.), *Property Economics: Property Rights, Creditor's Money and the Foundations of the Economy*, Metropolis: Marburg.

HUBBARD, R. G. [1998], "Capital-market Imperfections and Investment," *Journal of Economic Literature*, Vol. 36, 193–225.

JIMENEZ, G., V. SALAS, and J. SAURINA [2004], "Determinants of Collateral," *Banco de España Working Paper* 0420.

KAUFMANN, D., A. KRAAY, and M. MASTRUZZI [2006], "Governance Matters V: Aggregate and Individual Governance Indicators for 1996–2005," *World Bank Policy Research Working Paper* 4012.

KOO, R. C. [2001], "The Japanese economy in balance sheet recession," *Business economics*, Vol. 36(2), 15–23.

KOPCKE, R. W. [2002], "The Practice of Central Banking in Other Industrialized Countries," *New England Economic Review*, Vol. 8(2), 3–9.

KYDLAND, F. E., and E. C. PRESCOTT [1977], "Rules Rather than Discretion: The Inconsistency of Optimal Plans," *Journal of Political Economy*, Vol. 85(3), 473–491.

LEHMBECKER, P. [2008], *The Quality of Eligible Collateral, Central Bank Losses and Monetary Stability*: An Empirical Analysis, Peter Lang: Frankfurt am Main.

LEHMBECKER, P., and M. MISSONG [2008], "Measuring the Quality of Eligible Collateral," Research on Money in the Economy working paper 08–03.

LEVINE, R. [1997], "Financial Development and Economic Growth: Views and Agenda," *Journal of Economic Literature*, Vol. 35(2), 688–726.

LOUNGANI, P., and N. SHEETS [1997], "Central Bank Independence, Inflation, and Growth in Transition Economies," *Journal of Money*, Credit, and Banking, Vol. 29(3), 381–399.

LUCAS, R. E., Jr. [1973], "Some International Evidence on Output-Inflation Tradeoffs," *American Economic Review*, Vol. 63(3), 326–334.

MANOVE, M., and A. J. PADILLA [1999], "Banking (conservatively) with optimists," RAND *Journal of Economics*, Vol. 30(2), 324–350.

MARTINEZ-RESANO, J. R. [2004], "Central Bank Financial Independence," Bank of Spain Occasional Paper 0401.

MCCALLUM, B. T. [1997], "Crucial Issues Concerning Central Bank Independence," *Journal of Monetary Economics,* Vol. 39(1), 99–112.

MISHKIN, F. S. [1999], "International Experiences with Different Monetary Policy Regimes," *Journal of Monetary Economics*, Vol. 43(3), 579–605.

MISHKIN, F. S., and K. SCHMIDT-HEBBEL [2001], "One Decade of Inflation Targeting in the World: What Do We Know and What Do We Need to Know?," National Bureau of Economic Research Working Paper 8397.

POSEN, A. S. [1998], "Central Bank Independence and Disinflationary Credibility: A Missing Link?," *Oxford Economic Papers,* Vol. 50(3), 335–359.

POSEN, A. S. [2002], "Does It Pay To Be Transparent? International Evidence from Central Bank Forecasts – commentary," *Federal Reserve Bank of St. Louis Review*, Vol. 84(4), 119–126.

POSEN, A. S. [2003], "Six Practical Views of Central Bank Transparency," pp. 153–172 in: P. Mizen (ed.), *Central Banking, Monetary Theory and Practice: Essays in Honour of Charles Goodhart*, Edward Elgar: Cheltenham.

POZZOLO, A. F. [2004], "The role of guarantees in bank lending," *Bank of Italy Working Paper* 528.

REICHLIN, P. [2004], "Credit Markets, Intermediation, and the Macroeconomy: A Discussion," pp. 856–892 in: S. Bhattacharya, A. W. A. Boot and A. V. Thakor, (eds.), *Credit, Intermediation, and the Macroeconomy: Readings and Perspectives in Modern Financial Theory*, Oxford University Press: Oxford.

RITTER, J. A. [1995], "The Transition from Barter to Fiat Money," A*merican Economic Review*, Vol. 85(1), 134–149.

ROGOFF, K. [1985], "The Optimal Degree of Commitment to an Intermediate Monetary Target," *Quarterly Journal of Economics*, Vol. 100(4), 1169–1189.

ROMER, D. [1993], "Openness and Inflation: Theory and Evidence," *Quarterly Journal of Economics*, Vol. 108(4), 869–903.

RUDOLPH, B. [1982], "Können die Banken ihre Kreditsicherheiten 'vergessen'?," *Kredit und Kapital*, Vol. 15, 317–340.

SELGIN, G. A., and L. H. WHITE [1994], "How Would the Invisible Hand Handle Money?," *Journal of Economic Literature*, Vol. 32(4), 1718–1749.

SELGIN, G. A., and L. H. WHITE [2005], "Credible Currency: A Constitutional Perspective," *Constitutional Political Economy*, Vol. 16(1), 71–83.

SWISS NATIONAL BANK [2004], Richtlinien der SNB über das geldpolitische Instrumentarium, http://www.snb.ch/d/download/geldpol_instr_d.pdf (accessed March 25, 2004).

SPETHMANN, D., and O. STEIGER [2005], "The Four Achilles' Heels of the Eurosystem: Missing Central Monetary Institution, Different Real Rates of Interest, Nonmarketable Securities, and Missing Lender of Last Resort," *International Journal of Political Economy*, Vol. 34(2), 46–68.

STADERMANN, H.-J. [1994], *Geldwirtschaft und Geldpolitik. Einführung in die Grundlagen, Gabler*: Wiesbaden.

STEIGER, O. [2005], "Schuldnergeld: Der Wunde Punkt in der keynesianischen Staatstheorie des Geldes," pp. 169–188 in: G. Huber, H. D. Kurz and H. Krämer (eds.), *Einkommensverteilung, technischer Fortschritt und struktureller Wandel: Festschrift für Peter Kalmbach*, Metropolis: Marburg.

STEIGER, O. [2006], "The Endogeneity of Money and the Eurosystem: A Contribution to the Theory of Central Banking," pp. 150–169 in: M. Setterfield (ed.), *Complexity, Endogenous Money and Macroeconomic Theory: Essays in Honour of Basil J. Moore*, Edward Elgar: Cheltenham.

STIER, W. [1996], *Empirische Forschungsmethoden*, Springer: Berlin.

STIGLITZ, J. E., and A. WEISS [1981], "Credit Rationing in Markets with Imperfect Information," American Economic Review, Vol. 71(3), 393–410.

SVENSSON, L. E. O. [1999], "Inflation Targeting as a Monetary Policy Rule," *Journal of Monetary Economics*, Vol. 43(3), 607–654.

VAN DER CRUIJSEN, C., and M. DEMERTZIS [2005], "The Impact of Central Bank Transparency on Inflation Expectations," De Nederlandsche Bank Working Paper 031/2005.

WALSH, C. E. [1995], "Optimal Contracts for Central Bankers," *American*

Economic Review, Vol. 85(1), 150–167.

WHITE, H. [1980], "A Heteroscedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroscedasticity," *Econometrica*, Vol. 48, 817–838.

WHITE, L. H. [1984], "Competitive Payments Systems and the Unit of Account," *American Economic Review*, Vol. 74(4), 699–712.

WOODFORD, M. [2005], "Central Bank Communication and Policy Effectiveness," *National Bureau of Economic Research Working Paper* 11898.

WORLD BANK [2006], *World Development Indicators on CD-ROM*, World Bank: Washington, DC.

EXCHANGE MARKET PRESSURE AND THE ROLE OF INSTITUTIONS IN THE NEW EU MEMBERS, EU CANDIDATES AND POTENTIAL CANDIDATES

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ABSTRACT:

While going through the large-scale institutional changes the Central and Eastern Europe countries (CEECs) have experienced turmoil periods on their currency markets in the 1990s, like e.g. Hungary (1994), the Czech Republic, Romania and Bulgaria (1997). Therefore a research question arises whether the CEECs with lower level of institutional framework are more vulnerable to exchange market weaknesses than those with stronger institutions. The regression results for 14 new EU member, candidate and potential candidate countries reveal the role of fundamentals for explaining exchange market pressure in these countries. Also stronger institutions like, rule of law, efficient banking and non-banking systems and enterprise sector reforms, decrease the exchange market pressure.

JEL classification: F31, O24

INTRODUCTION

During the last 18 year the CEECs have witnessed wide scale changes in the institutional framework of the countries. Despite the remarkable

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progress in transforming their countries into market oriented economies the CEECs have experienced also several periods of high financial vulnerability.

It is generally considered that institutional development leads to lower tensions on the exchange markets. Financial and corporate governance, the quality of the legislative institutions and the advancements of the liberalization process all contribute to relieving the information asymmetries in the economy and consequently improve the quality of the investment decisions, thereby raising overall productivity and economic performance. Moreover, sound institutions increase transparency and credibility of government and central bank policies. All this is expected to contribute to a smoother working of the financial markets.

On the other hand product and financial market liberalization can increase financial vulnerability by the dependence of capital imports. As a result countries can become vulnerable to the changes in international investors' sentiments and sudden withdrawals. This concern has been voiced by a number of economists (see e.g. BUITER AND GRAFE [2002]). Also during the turmoil periods like the Czech crisis 1997 the countries experienced rapid capital outflows (see VANNESTE, VAN POECK & VEINER [2003]).

The focus of this paper lies in the relation between institutional framework and vulnerability to currency crises - whether the CEECs with weaker institutional settings have been more vulnerable to currency weakness than those with stronger institutions? The susceptibility to currency turmoil is proxied by an indicator of exchange market pressure (emp). The advantage of this measure is that it enables comparison of countries with different exchange rate regimes and institutions. We also test the bipolar view, whether intermediate exchange rate systems, such as e.g. conventional fixed pegs, are more vulnerable to exchange rate crises than extreme exchange rate systems, such as credible fixed exchange rate systems (monetary union or currency board) and freely floating exchange rates. DE GRAUWE & GRIMALDI [2002] argue that intermediate exchanger rate systems can never be made fully credible (as long as the

central bank cares about domestic objectives) and because the incentive of the central to devalue the currency increases once economic agents expect it to happen.

The research concentrates on transition economies and use data for 15 formerly planned economies in Central- and Eastern-Europe. This limitation allows the testing of transition-specific aspects of institutional development, such as e. g. banking sector reform. As the aim is to explain tensions in the exchange market rather than currency crises we use a measure of exchange market pressure instead of binary crisis dummy as our dependent variable.

The remainder of this paper is organized as follows. In section 2 the literature on currency crises theories, bi-polar view and existing empirical research is overviewed. Section 3 sketches the institutional developments in the transition countries covered in the analysis. In section 4 a quarterly measure of exchange market pressure is defined, computed and documented for three subgroups of our dataset. The regression analysis is presented in section 5. Policy conclusions and prospects for further research are discussed in the final section.

1. THEORIES OF CURRENCY CRISIS, BIPOLAR VIEW AND PREVIOUS EMPIRICAL RESEARCH

Since the collapse of the Bretton Woods system in the 1970s the world has witnessed a huge number of currency crises (see FELDSTEIN [2002]) and they have been a widely studied subject. Still the understanding of the causes and triggering mechanisms behind the crises remains discussable and every bigger wave of crises in the world brings new theoretical model into the picture. In this section three currently existing classes of crises models and the role that institutions play in these models has been summarized.

Weak macroeconomic fundamentals are the main cause of currency crises according to the first generation models pioneered by KRUGMAN

[1979]. Krugman's model considers the situation where the government pursues an overly expansionary monetary policy in a fixed exchange rate regime. The excessive expansion of domestic credit results from monetization of fiscal deficits or from supporting a weak banking system. It leads to a fall in the domestic interest rate, capital outflow and a loss of international reserves. Rational speculators regard this situation as unsustainable and believe the maintenance of a fixed peg is impossible in the long run. They anticipate the devaluation and launch an attack long before the international reserves are completely exhausted. According to the first generation models a currency crisis stems from monetary or fiscal policies that are inconsistent with the fixed exchange rate regime. Institutions have no specific contribution in this view. Since such crises result from macroeconomic imbalances they are in principle predictable.

However, the crisis of the EMS at the beginning of the 1990s has demonstrated that countries with relatively sound macroeconomic fundamentals can be victims of speculative attacks too (see e. g. EICHENGREEN, ROSE AND WYPLOSZ [1994]). The EMS crisis gave support to second generation models which incorporate the phenomenon of self-fulfilling expectations and multiple equilibria. CASTRÉN AND TAKALO [2000] add the institutional setting to the model of self-fulfilling currency crises. They argue that institutions fostering corporate governance increase the credibility of the exchange rate peg. They also show that the impact of institutional reforms depends crucially on the extent of the reforms, partial reforms increasing instead of reducing the vulnerability of a fixed exchange rate.

Increasing attention to institutions is characteristic for the so-called third generation models which were developed after the outburst of the South-East Asian crisis of 1997. Besides macroeconomic fundamentals (the inconsistency of economic policy with the fixed exchange rate regime) and the role of expectations, these models stress problems in the banking sector and weak institutions in general as the main driving forces behind banking crises which spill over into currency crises. Weak supervision of the banking sector and implicit government guarantees, leading to moral

hazard problems and over-indebtedness abroad are crucial elements in these models.

Inefficient financial systems stimulate excessive optimism through credit growth and asset-price inflation. The distortions are magnified further through net capital inflows which stimulate bank credit growth. Those effects are stronger in the environment of exchange rate pegs in combination with high interest rates that often characterizes developing countries (REISEN [1998]). Once short-term foreign debt exceeds official reserves, a run on a country's liquid assets is intensified by the investor knowledge that there are not enough liquid reserves to restore confidence. PITT [2001] e.g. develops a model where the costs and benefits of a fixed exchange rate are based on the country's ability to meet its external obligations while maximising economic growth. He concludes that liberalisation and institutional improvement increase the return on investment as the economy grows and thereby lower the cost of maintaining the peg. Stressing the difference between financial institutions in Taiwan and Korea during the recent Asian crisis HUANG AND XU [2000] particularly explain the financial crisis in Korea with the high government participation in financing and lending decisions.

It is clear from the above overview that including the institutional setting in crisis models is a relatively new phenomenon, mostly related to the third generation crisis models. Most of the models indicate that the sources of turbulence can be linked to one or more of the following institutional aspects: the exchange rate regime; the degree of economic liberalization, the level of corporate governance, the quality of the financial institutions, the development of the legal regime and the degree of corruption.

With respect to the exchange rate regime, the so-called bipolar view argues that conventional fixed pegged exchange rate systems are considered intrinsically more vulnerable to currency crises [see FISCHER 2001]. Hence in this view countries should prefer extreme exchange rate arrangements (such as a currency board or a freely floating exchange rate) to intermediate exchange rate arrangements, such as an adjustable fixed peg. Moreover flexible exchange rate regime advocates stress that this

system offers greater financial stability and allows transition countries to reform their economies more smoothly. MASSON [1999] adds that structural differences between the CEECs and the EU-countries make adjustable pegs in the CEECs especially vulnerable to speculative attacks.

In an adjustable pegged exchange rate regime, a central bank always has a temptation to renege on its promise not to devalue and hence to abandon the peg. This temptation increases with the importance that the central bank attaches to other objectives than defending the peg. This can be any economic objective that is conceivably part of the central bank's (or the government's) social welfare function and whose attainment involves a trade-off with the fixed peg (e.g. output stabilisation or employment growth). It can be shown that the temptation to renege increases with the size of the shock to the economy (e.g. the deepness of the recession) and the cost of defending the peg (e.g. output loss as a result of the interest rate increase to defend the peg). The temptation to abandon the peg decreases with the cost of the devaluation, such as the loss of credibility of the monetary authorities after the devaluation (DE GRAUWE & GRIMALDI [2002]).

On the empirical field an extensive amount of studies on explaining or predicting the occurrence of foreign exchange crises exists (see e.g. FLOOD AND MARION [1998]) however few studies have tested the role of the exchange rate system and institutions. Notable exceptions are EFFENBERGER [2004], MULDER, PERELLI AND ROCHA [2002] and GHOSH AND GHOSH [2002]. EFFENBERGER [2004] tests a logit model with a binomial crisis variable on 11 CEECs. Using institutional indicators in addition to macroeconomic fundamentals he shows that the exchange rate regime, the quality of the regulatory and supervisory setting and the degree of liberalisation of the economy significantly influence the probability of a currency crisis. MULDER, PERELLI AND ROCHA [2002] explain the probability and depth of external crises by macroeconomic, corporate, and institutional indicators on a wider set of developed countries. Their results suggest that corporate balance sheet variables such as leveraged financing and a the ratio of short term debt

to working capital play an important role in the occurrence of crises and the depth of crises. The same holds for macroeconomic variables such as the ratio of bank and corporate debt to exports and institutional indicators like the legal regime of a country and shareholders' rights. GHOSH AND GHOSH [2002] analyse 42 mainly emerging market countries. They find that overall governance and rule of law, corporate sector governance and corporate financing structure significantly affect the vulnerability to crises. Their findings also suggest that there exist interactions between structural vulnerabilities and macroeconomic imbalances. Weak governance increases the sensitivity to the effects of macroeconomic and corporate sector weaknesses. All these studies confirm the impact of institutions on financial crises and stress the interactions between structural vulnerabilities and macroeconomic imbalances.

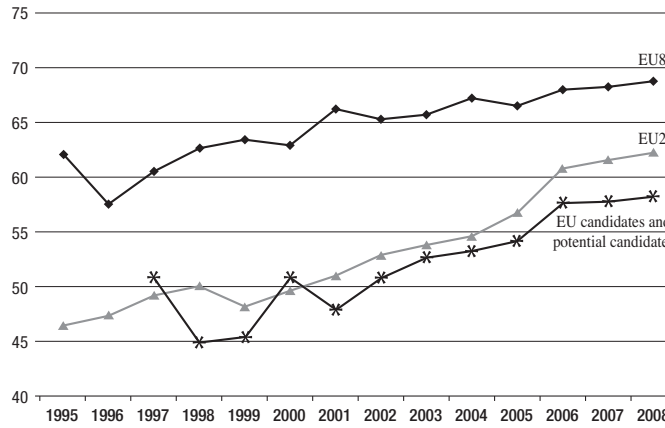
2. EXCHANGE REGIMES AND INSTITUTIONS IN THE CEECS

In this section we study the institutional development of the CEECs in more detail. We use various sources to collect variables reflecting the institutional framework in the CEECs. For analytical purposes we divide the sample into three categories: EU8 (the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia), EU2 (Bulgaria and Romania) and EU candidates and potential candidates (Albania, Bosnia and Herzegovina, Croatia, Macedonia and Serbia).

Heritage foundation publishes index of economic freedom yearly. The variable measures economic freedom in the wide range starting with easiness to establish enterprise to the ownership rights. The index cover ten components: business, trade, fiscal freedom, government size, monetary, investment, financial freedom, property rights, freedom from corruption and labour freedom. The ten subfreedoms are scored from 0 to 100 with increasing freedom and combined into overall index with equal weights.

Figure 1

INDEX OF ECONOMIC FREEDOM



Source: Heritage Foundation (http://www.heritage.org/research/features/index/index.cfm).

The past 14 years have recognized considerable increase in the economic freedom in the CEECs (see Figure 1 and Table A. 1). The eight CEECs from the EU 2004 enlargement round show the highest level of economic freedom. The general positive trend is picked by couple of falls in the index proving once again the difficulty to maintain the high pace of reforms throughout the transition. Bulgaria and Romania experienced a drawback in economic freedom in 1999 as a result of several stabilizing policies that followed critical period of currency and banking crises. Also in the EU candidates and potential candidates the economic freedom took positive trend in 2001 after a decade of regional conflicts and instability. Both EU2 and EU candidates and potential candidates have narrowed the gap with the EU8. In 2008 the EU candidates and potential candidates have on average 10 percentage points lower economic freedom than EU8 countries. However in Albania and Macedonia the economic freedom is higher than in the new EU member countries Poland and Slovenia while Estonia exhibits the overall highest degree of economic freedom.

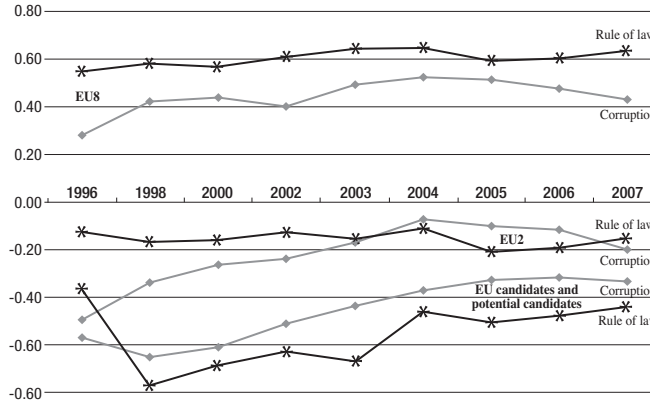
The World Bank operates wide scope governance indicators databank

where data is gathered to reflect six dimensions of governance: voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, rule of law and corruption. The last two indicators are used for evaluation of the general legal framework and spread of corruption in the CEECs. Rule of law includes indicators as perceptions of the incidence of crime, the effectiveness and predictability of the judiciary, and the enforceability of contracts. This indicator measures the success of a society in developing an environment in which fair and predictable rules form the basis for economic and social interactions and the extent to which property rights are protected. Control of corruption measures perceptions of corruption, conventionally defined as the exercise of public power for private gain. The indicators are available for 1996, 1998, 2000, and annually for 2002-2007. The dimensions of governance are measured following a normal distribution with a mean of zero and a standard deviation of one in each period. This implies that virtually all scores lie between -2.5 and 2.5, with higher scores corresponding to better outcomes.

Figure 2 shows the clear difference between EU8 and the countries of other two groups concerning the legal environment and incidence of corruption. The earliest joiners of economic union have remained on positive part of the scale over the period while the EU2 and EU candidates and potential candidates struggle below "ground 0". Among the EU candidates and potential candidates only Croatia has positive, although small, values for rule of law (0.03) and index of corruption (0.03) (see Table A. 2 and Table A. 3). In the EU8 countries legal environment shows on average quite constant level, corruption control index declines over the last four years. The EU2 and EU candidates and potential candidates exhibit clear positive change over the last ten years in the rule of law and control of corruption except the case of legal institutions in the EU2 where the increase in the indicator has been marginal.

Figure 2

RULE OF LAW AND CONTROL OF CORRUPTION.



Source: World Bank, http://info.worldbank.org/governance/wgi/index.asp.

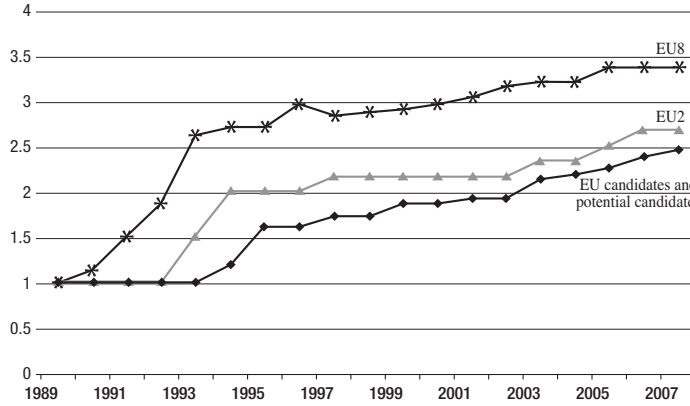
Transition countries have also specific characteristics that differentiate them form other developing countries like, for example, the past of planned economy and need to establish the market oriented system. One measure to assess the progress in building market economy institutions is the transition indexes of the European Bank of Reconstruction and Development (EBRD). Considering the further analyses the enterprise reform, banking sector and non-banking sector indexes are used.

Corporate governance is evaluated through the governance and enterprise restructuring index which measures such aspects as the corporate control mechanism and bankruptcy legislation. The index of banking sector reform assesses the compliance of supervision and competition in the transition countries' banking sector towards international standards. The EBRD index of non-banking sector reform reflects the level of the development of securities market rules and assesses the regulatory framework regarding non-banking financial institutions (e.g. insurance companies). The scale runs from 1 to 4+[(1)] where 1 means the least developed sector and 4+ denotes the level of advanced industrial economies.

(1) The "+" is expressed numerically as 0.3.

Figure 3

INDEX OF ENTERPRISE REFORM.



Source: EBRD, http://www.ebrd.org/country/sector/econo/stats/index.htm .

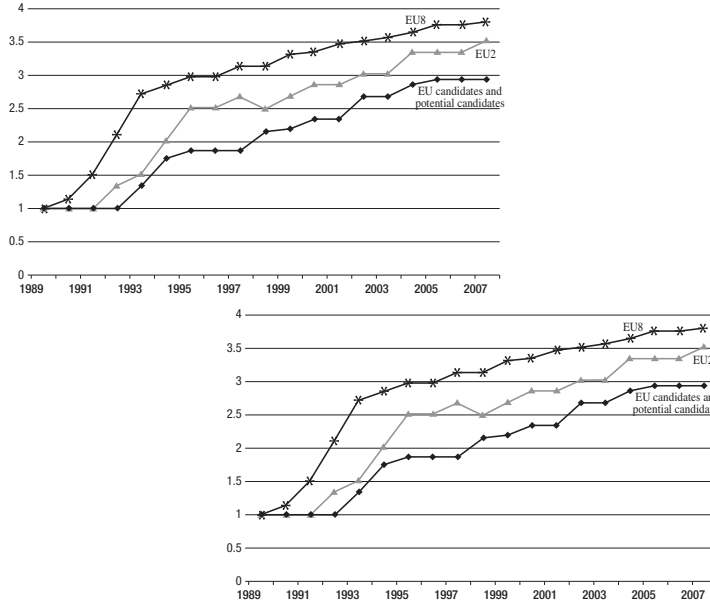
The dynamics of enterprise reform index since 1989 are reflected in Figure 3. The reforms started in all transition countries from a situation of an (under)developed and/or nonexistent institutional framework. The group of the earliest EU joiners has followed the quickest reform path and all the countries reach value 3 or higher. The EU2 countries show levels of corporate governance closer to the EU candidates and potential candidates than the EU8. Croatia has even higher enterprise reform index (3.0) than Bulgaria and Romania (see Table A. 4). Still all the CEECs need further improvements in the area to reach to the level of advanced industrial countries.

Figure 4 gives an overview of the development of financial institutions. The general pattern follows the one of enterprise reform index – starting with the absent market structures the group of EU8 became quickly a forerunner and the EU candidates and potential candidates draggle behind. Today the Czech Republic, Estonia, Hungary and Latvia have banking sector standards close to the advanced economies (see Table A. 5 and Table A. 6). The same holds for Croatia. The non-banking sector indexes still remain lower levels in comparison with the banking sector except in

Hungary and in the EU candidates and potential candidates the indicator shows values around 2 except in Croatia. The institutional framework of EU2 is comparable to the one of Croatia and strikingly in both banking and non-banking sectors the latter candidate country scores higher than Bulgaria and Romania. Romania has faced also the drawbacks in the banking sector were in 1997-98 the institutions actually degraded.

Figure 4

BANKING AND NON-BANKING SECTOR REFORM IN THE CEECS



Source: EBRD, http://www.ebrd.org/country/sector/econo/stats/index.htm.

There have been several attempts to classify exchange rate regimes. International Monetary Fund relied on official declarations of the country's government. Still de facto and de jure regimes can differ considerably and in 1997 and 1999 IMF redesigned and updated its official approach towards classifying exchange rate arrangements to take the real policies of governments into account. However this paper uses REINHART AND ROGOFF [2004] classification which considers in the first order market-based exchange rate history. In the context of the transition countries

we find particularly useful their "freely falling" regime – in the cases where the twelve-month inflation rate is equal to or exceeds 40 percent per annum the country is classified as having freely falling exchange rate regime. The only exception is Lithuania, REINHART AND ROGOFF [2004] reclassify the country in 2002 as de facto peg and then forward as narrow crawling band regime. However taking account the change in the base currency from US dollar to the euro in 2002 there is no reason to claim the difference between officially announced currency board and actual policies.

Table 1
Exchange rate regimes in the transition countries 1993-2007.

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
EU8															
Czech Republic	8	8	8	10	12	12	12	12	12	8	8	8	8	8	8
Estonia	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Hungary	10	8	8	8	8	8	9	9	9	9	9	9	9	9	9
Latvia	14	14	10	10	10	10	10	10	10	8	8	8	8	8	8
Lithuania	14	14	2	2	2	2	2	2	2	2	2	2	2	2	2
Poland	15	15	10	10	10	10	10	12	12	12	12	12	12	12	12
Slovakia	8	8	8	8	8	10	8	8	8	8	8	8	8	8	8
Slovenia	8	8	8	8	8	8	8	8	8	8	8	4	4	4	1
EU2															
Bulgaria	14	14	14	14	2	2	2	2	2	2	2	2	2	2	2
Romania	14	14	14	14	14	14	14	14	10	10	10	10	10	10	10
EU candidates and potential candidates															
Albania	14	13	13	13	14	13	13	13	13	10	10	8	8	8	8
Bosnia and Herzegovina		2	2	2	2	2	2	2	2	2	2	2	2	2	2
Croatia	14	14	8	8	8	8	8	8	8	8	8	8	8	8	8
Macedonia	14	14	7	7	7	7	7	8	4	4	4	4	4	4	4
Serbia									12	12	12	12	12	12	12

Note: 1 - no separate legal tender; 2 - pre announced peg or currency board arrangement; 3 - pre announced horizontal band that is narrower than or equal to +/-2%; 4 - de facto peg; 5 - pre announced crawling peg; 6 - pre announced crawling band that is narrower than or equal to +/-2% 7- de factor crawling peg; 8 - de facto crawling band that is narrower than or equal to +/-2%; 9 - pre announced crawling band that is wider than or equal to +/-2%; 10 - de facto crawling band that is narrower than or equal to +/-5%; 11 - moving band that is narrower than or equal to +/-2% (i.e., allows for both appreciation and depreciation over time); 12 - managed floating; 13 - freely floating; 14 - freely falling; 15 - dual market in which parallel market data is missing.

Source: REINHART AND ROGOFF [2004].

There is no clear trend present in the evolution of exchange rate regimes in the CEECs over the period of 17 years. The first years of transition can be characterized by the high inflation environment and freely falling regime, only more advanced Czech Republic, Hungary and Slovakia started their transition processes in more stable environment. Some countries, like Hungary and Poland from the second half of 1990s, have moved towards greater exchange rate flexibility to avoid exchange rate appreciation and sustain the competitively of exports. The Czech Republic and Slovakia have faced periods of both increasing and decreasing flexibility. The Czech Republic gave up the fixed peg as a consequence of a successful attack on the exchange rate in 1997 and introduced the floating regime. Slovakia experienced increasing pressure on the exchange rate in 1998 as the result of the Russian crisis and widened the official fluctuation band to +- 15%. Still the actual fluctuation period was short-lived in Slovakia and also in the Czech Republic, who, despite official declarations of managed float, follows since 2002 de facto narrow crawling band.

Several countries, e.g. Latvia, Romania, Slovenia, Albania and Macedonia, have not advanced towards greater exchange rate flexibility but tighten their exchange rate fluctuation range. Bulgaria introduced after 1996-97 crisis currency board that successfully stabilized the price level and financial system as a whole. Slovenia operating officially under managed float has de facto actively intervened in the formation of the equilibrium exchange rate and joined ERM II in 2004. Slovenia is also the first CEE country to fulfill the Maastricht criteria and adopting the euro. The members of ERM II are also Estonia, Lithuania, Latvia and Slovakia.

In terms of extreme exchange rate arrangements currency boards outnumber the floating systems – there are four currency boards (Bulgaria, Estonia, Lithuania, and Bosnia and Herzegovina) and two managed floaters (Poland and Serbia) in the region. Excluding the first years of transition in freely falling environment only countries with currency board have retained their exchange rate regime, except Croatia, where de facto narrow crawling band is in place.

In the further analyses we have to take into account the fact that the above mentioned indexes are often highly correlated, as countries tend to perform strongly or weakly in many institutional standards at the same time. Table 2 shows simple correlation coefficients which range from 0.56 to 0.94. As a result, in the regressions reported in section 5 all institutional variables can not be included at the same time, since this would result in multicollinearity. Therefore one should not be too much convinced about the contribution of one specific institutional characteristic and regard each of them more as an aspect of overall institutional quality.

Table 2
Correlation matrix of institutional variables

	Index of economic freedom	Rule of law	Index of corrupt-tion	Index of banking sector reform	Index of non-banking sector reform	Index of enterprise reform
Index of economic freedom	1	0.61	0.56	0.60	0.65	0.70
Rule of law		1	0.93	0.74	0.81	0.79
Index of corruption			1	0.73	0.80	0.79
Index of banking sector reform				1	0.87	0.93
Index of non-banking sector reform					1	0.90
Index of enterprise reform						1

Source: author's calculations.

3. CURRENCY CRISES AND EXCHANGE MARKET PRESSURE IN THE CEECS

In this section, moving form descriptive mode towards more formal analysis, the exchange market pressure measure is introduced to envalue the development of financial vulnerability over the period.

The notion of exchange market pressure was introduced by GIRTON AND ROPER [1977]. They started from the insight that excess demand or supply on the foreign exchange market can result in a change in the price of foreign exchange as well as in a change in the level of foreign reserves. The interesting feature of the concept is that is applicable to

countries with various institutional frameworks and to all exchange rate systems with different degrees of exchange rate management.

We use the extended version which includes the change in the interest rate differential, in addition to reserve and nominal exchange rate changes (see EICHENGREEN ET AL. [1995]). As a matter of fact, interest rates have been frequently used in CEECs to alleviate exchange market pressure(2). Exchange market pressure the*refore* also captures those attacks that have been successfully resisted by the monetary authorities (since it includes reserve and interest changes). It is therefore a good measure of crisis proneness(3). We also take into account the different volatility of the components by using variance smoothing weights. The weights on the intervention and interest rate terms are the ratio of the standard error of the percentage change of the exchange rate over the standard error of the percentage change of reserves and the interest rate differential respectively. Exchange market pressure is thus defined as:

$$(1) \qquad emp_{ERW} = \dot{e} - \frac{\sigma_{\dot{e}}}{\sigma_{\dot{r}}} \cdot \dot{r} + \frac{\sigma_{\dot{e}}}{\sigma_{(i_s - i_s^*)}} \cdot (i_s - i_s^*)$$

where:

$\dot{e}$ rate of depreciation of domestic currency;
$\dot{r}$ increase in domestic international reserves;
$i_s - i_s^*$ interest rate differential;
$\sigma_{\dot{r}}\ \sigma_{\dot{e}}\ \sigma_{(i_s - i_s^*)}$ standard error of the variables respectively.

(2) Due the lack of data the interest rates are not included in the emp-measure of Bosnia and Herzegovina and Macedonia.

(3) In the spirit of the emp-measure one might also include (changes in) capital controls, since capital controls have also been used to alleviate exchange market pressure. The empirical research testing the effectiveness of capital controls often relies on data from the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions. However, this source does not measure the intensity of controls and only reports on capital outflows. In the case of CEECs it is especially hard to connect increased capital controls with increased speculative pressure on their currencies. The eight EU joiners have achieved almost full alignment with the aquis' requirements on free capital movement. Hence during the last decade there has been almost a constant trend of liberalisation of capital flows. For these reasons we do not include capital controls in our emp-measure calculations.

The data used to compute emp is derived from IMF International Financial Statistics (see A.1 Data Sources). Changes in the exchange rate are computed relative to the German mark using the fixed Euro conversion rate after 1999. We also use Germany as anchor to compute the changes in the short term interest rate differential. We drop the possibility of intervention by foreign authorities, which is quite realistic for the CEECs. So only the unilateral intervention measure is used.

The end of the 20th century is characterised by diminishing volatility and declining tensions. Table 3 shows the statistics of the emp-measure and crisis quarters by country and country groups. A crisis quarter is defined as one in which the emp-measure exceeds the mean value by 2 standard deviation. However the general picture and conclusions are not significantly altered by using weaker (1.5 standard deviation) or stronger (2.5 standard deviations) definitions of currency crises.

The EU8 countries have experienced the least volatility over the period while the EU2 has struggled the most with the vulnerabilities. The EU candidates and potential candidates show more stability, however the availability of data for Bosnia and Herzegovina and Serbia is limited to very short period. The average emp-measure amounts to 0.61 and standard deviation to 5.74 in the EU8 countries. Taking account the troublesome transition process in Bulgaria and Romania it is also expected that this is revealed by the emp-measure. Bulgaria has the highest share of crisis quarters in the total observations and also Romania records the third most volatile emp-measure. The two countries show the highest average emp-measure (15.18) and standard deviation (39.3).

The candidates and potential candidates have higher average exchange market pressure (5.47) and the emp-measure varies over periods (standard deviation 22.29). However the countries differ in that group considerably reaching from very stable Bosnia and Herzegovina to Croatia with high emp-measure (15.33) and volatility (38.52). Still we have to keep in mind the difference in the length of covered period.

Table 3
Emp-measure in transition countries 1990-2007.

Country	Observa-tions	Average emp-mea-sure	Standard deviation	Number of "crisis" qua-ters1	Proportion of "crisis" quaters1 (%)
Czech Republic	59	0.95	4.55	0	0.00
Estonia	56	0.16	0.67	0	0.00
Hungary	72	2.63	7.83	0	0.00
Latvia	56	0.74	4.74	0	0.00
Lithuania	55	0.47	6.67	0	0.00
Poland	67	-2.37	7.70	0	0.00
Slovakia	55	0.62	4.50	0	0.00
Slovenia	60	1.63	3.19	0	0.00
EU8	480	0.61	5.74	0	0.00
Bulgaria	65	18.14	50.18	8	12.31
Romania	51	11.41	17.41	1	1.96
EU2	116	15.18	39.30	9	7.76
Albania	52	4.46	11.58	1	1.92
Bosnia & Herzegovina	28	0.00	0.00	0	0.00
Croatia	60	15.33	38.52	5	8.33
Macedonia	48	0.92	4.20	0	0.00
Serbia	24	-1.48	5.57	0	0.00
EU candidates and potential candidates	*212*	*5.47*	*22.29*	*6*	*2.83*
All	*808*	*3.98*	*19.87*	*15*	*1.86*

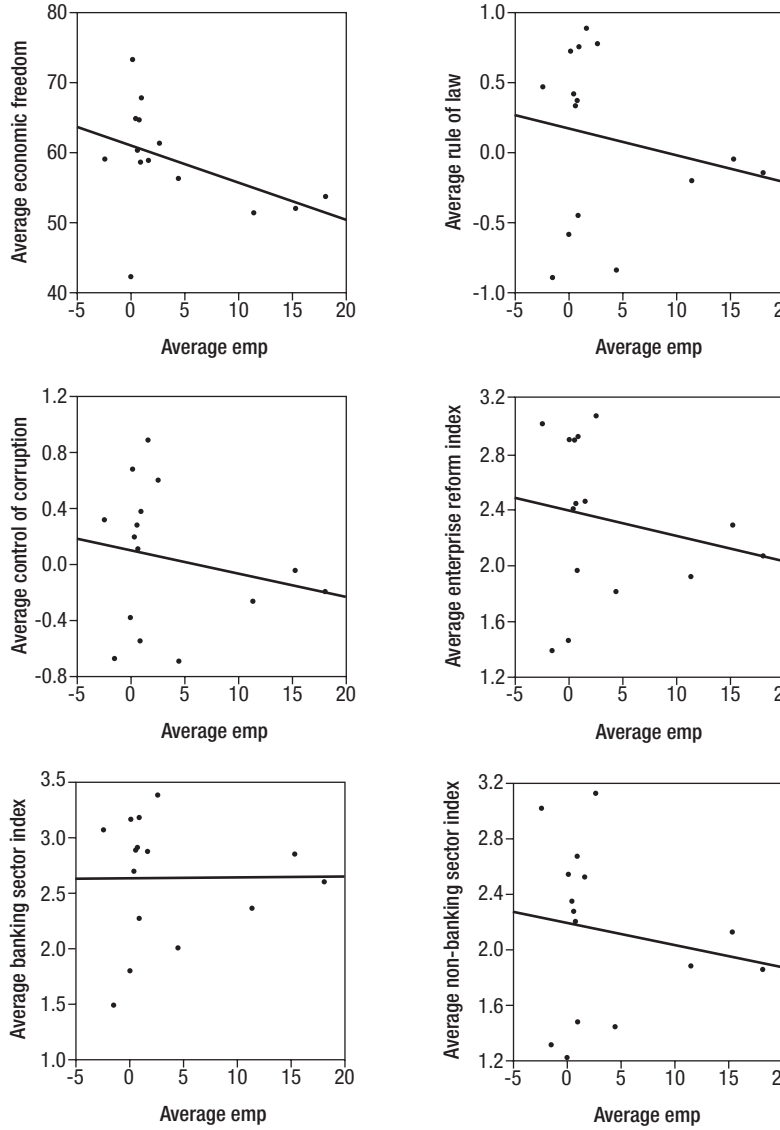
1 The "crisis" periods occur when the time series exceeds the sample mean by 2 standard deviation.

To conclude this section we examine side by side average emp-measure and average institutional development in the CEECs. The scatter diagrams in Figure 5 prove the hypothesis that better institutional frameworks diminish exchange market tensions. Only in case of banking sector reform index the regression line is rather flat suggesting no linear relationship at least when period averages are concerned.

On the other hand we can notice high variability among the countries when analysing them by average emp-measure and institutional indicator pairs. Therefore more advanced analytical methods are used in the next section.

Figure 5

AVERAGE EMP-MEASURE AND INSTITUTIONAL DEVELOPMENT.



Source: IMF International Financial Statistics, Heritage Foundation, World Bank, EBRD.

4. EMPIRICAL TESTING OF EMP-MODEL

In this section the bi-polar view on exchange rate regimes and the role of institutions in explaining exchange market pressure is tested in the CEECs while controlling for economic fundamentals. The exchange rate regime dummy takes the value of 1 for the extreme and 0 for the intermediate regimes . Hence the expected coefficient of this dummy is negative.

Evaluating the role of institutions in currency crises involves several problems. Firstly, the quality of institutions is hard to measure and therefore offers ground for debate. Secondly, the available institutional indexes do not always coincide completely with the theoretical concepts that we want to measure e.g. the index of economic freedom measures a wider set of factors than only economic liberalisation. Lastly, the frequency of these data is lower than for the financial and macro-economic data. We do expect the institutions lessen the pressures on the exchange markets so the expected coefficients are negative, except in case of economic freedom the sign of the coefficient can be also positive reflecting the vulnerability of open economy to the expectations of international investors.

As for the choice of the fundamentals we based ourselves on the findings of the theoretical and empirical literature (see FLOOD AND MARION [1998] for an overview). The following explanatory variables were used in a regression based on panel data for the 14 CEECs over the period 1990 (Q1) – 2007(Q4): current account balance (as % of GDP), domestic credit growth rate, inflation differential (with Germany) and growth rate of government borrowing.

We did not include international reserves or the money supply-reserves ratio since reserves also enter in the computation of the emp-measure. We also did not include structural variables (although the use of country dummies could potentially improve the regression results).

The regressions are presented in Table 4. These results confirm the importance of the economic fundamentals: the domestic credit growth and inflation differential significantly contribute and with expected sign in explaining exchange market pressure. The coefficient on the current account has the expected sign, but is statistically not significantly different

from zero. Also the growth rate of government borrowing is statistically insignificant.

The regressions confirm the bipolar view of exchange rate regimes in this sample of 14 CEECs and are in line with the findings of VANNESTE, VAN POECK AND VEINER [2007]. The extreme exchange rate regime dummy turned out to be significant in all regressions. Currency boards and floating regimes increase the financial stability in the EU member, candidate and potential candidate countries.

Table 4

Econometric estimation of exchange market pressure in the CEECs

Regression No.	1	2	3	4	5	6	7
Explanatory variables	0.6148	3.5454	5.4632**	7.8419**	10.5927**	6.1628**	9.9626***
	(0.5800)	(0.9842)	(2.2331)	(2.3230)	(2.5113)	(2.3709)	(2.8786)
Current account	-0.0753	-0.0901	-0.0818	-0.0876	-0.0194	-0.0794	-0.0491
	(-0.6635)	(-0.7856)	(-0.7171)	(-0.7743)	(-0.1610)	(-0.6898)	(-0.4186)
Domestic credit growth	0.3228*	0.3207*	0.3183*	0.3091*	0.3226*	0.3184*	0.3145*
	(1.7045)	(1.7121)	(1.6996)	(1.6490)	(1.7184)	(1.6959)	(1.6741)
Inflation differential	0.4954***	0.4921***	0.4874***	0.4888***	0.4878***	0.4872***	0.4870***
	(6.5272)	(6.5981)	(6.8024)	(6.9796)	(6.2485)	(6.7818)	(6.6260)
Government borrowing	-0.0318	-0.0347	-0.0377	-0.0399	-0.0272	-0.0371	-0.0318
	(-1.0824)	(-1.2043)	(-1.2915)	(-1.3322)	(-0.9430)	(-1.2614)	(-1.0390)
Exchange rate regime dummy	-2.0424**	-2.0165**	-1.8842**	-1.8288*	-2.4264***	-1.9210**	-2.3400**
	(-2.1811)	(-2.1993)	(-2.0095)	(-1.9562)	(-2.7294)	(-2.0246)	(-2.3238)
Index of banking sector reform		-0.9588			0.9893		
		(-0.8303)			(0.7757)		
Index of non-banking sector reform			-1.8858**			-1.7705**	
			(-2.4848)			(-2.2489)	
Index of enterprise reform				-2.6277**			-0.6156
				(-2.5764)			(-0.5199)
Average index of the rule of law							-4.1916***
							(-3.2385)
Average index of corruption					-4.7125***		
					(-3.7185)		
Average economic freedom						-0.0167	0.0737***
						(-0.6419)	(2.9130)
Statistics							
R2ad	0.2771	0.2770	0.2807	0.2822	0.2863	0.2798	0.2866
Durbin-Watson	1.9410	1.9369	1.9446	1.9464	1.9704	1.9448	1.9654

*Notes: Dataset consists of 731 quarterly observations for 14 countries over the 1st quarter of 1990 to 4th quarter of 2007. t-statistics are given in parentheses. *, ** and *** statistically significant at 10%, 5% and 1% level respectively. Institutional indexes – higher value implies to better institutions.*

The influence of legal system variables on the vulnerability to currency crises is not straightforward. Efficient financial regulatory and supervisory systems and enterprise reform reduce exchange market pressure in the CEECs, as shown by the significance of the indexes of non-banking sector and enterprise reform while the banking sector reform index turns out to be insignificant. This coincides with the results of GHOSH AND GHOSH [2002] and MULDER, PERRELLI AND ROCHA [2002] who find banking regulation, supervision and corporate governance to be significant in predicting financial crises.

The rule of law and control of corruption decrease the vulnerability. The coefficient on the index has the expected sign and is significant. This conclusion is not fully in line with EFFENBERGER [2004] who does not find a relation between the occurrence of currency crises and the legal system.

The average index of economic freedom enters in the regressions with positive and negative sign. However the negative coefficient turns out to be insignificant. Therefore the findings of present study suggest that rather negative impact of economic freedom on the exchange market vulnerability prevails.

Still no far-reaching conclusions can be made about the precise importance of individual institutions. We cannot prefer any specification in Table 4 to others. As an alternative to the specification in Table 4 the interactions between the institutional variables and the economic fundamentals is tested. This specification takes the following general form:

$$(2)\quad emp = a_0 + \sum \left(a_{j1} + a_{j2} Inst_i\right) F_j$$

with $Inst_i$: dummy of flexible exchange rate regime or institutional variable i,

F_j : economic fundamental variable j.

The results, however, show no strong support to the hypothesis that a higher quality of institutions lessens the adverse effect of economic fundamentals on exchange market pressure. The coefficient on the variable

(a_{j2}) has in number of cases a sign that is opposite to the coefficient a_{j1} but the coefficients turned out to be often statistically insignificant. The exchange rate arrangement dummy and index of banking sector reform seem to perform best and dampen the impact of domestic credit growth and inflation differential. The effect of domestic credit growth on emp-measure is also moderated by indexes of non-banking sector, enterprise reform, the rule of law and economic freedom but the same does not apply to the inflation differential.

Table 5
Econometric estimation of exchange market pressure in the CEECs, interaction between economic fundamentals and institutional variables.

	Exchange rate arrangement dummy	Index of banking sector reform	Index of non-banking sector reform	Index of enterprise reform	Index of the rule of law	Index of economic freedom
Regression No.	1	2	3	4	5	6
Constant	-2.2860	0.5089	0.6348	0.4924	1.5836	0.6605
	(-1.3936)	(0.9944)	(0.6274)	(0.4772)	(1.3813)	(0.4586)
Current account	-0.0552	0.6851	-0.2027	0.4686	0.0387	0.3917
	(-0.4240)	(0.9054)	(-0.4207)	(0.5716)	(0.1187)	(0.3632)
Insti	-0.2083	-0.2660	0.0469	-0.2175	0.0236	-0.0075
	(-1.0812)	(-1.2067)	(0.2854)	(-0.7840)	(0.2058)	(-0.4287)
Domestic credit growth)	0.5556**	1.7350*	1.0614*	1.5020**	1.0646**	3.9918**
	(2.4728)	(1.9220)	(1.9454)	(2.2303)	(2.2014)	(1.9643)
Insti	-0.5192**	-0.5061*	-0.3357*	-0.4943**	-0.2672*	-0.0621*
	(-2.2920)	(-1.7782)	(-1.6931)	(-2.2311)	(-1.7569)	(-1.9570)
Inflation differential	1.2990***	3.9701**	0.9430	2.5915*	2.2391**	-2.3105
	(3.4412)	(2.4351)	(1.5503)	(1.9339)	(2.0721)	(-0.7341)
Insti	-0.8132**	-1.3306**	-0.2364	-0.9198	-0.7553	0.0531
	(-2.1875)	(-2.1554)	(-0.7549)	(-1.5822)	(-1.6343)	(0.8475)
Government borrowing)	-0.0949***	-0.5042**	-0.2155	-0.3120**	0.0595	-0.0951
	(-2.5947)	(-2.4188)	(-1.2518)	(-2.0353)	(0.1236)	(-0.1319)
Insti	0.0803*	0.1500**	0.0752	0.1034*	-0.0202	0.0013
	(1.8540)	(2.2657)	(1.0764)	(1.8946)	(-0.1324)	(0.1194)
R2ad	0.3653	0.3675	0.2855	0.3177	0.3240	0.3451
Observations	731	731	731	731	612	619

*Notes: t-statistics are given in parentheses. *, ** and *** statistically significant at 10%, 5% and 1% level respectively. Institutional indexes – higher value implies to better institutions*

CONCLUSIONS

The 15 CEECs have made considerable progress in institutional development over the last 18 years. The countries have increased the economic freedoms and opened their capital accounts to foreign investors. Several new EU members have banking sector regulations comparable to the Western Europe. Nevertheless there still remain significant differences between the three groups of countries considered, viz. the EU8, the EU2 and the EU candidates and potential candidates. Also the groups themselves are not totally homogeneous.

Although an extensive literature exists on explaining the occurrence of foreign exchange crises few studies have tested the role of the institutional setting. Using transition specific indicators such as the indexes of enterprise, banking sector and non-banking sector reforms we investigate whether the CEECs with intermediate exchange rate regimes and weaker institutional settings have been more vulnerable to exchange market tensions.

In the regression analyses variance smoothed exchange market pressure (emp) is used. The emp-measure in the group of EU8 has been low and not much fluctuating. Bulgaria and Romania proved to be the most volatile region with average high emp-measures.

Following the results of regressions the incidence of economic fundamentals (credit growth and the inflation differential) for exchange market pressure is as expected. The regression results confirm the bi-polar view on exchange market regimes – extreme exchange rate regimes lessen the vulnerability to currency crises in the CEECs. The contribution of sound institutions for reducing exchange market turbulence is demonstrated. Strong rule of law, effective control of corruption, efforts in financial market and enterprise sector reforms significantly reduce exchange market pressure in the CEECs. The results of the interaction testing show that a higher quality of institutions lessens the effect of economic fundamentals on exchange market pressure in some cases. Institutional improvement is

rewarded through the milder effect of domestic credit growth on exchange market pressure. The extreme exchange arrangements and higher banking sector development constrain also the impact of inflation differential.

Clearly institutional development in the CEECs is at stake when exchange market pressure is studied.

APPENDIX

Table A. 1
The index of economic freedom 1997-2007.

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
EU8											
Czech Republic	68.8	68.4	69.7	68.6	70.2	66.5	67.5	67	64.9	66.8	67.8
Estonia	69.1	72.5	73.8	69.9	76.1	77.6	77.7	77.4	75.1	74.9	78
Hungary	55.3	56.9	59.6	64.4	65.6	64.5	63	62.7	63.2	64.7	64.4
Latvia	62.4	63.4	64.2	63.4	66.4	65	66	67.4	66.4	67.2	68.3
Lithuania	57.3	59.4	61.5	61.9	65.5	66.1	69.7	72.4	70.5	71.8	71.5
Poland	56.8	59.2	59.6	60	61.8	65	61.8	58.7	58.8	58.6	57.4
Slovak Republic	55.5	57.5	54.2	53.8	58.5	59.8	59	64.6	65.6	68.7	68.4
Slovenia	55.6	60.7	61.3	58.3	61.8	57.8	57.7	59.2	60.1	62.4	60.2
Average	60.1	62.3	63.0	62.5	65.7	65.3	65.3	66.2	65.6	66.9	67.0
EU2											
Bulgaria	47.6	45.7	46.2	47.3	51.9	57.1	57	59.2	61.6	63.4	62
Romania	50.8	54.4	50.1	52.1	50	48.7	50.6	50	51.9	58.2	61.2
Average	49.2	50.05	48.15	49.7	50.95	52.9	53.8	54.6	56.75	60.8	61.6
EU candidates and potential candidates											
Albania	54.8	53.9	53.4	53.6	56.6	56.8	56.8	58.5	58.9	61.4	62.4
Bosnia & Herzegovina		29.4	29.4	45.1	36.6	37.4	40.6	44.7	48.8	55.6	54.3
Croatia	46.7	51.7	53.1	53.6	50.7	51.1	53.3	53.1	52.4	54.1	53.9
Macedonia						58.0	60.1	56.8	56.5	59.6	60.7
Serbia											
Average	50.8	45.0	45.3	50.8	48.0	50.8	52.7	53.3	54.2	57.7	57.8

Note: The index takes scores between 0 and 100 where higher score means freer economy.

Source: Heritage Foundation.

Table A. 2
Index of Rule of Law, 1996-2007

	1996	1998	2000	2002	2003	2004	2005	2006	2007
EU8									
Czech Republic	0.87	0.82	0.69	0.74	0.8	0.7	0.74	0.73	0.77
Estonia	0.51	0.5	0.57	0.71	0.71	0.83	0.81	0.94	1
Hungary	0.84	0.74	0.82	0.84	0.82	0.82	0.71	0.76	0.74
Latvia	0.13	0.18	0.22	0.34	0.51	0.51	0.47	0.5	0.57
Lithuania	0.29	0.41	0.29	0.4	0.5	0.57	0.47	0.44	0.49
Poland	0.64	0.69	0.6	0.56	0.51	0.4	0.33	0.25	0.28
Slovak Republic	0.23	0.23	0.33	0.28	0.36	0.48	0.44	0.41	0.35
Slovenia	0.87	1.07	0.98	0.97	0.92	0.87	0.79	0.79	0.84
Average	0.55	0.58	0.56	0.61	0.64	0.65	0.60	0.60	0.63
EU2									
Bulgaria	-0.11	-0.23	-0.14	-0.02	-0.1	-0.06	-0.19	-0.19	-0.14
Romania	-0.15	-0.11	-0.19	-0.24	-0.22	-0.17	-0.23	-0.21	-0.17
Average	-0.13	-0.17	-0.17	-0.13	-0.16	-0.12	-0.21	-0.20	-0.16
EU candidates and potential candidates									
Albania	-0.12	-1.24	-1.1	-0.95	-1.03	-0.89	-0.8	-0.73	-0.7
Bosnia & Herzegovina	-0.03	-0.65	-0.64	-0.74	-0.86	-0.63	-0.62	-0.53	-0.52
Croatia	-0.56	-0.16	0.11	0.02	0.06	0.11	0.06	-0.05	0.03
Macedonia	-0.15	-0.52	-0.63	-0.59	-0.57	-0.23	-0.35	-0.5	-0.47
Serbia	-0.98	-1.3	-1.2	-0.91	-0.97	-0.7	-0.86	-0.59	-0.57
Average	-0.37	-0.77	-0.69	-0.63	-0.67	-0.47	-0.51	-0.48	-0.45

Note: The scores lie between -2.5 and 2.5, with higher scores corresponding to better outcomes.

Source: World Bank, http://info.worldbank.org/governance/wgi/index.asp.

Table A. 3
Index of Corruption, 1996-2007.

	1996	1998	2000	2002	2003	2004	2005	2006	2007
EU8									
Czech Republic	0.58	0.45	0.29	0.35	0.4	0.36	0.44	0.32	0.26
Estonia	-0.02	0.42	0.62	0.69	0.8	0.94	0.91	0.9	0.94
Hungary	0.63	0.67	0.69	0.58	0.62	0.68	0.61	0.57	0.44
Latvia	-0.65	0.1	0.04	0.07	0.25	0.23	0.34	0.34	0.31
Lithuania	-0.18	0.19	0.33	0.25	0.27	0.33	0.27	0.17	0.17
Poland	0.39	0.6	0.51	0.34	0.4	0.2	0.19	0.19	0.14
Slovak Republic	0.4	-0.03	0.24	0.1	0.34	0.45	0.45	0.37	0.28
Slovenia	1.05	0.94	0.76	0.79	0.84	1	0.87	0.94	0.9
Average	0.28	0.42	0.44	0.40	0.49	0.52	0.51	0.48	0.43
EU2									
Bulgaria	-0.76	-0.33	-0.23	-0.14	-0.06	0.1	0.01	-0.09	-0.22
Romania	-0.24	-0.35	-0.3	-0.35	-0.3	-0.25	-0.22	-0.15	-0.19
Average	-0.50	-0.34	-0.27	-0.25	-0.18	-0.08	-0.11	-0.12	-0.21
EU candidates and potential candidates									
Albania	0.03	-1.08	-0.82	-0.82	-0.77	-0.74	-0.72	-0.68	-0.57
Bosnia & Herzegovina	-0.26	-0.37	-0.6	-0.45	-0.39	-0.35	-0.25	-0.3	-0.43
Croatia	-0.59	-0.3	-0.01	0.19	0.06	0.13	0.14	0.03	0.01
Macedonia	-1.06	-0.45	-0.54	-0.76	-0.59	-0.47	-0.4	-0.34	-0.28
Serbia	-0.99	-1.08	-1.11	-0.75	-0.52	-0.47	-0.44	-0.32	-0.41
Average	-0.57	-0.66	-0.62	-0.52	-0.44	-0.38	-0.33	-0.32	-0.34

Note: The scores lie between -2.5 and 2.5, with higher scores corresponding to better outcomes.

Source: World Bank, http://info.worldbank.org/governance/wgi/index.asp.

Table A. 4
Enterprise reform index 1995-2007

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
EU8													
Czech Republic	3	3	3	3	3	3.33	3.33	3.33	3.33	3.33	3.33	3.33	3.33
Estonia	3	3	3	3	3	3	3.33	3.33	3.33	3.33	3.67	3.67	3.67
Hungary	3	3	3	3.33	3.33	3.33	3.33	3.33	3.33	3.33	3.67	3.67	3.67
Latvia	2	3	2.67	2.67	2.67	2.67	2.67	2.67	3	3	3	3	3
Lithuania	2	3	2.67	2.67	2.67	2.67	2.67	3	3	3	3	3	3
Poland	3	3	3	3	3	3	3.33	3.33	3.33	3.33	3.67	3.67	3.67
Slovak Republic	3	3	2.67	2.67	3	3	3	3.33	3.33	3.33	3.67	3.67	3.67
Slovenia	2.67	2.67	2.67	2.67	2.67	2.67	2.67	3	3	3	3	3	3
Average	2.71	2.96	2.84	2.88	2.92	2.96	3.04	3.17	3.21	3.21	3.38	3.38	3.38
EU2													
Bulgaria	2	2	2.33	2.33	2.33	2.33	2.33	2.33	2.67	2.67	2.67	2.67	2.67
Romania	2	2	2	2	2	2	2	2	2	2	2.33	2.67	2.67
Average	2	2	2.17	2.17	2.17	2.17	2.17	2.17	2.34	2.34	2.50	2.67	2.67
EU candidates and potential candidates													
Albania	2	2	2	2	2	2	2	2	2	2	2	2.33	2.33
Bosnia & Herzegovina	1	1	1	1.67	1.67	1.67	1.67	1.67	2	2	2	2	2
Croatia	2	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67	3	3	3	3
Macedonia	2	2	2	2	2	2.33	2.33	2.33	2.33	2.33	2.33	2.67	2.67
Serbia	1	1	1	1	1	1	1	2	2	2	2.33	2.33	2.33
Average	1.60	1.60	1.73	1.73	1.87	1.87	1.93	1.93	2.13	2.20	2.27	2.40	2.47

Note: 1 – soft budget constraints (lax credit and subsidy policies weakening financial discipline at the enterprise level), few other reforms to promote corporate governance; 2 – moderately tight credit and subsidy policy but weak enforcement of bankruptcy legislation and little action taken to strengthen competition and corporate governance; 3 – significant and sustained actions to harden budget constraints to promote corporate governance effectively (e.g. privatisation combined with tight credit and subsidy policies and/or enforcement of bankruptcy legislation); 4 – substantial improvement in corporate governance, for example, an account of an active corporate control market, significant new investment at the enterprise level; 4+ - standards and performance typical to advanced industrial economies, effective corporate control exercised through domestic financial institutions and markets, fostering market-driven restructuring.

Source: EBRD, http://www.ebrd.org/country/sector/econo/stats/index.htm.

Table A. 5
Index of banking sector reform 1991-2005

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
EU8													
Czech Republic	3	3	3	3	3.33	3.33	3.67	3.67	3.67	3.67	4	4	4
Estonia	3	3	3.33	3.33	3.67	3.67	3.67	3.67	3.67	4	4	4	4
Hungary	3	3	4	4	4	4	4	4	4	4	4	4	4
Latvia	3	3	3	2.67	3	3	3.33	3.67	3.67	3.67	3.67	3.67	4
Lithuania	3	3	3	3	3	3	3	3	3.33	3.33	3.67	3.67	3.67
Poland	3	3	3	3.33	3.33	3.33	3.33	3.33	3.33	3.33	3.67	3.67	3.67
Slovak Republic	2.67	2.67	2.67	2.67	2.67	3	3.33	3.33	3.33	3.67	3.67	3.67	3.67
Slovenia	3	3	3	3	3.33	3.33	3.33	3.33	3.33	3.33	3.33	3.33	3.33
Average	2.96	2.96	3.13	3.13	3.29	3.33	3.46	3.50	3.54	3.63	3.75	3.75	3.79
EU2													
Bulgaria	2	2	2.67	2.67	2.67	3	3	3.33	3.33	3.67	3.67	3.67	3.67
Romania	3	3	2.67	2.33	2.67	2.67	2.67	2.67	2.67	3	3	3	3.33
Average	2.50	2.50	2.67	2.50	2.67	2.84	2.84	3.00	3.00	3.34	3.34	3.34	3.50
EU candidates and potential candidates													
Albania	2	2	2	2	2	2.33	2.33	2.33	2.33	2.67	2.67	2.67	2.67
Bosnia & Herzegovina	1	1	1	2.33	2.33	2.33	2.33	2.33	2.33	2.67	2.67	2.67	2.67
Croatia	2.67	2.67	2.67	2.67	3	3.33	3.33	3.67	3.67	4	4	4	4
Macedonia	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67
Serbia	1	1	1	1	1	1	1	2.33	2.33	2.33	2.67	2.67	2.67
Average	1.87	1.87	1.87	2.13	2.20	2.33	2.33	2.67	2.67	2.87	2.94	2.94	2.94

Note: 1 – little progress beyond establishment of a two-tier system; 2 – significant liberalisation of interest rates and credit allocation, limited use of direct credit and interest rate ceilings; 3 – substantial progress in establishment of bank solvency and a framework for prudential supervision and regulation, full interest rate liberalisation with little preferential access to cheap refinancing, significant lending to private enterprises and significant presence of private banks; 4 – significant movement of banking laws and regulations towards BIS standards, well functioning banking competition and effective prudential supervision, significant term lending to private enterprises , substantial financial deepening; 4+ - standards and performance norms of advanced industrial economies, full convergence of banking laws and regulations with BIS standards, provision of full set of competitive banking services.

Source: EBRD, http://www.ebrd.org/country/sector/econo/stats/index.htm.

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Table A. 6
Index of non-banking sector reform 1995-2007

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
EU8													
Czech Republic	2.67	2.67	2.67	3	3	3	3	3	3	3.33	3.67	3.67	3.67
Estonia	1.67	2	3	3	3	3	3	3.33	3.33	3.33	3.33	3.67	3.67
Hungary	3	3	3.33	3.33	3.33	3.67	3.67	3.67	3.67	3.67	4	4	4
Latvia	2	2	2.33	2.33	2.33	2.33	2.33	3	3	3	3	3	3
Lithuania	2	2	2.33	2.33	2.67	3	3	3	3	3	3	3	3.33
Poland	3	3	3.33	3.33	3.33	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67
Slovak Republic	2.67	2.67	2.33	2.33	2.33	2.33	2.33	2.33	2.67	2.67	2.67	3	3
Slovenia	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67
Average	2.46	2.50	2.75	2.79	2.83	2.96	2.96	3.08	3.13	3.17	3.25	3.34	3.38
EU2													
Bulgaria	2	2	2	2	2	2	2	2.33	2.33	2.33	2.33	2.67	2.67
Romania	2	2	2	2	2	2	2	2	2.33	2.33	2.33	2.33	2.67
Average	2	2	2	2	2	2	2	2.17	2.33	2.33	2.33	2.50	2.67
EU candidates and potential candidates													
Albania	1	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67
Bosnia & Herzegovina	1	1	1	1	1	1	1	1.67	1.67	1.67	1.67	1.67	1.67
Croatia	2	2	2.33	2.33	2.33	2.33	2.33	2.67	2.67	2.67	2.67	3	3
Macedonia	1	1	1	1.67	1.67	1.67	1.67	1.67	1.67	2	2	2.33	2.33
Serbia	1	1	1	1	1	1	1	1.67	2	2	2	2	2
Average	1.20	1.33	1.40	1.53	1.53	1.53	1.53	1.87	1.94	2.00	2.00	2.13	2.13

Note: 1 – little progress; 2 – formation of securities exchanges, market-makers and brokers, some trading in government paper and/or securities, rudimentary legal and regulatory framework for the issuance and trading of securities; 3 – substantial issuance of securities by private enterprises, establishment of independent share registries, secure clearance and settlement procedures, and some protection of minority shareholders, emergence of non-bank financial institutions (e.g. investment funds, private insurance and pension funds, leasing companies) and associated regulatory framework; 4 – securities laws and regulations approaching IOSCO standards, substantial market liquidity and capitalisation, well-functioning non-bank financial institutions and effective regulation; 4+ - standards and performance norms of advanced industrial economies: full convergence of securities laws and regulations with IOSCO standards, fully developed non-bank intermediation.

Source: EBRD, http://www.ebrd.org/country/sector/econo/stats/index.htm.

A.1 Data sources

– Rate of depreciation of domestic currency. Defined as the percentage change of exchange rate vis-à-vis Deutsche mark. Calculated on the basis of IMF International Financial Statistics line ae.

– Proportional change in domestic international reserves. Defined as the change in the level of reserves divided by money base of previous period – IMF International Statistics financing of the balance of payments (line 79dad), for Poland the change in net foreign assets (line 11-line16c) was used; the whole was deflated by inherited money base (IFS line 14).

CA – Current account (as % of GDP) – IMF International Financial statistics line 78ALD and line 99b.

DC – Domestic credit growth rate – percentage change compared to previous period. Calculations based IMF International Financial statistics line 32 (domestic credit).

Real depreciation rate – defined as , where and are domestic and German inflation rates respectively. The time series are lagged for 1 period. IMF International Financial statistics line 64 consumer price index and line ae bilateral dollar rate

Inflation differential (with Germany) – IMF International Financial statistics line 64 consumer price index.

Growth rate of government borrowing – percentage change compared to previous period. IMF International Financial statistics lines 12a and 22a (claims on central government).

D – Exchange rate dummy – dummy variable takes the value of 1 for the exchange rate arrangements 1, 2, 6, 7 and 8 (see table 1) and the value of 0 for the exchange rate arrangement 3, 4, and 5.

D_{flx} – Flexible exchange rate dummy – dummy variable takes the value of 1 for the exchange rate arrangements 7 and 8 (see table 1) and the value of 0 for the exchange rate arrangement 1,2, 3, 4, 5 and 6.

REFERENCES

BUITER, W. H. AND C. GRAFE [2002], "Anchor, Float or Abandon Ship: Exchange Rate Regimes for the Accession Countries", Discussion Paper, CEPR, No. 3184.

CASTRÉN, O. AND T. TAKALO [2000], "Capital Market Development, Corporate Governance and the Credibility of Exchange Rate Pegs", Working Paper, ECB, No. 34.

DE GRAUWE, P. AND M. GRIMALDI [2002], "Exchange rate regimes and financial vulnerability", Papers, European Investment Bank, Vol. 7, No 2, 33-48.

EBRD [2007], "Transition indexes", http://www.ebrd.org/country/sector/econo/stats/index.htm. The European Bank of Reconstruction and Development, London.

EFFENBERGER, D. [2004], "Institutional Vulnerability indicators for currency crisis in Central and Eastern European countries", in: Morten Balling, Frank Lierman and Andy Mullineux (eds.) *Financial Markets in Central and Eastern Europe Stability and Efficiency*, Routledge Studies in the European Economy, 12-338.

EICHENGREEN, B., A. K. Rose, C. Wyplosz [1994], "Speculative Attacks on Pegged Exchange Rates: an Empirical Exploration with Special Reference to the European Monetary System", Working Paper, NBER No. 4898.

EICHENGREEN, B., A. K. ROSE, C. WYPLOSZ [1995], "Exchange market mayhem: the antecedents and aftermath of speculative attacks.", *Economic Policy*, Vol. 21 (October), 249–312.

FELDSTEIN, M. [2002], "Economic and Financial Crises in Emerging Market Economies: Overview of Prevention and Management", Working Paper, NBER No. 8837.

FISCHER, S. [2001], «Exchange rate regimes: is the bipolar view correct?», J*ournal of Economic Perspectives*, Vol. 15(2), -24.

FLOOD, R. AND N. MARION [1998], "Perspectives on the recent currency crisis literature", Working Paper, NBER No. 6380.

GIRTON, L. AND D. ROPER [1977], "A Monetary Model of Exchange Market Pressure Applied to the Postwar Canadian Experience", *American Economic Review*, Vol. 67, No. 4, 537-548

GHOSH, S. AND A. GHOSH [2002], "Structural Vulnerability and Currency Crises", Working Paper, IMF, No 02/09

HUANG, H. AND C. XU [2000], "Financial Institutions, Financial Contagion, and Financial Crises", Working Paper, IMF, No 00/92.

HERITAGE FOUNDATION [2005], "*Index of Economic Freedom*", The Heritage Foundation and Wall Street Journal, http://www.heritage.org/research/features/index/.

KRUGMAN, P. [1979], "A Model of Balance-of-Payments Crises", *Journal of Money*, Credit, and Banking, Vol. 11, 311-25.

MASSON, P. [1999], "Monetary and Exchange Rate Policy of Transition Economies of Central and Eastern Europe after the Launch of EMU", Policy Discussion Paper, IMF, No 99/5.

MULDER, C., R. PERRELLI AND M. ROCHA [2002], "The Role of Corporate, Legal and Macroeconomic Balance Sheet Indicators in Crisis Detection and Prevention", Working Paper, IMF, No 02/59

PITT, A. [2001], "Sustaining Fixed Exchange Rates--A Model with Debt and Institutions", Working Paper, IMF, No 01/27.

REINHART, C. M. AND K. S. ROGOFF [2004],"The Modern History of Exchange Rate Arrangements: A Reinterpretation", *Quarterly Journal of Economics*, Vol. 119(1), 1-48, available via the Internet: http://www.puaf.umd.edu/faculty/papers/reinhart/papers.htm.

REISEN H. [1998], «Domestic Causes of Currency Crises: Policy Lessons for Crisis Avoidance,», Working Paper, OECD Development Centre, No 136.

VANNESTE, J., A. VAN POECK AND M. VEINER [2003], «Capital Reversals and the CEEC's Transition to the EMU», *Bank- en Financiewezen*, Vol. 7 (October), 390-401.

VANNESTE, J., A. VAN POECK AND M. VEINER [2007], «Exchange rate regimes and exchange market pressure in the new EU member countries», *Journal of Common Market Studies*, Vol. 45:2, 459-485.

VON HAGEN, J. AND J. ZHOU [2002], "The Choice of Exchange Rate Regimes: An Empirical Analysis for Transition Economies", ZEI Working Paper, Centre for European Integration Studies, No. B02-03.

WORLD BANK [2004], "*Worldwide Governance Research Indicators Dataset*", available via the Internet: http://www.worldbank.org/wbi/governance/govdata/ .

COMOUVEMENTS DE PRIX ET PRODUCTION: UNE INVESTIGATION EMPIRIQUE

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RÉSUMÉ :

Cet article étudie les particularités des co-mouvements de prix et de production entre d'une part, six PECO récemment intégrés dans l'UE et d'autre part, la zone euro. Plus précisément, à l'aide d'une méthodologie suggérée par les travaux d'Alesina, Barro et Tenreyro (2002), nous évaluons la taille et la persistance des chocs de prix et de production entre les PECO et la zone euro en utilisant des données trimestrielles s'étalant entre 1995:01 et 2004:04 (dans des conditions ex-ante d'entrée dans l'UE. Nos résultats souhaitent contribuer aux débats sur la participation des nouveaux entrants dans l'union monétaire européenne.

Classification JEL : C22, E30, F33, F42, F47.

Mots-clés : Integration monétaire européenne, co-mouvements, modèles AR, PECO.

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INTRODUCTION

L'élargissement récent de l'Union Européenne (UE) soulève des questions essentielles autour de la participation de nouveaux membres à la zone euro. On en dénombre quelques unes. Du côté de nouveaux entrants, la création de la monnaie unique incite à repenser des politiques de change compatibles avec le nouveau mécanisme de change-SME2 pour stabiliser les monnaies nationales par rapport à l'euro et préparer l'adhésion à l'union monétaire. D'autre part, elle nécessite une évaluation juste des mécanismes de transmission de la politique monétaire pour mieux appliquer la stratégie de l'Eurosystème et une meilleure syncronisation des cycles économiques. Du côté des pays membres de la zone euro et de la Banque Centrale Européeenne (BCE), la pertinence de la cible d'inflation proche de 2% à moyen terme pourrait être remise en cause dans une future zone élargie car en dépit d'une décélération considérable du rythme de hausse des prix depuis la phase de la transition, un surcroît d'inflation de 0,25 à 0,75 points dû au rattrapage économique, serait susceptible de demeurer lors de l'adoption de l'euro (BENASSY-QUERE ET LAHRECHE-REVIL [2001]). Pour respecter son mandat, la BCE serait contrainte de mener une politique monétaire restrictive dont les possibles incidences déflationnistes viendraient compromettre le processus de convergence réeelle de nouveaux entrants. Malgré le processus de rattrapage économique, les huit pays d'Europe centrale et orientale (PECO) ont vocation à joindre l'Union Monétaire Européenne (EMU) pour plusieurs raisons: cette entrée pourrait les garantir des taux d'intérêt plus bas, une certaine stabilité monétaire et un accès moins contraignant aux financements extérieurs. De plus, contrairement au Royaume-Uni et au Danemark, les PECO n'ont constitutionnellement pas le droit de choisir de rester en dehors de la zone euro étant tenus d'adopter la monnaie unique le plus rapidemment possible. L'adoption de l'euro et ses effets sont donc devenus des enjeux cruciaux pour leur réussite future.

L'entrée dans une union monétaire implique à la fois des coûts et des bénéfices pour les pays membres. Les coûts de l'adoption d'une monnaie commune sont généralement établis selon deux critères: (i) les critères

institutionnels (les critères de convergence de Maastricht) et (ii) les critères dérivés de la théorie des zones monétaires optimales (ZMO) initiés par MUNDELL (1961). Si le traité de Maastricht privilège les critères de convergence nominale qui évaluent la faisabilité pratique de l'union (des taux d'inflation bas, des taux de change stables) et les risques pesant sur l'indépendance de la BCE (la santé des finances publiques), les critères de la théorie des zones monétaires optimales sont de nature plûtot structurelle: deux pays ou régions profiteront d'une union monétaire s'ils sont caractérisés par une grande similitude des cycles économiques, ont de forts échanges commerciaux et un mécanisme d'ajustement efficace pour atténuer les effets négatifs des chocs asymétriques. Il est également à noter que le coût le plus généralement identifié dans la littérature théorique et empirique est la perte de l'autonomie de la politique monétaire comme important outil de stabilisation et le bénéfice le plus cité d'une union monétaire est l'augmentation des échanges commerciaux et des investissements directs étrangers. Au delà de ces divers critères structuraux de la théorie des ZMO qui peuvent guider le choix d'un régime de change, un rôle important joue la nature des chocs affectant une union monétaire. En cas de chocs symétriques affectant les économies, le choix d'un taux de change fixe est préférable à la flexibilité. En cas de chocs asymétriques, la situation oposée est à prendre en compte. Puisque des chocs parfaitement symétriques n'existent pas, la plupart des études se concentre sur le degré de (a)symétrie des chocs plutôt que sur la nature des chocs, cette approche de la littérature évoquant une diminution des côuts d'union monétaire proportionnelle au degré de symétrie des chocs (autrement dit, les cycles économiques devraient être plus syncronisés lorsque les monnaies sont ancrées à l'euro puisqu'on admet l'existence d'une politique monétaire commune). L'objectif de cette article est de mesurer le degré de symétrie des chocs ou de syncronisation des cycles entre les nouveaux membres de l'UE et la zone euro.

Plusieurs méthodes d'évaluation de la nature et le degré de symétrie des chocs sont présentées dans les travaux empiriques : statistiques descriptives (calculant le taux de corrélation entre des variables

représentatives de la conjoncture où une corrélation fortement positive traduit des chocs relativement symétriques (BOONE ET MAUREL [1999]) ou calculant le taux d'ouverture pour examiner la répartition du commerce où une intégration commerciale forte et diversifiée réduit l'occurrence des chocs asymétriques), estimations économétriques des équations macroéconomiques où les résidus sont identifiés à des chocs frappant les économies (BLANCHARD ET QUAH [1989] et BAYOUMI ET EICHENGREEN [1993, 1996]) et simulations stochastiques où partant d'un modèle économétrique où les résidus sont assimilés à des chocs macroéconomiques, on tire au hasard des chocs dans les distributions estimées et l'on calcule la variance simulée des variables entrant dans la fonction de perte sous la contrainte de divers régimes de changes (MASSON ET SYMANSKY [1992]). Pour cette dernière méthode, l'invariance des paramétres estimés indépendemment du régime de change est considérée comme l'un des défauts de cette méthode (cf. critique de Lucas).

L'étude des co-mouvements constitue une autre manière d'analyser la syncronisation des cycles économiques et peut être encadrée dans notre deuxième classification. Une réaction favorable des comovements à l'union monétaire mènerait à un degré plus élevé de consensus autour d'une politique monétaire commune sans impliquer des déséquilibres entre les participants et aux coûts inférieurs produits par la perte de l'autonomie monétaire. Une réponse négative des comouvements aurait l'effet opposé: elle produirait des fluctuations divergentes ce qui préjuge que les politiques de change seront importantes pour soutenir l'activité économique. L'investigation des co-mouvements suppose le calcul des deux indices de sensibilité: la variance conditionnelle (ALESINA, BARRO ET TENREYRO [2002]) et la variance non-conditionnelle. Du point de vue méthodologique, le but de cet article est d'analyser les co-mouvements de différentes variables macroéconomiques (prix et production) entre les PECO et la zone euro en exploitant cette nouvelle classe des indices dits de sensibilité: la variance conditionnelle et la variance non-conditionnelle. Les deux concepts sont différents comme

illustré par exemple, dans les études sur l'inflation dans lesquelles la variance conditionnelle mesure simplement la variabilité de l'inflation et la variance non-conditionnelle mesure l'incertitude de l'inflation (BALL, CECHETTI ET GORDON [1990]). Ces contributions méthodologiques mènent aux résultats suggérant que les co-mouvements des prix sont plus élevés par rapport aux co-mouvements de production et que, généralement, ils sont proches à ceux des anciens membres de l'UE. Notre contribution est double. Premièrement, nous concentrons notre attention sur l'expérience récente des nouveaux États membres de l'UE qui constitue des exemples intéressants pour évaluer les co-mouvements des prix et productions dans les conditions ex-ante (c-à-d, avant l'entrée dans l'UE): pays caractérisés par une hétérogénéité des régimes de change, récemment intégrée dans l'UE et candidats pour l'adoption de l'euro. Deuxièmement, du point de vue méthodologique, nous utilisons dans le cadre des modèles autorégressifs, les deux indices de sensibilité pour mesurer les co-mouvements de nos variables.

Le papier est organisé de la manière suivante. La section 2 présente quelques faits stylisés autour de la syncronisation des cycles. La section 3 detaille la méthodologie adoptée et décrit la base de données. La section 4 présente les principaux résultats. Finalement, la dernière section offre des élements de conclusion.

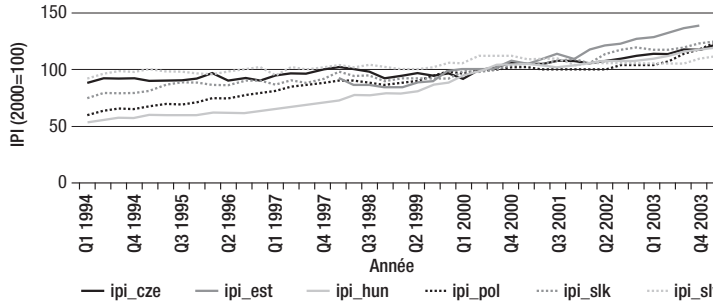
1. QUELQUES FAITS STYLISÉS

Une manière d'étudier le degré d'asymétrie des chocs est de comparer les corrélations entre les cycles du PIB réel, de la production industrielle ou des taux de change réel des différents pays. Loin de prétendre à l'exhaustivité, nous nous attachons à dresser un panorama de quelques faits stylisés pour les nouveaux membres de l'UE. A cet effet, nous proposons une comparaison des cycles économiques entre d'une part, les nouveaux États de l'UE et d'autre part, la zone euro. L'étude s'étalera sur la période janvier 1994-mai 2004 coincidant avec une analyse dans des conditions ex-ante (c'est-à-dire, la période d'avant l'entrée des PECO

dans l'UE). Les variables considérées sont la production industrielle (un proxy du PIB), le PIB réel, l'indice des prix à la consommation et le déflateur du PIB. Les graphiques de 1 à 4 présentent l'évolution des variables précédemment énumérées et elles sont corrigées des variables saisonières. Il est à noter que l'approche d'ALESINA, BARRO ET TENREYRO [2002] utilise le PIB réel par habitant pour l'output et les prix relatifs sont calculés comme le ratio entre le PIB en PPA et le taux de change par rapport au dollar. Puisque nous ne disposons pas de PIB en PPA dans la fréquence trimestrielle pour tous nos pays, nous sommes contraints d'employer l'indice des prix à la consommation comme dans CECCHETTI ET AL. [2000], SOSVILLA-RIVERO ET GIL-PAREJA [2002] et ALLINGTON ET AL. [2004]. Il est à noter que les deux types des données ont leurs défenseurs. ENGEL ET ROGERS [2004] soulignent que les indices, qui ne fournissent pas des niveaux de prix absolu, ne peuvent pas être comparés directement entre divers pays afin d'étudier les écarts de prix. Puisque leurs niveaux sont arbitraires, ils ne permettent pas d'examiner directement et de manière coherente la loi du prix unique. ALLINGTON ET AL. [2004] préfèrent à leurs tour des indices car ils sont plus représentatifs et beaucoup plus facilement disponibles aux chercheurs. Quelques faiblesses des indices des prix résultent directement du fait qu'ils sont obtenues suite à un processus compliqué de collecte de données, d'évaluation, de recalcul etc..

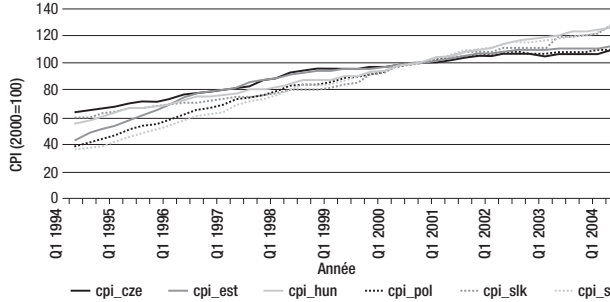
Figure 1

ÉVOLUTION DE LA PRODUCTION INDUSTRIELLE POUR LES SIX PECO ÉTUDIÉS



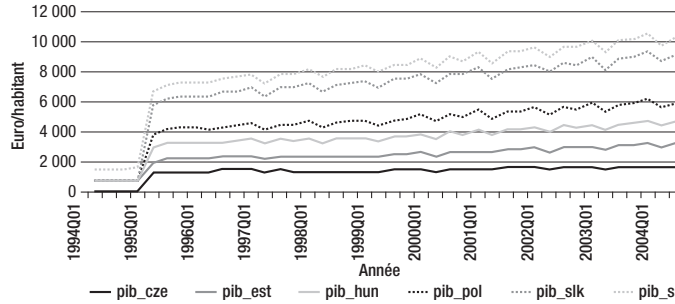
Source: Eurostat, 2008.

Figure 2
ÉVOLUTION DES INDICES DE PRIX À LA CONSOMMATION POUR LES SIX PECO



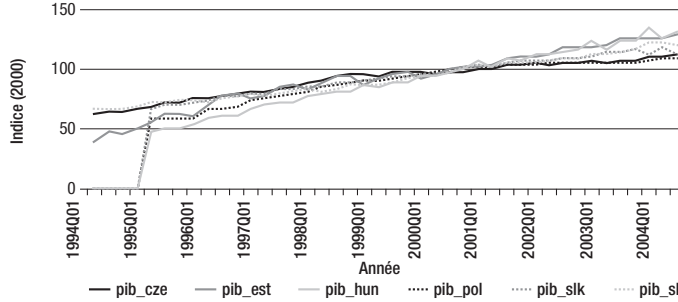
Source: Eurostat, 2008.

Figure 3
ÉVOLUTION DU PIB RÉEL POUR LES SIX PECO ÉTUDIÉS



Source: Eurostat, 2008.

Figure 4
ÉVOLUTION DU DÉFLATEUR DU PIB POUR LES SIX PECO ÉTUDIÉS



Source: Eurostat, 2008.

Dans l'annexe A.3, les tableaux de A.3 à A.8 exposent la corrélation de cycles conjoncturels entre les pays de l'UE et la zone euro pour nos variables d'intéret. Les résultats sont présentés pour la période 1994-2004 et pour les sous-périodes (1994-1998 et respectivement, 1999-2004). Afin d'extraire la tendance et le cycle, nous appliquons le filtre Hodrick Prescott. Concernant la production industrielle, nous observons que les cycles des PECO apparaissent plus ou moins corrélés avec ceux de la zone euro à la fois dans les sous-périodes et la période entière. Parmi les PECO considérés, seulement la Slovénie est corrélée avec la zone euro à la fois sur les sous-périodes et la période entière. Son cycle économique semble davantage corrélé avec le cycle de zone euro pour la sous-période 1999-2004 par rapport à la période entière en raison du processus de transition vers l'économie de marché (0.51 pour 1999-2004 et 0.41 pour 1994-1998). Les résultats de la Slovénie penchent plutôt en faveur de son intégration dans la zone euro. Pour ce qui concerne les prix, les cycles des PECO sont très corrélées (sauf pour la Slovaquie) avec ceux de la zone euro, en particulier sur la période 1999-2004. Ce résultat pourrait être justifié par l'objectif de stabilité des prix ou la stratégie de ciblage d'inflation afin de joindre l'UE en mai 2004. Globalement, les corrélations des cycles économiques entre les PECO et la zone euro sont différents à travers le panel des pays étudiés : de 0.73 pour l'Estonie ou 0.70 pour la Slovénie à 0.01 pour la Slovaquie sur la sous-période 1999-2004. Pourrait-t-on observer les mêmes résultats en calculant les co-mouvements? Ce sera l'objectif des prochaines sections.

2. MÉTHODOLOGIE ET SOURCES DES DONNÉES

2. 1. La méthodologie

Les économies modernes sont liées étroitement entre elles par les échanges de biens et services, par les flux monétaires et les investissements de telle sorte que des événements dans un pays peuvent avoir des répercussions sur d'autres pays. Dans ce sens, les développements récents sur la transmission internationale des fluctuations se concentrent à la fois sur

les connexions entre ces différents pays et sur les impacts que celles-ci pourraient avoir sur la transmission des fluctuations. Cet aspect, dans les travaux de recherches académiques, est examiné en termes de volatilité et des co-mouvements dans les séries macroéconomiques entre pays ou régions(1). Bien qu'ils ne soient pas précis, ces modèles économétriques utilisés pour estimer les co-mouvements offrent une information quantitative qui mérite une attention particulière et répondent à des questions liées aux particularités des fluctuations de divers économies.

En suivant partiellement la méthodologie d'ALESINA, BARRO et TENREYRO [2002], nous examinons la taille et la persistance des chocs sur les prix et productions entre chaque pays et la zone euro. Nous commençons par le calcul des prix relatifs représentés par le ratio: P_{it}/P_{jt} où «i» désigne l'un des pays européens (y compris PECO) et «j» la zone euro. Ici, l'expression (1) représente une mesure de la dispersion internationale des prix entre le pays i et j et est calculé pour toutes les paires des pays (i, j). Elle est souvent utilisée pour mesurer la *β-convergence* :

$$(1) \qquad \left|\ln P_{it} / P_{jt}\right| = \left|\ln P_{it} - \ln P_{jt}\right|$$

Pour mesurer la β-convergence ou la tendance des pays moins dévéloppés à croître, la littérature empirique part de la régression connue sous le nom de la « regression de Barro » dans laquelle le différentiel des productions ou des revenus peut être remplacé par les écarts des prix selon l'équation suivante:

$$(2) \qquad \Delta P_{ijt} = \alpha_{ijt} + \beta P_{ij,\, t-1} + \varepsilon_{tij}.$$

La validité de *β-convergence* peut être examinée à l'aide de différentes procédures de racines d'unitaires. Si le coefficient de *β* est négatif, la validité du concept de *β-convergence* est vérifiée. L'équation (2) peut-être appliquée dans le cas où nous devons procéder à une regression de premier ordre qui implique l'existance d'une racine unitaire dans les estimations (par exemple, lorsqu'on analyse l'évolution du PIB réel).

(1) La volatilité des fluctuations de la balance commerciale, la corrélation entre la production et la consommation entre différents pays ou régions, la volatilité des prix des biens domestiques ou étrangers constituent quelques exemples dans ce sens.

Pour chaque paire de pays (i, j), nous calculons alors l'autorégression suivante du second ordre sur des données trimestrielles pour les indices des prix à la consommation. Pour chaque paire de pays (i, j) nous procédons à la régression du deuxième ordre ci-jointe:

(3) $$\ln P_{it}/P_{jt} = \phi_0 + \phi_1 \ln P_{i,t-1}/P_{j,t-1} + \phi_2 \ln P_{i,t-2}/P_{j,t-2} + \beta_t + \varepsilon_{tij}.$$

Les résidus estimés $\hat{e}_{tij}$ mesurent les prix relatifs qui ne peuvent pas être prévus au-delà de leur deuxième valeur. Le co-mouvement des prix est représenté par la moyenne de la racine carrée des résidus:

(4) $$VP_{ij} = \sqrt{(1/T\text{-}3)\sum(\hat{e}_{ijt})^2} \quad \text{où} \quad T = 37$$

Il est à noter que les comouvements sont calculés à l'aide de la variance conditionnelle (var $x_t | x_{t-1} \Lambda x_{t-2}$) qui tient compte de valeurs passées de nos variables d'intérêt (où $x_t = \ln P_{it}/P_{jt}$). Nous observons que plus la valeur de VP_{ij} est faible, plus le co-mouvement de prix entre les pays i et j augmente. Rappelons que l'existence des comouvements élevés entre les pays examinés et la zone euro implique de moindres coûts d'entrée dans une union monétaire.

Autrement dit, la stratégie de ce test nous dit que si les séries sont affectées par des chocs symétriques, la variance conditionnelle du ratio des séries considérée devrait tendre vers zéro.

De la même manière, nous calculons les co-mouvements de production en utilisant les données de la production industrielle en fréquence trimestrielle. Pour chaque paire de pays (i, j) nous procédons à la régression du deuxième ordre ci-jointe:

(5) $$\ln (Y_{it}/Y_{jt}) = \gamma_0 + \gamma_1 \ln (Y_{i,t-1}/Y_{j,t-1}) + \gamma_2 \ln (Y_{i,t-2}/Y_{j,t-2}) + u_{tij}.$$
où $T = 37$

Les résidus estimés $\hat{u}_{tij}$ mesurent les productions qui ne peuvent pas être prévues au-delà d'une deuxième valeur. Le co-mouvement de production est donné par la moyenne de la racine carrée des résidus :

(6) $$VY_{ij} = \sqrt{(1/T\text{-}2)\sum(\hat{u}_{ijt})^2} \quad \text{où} \quad T = 37$$

Comme dans le cas précédent, nous remarquons que plus la valeur de VY_{ij} diminue, le co-mouvement de production entre les pays i et j augmentera

davantage. Il est également à noter que nous excluons de notre panel les pays pour lesquels nous disposons de moins de 37 observations.

Nous nous proposons maintenant de calculer les co-mouvements de prix et production avec une méthode différente de celle utilisée par ALESINA, BARRO et TENREYRO [2002]. A cet effet, nous faisons appel à un deuxième indicateur de sensibilité : la variance non-conditionnelle qui ne tient pas compte des valeurs passées de nos séries: xt = lnPit/Pjt et qui offre une meilleure prévision liée au processus autorégressif. Mais, cette méthode suppose le calcul préalable de la variance conditionnelle. Le co-mouvement de prix prendra donc la forme suivante (voir l'annexe A.2 pour plus de détails sur le résultat présenté en (7)).

$$(7) \qquad VP^*_{ij} = \frac{VP_{ij}\,(1 - \Phi_2)}{(1 + \Phi_2)\,(1 - \Phi_2 - \Phi_1)\,(1 - \Phi_2 + \Phi_1)}$$

où $VP = var(\varepsilon_{tij})$, $VP^*_{ij} = var(x_t)$, $x_t = lnP_{it}/P_{jt}$ et le dénominateur différent de zéro.

Les co-mouvements de production sont calculés de la même façon. Pour chaque paire de pays i et j, la valeur VY_{ij} provient du calcul des résidus de la régression de second ordre sur les données trimestrielle de la production industrielle.

$$(8) \qquad \ln (Y_{it}/Y_{jt}) = \gamma_0 + \gamma_1 \ln (Y_{i,t-1}/Y_{j,t-1}) + \gamma_2 \ln (Y_{i,t-2}/Y_{j,t-2}) + u_{tij}.$$

De la même façon, les résidus estimés ûtij mesurent les productions qui ne peuvent pas être prévues au-delà d'une seconde valeur. Le co-mouvement de production est calculé à l'aide de la racine carrée des résidus et est donné par l'expression suivante:

$$(9) \qquad VY_{ij} = \sqrt{(1/T\text{-}2)\sum(\hat{u}_{ijt})^2} \qquad \text{où } T = 37$$

En utilisant la variance non-conditionnelle, nous obtenons la forme suivante du co-mouvement de production:

$$(10) \qquad VY^*_{ij} = \frac{VY_{ij}\,(1 - \Phi_2)}{(1 + \Phi_2)\,(1 - \Phi_2 - \Phi_1)\,(1 - \Phi_2 + \Phi_1)}$$

où $VY = var(\varepsilon_{tij})$, $VY^*_{ij} = var(x_t)$, $x_t = \ln Y_{it}/Y_{jt}$ et le dénominateur est différent de zéro.

2.2. Les sources de données

Les données macroéconomiques sont en fréquence trimestrielle. Elles proviennent de la base de données FMI (IFS-International Financial Statistics) et Eurostat. Combinant les deux sources de données, nous formons un panel de pays avec des données de prix et de production en fréquence trimestrielle qui s'étalent sur la période 1995:01 to 2004:01 (avant l'entrée dans l'UE). Pour calculer les co-mouvements des prix, nous utilisons comme indicateurs, les indices des prix à la consommation et pour évaluer les co-mouvements de production, nous utilisons la production industrielle (prix constants 2000).

3. RÉSULTATS

Cette section présente nos principaux résultats économétriques. Nous estimons nos modèles et réalisons une comparaison entre les résultats obtenues à l'aide de deux indices de sensibilité à la fois dans le cas de quelques anciens membres et nouveaux membres de l'UE. Il est à noter que nous nous sommes penchés sur les pays pour lesquels nous disposons d'au moins 37 observations afin de pouvoir réaliser des comparaisons fiables des résultats obtenus. Nous avons également choisit quelques anciens membres de l'UE qu'on les retrouvent d'ailleurs dans l'étude d'ABT [2002] afin de faciliter divers comparaisons des résultats.

Nous analysons la persistance et la taille des chocs sur les prix et les productions à l'aide des tests de racine unitaire tels que le test de Dickey Fuller Augmenté. Il est à noter qu'une large littérature empirique a étudié la persistance des chocs en macroéconomie et que ce type d'analyse devient populaire avec le travail de NELSON et PLOSSER [1982] sur les tendances stochastiques dans lequel ils démontrent que le produit intérieur brut réel suit généralement un modèle de racine unitaire. Le test de Dickey Fuller Augmenté est appliqué à la fois au différentiel de prix et

de production. Les résultats des estimations nous indiquent le fait que les séries suivent un processus intégré d'ordre 2 (autrement dit, AR(2)). Par conséquent, nous pouvons conclure que les séries des prix et de production sont des processus non-stationnaires qui ont des racines unitaires(2).

Une large part de la littérature empirique sur les membres de l'UE ont souligné que les séries de la zone euro sont moins volatiles que celles des pays nationaux. Les résultats présentés dans les tableaux suivants peuvent être utiles pour réaliser ce genre de comparaisons. Les tableaux de 1 à 4 présentent les résultats obtenus avec les deux indices (la variance conditionnelle et la variance non-conditionnelle).

Tableau 1.
Co-mouvements de prix de six PECO

Pays	Co-mouvements de prix	
	Variance conditionnelle	Variance non-conditionnelle
Rép. Tchèque	0,0083	0,0087
Estonie	0,0069	0,0070
Hongrie	0,0071	0,0084
Pologne	0,0073	0,0076
Slovaquie	0,0131	0,0131
Slovenia	0,0062	0,0062

Calculs de l'auteur.

Tableau 2.
Co-mouvements de production de six PECO

Pays	Co-mouvements de produit	
	Variance conditionnelle	Variance non-conditionnelle
Rép. Tchèque	0,0277	0,0280
Estonie	0,0279	0,0289
Hongrie	0,0207	0,0208
Pologne	0,0260	0,0266
Slovaquie	0,0305	0,0307
Slovenia	0,0203	0,0236

Calculs de l'auteur.

(2) Les series sont intégrées d'ordre 2 (I(2)) car nous utilisons des indices et non des variables en niveau (par exemple, le PIB qui s'avère à être un AR(1)).

Tableau 3.
Co-mouvements de prix de quelques pays de l'UE

Pays	Co-mouvements de prix	
	Variance conditionnelle	Variance non-conditionnelle
Allemagne	0,0030	0,0030
Autriche	0,0048	0,0053
Belgique	0,0028	0,0035
Espagne	0,0046	0,0050
Finlande	0,0042	0,0042
France	0,0032	0,0032
Grande Bretagne	0,0046	0,0049

Calculs de l'auteur.

Tableau 4.
Co-mouvements de production de quelques pays de l'UE

Pays	Co-mouvements de produit	
	Variance conditionnelle	Variance non-conditionnelle
Allemagne	0,0226	0,0342
Autriche	0,0175	0,0200
Belgique	0,0189	0,0267
Espagne	0,0158	0,0239
Finlande	0,0226	0,0252
France	0,0167	0,0213
Grande Bretagne	0,0157	0,0190

Calculs de l'auteur.

La deuxième colonne des tableaux 1 et 2 montrent les résultats de nos estimations à l'aide de la variance conditionnelle. La troisième colonne présente les résultats des co-mouvements en utilisant la variance non-conditionnelle. La dernière méthode a l'avantage qu'elle prend en compte la volatilité de la composante permanente (la tendance) qui est une propriété de toute les corrélations. Cette question est importante parce que les procédures conventionnelles (ADF test) se concentrent habituellement sur les premières autocorrélations pour analyser la dynamique de court terme des séries (COCHRANE [1988]). Par conséquent, il y a un risque des régressions fallacieuses.

Les tableau 1 et 2 donnent les résultats des co-mouvements des prix et productions dans le cas des PECO. Nous observons que les co-mouvements des prix sont plus élevés que ceux de productions et qu'ils

ne sont pas systématiquement corrélés. D'autre part, les co-mouvements des prix des PECO sont inférieurs à ceux des anciens membres de l'UE. Le plus bas co-mouvement de prix par rapport à la zone euro est celui de la Slovaquie (0.131 dans les deux cas d'études). Il est suivi par celui de la République Tchèque (0.0083 ou 0.0087). Les Co-mouvements des prix de l'Estonie (0.0069) et de la Slovénie (0.0062) sont plus proches de ceux des anciens États membres de l'UE qui sont de 0.0030 à 0.0048. Les Co-mouvements des prix pour la Pologne (0.0073 ou 0.0084) et la Hongrie (0.0071 ou 0.0084) sont beaucoup plus étroits en termes de variance conditionnelle.

Les tableaux 3 et 4 présentent les résultats des co-mouvements dans le cas des anciens pays d'UE. Ces résultats sont proches comme valeur de ceux obtenus par d'ALESINA, BARRO et TENREYRO [2002] pour quelques membres d'UE de 1960 à 1997 (voir les tableaux 5 et 6 dans les annexes) utilisant des données annuelles.

Quant aux co-mouvements de production des PECO, ils sont proches de ceux des anciens membres comme: l'Allemagne, la Belgique ou la Finlande. Les résultats sont presque similaires avec ceux obtenus par ALESINA, BARRO et TENREYRO [2002] pour des pays comme la Norvège (0.0210) ou le Chypre (0.0227) (voir annexe A1, les tableaux A.1, A.2).

De nouveau, les co-mouvements de la Slovaquie (0.0305 or 0.0307) suivi par celui de la République Tchèque (0.0277 or 0.0280) sont plus faibles par rapport aux autres PECO ce qui peut nous suggérer des coûts importants de perte de l'autonomie monétaire. Ce résultat est d'ailleurs dans la lignée avec celui présenté dans la partie fait stylisés.

Nous avons également calculé les co-mouvements de production en utilisant comme indicateur le PIB réel à l'aide de la variance conditionnelle. Avant de présenter les résultats, notons que le PIB suit un processus intégré d'ordre 1 ce qui correspond à l'équation de Barro présentée dans la section précédente. Le tableau 5 montre la synthèse de nos résultats dans le cas des six PECO et quelque anciens membres de l'UE à 15.

Tableau 5.
Co-mouvements de production des anciens et nouveaux membres de l'UE

Pays	PECO Variance conditionnelle	UE à 15 Variance conditionnelle	Pays
Rép. Tchèque	0,0034	0,0013	Allemagne
Estonie	0,0130	0,0030	Autriche
Hongrie	0,0023	0,0041	Espagne
Pologne	0,0048	0,0108	Finlande
Slovaquie	0,0105	0,0023	France
Slovenia	0,0127	0,0167	Grande Bretagne
-	-	0,0067	Pays Bas

Nous observons que parmi les six PECO, les co-mouvements les plus élevés sont ceux de la Hongrie, la République Tchèque et la Pologne. Les co-mouvements de l'Estonie, Slovaquie et Slovénie sont moins forts et proches des pays comme la Finlande ou la Grande Bretagne. Notons que les co-mouvements apparaissent plus élevés par rapport à ceux calculés avec la production industrielle comme proxy du PIB marquant un rapprochement indéniable avec les pays UE à 15.

CONCLUSIONS

L'objectif de cette article a été double: de presenter de nouveaux résultats sur les co-mouvements des prix et de productions entre les PECO et la zone euro avant l'entrée de ces pays dans l'UE à l'aide de deux indices de sensibilité (la variance conditionnelle et la variance non-conditionelle) et de comparer ces résultats avec ceux obtenus par l'approche d'ALESINA, BARRO et TENREYRO (ABT) entre 1960-1997.

A partir de cette analyse, nous trouvons dans la même lignée que l'approche ABT que les co-mouvements des prix sont plus élevés que ceux de production dans le cas de nouveaux membres de l'UE et qu'ils ne sont pas systématiquement corrélés. Les co-mouvements de production des PECO sont beaucoup plus proches de ceux des anciens membres, ce résultat suggérant des coûts plus faibles d'entrée dans la zone euro. D'autre part, les co-mouvements des prix des PECO sont plus faibles par rapport aux anciens membres lorsqu'on utilise des données trimestrielle

sur la période 1995:01-2004:01. Il serait intéressant d'étudier dans une étude empirique future les caractéristiques des co-mouvements sur la période d'ensemble 1994-2008 et également après l'entrée dans l'UE des PECO afin d'observer si les résultats obtenus dans les conditions ex-ante sous-estiment les bénéfices potentiels d'une union monétaire comme l'ont souligné les travaux de FRANKEL et ROSE [1998] et d'ALESINA, BARRO et TENREYRO [2002].

RÉFÉRENCES

ALESINA A., BARRO R., TENREYRO S. [2002], "Optimal currency areas", NBER Working Paper 9072, June.

ALLINGHTON NFB, KATTUMAN PA, WALDMANN F.A. [2004], "One Market, One Money, One Price? Price Dispersion in the European Union", University of Cambridge Judge Institute of Management Working Paper.

BABETSKII I., BOONE L., MAUREL M. [2002, 2004], "Exchange Rate Regimes and Supply Shocks Asymmetry: the case of the Accession Countries", CEPR Discussion Paper, DP3408, June.

BAYOUMI, T., EICHENGREEN B. [1996], "Operationalzing the Theory of Optimum Currency Areas", CEPR Discussion Paper, n° 1484.

BAYOUMI T., EICHENGREEN B. [1993], "Shocking Aspects of European Monetary Unification", NBER Working Paper, WP/No. 3949.

BALL L., CECHETTI S. G., GORDON, R. J. [1990], "Inflation and Uncertainty at short and Long Horizons", in The Brookings Institution, *Brookings Papers on Economic Activity*, Vol. 1990, No. 1 (1990), pp. 215-254

BENASSY-QUERE A., LAHRECHE-REVIL A. [2001], "L'élargissement de la zone euro", in CEPII, L'*Économie Mondiale* 2002, La Découverte, pp. 297-446.

BENASSY-QUERE A., COEURE B., JACQUET P., FERRY J.P. [2004], "*Politique Economique*", Ed. De Boeck Université, Bruxelles.

BOONE, L., MAUREL, M. [1999], « L'ancrage de l'Europe Centrale et Orientale à l'Union Européenne», *Revue Economique*, vol. 50, N° 6, novembre 1999, pp. 1123 – 1137.

BLANCHARD, O.J., QUAH, D. [1989], "The Dynamic Effects of Aggregate

Demand and Supply Disturbances", *American Economic Review*, September, pp. 655-673

CECCHETTI SG, MARK NC, SONORA R.J. [2000], "Price Level Convergence Among United States Cities: Lessons for the European Central Bank", NBER Working Paper 7681

COCHRANE J. [1988], "How big is the random walk in GNP?", *Journal of Political Economy*, Vol. 96 (1988), pp. 893–920.

DICKEY D.A., FULLER W. A, [1979], "Distribution of the Estimators for autoregressive Time Series with a Unit Root", *Journal of the American Statistical Association*, Vol. 74, 1979, pp. 427-431.

ENGEL CH, ROGERS J.H. [2004], "Product market integration after the euro". Economy Policy Vol. 19(39): 347–384

FRENKEL J.A., ROSE A.K. [1998], "The Endogeneity of the OCA", *Economic Journal*, Vol. 108 (449), July, pp. 1009-1025.

GIL-ALANA, L., ROBINSON, P.M. [1997] "Testing of unit root and other nonstationary hypotheses in macroeconomic time series, *Journal of Econometrics*, Vol. 80, pp. 241-268.

MACARO, C., [2008], "The impact of vintage on the persistence of gross domestic product shocks", *Economics Letters*, Vol. 98 (2008), pp. 301-308.

MASSON P., SYMANSKY S. [1992], "Evaluating the EMS and EMU: Some Issues", in Barell R. et Whitley J. (eds.) *Macroeconomic Policy Coordination in Europe*: The ERM and Monetary Union, Sage.

McKINNON, R. [1963], "Optimum Currency Areas", *American Economic Review*, Vol. 53, pp. 717-725.

MUNDELL, R. [1961], "A theory of Optimum Currency Areas", *American Economic Review*, September, pp. 657 – 665.

NELSON, C.R., PLOSSER C.I. [1982], « Trends and random walks in macroeconomic time S. *Journal of Monetary Economics*, Vol. 10, pp. 139-162.

RUDENBUSH, G. [1993], "The uncertain unit root in real GNP", *Journal of Econometrics*, Vol. 83 (1), pp. 264 – 272.

SOSVILLA-RIVERO S, GIL-PAREJA [2002], "Price convergence in the European Union". Documento de Trabajo sur http://www.fedea.es/hojas/publicaciones.html.

ANNEXES

Annexe A.1

Les co-mouvements obtenus par ABT [2002] entre 1960-1997.

Table A.1
Co-mouvements des prix pour quelques membres UE à 15

High Co-movement Countries	Conditional variance
Austria	0.0196
Netherlands	0.0217
Denmark	0.0219
Belgium	0.0242
Germany	0.0328
France	0.0338
Finland	0.0552
Spain	0.0491
United Kingtom	0.0616

Table A.2
Co-mouvements de production pour quelques membres UE à 15

High Co-movement Countries	Conditional variance
Netherlands	0.0116
Denmark	0.0177
Belgium	0.0108
Germany	0.0154
France	0.0094
Spain	0.0165
United Kingtom	0.0170

Annexe A.2

L'algorithme des co-movements avec la variance non-conditionnelle

$$VP^*_{ij} = \frac{VP\,(1 - \Phi_2)}{(1 + \Phi_2)\,(1 - \Phi_2 - \Phi_1)\,(1 - \Phi_2 + \Phi_1)} \qquad (1)$$

où $VP = var(\varepsilon tij)$, $VP^*_{ij} = var(x_t)$ et $x_t = \ln P_{it}/P_{jt}$.

En effet, soit l'équation de départ :

$$X_t - \phi_1 X_{t-1} - \phi_2 X_{t-2} = \varepsilon_t \quad ==> \quad X_t = \phi_1 X_{t-1} + \phi_2 X_{t-2} + \varepsilon_t \ \ |. X_{t-\tau}$$

$$==> X_t X_{t-\tau} = \phi_1 X_{t-1} X_{t-\tau} + \phi_2 X_t\text{-}2 X_{t-\tau} + \varepsilon_t X_{t-\tau}$$

$$(2) \ ==> \ \gamma_\tau = E(X_t X_{t-\tau}) = E(\phi_1 X_{t-1} X_{t-\tau}) + E(\phi_2 X_{t-2} X_{t-\tau}) + E(\varepsilon_t X_{t-\tau}).$$

$$(3) ==> \ \gamma_\tau = E(X_t X_{t-\tau}) = \phi_1 E(X_{t-1} X_{t-\tau}) + \phi_2 E(X_{t-2} X_{t-\tau}) + E(\varepsilon_t X_{t-\tau}).$$

Pour **τ=0**, la relation (3) peut s'écrire : $\gamma_0 = \phi_1 E(X_{t-1} X_t) + \phi_2 E(X_{t-2} X_t) + E(\varepsilon_t X_t)$.

$$(4)==> \ \gamma_0 = \phi_1 \gamma_1 + \phi_2 \gamma_2 + \sigma^2\varepsilon \ ==> \ \boxed{\sigma^2_x = \phi_1 \gamma_1 + \phi_2 \gamma_2 + \sigma^2_\varepsilon}$$

Pour **τ=1**, la relation (3) peut s'écrire : $\gamma_1 = E(X_t X_{t-1}) = \phi_1 E(X_{t-1} X_{t-1}) + \phi_2 E(X_{t-2} X_{t-1}) + E(\varepsilon_t X_{t1})$

Mais, $E(\varepsilon_t X_{t-1}) = 0$. La relation ci-dessus peut s'écrire de nouveau de la sorte :

$$(5) \ ==> \ \boxed{\gamma_1 = \phi_1 \sigma^2_x + \phi_2 \gamma_1} \qquad ==> \gamma_1 - \phi_2 \gamma_1 = \phi_1 \sigma^2_x$$

$$==> \gamma_1 (1 - \phi_2) = \phi_1 \sigma^2_x$$

$$(6) \ ==> \ \boxed{\gamma_1 = (\phi_1 \sigma^2_x) / (1- \phi^2)} \qquad \text{avec } 1 - \phi_2 \neq 0 ==> \phi_2 \neq 1.$$

Pour **τ = 2**, la relation (3) peut s'écrire de la manière suivante :

$$==> \ \gamma_2 = E(X_t X_{t-2}) = \phi_1 E(X_{t-1} X_{t-2}) + \phi_2 E(X_{t-2} X_{t-2}) + E(\varepsilon_t X_{t-2}),$$

$$\text{avec } E(\varepsilon_t X_{t-2}) = 0,$$

$$(7) \ ==> \ \boxed{\gamma_2 = \phi_1 \gamma_1 + \phi_2 \sigma^2_x}$$

Si nous remplaçons dans la relation (4) la valeur de γ_2 obtenue dans la relation (7), on obtient que :

$$\sigma^2_x = \phi_1 \gamma_1 + \phi_2 \gamma_2 + \sigma^2_\varepsilon \ ==> \ \sigma^2_x = \phi_1 \gamma_1 + \phi_2 (\phi_1 \gamma_1 + \phi_2 \sigma^2_x) + \sigma^2_\varepsilon \ ==>$$

$$==> \ \sigma^2_x = \phi_1 \gamma_1 + \phi_2 \phi_1 \gamma_1 + \phi^2_2 \sigma^2_x + \sigma^2_\varepsilon$$

$$==> \ \sigma^2_x - \phi^2_2 \sigma^2_x = \phi_1 \gamma_1 + \phi_2 \phi_1 \gamma_1 + \sigma^2_\varepsilon \ ==>$$

$$==> \sigma^2_x(1- \phi^2_2) = \phi_1 \gamma_1 + \phi_2 \phi_1 \gamma_1 + \sigma^2_\varepsilon \ ==> \ \sigma^2_x(1- \phi^2_2) = \gamma_1(\phi_1 + \phi_2 \phi_1) + \sigma^2_\varepsilon$$

$$==> \sigma^2_x (1- \phi^2_2) = [\phi_1 \sigma^2_x/(1- \phi_2)] (\phi_1 + \phi_2 \phi_1) + \sigma^2_\varepsilon$$

$$==> \sigma^2_x (1- \phi^2_2) - [\sigma^2_x \phi^2_1 (1 + \phi_2)]/(1- \phi_2) = \sigma^2_\varepsilon$$

$$==> \sigma^2_x(1- \phi^2_2) - [\phi^2_1 (1 + \phi_2)/(1- \phi_2)]\} = \sigma^2_\varepsilon, \text{ avec } 1- \phi_2 \neq 0 ==> \phi_2 \neq 1.$$

Finalement, on obtient que :

$$==> \quad \sigma^2_x = \frac{\sigma^2_\varepsilon (1- \phi_2)}{(1 + \Phi_1) (1 - \Phi_2 - \Phi_1) (1 - \Phi_2 + \Phi_1)} \qquad (8)$$

Dans notre cas, la relation (8) peut s'écrire de la façon suivante :

$$VP^*_{ij} = \frac{VP (1 - \Phi_2)}{(1 + \Phi_2) (1 - \Phi_2 - \Phi_1) (1 - \Phi_2 + \Phi_1)} \qquad (1)$$

où $VP = var(\varepsilon_{tij})$, $VP^*_{ij} = var(x_t)$ et $x_t = \ln P_{it}/P_{jt}$.

Annexe A.3

Corrélations des cycles des prix et production sur toute la période d'étude et sur les sous-périodes

Tableau A. 3
Corrélation des cycles de la production industrielle sur la période 1994:01-2004:04

	BEL	CZE	EST	FRA	HUN	POL	SLK	SLV	ZE
BEL	1,00	0,10	0,24	0,02	0,29	-0,09	0,22	0,20	0,28
CZE		1,00	0,48	0,07	0,32	0,52	0,46	0,14	0,24
EST			1,00	0,09	0,19	0,24	0,48	0,16	0,23
FRA				1,00	0,14	0,11	0,13	0,06	0,07
HUN					1,00	0,29	0,34	0,42	0,37
POL						1,00	0,01	0,10	0,28
SLK							1,00	0,21	0,24
SLV								1,00	0,41
ZE									1,00

Note : Calculs de l'auteur

Tableau A. 4
Corrélation des cycles de la production industrielle sur la période 1999:01-2004:04

	BEL	CZE	EST	FRA	HUN	POL	SLK	SLV	ZE
BEL	1,00	0,32	0,25	0,05	0,37	0,34	0,32	0,27	0,53
CZE		1,00	0,37	-0,02	0,40	0,44	0,42	0,21	0,24
EST			1,00	0,08	0,22	0,02	0,57	0,17	0,20
FRA				1,00	0,15	0,19	0,09	0,09	0,00
HUN					1,00	0,63	0,33	0,43	0,64
POL						1,00	0,13	0,26	0,42
SLK							1,00	0,17	0,39
SLV								1,00	0,51
ZE									1,00

Note : Calculs de l'auteur

Tableau A.5
Corrélation des cycles de la production industrielle sur la période 1999:01-2004:04

	BEL	CZE	EST	FRA	HUN	POL	SLK	SLV	ZE
BEL	1,00	-0,10	0,23	-0,02	0,17	-0,41	0,11	0,12	0,10
CZE		1,00	0,55	0,15	0,28	0,58	0,47	0,08	0,25
EST			1,00	0,11	0,19	0,40	0,39	0,16	0,26
FRA				1,00	0,12	0,05	0,17	0,02	0,13
HUN					1,00	-0,07	0,44	0,42	0,10
POL						1,00	-0,06	-0,04	0,21
SLK							1,00	0,27	0,15
SLV								1,00	0,35
ZE									1,00

Note : Calculs de l'auteur

Tableau A.6
Corrélation des cycles des prix sur la période 1994:01-2004:04

	BEL	CZE	EST	FRA	HUN	LET	LIT	POL	SLK	SLV	ZE
BEL	1,00	0,21	0,37	0,64	0,45	0,26	0,41	0,61	0,18	0,39	0,69
CZE		1,00	0,46	0,07	0,59	0,35	0,21	0,37	-0,24	0,30	0,17
EST			1,00	0,42	0,45	-0,15	0,80	0,29	-0,32	,66	0,66
FRA				1,00	0,27	0,20	0,49	0,39	0,12	0,40	0,68
HUN					1,00	0,37	0,26	0,71	0,17	0,30	0,45
LET						1,00	-0,11	0,28	0,16	-0,07	0,10
LIT							1,00	0,23	-0,10	0,45	0,60
POL								1,00	0,40	0,45	0,53
SLK									1,00	-0,12	0,04
SLV										1,00	0,64
ZE											1,00

Note : Calculs de l'auteur

Tableau A.7
Corrélation des cycles des prix sur la période 1999:01-2004:04

	BEL	CZE	EST	FRA	HUN	LET	LIT	POL	SLK	SLV	ZE
BEL	1,00	0,58	0,48	0,73	0,50	0,32	0,55	0,65	0,18	0,42	0,67
CZE		1,00	0,67	0,23	0,75	0,43	0,69	0,50	-0,08	0,25	0,50
EST			1,00	0,26	0,46	-0,14	0,66	0,31	-0,44	0,70	0,73
FRA				1,00	0,16	0,24	0,29	0,35	0,13	0,29	0,62
HUN					1,00	0,37	0,35	0,70	0,23	0,19	0,47
LET						1,00	0,33	0,26	0,49	-0,27	0,10
LIT							1,00	0,32	-0,20	0,52	0,57
POL								1,00	0,45	0,41	0,55
SLK									1,00	-0,13	0,01
SLV										1,00	0,70
ZE											1,00

Note : Calculs de l'auteur

Tableau A.8

Corrélation des cycles des prix sur la période 1994:01-1998:12

	BEL	CZE	EST	FRA	HUN	LET	LIT	POL	SLK	SLV	ZE
BEL	1,00	-0,28	-0,02	0,31	0,15	0,12	0,19	0,43	0,50	0,16	0,69
CZE		1,00	0,23	-0,29	0,51	0,26	-0,21	0,26	-0,57	0,40	-0,45
EST			1,00	0,35	0,34	-0,51	0,80	0,14	0,33	0,67	0,29
FRA				1,00	0,30	0,00	0,49	0,43	0,61	0,62	0,67
HUN					1,00	0,38	-0,08	0,73	0,19	0,70	0,16
LET						1,00	-0,71	0,37	-0,30	0,12	-0,10
LIT							1,00	-0,01	0,53	0,40	0,51
POL								1,00	0,44	0,56	0,41
SLK									1,00	0,25	0,74
SLV										1,00	0,27
ZE											1,00

Note : Calculs de l'auteur

MÉCANISMES DE TRANSMISSION DE LA POLITIQUE MONÉTAIRE DANS LES PECO : APPROCHE EN TERMES DE VAR STRUCTURELS

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ABSTRACT:

Ce papier s'intéresse aux canaux de transmission des politiques monétaires de six PECO - Hongrie, Pologne, République Tchèque, Roumanie, Slovaquie et Slovénie - sur des périodes récentes correspondant à des régimes monétaires stables. En faisant la distinction entre le taux d'intérêt, le taux de change et le crédit, on utilise une modélisation de type VAR pour rendre compte de l'importance relative de ces trois canaux de transmission. Au delà d'une caractéristique commune concernant la faiblesse indéniable du canal du crédit, les résultats mettent en évidence une hétérogénéité accentuée entre ces pays en termes de l'efficacité relative des canaux de taux d'intérêt et de taux de change. Ainsi, la Hongrie et la Pologne se démarquent par la présence d'un effet de « price puzzle » qui est associée à une très forte dépendance du taux de change, entendu simultanément comme mécanisme de transmission de la politique monétaire et comme amortisseur des chocs de demande et d'offre. En revanche, à l'instar des pays de la zone euro, la Slovaquie, la Slovénie, la République Tchèque et partiellement la Roumanie, se caractérisent par la prépondérance du canal de taux d'intérêt ; ces pays semblent alors les plus prêts pour une adhésion rapide à la zone euro, fait confirmé d'ailleurs par l'expérience slovène.

JEL classification : C32, E52, E58, P24

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INTRODUCTION

Les PECO font partie depuis quelques années déjà de l'UE et, à l'instar de la Slovénie, ils ont vocation à rejoindre la zone euro. Se pose alors la question de la cohésion de l'UEM élargie car les effets asymétriques de la politique monétaire unique risquent d'être considérablement renforcés. Par conséquent, une identification exacte des canaux de transmission de la politique monétaire des PECO représente un préalable nécessaire pour évaluer l'opportunité d'un changement institutionnel d'une telle ampleur.

La littérature empirique portant sur cette problématique est peu abondante et se doit d'être renouvelée en permanence, compte tenu de la dynamique structurelle très forte accompagnant le processus de rattrapage propre à ces pays.

Dans ce contexte, l'objectif de ce papier est d'analyser les mécanismes de transmission de la politique monétaire des PECO pour les périodes les plus récentes possibles correspondant à des régimes monétaires stables. La stabilité des régimes de change reflète le succès d'une longue période de transition et traduit ainsi une certaine maturité structurelle d'ordre politico-économique, indispensable pour renforcer la fiabilité des conclusions de notre analyse.

En poursuivant la logique souvent développée dans la littérature, notre analyse portera sur trois canaux de transmission de la politique monétaire, à savoir le taux d'intérêt, le taux de change et le crédit. Ainsi, d'un point de vue théorique, une hausse du taux d'intérêt nominal traduit, si les prix sont rigides, une hausse du taux d'intérêt réel qui engendre une diminution de la demande globale et du niveau des prix. Dans un régime de change flexible, ces effets du canal du taux d'intérêt se trouvent amplifiés par le canal du taux de change car l'augmentation du taux d'intérêt provoque une appréciation réelle du change nuisible à la compétitivité extérieure.

Finalement, le canal du crédit transmet l'impulsion monétaire initiale vers la sphère réelle par le biais d'une réduction de l'offre de crédit des banques et par la dégradation de la situation financière des emprunteurs.

Au niveau méthodologique, la distinction entre les trois canaux de transmission se réalisera par l'intermédiaire d'une modélisation VAR en utilisant une technique de décomposition structurelle (SVAR). Cette grille de lecture nous permettra de mener une analyse comparative de l'efficacité relative de ces canaux de transmission au sein des PECO. Formellement, afin de faciliter cette analyse, on a choisi de s'intéresser uniquement aux PECO dont les régimes monétaires autorisent une relative flexibilité des monnaies nationales et pour lesquels l'existence du canal de taux de change est donc effective. Il s'agit, par conséquent, de la Hongrie, de la Pologne, de la République Tchèque, de la Roumanie, de la Slovaquie, de la Slovénie. On écarte de l'analyse les pays baltes (Estonie, Lettonie et Lituanie) et la Bulgarie, caractérisés par des régimes de change fixes ou de type caisse d'émission pour lesquels l'examen du taux de change comme canal de transmission de la politique monétaire serait caduc.

En anticipant les résultats, on remarquera notamment que la faible sensibilité des variables réelles aux chocs de crédit, identifiable pour l'ensemble des pays, s'associe à une forte hétérogénéité concernant l'efficacité relative des canaux de taux d'intérêt et de taux de change. Ainsi, en subissant une forte dépendance du taux de change, entendu simultanément comme mécanisme de transmission de la politique monétaire et comme amortisseur des chocs de demande et d'offre, la Hongrie et la Pologne semblent être les candidats les moins préparés pour une adhésion rapide à l'UEM.

Sur le plan structurel, la première section fixe, par le biais d'une brève revue de la littérature, les principales tendances qui se dégagent des études utilisant les modèles VAR pour analyser les mécanismes de transmission des politiques monétaires dans les PECO. La deuxième section expose le cadre méthodologique choisi en se focalisant sur l'analyse de la technique d'identification des chocs et sur la présentation des données utilisées tandis que la troisième section présente les résultats des estimations en insistant sur les éventuelles spécificités nationales en termes de réponses des variables macroéconomiques aux différents types d'impulsions monétaires.

1. REVUE DE LA LITTÉRATURE

Proposée par Sims [1986] comme une alternative aux modèles macroéconomiques structurels dont les performances empiriques s'avéraient insatisfaisantes, la modélisation VAR s'impose grâce à sa souplesse et à sa pertinence, comme un instrument incontournable d'analyse des mécanismes de transmission de la politique monétaire. En effet, cette modélisation permet d'identifier efficacement les chocs structurels en s'appuyant sur un nombre réduit de contraintes théoriques en renforçant ainsi son utilisation aisée(1).

Confortée par ses avantages indéniables, la méthodologie VAR a ouvert la voie à une littérature abondante portant sur les mécanismes de transmission de la politique monétaire et dont le développement peut être synthétisé à travers trois vagues successives. Initialement, cette modélisation a été appliquée dans le cas des États Unis afin d'analyser l'efficacité relative des différents canaux de transmission de la politique monétaire(2). Ensuite, la création de la zone euro a fait émerger une littérature vaste s'employant à mener des analyses comparatives des mécanismes de transmission monétaire au sein des pays membres(3). Finalement, il existe une littérature relativement importante qui étudie les effets des politiques monétaires dans les pays en transition, et dont une partie appréciable s'intéresse aux canaux de transmission de la politique monétaire des PECO.

Les études sur les PECO peuvent être structurées autour de deux tendances principales. La première, qui est d'ailleurs la plus importante, concerne les études portant sur un pays en particulier(4). Comme le souligne Ganev et

(1) La principale critique des modèles VAR réside dans la fragilité de ses fondements théoriques. Pourtant, comme le soulignent Amato et Gerlach [2001], même les modèles structurels de taille réduite s'appuient sur des hypothèses d'identification plus restrictives que celles concernant les VAR et qui, en outre, conditionnent d'une manière déterminante les résultats obtenus

(2) Pour une revue de la littérature voir Leeper [1991] et Christiano et alii. [1999].

(3) Pour une revue de la littérature voir Angeloni et al. [2003].

(4) Voir, entre autres : Christoffersen et al. [2001], Gottschalk et Moore [2001], Klos et Wrobel [2001], Kujis [2002], Pelinescu et Scutaru [2000], Botel [2002], Maliszewski [1999], Arnostova et Hurnik [2004], Vonnak [2005].

alii. [2002], l'analyse exclusive des mécanismes nationaux de transmission de la politique monétaire répond aux besoins spécifiques des Banques centrales nationales préoccupées de mieux fonder leurs décisions de politique économique. La deuxième tendance regroupe les études réalisant des analyses comparatives des mécanismes de transmission des politiques monétaires dans les PECO (Ganev et alii. [2002], Anzuini et Levy [2004], Creel et Levasseur [2006], Elbourne et de Haan [2006], Héricourt et Matei [2007]). Le nombre relativement limité de ces approches comparatives s'explique notamment par les contraintes au niveau de la fiabilité des données statistiques imposées par le caractère particulièrement instable de l'environnement macroéconomique de ces pays dans la première partie des années 1990.

D'une manière générale, la principale conclusion de ces études concerne la forte dépendance des résultats obtenus du cadre de modélisation adopté et plus précisément, du choix des périodes d'estimation d'un côté et des techniques d'identification des chocs monétaires, de l'autre. Ainsi, Creel et Levasseur [2006] appliquent pour la période 1995-2004 une méthode récursive d'identification des chocs et révèlent pour la Hongrie, la Pologne et la République Tchèque qu'un impact très faible d'un choc monétaire sur la production industrielle s'accompagne des réponses contraires aux attentes théoriques sur les prix et les taux de change (il s'agit des phénomènes couramment appelées dans la littérature « price puzzle » et « exchange rate puzzle » traduisant respectivement la hausse des prix et la dépréciation du taux de change consécutives à un choc restrictif de taux d'intérêt). Leur analyse suggère ainsi le manque chronique d'efficacité des canaux de taux d'intérêt et de taux de change comme mécanismes de transmission de la politique monétaire notamment dans le cas de la Hongrie et de la République Tchèque.

En préservant le même cadre méthodologique, Héricourt et Matei [2007] élargissent l'analyse à l'ensemble des PECO qui ont rejoint l'Union Européenne en 2004 et divisent la période étudiée en sous-périodes correspondant à des régimes monétaires stables. Les résultats en sont sensiblement affectés, car, contrairement aux résultats sur la période

d'ensemble, la stabilité des régimes monétaires suppose l'absence, à l'exception notable de la Hongrie, des énigmes des prix et des taux de change, tandis qu'un choc positif de taux d'intérêt engendre des baisses significatives de la production industrielle pour tous les pays analysés. Le taux d'intérêt acquiert ainsi un rôle substantiel dans la transmission des impulsions monétaires, en rapprochant ainsi les mécanismes de transmission de la politique monétaire des PECO de ceux des pays de la zone euro.

Dans le même contexte de stabilité des régimes monétaires, Elbourne et de Haan [2006] utilisent une technique alternative d'identification des chocs (VAR structurel) supposant l'application des restrictions de court terme entre les variables monétaires. Par rapport à l'étude de Héricourt et Matei [2007], les principales différences en matière de résultats concernent l'ampleur des réponses des variables modélisées aux différents types de chocs monétaires. Plus précisément, ces réponses se différencient au niveau du degré de significativité, de la persistance, de même qu'au niveau du moment d'émergence de leur intensité maximale.

Dans la perspective de cette littérature hétéroclite, ce papier se propose de contribuer aux débats récents sur l'efficacité relative des canaux de transmission de la politique monétaire des PECO en menant une analyse sur les périodes les plus récentes correspondant à des régimes monétaires stables. On tentera ainsi d'identifier les canaux prédominants de transmission dans chaque pays en dressant un bilan des hétérogénéités en termes de réponses des variables modélisées aux chocs monétaires.

2. CADRE MÉTHODOLOGIQUE

L'analyse empirique des canaux de transmission des politiques monétaires des PECO se fera par l'intermédiaire d'une modélisation de type VAR qui constitue la technique le plus fréquemment utilisée dans la littérature s'intéressant aux mécanismes de transmission des impulsions monétaires.

Le modèle VAR s'écrit de la manière suivante :

(1) $Y_t = A(L)Y_{t-1} + B(L)X_t + \varepsilon_t$

où Y_t représente le vecteur des variables endogènes, X_t celui des variables exogènes et ε_t le vecteur des erreurs qui sont normalement distribuées.

Le vecteur des variables endogènes (Y_t) est constitué, pour chaque PECO, des indices de production industrielle (y_t) et de prix à la consommation (p_t), du taux d'intérêt nominal du marché monétaire (i_t), du taux de change nominal (e_t)(5) et du crédit domestique (cd_t) :

(2) $Y_t = [y_t\, p_t\, i_t\, e_t\, cd_t]$

Le vecteur des variables exogènes (X_t) est composé des indices de production industrielle (y_t^{UE}) et des prix à la consommation (p_t^{UE}) pour l'Union Européenne à 25 et du taux d'intérêt nominal du marché monétaire pour la zone euro (i_t^{euro}).

En ce qui concerne la méthode d'identification des chocs structurels, deux possibilités sont à explorer : une technique de décomposition à la Cholesky, d'un côté et une procédure structurelle, mieux définie sur le plan théorique, de l'autre. Il n'existe pas d'unanimité au niveau académique sur l'opportunité de l'une ou l'autre des deux méthodes. L'avantage relatif de la technique structurelle, reconnu pour analyser les petits pays ouverts (Kim et Roubini [2000], Elbourne et de Haan [2006]) risque de se dissiper dans le cas des PECO à cause de leur instabilité macroéconomique (Ganev et alii. [2002], Héricourt et Matei [2007]). Pourtant, cet inconvénient peut être largement contourné si l'on choisit d'analyser des périodes très récentes, exemptées des bouleversements structurelles du début ou milieu des années 1990, et correspondant à des régimes monétaires stables. Ainsi, on a choisi d'appliquer une technique structurelle qui nous permet d'avoir davantage de souplesse dans la manière de définir les interactions de court terme entre les variables endogènes(6).

(5) Il s'agit des taux de change côtés à l'incertain par rapport à l'euro.

(6)Dans la méthode de décomposition récursive à la Choleski, les mécanismes d'identification des chocs sont conditionnés par l'ordre des variables endogènes dont les réponses instantanées aux différents chocs structurels sont par conséquent sévèrement contraintes.

Le principe de la méthode structurelle (SVAR)[7] consiste dans la mise en place d'un nombre suffisant de restrictions permettant d'orthogonaliser les résidus de l'équation (1) et de déterminer ainsi leurs composantes structurelles. Ainsi, à la manière de Amisano et Giannini [1997], les résidus du modèle VAR (ε_t) peuvent être mis en relation avec les chocs structurels non observés (μ_t) de la façon suivante :

(3) $A\varepsilon_t = B\mu_t$

Dans la définition des restrictions de court terme entre les variables endogènes, on suit le cadre développé par Sims et Zha [1998], Kim et Roubini [2000], Peersman et Smets [2003] qui suppose l'existence d'interactions simultanées entre les variables monétaires. Afin d'identifier les chocs structurels, on pose les restrictions suivantes sur les matrices et :

(4) $$A = \begin{vmatrix} 1 & 0 & 0 & 0 & 0 \\ a_{21} & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & a_{34} & a_{35} \\ a_{41} & a_{42} & a_{43} & 1 & 0 \\ a_{51} & a_{52} & a_{53} & a_{54} & 1 \end{vmatrix}$$

(5) $$B = \begin{vmatrix} b_{11} & 0 & 0 & 0 & 0 \\ 0 & b_{22} & 0 & 0 & 0 \\ 0 & 0 & b_{33} & 0 & 0 \\ 0 & 0 & 0 & b_{44} & 0 \\ 0 & 0 & 0 & 0 & b_{55} \end{vmatrix}$$

En faisant la distinction entre les variables réelles (production et prix) et monétaires (taux d'intérêt, taux de change et crédit domestique), les deux premières lignes des matrices *A* et *B*[8] traduisent l'existence d'un ajustement lent des variables réelles aux chocs monétaires (la sphère

(7) Cette méthode a été suggérée par Bernanke [1986] et appliquée entre autres par Sims et Zha [1998], Kim et Roubini [2000], Peersman et Smets [2003].

(8) Les lignes des matrices A et B traduisent les réactions des variables endogènes dont l'ordre est décrit par l'équation (2).

réelle n'est influencée qu'avec retard par les chocs sur les variables monétaires).

En ce qui concerne la troisième ligne traduisant la réaction de court terme du taux d'intérêt, elle tient compte de plusieurs hypothèses théoriques. On considère d'abord l'absence de réaction immédiate du taux d'intérêt aux chocs de production et de prix. On s'appuie ainsi sur l'hypothèse émise par Sims et Zha [1998] et Kim et Roubini [2000] postulant que l'information sur les chocs réels n'est disponible qu'avec un certain retard et donc qu'elle ne peut pas être immédiatement exploitée par les autorités monétaires pour orienter leurs décisions de politique économique. Ensuite, compte tenu du fait que l'analyse s'applique à des petits pays ouverts, on retient l'idée développée par Kim et Roubini [2000] selon laquelle le taux d'intérêt réagit immédiatement à un choc de taux de change. Finalement, on considère l'existence d'une réponse simultanée du taux d'intérêt à un choc de crédit domestique.

Pour ce qui est des deux dernières lignes, la structure des matrices et suppose que le taux de change et le crédit domestique réagissent simultanément aux chocs réels et aux chocs de taux d'intérêt.

L'estimation a été réalisée à partir de données mensuelles sur des périodes correspondant à des régimes monétaires stables car tout changement de régime monétaire risque d'affecter considérablement les canaux de transmission de la politique monétaire et de biaiser par conséquent les résultats. Ainsi, les périodes d'analyse pour chaque pays en fonction des différents régimes monétaires sont présentées dans le tableau 1.

Tableau 1
Régimes monétaires et périodes d'estimation par pays

Pays	Période d'analyse	Régime de change
Hongrie	2000:02-2007:12	Flottement contrôlé
Pologne	2001:01-2007:12	Flottement libre Ciblage d'inflation
Roumanie	2000:01-2007:12	Flottement contrôlé
Slovaquie	1999:01-2007:12	Flottement contrôlé
Slovénie	1998:01-2006:12	Flottement contrôlé
République Tchèque	1998:01-2007:12	Flottement contrôlé Ciblage d'inflation

Les données[9] ont été désaisonnalisées et exprimées en logarithme (sauf le taux d'intérêt). L'ordre d'intégration des séries a été étudié par l'intermédiaire du test ADF ce qui nous a permis de constater que la majorité des variables sont intégrées d'ordre 1. Les tests de cointégration de Johansen indiquent l'existence de plusieurs relations de cointégration entre les variables de chaque pays. Par conséquent, à l'instar de Sims et alii. [1990] ou Coudert et Mojon [1997], on a choisi de mener nos estimations sur les variables en niveau.

Afin d'établir le nombre optimal de retards on a eu recours principalement aux critères d'information d'Akaike et de Schwartz. En cas d'indications divergentes, ces critères ont été épaulés par le test de ratio de vraisemblance. Ces tests nous permettent de retenir un nombre de retards égal à 2.

3. RÉSULTATS DES ESTIMATIONS ET COMMENTAIRES

On examinera pour chaque pays les effets induits sur les variables macroéconomiques par un choc de taux d'intérêt, de taux change et de crédit domestique. L'ampleur des chocs est d'un écart type et les fonctions de réponse, encadrées par un intervalle de confiance de plus ou moins deux erreurs standard, sont représentées dans la figure 1 de l'Annexe. En même temps, à la manière de Héricourt et Matei [2007], les principaux résultats sont synthétisés dans les tableaux 2a et 2b qui présentent respectivement les réactions maximales des variables endogènes et les impacts cumulés qui sont significatifs statistiquement à 5% ou à 10%.

Un choc restrictif sur le taux d'intérêt[10] (première colonne des graphiques représentés dans la figure 1) provoque un impact non significatif sur la production industrielle pour l'ensemble des pays analysés, à l'exception de la Slovaquie. En présentant une ampleur maximale commune au bout de deux mois, cet impact est hétérogène de par sa nature car on

(9) Les données sont issues du FMI (International Financial Statistics), d'Eurostat ou des Banques centrales nationales.

(10) La baisse de la production est persistante uniquement en Slovaquie et cela pendant onze mois.

distingue d'un côté la Pologne, la Roumanie, la République Tchèque et la Slovaquie qui subissent l'effet attendu d'une diminution de leur production industrielle suite à une hausse du taux d'intérêt et de l'autre, la Hongrie et la Slovénie dont les niveaux de production industrielle réagissent positivement à un choc restrictif sur le taux d'intérêt. Ce dernier effet, communément appelé « output puzzle » connaît une persistance particulièrement forte dans le cas de la Slovénie. L'explication de cet effet contre intuitif peut être suggérée par le modèle de Lucas [1973] selon lequel, dans un milieu relativement inflationniste(11), une hausse du taux d'intérêt représenterait un signe d'une stabilité future des prix, ce qui encourage les investissements et fait décoller la production industrielle. Dans le cas de la Slovénie, ce mécanisme aurait pu se trouver renforcé par la perspective concrète de l'adoption de l'euro qui pourrait être également responsable de la persistance de cet effet.

Dans le cas des prix, on retrouve une hétérogénéité marquée entre les pays. Ainsi, la Hongrie et la Pologne connaissent une hausse des prix (dont l'effet est statistiquement significatif uniquement pour la première) consécutive à une augmentation du taux d'intérêt. Cet effet, contraire aux attentes théoriques, est fréquemment identifié dans les études empiriques de type VAR et porte le nom de « price puzzle ». Les hausses des prix sont immédiates et atteignent leurs niveaux maximaux au bout de respectivement cinq et deux mois sans pour autant que leur persistance soit significative. Plusieurs raisons ont été invoquées dans la littérature pour justifier cet « énigme des prix »(12) allant de considérations purement méthodologiques à des explications plus structurelles. Au niveau des premières, on souligne la construction inopportune du vecteur autorégressif qui se manifeste soit par l'absence des variables prédictives de l'inflation future, comme par exemple le prix des matières premières (Sims [1992]), soit par la non prise en compte de l'output gap comme mesure de l'activité

(11) Pour la période analysée, l'inflation moyenne en Hongrie et en Slovénie était respectivement de 6,4% et de 5,9%.

(12) Voir Coricelli et alii. [2006] pour une revue de la littérature sur les diverses explications du « price puzzle ».

économique (Giordani [2004]). Pour la deuxième catégorie d'explications, le phénomène de « price puzzle » est la conséquence transitoire des régimes monétaires spécifiques (Castelnuovo et Surico [2006]) ; il peut traduire également la préoccupation des entreprises de préserver leurs marges qui sont menacées par l'alourdissement des charges financières suite à la hausse des taux d'intérêt (Barth et Ramey [2001]).

Pour les autres pays, à savoir la Roumanie, la Slovaquie, la Slovénie et la République Tchèque, la hausse du taux d'intérêt engendre une baisse attendue des prix dont l'effet est immédiat mais d'une ampleur et persistances différentes. Ainsi, la Roumanie et la République Tchèque se distinguent par des réponses non significatives et non persistantes dont l'ampleur maximale est relativement rapide, de l'ordre de respectivement trois et huit mois. En revanche, la Slovaquie et la Slovénie présentent des réponses significatives, fortement persistantes – respectivement neuf et douze trimestres – et dont l'intensité connaît une montée en puissance plus longue (de dix et trente six mois respectivement). En poursuivant l'analyse de l'impact d'une hausse du taux d'intérêt sur les variables macroéconomiques, on remarque l'effet logique d'une appréciation du taux de change dans tous les pays à l'exception de la Pologne pour laquelle l'appréciation est précédée d'une légère dépréciation initiale non significative qui se poursuit durant deux mois. Pour ce pays, la dépréciation du taux de change induit une hausse initiale des prix et donc le paradoxe « price puzzle » pourrait être expliqué par une « énigme du taux de change » (« exchange rate puzzle »).

Parmi les pays dont le change s'apprécie suite à un choc positif de taux d'intérêt, on distingue à nouveau le cas particulier de la Slovénie qui se caractérise par une réponse significative qui persiste pendant trois ans environ et dont l'intensité augmente progressivement en puissance jusqu'au trente six mois. Les autres pays se caractérisent par des réponses non significatives et non persistantes statistiquement dont l'impact maximal se produit après un trimestre en Hongrie et en Roumanie ou plus tardivement, après environ trois trimestres, en Slovaquie et en République Tchèque.

Les réponses du crédit domestique à une hausse du taux d'intérêt sont également fortement hétérogènes parmi les pays. Ainsi, l'effet négatif qui peut être significatif et persistant (Pologne) ou non significatif (Hongrie, Roumanie et Slovénie) est associé à des réponses positives qui se déclinent de la même façon : significatives et persistantes (Slovaquie) et non-significatives (République Tchèque). La seule caractéristique commune de ces réponses est liée au fait que leur ampleur commence à décroître très rapidement (généralement dès le premier mois ou au plus tard après un trimestre). D'une manière générale, la présence d'un impact limité, voire positif d'un choc de taux d'intérêt sur le crédit, peut s'expliquer par le fait que les entreprises sont amenées à emprunter davantage pour faire face aux baisses de cash flow lors des périodes de faible croissance (Christiano et alii. [1999]). Dans le cas particulier des PECO, Creel et Levasseur [2006] expliquent cette déconnexion entre le taux d'intérêt et le crédit par l'association d'un faible niveau d'endettement des ménages ayant une forte volonté à consommer, d'un côté, et par la présence d'un excès de liquidité au niveau du système bancaire, de l'autre.

Le deuxième canal de transmission de la politique monétaire est représenté par le taux de change (deuxième colonne dans la figure 1). D'une manière générale, les réponses nationales engendrées par une dépréciation du taux de change sont plus homogènes que ceux identifiés pour un choc restrictif sur le taux d'intérêt et respectent plus fidèlement les attentes théoriques.

On remarque d'abord la hausse immédiate et non significative statistiquement de la production industrielle suite à une dépréciation du taux de change, et ce pour l'ensemble des pays analysés. Les seules divergences concernent la persistance de ces réponses, particulièrement forte en Roumanie et notamment en République Tchèque. Cette structure des réponses est également identifiable dans le cas des prix qui réagissent par une hausse initiale et non significative suite à un choc positif de taux de change. L'exception concerne la Slovaquie où on constate une légère baisse des prix durant les cinq premiers mois[13]. De la même façon que

(13) Cette baisse des prix pourrait s'expliquer par le relèvement du taux d'intérêt provoqué par la dépréciation du taux de change car pour la Slovaquie on a identifié une très forte sensibilité des prix à un choc du taux d'intérêt.

dans le cas de la production industrielle, les réponses les plus persistantes sont signalées en Roumanie et en République Tchèque auxquelles s'ajoute la Hongrie. En même temps, la dépréciation du change provoque un relèvement significatif des taux d'intérêt dont les effets persistent pendant environ une année en Hongrie, Roumanie et Slovaquie ou beaucoup plus longtemps en Slovénie et en République Tchèque (trois ans). Cette tendance commune consistant dans un resserrement monétaire initial comme réponse à un choc de taux de change n'est pas observable en Pologne où la hausse du taux d'intérêt est précédée par une baisse non significative qui s'étend sur sept mois.

L'hétérogénéité la plus marquée des réponses nationales à une dépréciation du taux de change est identifiable au niveau de l'évolution du crédit domestique. Ainsi, les hausses initiales du crédit qui peuvent être significatives statistiquement (Hongrie et Roumanie) ou d'ampleur très modérée (Pologne, République Tchèque) côtoient des contractions initiales de faible ampleur (Slovaquie et Slovénie).

Le troisième canal de transmission de la politique monétaire est le crédit domestique (dernière colonne des schémas dans la figure 1). Globalement, les effets d'une hausse du crédit domestique sont cohérents avec les intuitions théoriques, hormis certaines exceptions, mais leur ampleur est faible et leur persistance non significative statistiquement. Ainsi, un choc positif sur le crédit domestique engendre une légère hausse de la production industrielle dont l'impact maximal se manifeste après environ un trimestre. Des effets toujours non significatifs, mais à la baisse, sont identifiés en Roumanie, en République Tchèque, et en Slovénie. On note également que la seule réponse persistante statistiquement est recensée en Hongrie et correspond à une période de sept mois.

La hausse du crédit domestique induit des effets inflationnistes immédiats dans tous les pays analysés sauf la Slovénie où la hausse des prix est précédée d'un léger effet déflationniste. Ces effets sont de faible ampleur, et leurs persistance est significative statistiquement exclusivement dans le cas de la Roumanie (pendant une durée de deux ans environ). En même temps, un choc positif sur le crédit domestique provoque un

relèvement immédiat et non significatif des taux d'intérêt à l'exception de la Slovaquie où une légère baisse initiale est à signaler et de la République Tchèque. Ces réponses ne sont pas persistantes et leur ampleur maximale est atteinte généralement au cours du premier trimestre, sauf pour la Pologne et la République Tchèque dont les réponses sont les plus intenses pendant le huitième et dixième mois respectivement.

Finalement, une hausse du crédit domestique engendre une dépréciation non significative du taux de change dont l'ampleur maximale est observable au cours du premier trimestre. Deux pays se démarquent par des trajectoires particulières : la République Tchèque qui est la seule dont la réponse est persistante statistiquement et la Slovénie qui connaît une appréciation initiale du change avant que sa monnaie nationale commence à se déprécier.

En synthétisant l'information délivrée par ces trois canaux de transmission de la politique monétaire plusieurs éléments ressortent avec clarté. D'une manière générale, on remarque d'abord l'impact très limité du taux d'intérêt sur la production industrielle qui est associé à une fragilité manifeste du canal de crédit dans la transmission des impulsions monétaires. En même temps, nos résultats indiquent un rôle actif du taux d'intérêt qui, aux côtés du taux de change, représentent les deux principaux canaux de transmission de la politique monétaire. On assiste ainsi à un point de rupture avec une large partie de la littérature qui prône l'idée selon laquelle le taux de change représente le principal canal de transmission des politiques monétaires dans les PECO, contrairement aux pays de la zone euro pour lesquels le canal prédominant est le taux d'intérêt (Angeloni et alii. [2003], Creel et Levasseur [2006], Ganev et alii. [2002]). Dans ce contexte, ce renforcement du rôle du taux d'intérêt dans la transmission de la politique monétaire pourrait être interprété comme un signe de rapprochement progressif des PECO vers les mécanismes de transmission monétaire propres aux pays de la zone euro. Ceci traduit une certaine maturité structurelle des systèmes économiques et financiers des PECO analysés. Pourtant, une hétérogénéité considérable est à signaler entre les réponses nationales aux différents chocs monétaires, notamment

au niveau des réponses engendrées par un relèvement du taux d'intérêt ou par rapport à l'efficacité relative du taux d'intérêt et du taux de change comme vecteurs de transmission de la politique monétaire.

L'information dégagée par l'examen des fonctions de réponse aux chocs de taux d'intérêt, de taux de change et de crédit domestique peut être complétée par la décomposition de la variance des variables macroéconomiques. Cette technique nous permettra notamment de mener une analyse plus fine des hétérogénéités qui subsistent entre les six PECO pris en considération. Les tableaux 3 dans l'Annexe présentent la décomposition de la variance des variables endogènes à l'horizon de 12 mois.

L'interprétation des informations délivrées par la décomposition de la variance peut se réaliser à deux niveaux distincts en fonction du rôle prépondérant joué par les variables monétaires. Ainsi, si l'on envisage ces variables comme étant des vecteurs de transmission de la politique monétaire, on peut identifier, selon le type de modélisation choisi, quelle est l'influence relative exercée par ces différents vecteurs sur la sphère réelle. En revanche, en considérant les variables monétaires comme étant des instruments d'absorption des chocs réels, on peut s'interroger sur leur capacité relative de réagir aux chocs de production ou de prix.

En ce qui concerne le rôle des variables monétaires comme instruments de transmission de la politique monétaire, on remarque d'emblée l'influence marginale exercée par le crédit domestique dans l'explication des variances des variables réelles (l'exception est représentée par la Pologne où le crédit constitue le premier canal de transmission monétaire). Dans ce contexte, pour les autres pays, la prépondérance dans l'explication de la variance des variables réelles sera partagée entre le taux d'intérêt et le taux de change. Ainsi, une lecture de l'importance relative de ces deux canaux de transmission sur l'évolution de la production industrielle et des prix permet d'identifier deux groupes distincts parmi ces pays. Le premier, composé de la Hongrie et de la Pologne, se caractérise par l'existence d'un canal du taux de change nettement plus puissant que celui du taux d'intérêt et ce pour les deux variables réelles (production

industrielle et prix). Concrètement, les chiffres sont de 14% pour le taux d'intérêt contre 42% pour le taux de change en Hongrie et de 3% pour le taux d'intérêt contre 5% pour le taux de change en Pologne. Contrairement à ces pays, pour la République Tchèque, la Slovaquie, la Slovénie et, dans une moindre mesure, pour la Roumanie l'explication des variables réelles passe prioritairement par le canal de taux d'intérêt. Ainsi, l'efficacité relative du taux d'intérêt dans la transmission de la politique monétaire est très nette, les chiffres étant de 22% contre 16% en République Tchèque, de 45% contre 9% en Slovaquie et de 40% contre 9% en Slovénie. Dans ces conditions, les mécanismes de transmission monétaire de ces pays sont très rapprochés de ceux existant dans la zone euro qui se caractérisent par un canal de taux d'intérêt particulièrement efficace. Finalement, entre ces deux groupes clairement dessinés, on peut positionner la Roumanie pour laquelle l'efficacité relative des deux variables monétaires est mitigée : le taux de change est prépondérant pour expliquer la variance de la production industrielle, tandis que le taux d'intérêt est plus à même d'expliquer la variance des prix.

Cette différenciation entre les pays persiste si l'on examine également l'importance du taux d'intérêt dans l'explication de la variance du taux de change. Si pour les pays du premier groupe le taux d'intérêt est responsable de maximum 10% de la variance du taux de change, pour les pays du deuxième groupe, ces valeurs se situent autour de 40%. En ce qui concerne la Roumanie, sa position intermédiaire entre les deux groupes est confirmée. Néanmoins, avec un quart de la variance du taux de change expliquée par le taux d'intérêt, la Roumanie semble être plus proche des pays du deuxième groupe.

La distinction entre ces deux groupes de pays, basée sur l'efficacité relative des différents canaux de transmission de la politique monétaire, est réitérée si l'on prend en considération le rôle d'amortisseurs des chocs réels endossé par les variables monétaires. Ainsi, pour la Hongrie et la Pologne le taux de change représente l'instrument principal permettant d'absorber les chocs de production industrielle et de prix. En effet, les chocs réels contribuent à l'hauteur de respectivement 21% et 14% dans

l'explication de la variance du taux de change contre seulement 14% et 7% respectivement pour celle du taux d'intérêt. Par conséquent, une adhésion rapide à l'UEM serait peu probable car le coût induit par la renonciation au taux de change comme variable d'ajustement serait particulièrement élevé. En revanche, pour la Roumanie et la Slovaquie c'est le taux d'intérêt qui absorbe l'essentiel des chocs réels(14), tandis que pour la République Tchèque et la Slovénie, le crédit domestique joue un rôle considérable aux côtes du taux d'intérêt comme amortisseur des chocs réels – les chocs de demande et d'offre expliquent respectivement 35% et 20% de la variance du crédit et du taux d'intérêt en République Tchèque et respectivement 23% et 8% en Slovénie. Ainsi, selon cette grille de lecture, ces pays, à l'image de l'expérience slovène, sont susceptibles de rejoindre plus rapidement l'UEM car leur coût d'opportunité engendré par la perte du taux de change comme instrument d'ajustement est nettement moins élevé par rapport à la Hongrie et à la Pologne.

D'une manière générale, la décomposition de la variance permet de renforcer un élément essentiel suggéré par l'analyse précédente en termes de fonctions de réponses qui concerne l'existence des asymétries au niveau des mécanismes monétaires entre les PECO Ainsi, on peut repérer une dynamique à plusieurs vitesses vers l'intégration dans la zone euro : la Slovénie est déjà membre depuis 2007 alors que la Slovaquie et la République Tchèque sont largement en tête de peloton pour la rejoindre.

CONCLUSION

Ce papier s'est proposé de développer une analyse comparative des canaux de transmission de la politique monétaire des PECO, pour des périodes récentes correspondant à des régimes monétaires stables. L'analyse a été construite sur une distinction théorique entre trois canaux spécifiques, à savoir le taux d'intérêt, le taux de change et le crédit domestique, et

(14) Pour ces deux pays, les chocs réels expliquent respectivement 28% et 38% de la variance du taux d'intérêt.

a été ensuite appliquée uniquement aux six PECO – Hongrie, Pologne, Roumanie, Slovaquie, Slovénie et République Tchèque – capables de mobiliser réellement l'ensemble de ces trois canaux de transmission.

Techniquement, on a adopté un cadre de modélisation classique de type VAR et on a fait appel à une technique structurelle de décomposition qui suppose l'application des restrictions de court terme entre les variables monétaires

Globalement, notre analyse révèle l'impact très limité du taux d'intérêt sur la dynamique de la production industrielle des PECO étudiés, phénomène que l'on retrouve également dans les pays de la zone euro. Parallèlement, on a identifié la fragilité du crédit comme mécanisme de transmission de la politique monétaire, ce qui s'explique essentiellement par la recrudescence de la consommation des ménages et par l'existence d'un excès de liquidité bancaire.

En même temps, la méthode du VAR structurels permet de capturer l'existence d'une hétérogénéité marquée au sein des pays analysés qui peut engendrer des conséquences institutionnelles importantes affectant directement la dynamique de l'intégration dans la zone euro. On distingue ainsi un premier sous-groupe composé de la Slovaquie, de la Slovénie, de la République Tchèque et partiellement de la Roumanie qui, à l'instar des pays de la zone euro, se caractérisent par la prépondérance du canal de taux d'intérêt comme mécanisme de transmission de la politique monétaire. Ces pays semblent ainsi les plus prêts pour une adhésion rapide à la zone euro, fait confirmé d'ailleurs par l'expérience slovène. En revanche, un deuxième sous-groupe se démarque, composé de Hongrie et de Pologne pour lesquels le taux de change joue un rôle déterminant à la fois comme instrument de transmission de la politique monétaire et comme amortisseur des chocs de demande et d'offre. Une adhésion rapide à l'UEM serait ainsi inopportune pour ces deux pays et elle devrait être précédée d'un renforcement de l'efficacité relative du canal de taux d'intérêt.

RÉFÉRENCES

AMATO J. et S. GERLACH [2001], " Modelling the transmission mechanism of monetary policy in emerging market countries using prior information", BIS papers, n° 18, 264-272

AMISANO G. et C. GIANNINI [1997], *Topics in Structural VAR Econometrics*, 2nd Edition, Springer-Verlag, Berlin

ANGELONI I., A. KASHYAP et B. MOJON (eds.) [2003], *Monetary Policy Transmission in the Euro Area*, Cambridge University Press, Cambridge

ARNOSTOVA K.et J. HURNIK [2004], "The Monetary Transmission Mechanism in the Czech Republic: Evidence from the VAR Analysis", Working Paper n°4, Czech National Bank, Prague

ANZUINI A. et A. LEVY [2004], "Financial structure and the transmission of monetary shocks: preliminary evidence for the Czech Republic, Hungary and Poland", Temi di discussione n° 514, Bank of Italy, Rome

BARTH M. J. et V. A. RAMEY [2001], "The Cost Channel of Monetary Transmission", 199-239, in NBER *Macroecomics Annual* 2001, MIT Press, Cambridge

BERNANKE B. [1986], "Alternative explanation of the money-income correlation", 49-99 in K BRUNNER K. et A. MELTZER (eds), *Real business cycles, real exchange rates, and actual policies*, Carnegie-Rochester Conference Series on Public Policy, Amsterdam

BOTEL C. [2003], "Monetary Policy, Exchange Rate, And The Transmission Mechanism In Romania: A Structural Var Approach", *Journal for Economic Forecasting*, n° 4, 65-85

CASTELNUOVO A. et P. SURICO [2006], "The Price puzzle: Fact or Artefact?", Document de Travail n° 288, Bank of England, Londres

CHRISTIANO L., M EICHENBAUM et C. EVANS [1999], "Monetary Policcy Schocks: What Have we Learned and to What End?", 65-148, in TAYLOR J. et M. WOODFORD (eds.), *Handbook of Macroeconomics*, Elsevier, Amsterdam

CHRISTOFFERSEN P., T. SLOK et R. WESCOTT [2001], "Is Inflation Targeting Feasible in Poland?", *Economics of Transition*, n°1, 153-174

CORICELLI F., B. EGERT et R. MACDONALD [2006], "Monetary Transmission Mechanism: Gliding on a Wind of Change", Discussion Papers n° 8, BOFIT, Bank of Finland, Helsinki

COUDERT V. et B. MOJON [1997], « Asymétries financières et transmission de la politique monétaire en Europe », *Économie et Prévision*, n° 128, 41-60

CREEL J. et S. LEVASSEUR [2006], « Canaux de transmission de la politique monétaire dans l'UE. Le cas de trois nouveaux entrants », *Revue économique*, Vol. 57, n° 4, 881- 898

ELBOURNE A. et J. DE HAAN [2006], "Financial Structure and Monetary Policy Transmission in Transition Countries", *Journal of Comparative Economics*, n° 34, 1-23

GANEV G., K. MOLNAR, K. RYBINSKI et P. WOZNIAK [2002], "Transmisssion Mechanism of Monetary Policy in Central and Eastern Europe", Report n° 52, CASE, Varsovie

GIORDANI P. [2004], "An alternative explanation of the price puzzle", *Journal of Monetary Economics*, n° 51, 1271-1296

GOTTSCHALK L. et D. MOORE [2001], "Implementing Inflation Targeting Regimes: the Case of Poland", *Journal of Comparative Economics*, n° 29, 24-39

HERICOURT J. et I. MATEI [2007], « Transmission de la politique monétaire dans les Pays d'Europe Centrale et Orientale : que savons-nous vraiment ? », *Économie et Prévision*, n° 180-181, 221-238

HANSON D. [2004], " The "Price Puzzle" reconsidered ", *Journal of Monetary Economics*, n° 51, 1385-1413

KIM S. et N. ROUBINI [2000], "Exchange rate anomalies in the industrial countries : A solution with a structural VAR approach", *Journal of Monetary Economics*, n° 45, 561-586

KLOS B. et E. WROBEL [2001], "The Monetary Transmission Mechanism and the Structural Modelling of Inflation at the National Bank of Poland", BIS Papers, n° 8, 232-242

KUIJS L. [2002], "Monetary Policy Transmission Mechanism and Inflation in the Slovak Republic", Working Paper n° 80, IMF, Washington

LEEPER E. [1991], "Equlibria under 'active' and 'passive' monetary and fiscal policies", *Journal of Monetary Economics*, n° 27, 129-147

MALISZEWSKI W. [1999], "VAR-ing Monetary Policy in Poland", Studies & Analyses n° 188, CASE, Varsovie

MOJON B. [1998], « Structures financières et transmission de la politique monétaire en Europe, analyses comparatives de l'Allemagne, la France, l'Italie et le Royaume-Uni », Document de travail n° 12, CEPII, Paris

MOJON B. et G. PEERSMAN [2003], "A VAR Description of the Effects of Monetary Policy in the Individual Countries of the Euro Area", 56-74, in ANGELONI et alii. (eds), *Monetary Policy Transmission in the Euro Area*, Cambridge University Press, Cambridge

PEERSMAN G. et F. SMETS [2003], "The Monetary Transmission Mechanism in the Euro Area: Evidence from VAR Analysis", 36-55, in ANGELONI et alii. (eds), *Monetary Policy Transmission in the Euro Area,* Cambridge University Press, Cambridge

PELINESCU E. et C. SCUTARU [2000], "Econometric Analysis of the Effects of Indirect Monetary and Foreign Exchange Policy Instruments", April 20 Studies, Institut for Economic Forecasting, Economic Performance Evolution in Transitional Systems, Bucharest

SIMS C. A. [1986], "Are forecasting models usable for policy analysis?", *Federal Reserve Bank of Minneapolis Quartely Review*, n° 10, 2-16

SIMS C. A. [1992], "Interpreting the Macroeconomic Time Series Facts: The Effects of Monetary Policy", *European Economic Review*, Vol. 36, n° 5, 575-1000

SIMS C. A., J. H. STOCK et M. W. WATSON [1990], "Inference in Linear Time Series Models with Some Unit Roots", *Econometrica*, Vol. 58, n° 1, 113-144

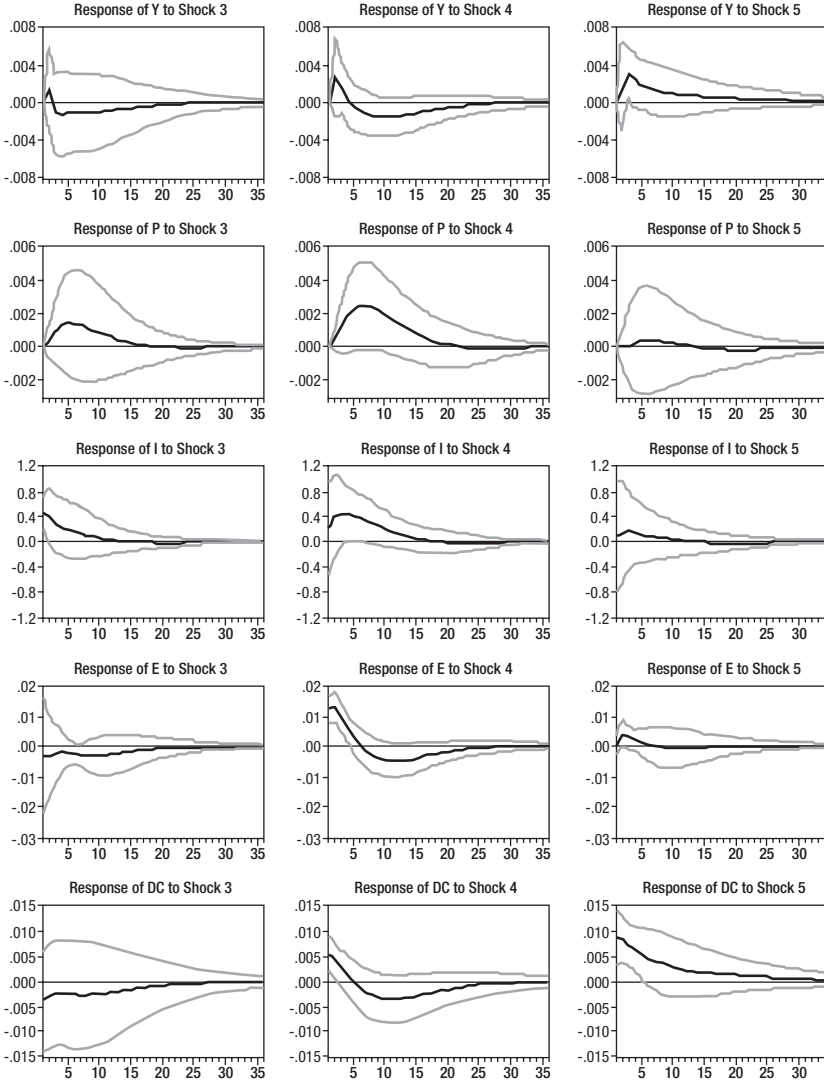
SIMS C. A. et T. ZHA [1998], "Does monetary policy generate recessions?", Working Paper n° 12, Federal Reserve Bank of Atlanta, Atlanta

VONNAK B. [2005], "Estimating the Effect of Hungarian Monetary Policy within a Structural VAR Framework", Working Paper n° 1, Magyar Nemzeti Bank, Budapest

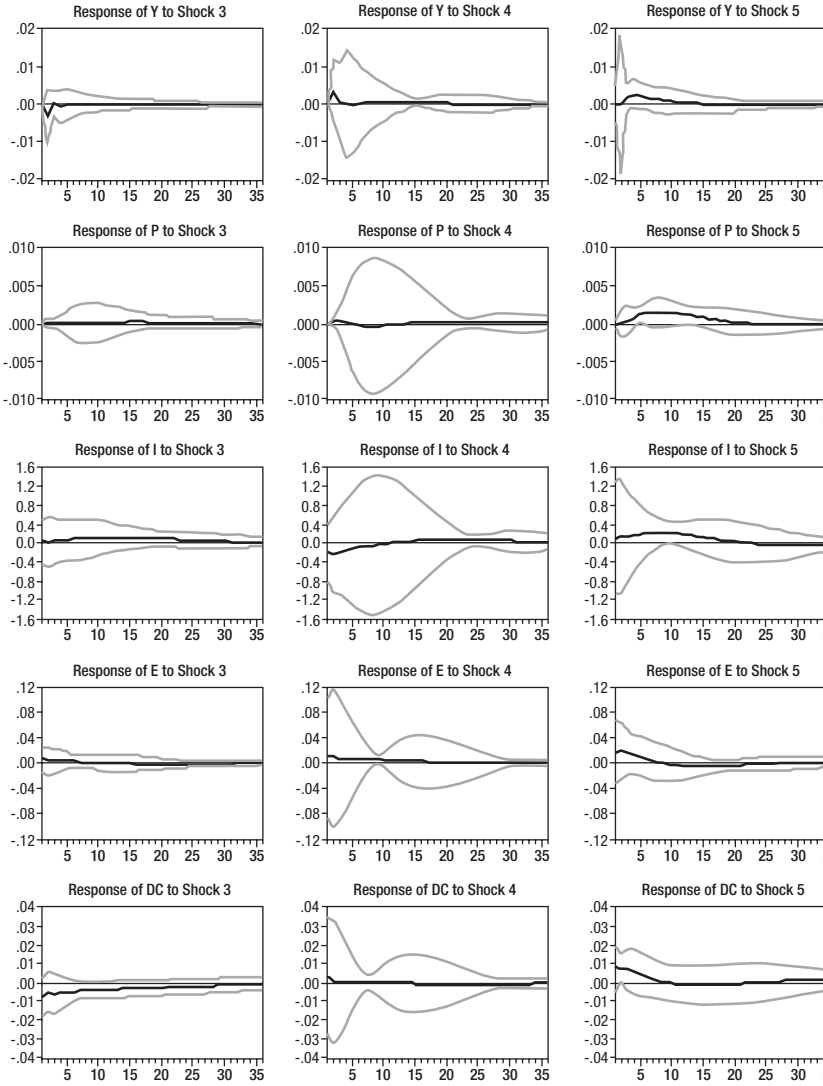
Figure 1

LES FONCTIONS DE RÉPONSE NATIONALES AUX CHOCS DE TAUX D'INTÉRÊT, DE TAUX DE CHANGE ET DE CRÉDIT

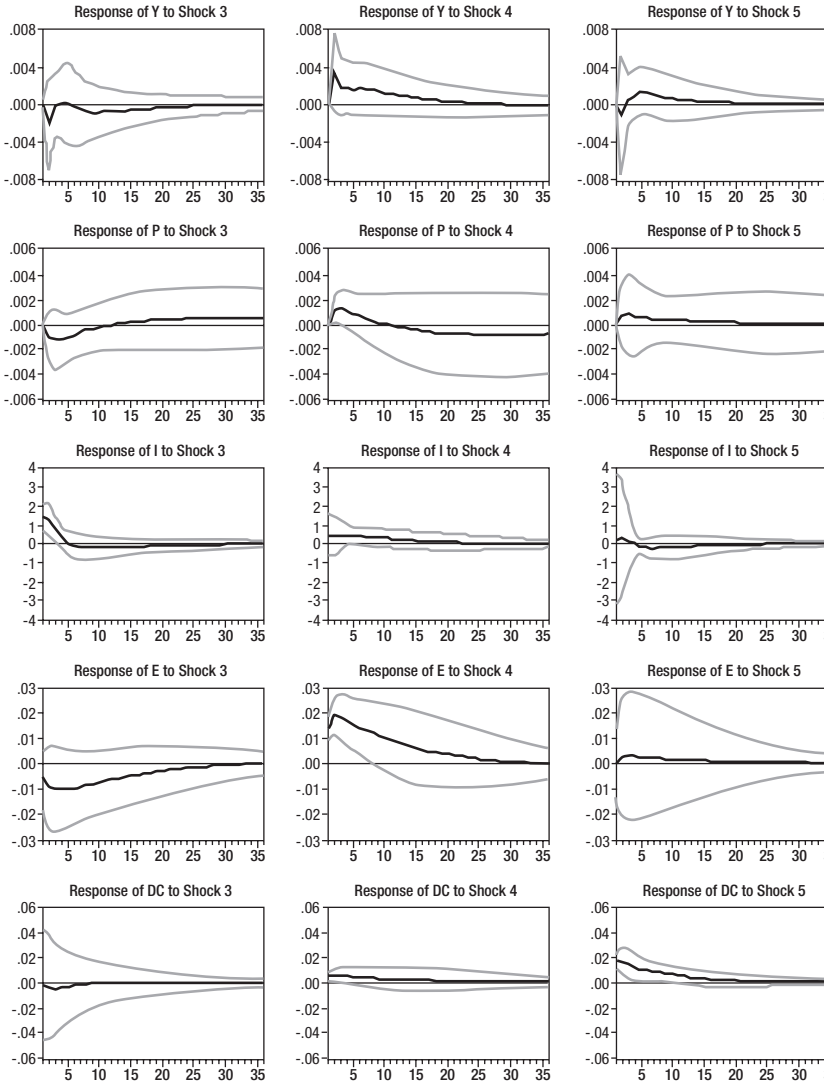
Hongrie : Response to structural One S.D. Innovations ± 2 S.E.



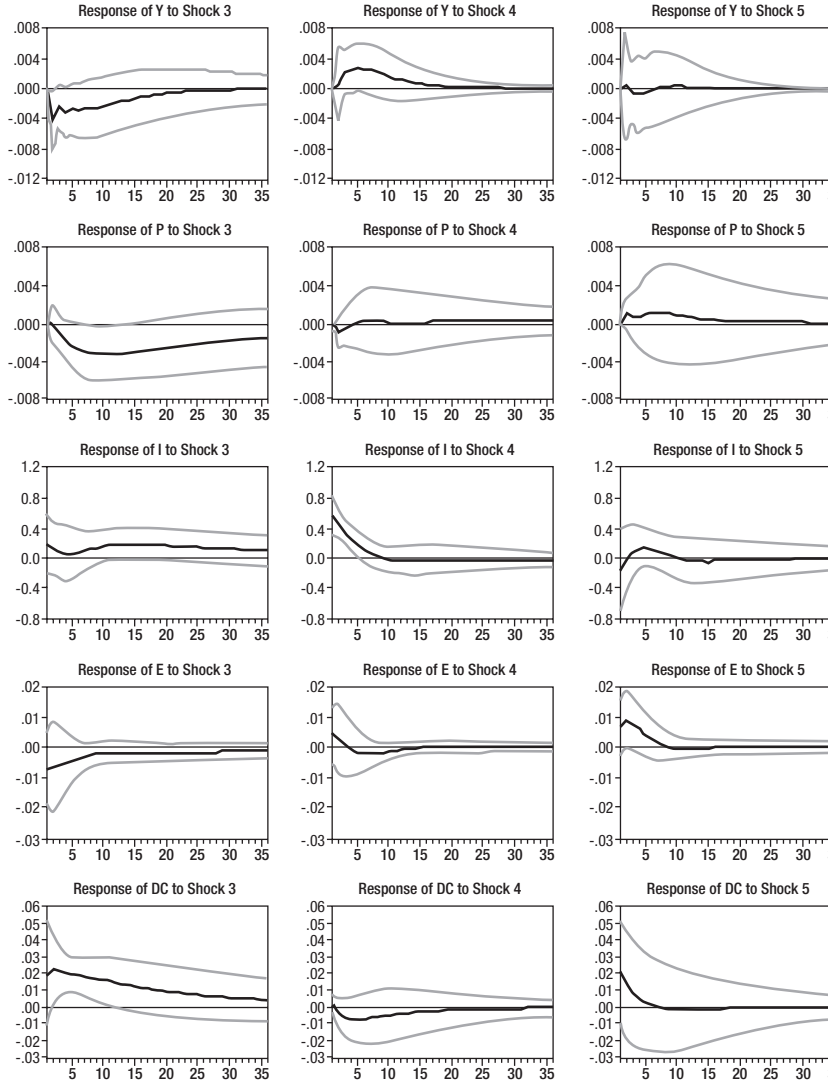
Pologne : Response to structural One S.D. Innovations ± 2 S.E.



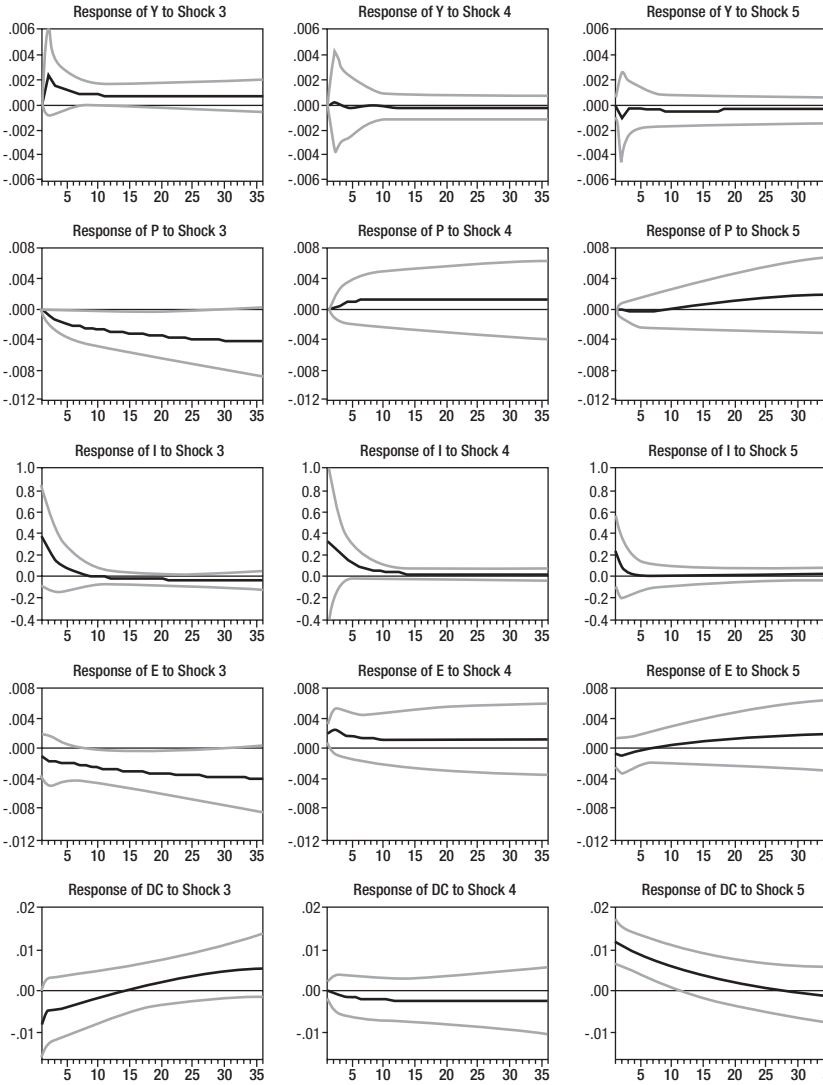
Roumanie : Response to structural One S.D. Innovations ± 2 S.E.



Slovaquie : Response to structural One S.D. Innovations ± 2 S.E.



Slovénie : Response to structural One S.D. Innovations ± 2 S.E.



République Tchèque : Response to structural One S.D. Innovations ± 2 S.E.

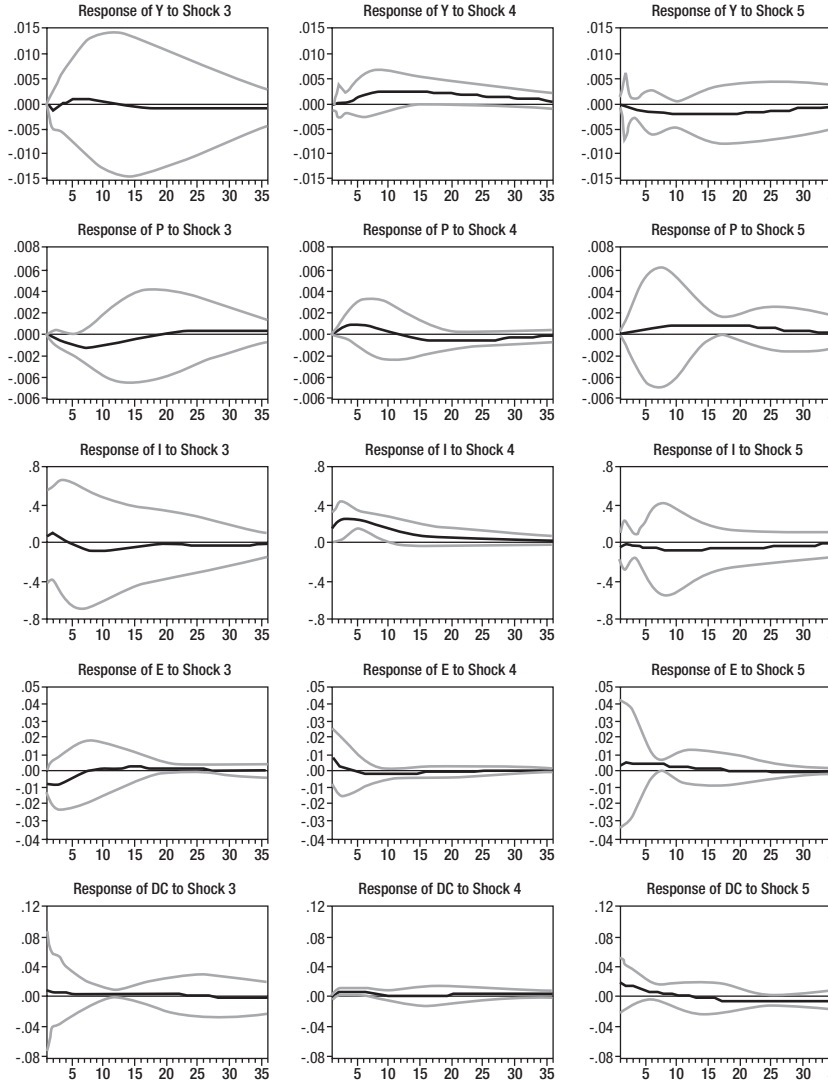


Tableau 2a
Impacts maximaux des chocs monétaires

		Hon	Pol	Rou	Slovq	Slov	Tch
Choc sur le taux d'intérêt	y)	0,001 (2) (-0,7)	-0,03 (2) (0,82)	-0,002 (2) (0,82)	-0,004(2) (2,16)	0,002(2) (-1,47)	-0,001(2) (-0,55)
	p	0,001 (5) (0,9)	0,0001 (2) (-0,34)	0,001 (3) (1,03)	0,003 (10) (2,21)	-0,004(36) (1,92)	-0,001 (8) (0,66)
	e	-0,003 (2) (0,47)	0,004 (1) (-0,51)	0,01 (3) (1,22)	-0,006 (1) (1,14)	0,001 (36) (-0,32)	0,007 (2) (0,66)
	dc	-0,003 (1) (0,75)	0,008 (1) (-1,16)	0,004 (3) (0,25)	-0,02 (2) (-2)	0,007 (1) (1,87)	0,09 (1) (0,23)
(Choc sur le taux de change	y	0,002 (2) (-1,4)	-0,03 (2) (-0,86)	0,003 (2) (-1,63)	0,002 (5) (-1,84)	-0,0003(2) (-0,16)	0,002 (11) (-1,85)
	p	0,002 (7) (-2,01)	0,0003 (3) (-0,31)	0,001 (2) (-2,14)	0,0008 (2) (1,08)	0,0003 (5) (-0,51)	0,0009 (5) (-1,27)
	i	0,45 (3) (-2,19)	-0,22 (2) (0,53)	0,48 (1) (-0,88)	0,55 (1) (-4,31)	0,29 (1) (-0,27)	0,26 (4) (7,13)
	dc	0,005 (1) (-1,29)	0,002 (1) (-0,18)	0,005 (2) (-2,17)	0,007 (5) (1)	-0,002(36) (0,46)	0,016 (2) (-0,51)
Choc sur le crédit	y	0,003 (3) (-1,93)	0,002 (4) (-1,44)	0,001 (5) (-1,09)	-0,0006(4) (0,24)	-0,0009(2) (0,53)	0,002 (14) (0,93)
	p	0,0004 (6) (-0,39)	-0,001(8) (-1,55)	-0,0007(3) (-0,49)	0,0011(8) (-0,44)	0,001 (36) (-0,74)	0,0008(15) (-1,06)
	i	0,17 (3) (-0,83)	0,23 (8) (-1,47)	0,28 (2) (-0,18)	-0,16 (1) (0,60)	0,21 (1) (-1,29)	0,071 (10) (0,31)
	e	-0,004 (2) (-0,83)	0,018 (2) (-0,79)	0,003 (3) (-0,24)	0,009 (2) (-1,88)	0,001 (36) (-0,76)	0,0044 (2) (-0,24)

Le chiffre entre parenthèses désigne le mois où l'impact des chocs est maximal. t de Student en italique.

Tableau 2b : Impacts cumulés significatifs

		Hon	Pol	Rou	Slovq	Slov	Tch
Choc sur le taux d'intérêt	y				-0,02(11) (1,67)	0,02(32) (-1,96)	
	p				-0,06(26) (1,95)	-0,11(36) (2,24)	
	e	-0,04(32) (1,96)				0,11 (36) (2,16)	
	dc		-0,11(36) (-2,04		0,4 (34) (-1,96)		
Choc sur le taux de change	y			0,01 (9) (-1,65)			0,03 (18) (-1,64)
	p	0,02 (12) (-1,97)		0,003 (4) (-1,79)			0,003(5) (-1,68)
	i	3,78 (13) (-1,96)		5,65 (14) (-1,67)	1,91 (12) (-1,96	1,8 (36) (-2,76)	3,56 (32) (-1,97
	dc			(-1,96)	1,8 (36)		
Choc sur le crédit	y	0,01 (7) (-1,97)		(-2,76)	3,56 (32)		
	p		0,01(26) (-2)	(-1,97)			
	i						
	e						0,04 (36) (-2,18)

Le chiffre entre parenthèses désigne la période (en mois) pendant laquelle l'impact cumulé des chocs est significatif. t de Student en italique.

Tableaux 3 : Décomposition de la variance

HONGRIE						
	Chocs					
	S E	Production industrielle	Prix	Taux d'intérêt	Taux de change	Crédit domestique
Production industrielle	0,02	77,54	3,33	3,92	6,55	8,66
Prix	0,01	7,05	46,06	10,15	35,94	0,79
Taux d'intérêt	1,55	1,18	12,78	27,29	53,15	5,59
Taux de change	0,03	4,75	16,13	10,21	64,92	3,98
Crédit domestique	0,03	4,08	8,66	12,59	17,71	56,95

POLOGNE						
	Chocs					
	S E	Production industrielle	Prix	Taux d'intérêt	Taux de change	Crédit domestique
Production industrielle	0,02	73,79	14,07	2,49	3,43	6,22
Prix	0,01	3,19	49,94	0,38	1,67	44,82
Taux d'intérêt	0,88	3,70	3,24	10,86	23,63	58,56
Taux de change	0,04	2,92	11,01	2,36	18,67	65,05
Crédit domestique	0,03	1,01	10,32	51,60	1,92	35,14

ROUMANIE						
	Chocs					
	S E	Production industrielle	Prix	Taux d'intérêt	Taux de change	Crédit domestique
Production industrielle	0,02	85,26	4,80	1,35	6,65	1,94
Prix	0,01	5,92	85,56	3,59	3,32	1,61
Taux d'intérêt	3,14	22,25	5,70	49,20	18,08	4,77
Taux de change	0,06	16,80	0,95	22,63	58,18	1,45
Crédit domestique	0,05	14,62	1,82	3,81	10,30	69,45

SLOVAQUIE						
	Chocs					
	S E	Production industrielle	Prix	Taux d'intérêt	Taux de change	Crédit domestique
Production industrielle	0,02	76,44	2,01	13,01	8,26	0,29
Prix	0,02	3,10	60,17	31,74	0,57	4,42
Taux d'intérêt	1,31	11,08	26,54	11,49	44,09	6,81
Taux de change	0,02	1,35	3,09	37,52	8,09	49,96
Crédit domestique	0,08	6,54	0,23	72,56	6,59	14,09

SLOVÉNIE						
	Chocs					
	S E	Production industrielle	Prix	Taux d'intérêt	Taux de change	Crédit domestique
Production industrielle	0,02	92,71	0,25	6,18	0,08	0,78
Prix	0,01	5,97	50,13	34,10	9,27	0,53
Taux d'intérêt	0,79	7,04	0,76	40,54	43,31	8,35
Taux de change	0,01	9,81	22,59	42,72	22,87	2,01
Crédit domestique	0,04	0,86	22,03	12,87	2,55	61,68

RÉPUBLIQUE TCHÈQUE						
	Chocs					
	S E	Production industrielle	Prix	Taux d'intérêt	Taux de change	Crédit domestique
Production industrielle	0,02	80,42	4,98	1,39	8,05	5,15
Prix	0,01	9,81	53,55	20,73	8,46	7,44
Taux d'intérêt	0,86	13,46	6,97	7,45	66,61	5,50
Taux de change	0,02	4,93	6,13	45,52	15,34	28,08
Crédit domestique	0,05	12,13	23,82	13,73	9,56	40,76

Horizon : 12 mois

IS THE BALASSA-SAMUELSON EFFECT STILL RELEVANT FACTOR OF REAL APPRECIATION:

LESSONS FOR SOUTH EASTERN EUROPEAN COUNTRIES?

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ABSTRACT:
This paper tries to explain relative price differentials between transition countries and euro area in terms of differences in productivity growth between tradable and non-tradable goods sectors. Using panel estimation techniques evidence in favor of the Baumol-Boven and Balassa-Samuelson effect in transition countries was found. Panel cointegration test detected relationship between productivity and relative prices (BB effect) and partly relationship between relative productivity differential vis-à-vis euro area and real exchange rate (BS effect). Similar evidence resulted from FMOLS and PMGE methods. While evidence of the BB effect is robust to alternative model formulation, the evidence concerning the BS effect is less convincing and sensitive to model formulation. The econometric analysis shows that BS effect is less evident particularly for Romania, Bulgaria and Macedonia.

Main policy implications of these results are that BS effect is not determining factor in the ability of CEEC and SEEC countries to satisfy the Maastricht inflation criteria. Second, it seems that BB and BS effect is likely to be smaller in the future and would not significantly affect inflation target in IT countries.

JEL classification: G23, G28

Keywords: Baumol-Bowen effect, Balassa-Samuelson effect, PPP, real appreciation, inflation.

** The opinions expressed in the paper are those of the author and do not necessarily represent the views of the National bank of Serbia.*

INTRODUCTION

Since the beginning of the transition process, most Central and Eastern European countries (CEECs) experienced relatively high inflation rates and real appreciation of their currencies. *Balassa-Samuelson* theory (BS effect) provides a supply side explanation for the relative price of tradables and non-tradables in an economy and becomes one of the prime explanations of the continuous real appreciation of *CEECs* against their western counterpart. The key idea behind BS theory is that in a given economy, higher productivity growth in tradable sector than that in non-tradable (if wages equalize among sectors) pushes up wages in all sectors. This in turn increases the relative prices of non-tradable goods and raises the ratio of non-tradable to tradable prices. If productivity growth in one country is higher than in the other, overall inflation will be higher in the former and real exchange rate based on *CPI* is likely to appreciate in the long run.

Analyzing the extent to which inflation is caused by the *BS* effect is important for at least three reasons. First, inflation stemming from the *BS* effect does not cause a loss of competitiveness. Namely, although the price of non traded goods rises relative to the price of traded goods, the tradable sector does not become less profitable, due to its higher rate of productivity growth.

Second, the monetary authority should consider the strength of the BS effect in setting its inflation target. Rising non traded goods relative prices would need falling prices in the traded goods sector in order to achieve inflation target. Disinflation in the tradable good sector requires the exchange rate to appreciate over time and central bank has to keep the interest rate high to offset the inflation caused by the non traded goods sector.

Third, the presence of BS effect is of particular importance for those countries that plan to join *EMU*. Namely, *BS* theory becomes a popular framework used for assessment feasibility of meeting Maastricht criteria. The problem might arise in the new *EU* member countries, if the inflation

and exchange rate criteria are impossible to achieve in the presence of the *BS* effect. There would be a risk of sacrificing the real convergence for the nominal one, because a monetary tightening that might be necessary to bring inflation or exchange rate to Maastricht criteria could suppress real growth.

Accession of eight *CEECs* countries to the European Union in 2004 has triggered a lot of research related to *BS* effect. A first round of studies, from late 1990s to early 2000s suggested that *BS* effect is one of the major determinants of high inflation in *CEECs*. For instance, *Simon* and *Kovacs* (1998), *Rother* (2000) and *Halpern* and *Wyplosz* (2001) estimate that real appreciation driven by productivity is approximately 3 per cent annum in a number of transition countries.

A second wave of studies pointed out that *BS* effect may not be all that important for the new EU members. They usually conclude that observed inflation and real exchange appreciation is only in small part explained by *BS* effect. For instance, *De Broeck-Slok* (2001), *Corricelli-Jazbec* (2001), *Egert* (2002), *Mihaljek* and *Klau* (2004) and *Cipriani* (2001) estimates are considerably lower than those found in the early literature. Contribution of *BS* effect to real appreciation in those studies ranges from 0% to 1.5% a year.

However, a very few studies analyze the importance of *BS* effect in countries other than eight mentioned *EU* state members, such as Souht Eastern European countries (*SEECs*). This motives us to take closer look is the *BS* effect still relevant factor of real appreciation, both in *CEECs* and *SEECs*.

The reminder of the paper is composed as follows. The next two chapters lay out the analytical and empirical framework used in the paper. In the second chapter, theoretical exposition of the Baumol-Bowen (*BB* effect) and *BS* effect has been presented, as well as the methodology used for estimation and testing those hypotheses. The third chapter covers brief discussion of the data sources, definitions of the variables including into empirical analysis and empirical results. In particular, empirical verification of *PPP* theory, domestic transmission mechanism - *BB* effect

and international version - *BS* effect were in a focus of empirical analysis. In the fourth chapter main conclusions of empirical analysis and policy implications of these results has been presented.

1. ANALYTICAL FRAMEWORK

1.1 Theoretical concept of Balassa-Samuelson effect

Consider a case of small open economy that produces traded (T) and non- traded goods (N), assuming *Cobb-Douglas* production function with technology (*A*), labor (*L*) and capital (*K*) as production factors:

$$\begin{aligned} Y^T &= A^T K^{T(1-\theta^T)} L^{T\theta^T} \\ Y^N &= A^N K^{N(1-\theta^N)} L^{N\theta^N} \end{aligned} \tag{1}$$

where Θ^T and Θ^N are elasticity of output with respect to labor in traded and in non traded goods sector. Competition in the labor market assures that the wages in two sectors will be equal to the marginal product of labor:

$$\begin{aligned} W^T &= P^T \frac{\partial Y^T}{\partial L^T} = P^T \theta^T A^T \left(\frac{K^T}{L^T} \right)^{1-\theta^T} \\ W^N &= P^N \frac{\partial Y^N}{\partial L^N} = P^N \theta^N A^N \left(\frac{K^N}{L^N} \right)^{1-\theta^N} \end{aligned} \tag{2}$$

where W^T and W^N represent wages in traded and non traded goods sector respectively.

Taking that wages in the traded and in non-traded sector are the same, ratio of the tradable and non-tradable good prices is defined by:

$$R = \frac{P^N}{P^T} = \frac{\theta^T A^T \left(\frac{K^T}{L^T} \right)^{1-\theta^T}}{\theta^N A^N \left(\frac{K^N}{L^N} \right)^{1-\theta^N}} = \frac{\theta^T \frac{Y^T}{L^T}}{\theta^N \frac{Y^N}{L^N}} \tag{3}$$

After log-differencing transformation, previous equation obtains following form:

$$\Delta \log R = \Delta \log \frac{Y^T}{L^T} - \Delta \log \frac{Y^N}{L^N} \qquad (4)$$

Last equation shows that the growth in the relative prices is equal to the difference between average labor productivity growth in traded and non-traded goods sector. Assuming that productivity growth is higher in the traded goods sector, this equation suggests that relative productivity growth determines prices in non-traded good sector and consequently headline inflation. Given that, firms in non-traded goods sector would increase prices of their goods to keep profitability. Consequently, relative prices will increase, $P^{rel} = P^N - P^T$. This effect in literature is known as domestic *BS* or *Baumol-Bowen* effect.

If the wage rates in traded and in the non-traded goods sector are allowed to differ, the equation that describes the behavior of the price of non-traded goods relative to that of traded goods becomes:

$$R = \frac{\theta^T \frac{Y^T}{L^T} W^N}{\theta^N \frac{Y^N}{L^N} W^T} \qquad (5)$$

or by log-differencing, it takes form:

$$\Delta \log R = \Delta \log \frac{Y^T}{L^T} - \Delta \log \frac{Y^N}{L^N} - \Delta \log \frac{W^T}{W^N} \qquad (6)$$

If wages in traded goods sector grow faster relative to wages in non-traded goods sector, this will offset the relative increase in productivity and lead to lower growth of the relative prices of non-traded goods.

Further, inflation rate could be expressed as a weighted average traded and non-traded inflation:

$$\pi^{CPI} = \sigma\pi^{N} + (1-\sigma)\pi^{T} = \pi^{T} + \sigma\Delta\log R \qquad (7)$$

where σ is share of non-traded goods in consumer basket.

Expression $\sigma\Delta\log R$, which is defined by relative productivity growth, represents the contribution of *BS* effect to domestic inflation. *BS* effect can also help to explain inflation differential between two countries. Taking into account that country trades with a foreign country, domestic inflation can be expressed as:

$$\pi^{CPI} = \sigma\pi^{FT} + \Delta\log s + \sigma\Delta\log R \qquad (8)$$

where s is nominal exchange rate, π^{FT} is foreign traded goods inflation, and:

$$\pi^{T} = s\pi^{FT} \qquad (9)$$

Inflation in foreign country becomes:

$$\pi^{CPIF} = \sigma\pi^{FT} + \sigma\Delta\log R^{F} \qquad (10)$$

Replacing equation (10) in equation (8), implies:

$$\pi^{CPI} = \pi^{CPIF} - \sigma\Delta\log R^{F} + \Delta\log s + \sigma\Delta\log R$$

or

$$\pi^{CPI} - \pi^{CPIF} = \Delta\log s + \sigma\Delta\log R - \sigma\Delta\log R^{F} \qquad (11)$$

Previous expression means that inflation differential is result of nominal exchange rate change and $\sigma\Delta\log R - \sigma\Delta\log R^{F}$, which represents contribution of BS effect to inflation differential.

Next, it can be seen how relative productivity difference contributes to real appreciation, assuming that productivity is faster in domestic relative to foreign country.

Replacing equation (7) in real exchange equation ($r = s + \pi^{CPIF} - \pi^{CPI}$):

$$r = s + \pi^{FT} - \pi^{T} + \sigma\left(\pi^{T} - \pi^{N}\right) - \sigma^{F}\left(\pi^{FT} - \pi^{FN}\right) \qquad (12)$$

and assuming $\sigma = \sigma^{F}$, previous equation takes form:

$$r = s + \pi^{FT} - \pi^{T} - \sigma\left[\left(\pi^{T} - \pi^{N}\right) - \left(\pi^{FT} - \pi^{FN}\right)\right] \quad (13)$$

Assuming that prices in the domestic traded goods sector and abroad are equal, if they are expressed in the same currency, real exchange rate changes are determined by changes of relative prices in non-traded goods sector, or:

$$r = -\sigma\left[\left(\pi^{T} - \pi^{N}\right) - \left(\pi^{FT} - \pi^{FN\backslash}\right)\right] \quad (14)$$

1.2 Some methodological notes

All empirical tests for verification of the *BS* hypotheses are conducted in the heterogonous dynamic panel framework, using *Pedroni* and *Kao* panel cointegration tests. Long-run relationships between relevant macroeconomic variables were estimated with Fully Modified *OLS (FMOLS)*, Dynamic *OLS (DOLS)* and Pooled Mean Group *(PMGE)* and Mean Group (*MGE*) estimator techniques.

FMOLS estimation, introduced by *Philips* and *Hansen* (1990) allows for serial correlation in the residuals and for endogenity of regressors in the cointegrating regression and results in asymptotically efficient estimation of the cointegrtaing vector. The pooled *FMOLS* coefficients can be computed in two different ways, within dimension and between dimensions. The idea of *FMOLS* is to obtain in the first step OLS estimates of long-run variance matrices. In the second step another regression is run on corrected variables, with the correction factors being functions of the estimate long-run variance matrices.

FMOLS within estimator for coefficient β of panel:

$$\begin{aligned} y_{it} &= \alpha_{1i} + \beta x_{it} + \mu_{it} \\ x_{it} &= \alpha_{2i} + x_{it-1} + e_{it} \end{aligned} \quad (15)$$

is given by:

$$\hat{\beta}^{*}_{nT} - \beta = \left(\sum_{i=1}^{n} \hat{L}_{22i}^{-2} \sum_{t=1}^{T} \left(x_{it} - \bar{x}_i \right)^2 \right)^{-1} \sum_{i=1}^{n} \hat{L}_{11i}^{-1} \hat{L}_{22i}^{-1} \left(\sum_{t=1}^{T} \left(x_{it} - \bar{x}_i \right) \mu^{*}_{it} - T \hat{\gamma}_i \right) \qquad (16)$$

where $\hat{L}_i$ the lower triangular decomposition of a consistent estimator of the idiosyncratic asymptotic covariance matrix $\Omega_i = \Omega^0{}_i + \Gamma_i - \Gamma_i'$ with $\hat{L}_i$ normalized such that $\hat{L}_{22i} = \hat{\Omega}_{i22}^{-1/2}$, and where μ^{*}_{it} is given by $\mu^{*}_{it} = \mu_{it} - \frac{\hat{L}_{21i}}{\hat{L}_{22i}} \Delta x_{it}$ and the serial correlation adjustment parameter $\hat{\gamma}_i$ is given by $\hat{\gamma}_i = \hat{\Gamma}_{21i} + \hat{\Omega}^{0}{}_{21i} - \frac{\hat{L}_{21i}}{\hat{L}_{22i}} \left(\hat{\Gamma}_{22i} + \hat{\Omega}^{0}{}_{21i} \right)$. FMOLS estimator $\hat{\beta}^{*}_{nT}$ is distributed normally.

FMOLS t statistics for $\hat{\beta}^{*}_{nT}$ estimator is standard normal:

$$t_{\beta^{*}_{nT}} = \left(\hat{\beta}^{*}_{nT} - \beta \right) \sqrt{\sum_{i=1}^{n} \hat{L}_{22i}^{-2} \sum_{t=1}^{T} \left(x_{it} - \bar{x}_i \right)^2} \rightarrow N(0,1) \qquad (17)$$

Based on *Pedroni* (1996, 2000), the between dimension group mean panel *FMOLS* estimator is given as:

$$\beta^{*}_{GFM} = \frac{1}{n} \sum_{i=1}^{n} \left(\sum_{t=1}^{T} \left(x_{it} - \bar{x}_i \right)^2 \right)^{-1} \left(\sum_{t=1}^{T} \left(x_{it} - \bar{x}_i \right) y^{*}_{it} - T \hat{\gamma}_i \right) \qquad (18)$$

where: , $y^{*}_{it} = y_{it} - \frac{\hat{L}_{21i}}{\hat{L}_{22i}} \Delta x_{it}$

$$\hat{\gamma}_i = \hat{\Gamma}_{21i} + \hat{\Omega}^{0}{}_{21i} - \frac{\hat{L}_{21i}}{\hat{L}_{22i}} \left(\hat{\Gamma}_{22i} + \hat{\Omega}^{0}{}_{21i} \right) \qquad (19)$$

The expression following the summation over the *i* is identical to the conventional time series *FMOLS* estimator and between dimension

estimator can be constructed simply as average *FMOLS* estimator for each panel member. Likewise, the associated *t* statistics for the between dimension estimator can be constructed as:

$$\bar{t}_{\beta^* GFM} = \frac{1}{\sqrt{n}} \left(\sum_{i=1}^{n} \hat{L}_{11i}^{-2} \sum_{t=1}^{T} \left(x_{it} - \bar{x}_i \right)^2 \right)^{-1/2} \left(\sum_{t=1}^{T} \left(x_{it} - \bar{x}_i \right) y_{it}^* - T \hat{\gamma}_i \right) \rightarrow N(0,1) \quad (20)$$

Contrary to *FMOLS*, *DOLS* estimator employs a parametric correction for the endogeneity achieved by augmenting regression with leads and lags of first difference of x_{it} as below:

$$y_{it} = \alpha_i + \beta_i x_{it} + \sum_{k=-K}^{K} \gamma_{ik} \Delta x_{it-k} + \mu_{it} \quad (22)$$

where the estimated coefficient β is given by:

$$\beta^*_{DOLS} = \frac{1}{n} \sum_{i=1}^{n} \left(\sum_{t=1}^{T} z_{it} z'_{it} \right)^{-1} \left(\sum_{t=1}^{T} z_{it} y_{it}^* \right) \quad (23)$$

where $z_{it} = \left(x_{it} - \bar{x}_i, \Delta x_{it-K}, ... \Delta x_{it+K} \right)$ is vector of regressors.

Pooled Mean Group (*PMGE*) estimator, introduced by *Pesaran*, *Shin* and *Smidth* (1997), involves pooling and averaging and allows the intercepts, short run coefficients and error variances to differ freely across groups, but the long-run coefficients are constructed to be the same. They propose estimating the following autoregressive distributed lag (*ARDL*) model of order *l*1 and *l*2 :

$$\Delta \mathbf{y}_i = \beta_0 + \rho \left(\mathbf{y}_{i,-1} - \sum_{i=1}^{n} \beta_n X_i \right) + \sum_{j=1}^{l1} \lambda^*_j \Delta y_{i,-j} + \sum_{i=1}^{n} \sum_{j=0}^{l2} \Delta \mathbf{X}_{i,-j} \ddot{\mathbf{a}}^*_{ij} + \varepsilon_i \quad (24)$$

The dependent variable in the first differences is regressed on the lagged values of the dependent and independent variables in the levels and first differences. The long-run coefficients, β, are defined to be

the same across countries. The error correction term obtains from the pooled mean group estimator is used as test of cointegration. A negative and statistically significant error correction term, ρ, confirms presence of long-run relationship between y_{it} and x_{it}. The equation is estimated using the maximum likelihood procedure to get *PMGE* estimator. This regression can also be estimated with individual specific, which are then averaged over to obtain a mean-group estimator (*MGE*), which is the natural background to test for the presence of slope homogeneity based on a *Hausman* test.

FMOLS estimator has various qualities (better small sample propreties with respect to its alternatives, permits a great amount of heterogeneity). Due to this fact conclusions relating to BB and BS effect will be based mostly on FMOLS method estimates, while other methods will be used for robustness check.

2. EMPIRICAL FRAMEWORK

This section presents a brief discussion of the data sources, definitions of the variables including in empirical analysis, as well as details of empirical results.

2.1 Data sources and definitions

The data set used in this study consists of average labor productivity data, real wages, the relative prices and real exchange rates. The panel data covers 9 transition countries (Bulgaria, Croatia, Czech Republic, Hungary, Macedonia, Poland, Romania, Slovenia and Slovakia). All series are transformed into natural logarithms. Empirically testing the *BS* hypothesis was done using quarterly data covering period from 1995:1 to 2007:3. First years of transition were eliminated from this analysis due to fact that during this period price and productivity developments were much more driven by initial reforms than by the *BS* effect.

The national account data, wages and employment data are obtained from *Eurostat*, and national statistical offices, while, nominal and real exchange

rate data, as well as, *CPI* and *PPI* indices are taken from *International financial statistics*.

One crucial issue in constructing productivity and relative price variables is how to define tradable and non-tradable sector. No consensus has been reached in the literature on this issue, but most of empirical studies used industry as a tradable goods sector (mining and quarrying, manufacturing industries, electricity, gas and water supply – C, D and E of the *NACE* classification of the economic activity), or industry and agriculture, fishing and forestry (A, B, C, D and E of the *NACE*).

Average labor productivity, which is a proxy of average total productivity, is computed using the above classification as a base and by dividing the sectoral value added (*GVA*) by the corresponding number of employees (*EMP*). Sectoral productivities serve as a basis for calculating relative productivities:

$$PRI = \frac{GVA_TI / EMP_TI}{GVA_N / EMP_N} \tag{25}$$

where *TI* stands for sectors C, D and E,

$$PRIA = \frac{GVA_TIA / EMP_TIA}{GVA_N / EMP_N} \tag{26}$$

where *TIA* stands for sectors A, B, C, D and E.

Relative productivity differential is defined as a ratio of relative productivities in transition countries and euro area 12.

Three types of proxies were used as a measure of relative prices. First, relative price is defined as a ratio of the corresponding sectoral *GDP* deflators. The prices of non-tradable goods are given by the deflator for services (*GDPD_N*), while, the prices of tradable goods were given by the deflators for industry (*GDPD_T*):

$$RP1 = \frac{GDPD_N}{GDPD_T} \tag{27}$$

Second, ratio of consumer price index ( ) and producer price index ( ) was used as a proxy for relative prices:

$$RP2 = \frac{CPI}{PPI} \tag{28}$$

It assumes that all non-goods items in the *CPI* are non-tradable.

The third proxy for relative prices is the ratio of services in *CPI* ( ) and *PPI*:

$$RP3 = \frac{CPI_N}{PPI} \tag{29}$$

Real exchange rate was defined in three ways, deflated by the *PPI* (*RERP*), deflated by the *CPI* (*RERC*) and deflated by the deflator of *GVA* (*RERG*).

Productivity differentials, as well as prices in tradable and nontradable sector and relationship between relative prices and productivity differential are shown in Appendix.

2.2 Empirical Results

2.2.1 Testing PPP hypothesis

The *BS* effect contains at least two propositions. First, it implies that the relative price of non-traded goods in each country should reflect the relative productivity of labor in the traded and non-traded goods sector. Second, it assumes purchasing power parity (*PPP*) holds for traded goods.

Due to the fact that empirical evidence against *PPP* may severely impair the empirical results of the *BS* estimation, empirical testing of *PPP* has been conducted prior to formal empirical testing of *BB* and *BS* effect. Empirical testing of *PPP* has been done using two approaches, by testing stationarity of real exchange rate, and by testing cointegration between nominal exchange rate and ratio of price levels of tradables in the two countries. The weak version of PPP requires existence of cointegration between those two variables and does not require unit elasticity, while strong version requires that the nominal exchange rate is exactly equal to the price ratio.

Table 1. Panel unit root tests for real exchange rate

	Model with individual intercepts		Model with individual intercepts and individual trends	
	STATISTICS	VALUE	STATISTICS	VALUE
Levin, Lin, Chu	0.84142	0.7999	1.39205	0.9180
Im, Pesaran, Shin	0.40700	0.6580	-2.06820	0.0193**
Maddala-Wu	25.7570	0.0575*	31.7722	0.0107**
Choi	0.74573	0.7721	-1.86941	0.0308**
Hadri, W_{LM}	9.67471	0.0000***	2.95694	0.0016***
Hadri, W_{LM}*	7.53618	0.0000***	3.60478	0.0002***
Bai, Ng, Z^c_{choi}	-1.2904	0.9015	-	-
Bai, Ng, Z^c_{MW}	8.7005	0.9252	-	-
Moon, Perron, t_a	-10.619	0.000***	-2.4502	0.0071***
Moon, Perron, t_b	-5.1905	0.000***	-1.6078	0.0539*
Choi, P_m	1.6048	0.0543*	1.7282	0.0420**
Choi, Z	0.3251	0.6274	0.7356	0.2310
Choi, L*	0.1337	0.4468	-0.7748	0.2192
Chang, S_n	2.4790	0.9934	-3.6594	0.0012***

*Note: Tests were conducting under the assumption that maximum number of lags is 4 for each cross section member. * refers to statistical significance at 10% significance level, ** refers to statistical significance at 5% significance level, while *** refers to statistical significance at 1%.*

Note that trend stationarity (*TPPP*) of real exchange rate as well as stationarity in mean will be tested (*PPP*)[(1)] . In line with subsequent analysis, these tests were carried out in the panel framework, by implementing both, first and second generation panel unit root tests.

For Bai-Ng test, nonstationarity in common component was tested too. Statistics MQ_C and MQ_F suggest presence of unit root in the common component.

The presence of unit root in model with constant is confirmed by all tests except *Maddala-Wu* and *Moon-Perron* tests, while in the model with

(1) See Papell and Prodan (2003).

constant and trend it is confirmed by most of the applied tests. Applied tests are inconclusive, but presence of unit root could not been strongly rejected in any case and lead us to conclude that real exchange rate is not stationary variable. These results are, for instance, in line with results of *Banerjee*, *Marcellino* and *Osbat* (2005).

Lets us now turn to the second method of testing *PPP*. Testing cointegration has been conducted by *Kao* and *Pedroni's* panel tests.

Key element in estimation stronger version of *PPP* is selection of dependent variable. For time series, this issue could be tested in *VAR* methodology with formally testing of exogenity of variables. In a panel framework this can not be easily done.

Rawdanowicz (2004) stressed that exchange rate is not good candidate for a dependent variable in the *PPP* model for *CEEC*s. In the countires with de facto fixed or crawling peg exchange rate regimes, nominal exchange rate could be good indicator of predetermined or controlled variable. On the other hand, under more flexible exchange rate regime, nominal exchange rate tends to be volatile and hard to predict. Given these considerations, the following equation seems to be more appropriate in the case of selected countries:

$$p_T = \beta_1 e + \beta_2 p_T^*$$

where p_T denote domestic producer prices in manufacturing, e nominal euro exchange rate and p_T^* producer prices in manufacturing in euro area 12.

Producer prices in manufacturing were used as a proxy of tradable goods prices. Sum of nominal euro exchange rate and producer prices in euro area was used as a explanatory variable.

Prior to testing long run relationship between prices and nominal exchange rate, panel unit root tests were conducted to test nonstationarity, necessary condition for cointegration(2).

(2) For a practical reasons, those results have not been presented.

Choice about number of lags that are included in the model was made using *Schwarz* information criteria. Long run covariance matrix is obtained using *Newey-West* estimator with *Bartlet* kernel weight. Implementation of *Pedroni* and *Kao* cointegration tests suggests long-run relationship between prices and nominal exchange rate. This suggests evidence in favor of purchasing power parity for tradable goods sector. Although, we present all seven Pedroni test, decision relating to cointegration was made predominantly due to group *ADF*, panel *ADF* and panel ρ statistics, with respect *Pedroni`s* Monte Carlo simulations which show that those test are the most powerful in small samples.

Table 2. Panel cointegration tests

Variable: **LPPI, LNER**								
	Model with individual intercepts				Model with individual intercepts and individual trends			
	statistic	p value	weighted statistic	p value	statistic	p value	weighted statistic	p value
Panel v	2.565	0.0148**	-0.342	0.376	10.168	0.000***	5.,621	0.000***
Panel rho	-2.751	0.01**	-0.163	0.393	-10.086	0.000***	-2.909	0.006*
Panel PP	-3.485	0.001***	-0.721	0.308	-12.972	0.000***	-4.613	0.000***
Panel ADF	-3.421	0.001**	-0.747	0.302	-16.151	0.000***	-4.706	0.000***
Group rho	-2.437	0.021**	...	...	-1.973	0.006	...	...
Group PP	-3.483	0.001***	...	...	-4.719	0.000***	...	...
Group ADF	-4.902	0.000***	...	...	-6.397	0.000***	...	...
Kao ADF	-1.441	0.075*	...	...	...	...	...	...

*Note: LPPI - logarithm of domestic PPI index, LNER - sum of logarithms of nominal euro exchange rate and PPI index of euro area 12. Symbol * refers to statistical significance at 10% significance level, ** refers to statistical significance at 5% significance level, while *** refers to statistical significance at 1%.*

Cointegration vector of prices and nominal exchange rate will be estimated by several methods, *FMOLS*, *DOLS* and *PMGE*. The estimates of those methods should be interpreted as long run coefficients.

Table 3. Results of FMOLS method

	Coefficient	Test statistics
Bulgaria	2.41	16,64***
Croatia	0.78	-3.03***
Czech Republic	-0.50	-3.62***
Hungary	1.09	1.04
Macedonia	0.69	-5.69***
Poland	0.86	-0.97
Romania	1.11	2.17**
Slovakia	1.47	1.17
Average	0.99	2.73***
Average with time effects	0.99	-5.59***

*Note: Symbol * refers to statistical significance at 10% significance level, ** refers to statistical significance at 5% significance level, while *** refers to statistical significance at 1%.*

Results of *FMOLS* method suggest unit elasticity. However, estimated coefficient for Czech Republic is negative. Having in mind that *FMOLS* panel coefficient is mean average of country specific results and sensitive to outlier estimates, indication of stronger version of *PPP* is likely to be result of outcome for Czech Republic. In order to check robustness of these results, model is re-estimated excluding this country.

The exclusion of Czech Republic changed *FMOLS* estimate of cointegration coefficient to 1.2. Thus, the *FMOLS* estimator does not support stronger version of *PPP* and indicate appreciation bias. *DOLS* estimates suggest similar conclusion.

Table 4.
DOLS estimetes of cointegration vector between prices and exchange rate

	Coefficient	St. error	Statistics	p value
LNER	1.098219	0.0241834	45.41	0.000
$D(LNER)_{t-1}$	-0.844978	0.1358429	-6.22	0.000
$D(LNER)_{t+1}$	-0.0282491	0.152844	-0.18	0.854
$D(LNER)_{t-2}$	-0.8011195	0.1324824	-6.05	0.000
$D(LNER)_{t+2}$	0.1229268	0.1576153	0.78	0.436
Intercept	-5.400422	0.2324032	-23.24	0.000

On the other hand, PMGE and DFE[3] estimators indicate depreciation bias, while MGE confirms appreciation bias too.

Table 5.
MGE, PMGE and DFE estimation of cointegration vector between prices and exchange rate - excluding Czech Republic

	MGE	*PMGE*	*DFE*
LNER	1.36 (4.34)***	0.86 (12.86)***	0.957 (22.93)***
Error correction	-0.17 (-3.78)***	-0.11 (-2.77)***	-0.202 (-10.13)***
ARDL(p,q)	**ARDL (2,2)**	**ARDL (2,2)**	**ARDL (2,2)**

*Note: Test statistics are given in brackets. Best fitted model was chosen using Schwartz-Bayes criteria. Symbol * refers to statistical significance at 10% significance level, ** refers to statistical significance at 5% significance level, while *** refers to statistical significance at 1%.*

Different explanations of the *PPP* puzzle are addressed in the literature; some of the most important are: problems with precise sector division, incomplete substitutability of tradables in euro area and *CEECs*, and, the existence of the nontradables processing component introducing frictions to the international arbitrage.

The inability to empirically confirm stronger version of *PPP*, does not impact the *BB*, but on *BS* effect. The assumption of the *PPP* in the traded goods sector is the only assumption that is added to the *BS* effect testing. Violation of *PPP* suggests including real exchange rate deflated by tradable prices in the testing model.

2.3 Testing Boumol-Bowen effect

Empirical testing of *BB* effect has been conducted in three steps:

- In the first step cointegration between productivity and real wages in tradable sector has been tested,

(3) DFE constrains that all the slope coefficient and error variances to be the same.

- In the second step cointegration between wages in the tradable and non-tradable sector has been tested,
- In the third step cointegation vector between relative productivity and prices has been estimated and consequently contribution of *BB* effect to domestic inflation.

Kao and *Pedroni* cointegration tests were used for testing long run relationship between productivity in tradable sector and real wages, necessary condition for confirmation that *BS* effect is one of the most important factors of real appreciation.

Table 6.
Panel cointegration test

Variables: WAG^{TC}, PR_T^{TC}								
	Model with individual intercepts				Model with individual intercepts and individual trends			
	statistic	p value	weighted statistic	p value	statistic	p value	weighted statistic	p value
Panel v	2.2152	0.0343**	2.0765	0.046**	2.089	0.0449**	2.1847	0.0367**
Panel rho	-0.0836	0.3975	-0.4027	0.3679	1.283	0.1751	0.7561	0.2998
Panel PP	-2.5939	0.0138**	-2.7902	0.008***	-3.196	0.0024***	-3.7740	0.0003***
Panel ADF	-1.8801	0.0681*	-2.2226	0.034**	-1.721	0.0908*	-2.6559	0.0117**
Group rho	1.0253	0.2359	...	...	1.4588	0.1377	...	...
Group PP	-2.3768	0.0237**	...	...	-4.3959	0.0000***	...	...
Group ADF	-1.1674	0.2018	...	...	-3.4635	0.0010***	...	...
Kao ADF	-2.0411	0.0206**	...	...	...	...	...	...

*Note: PR_T^{TC} - logarithm of productivity measure in tradable goods sector, WAG^{TC} real wages in industry. Symbol * refers to statistical significance at 10% significance level, ** refers to statistical significance at 5% significance level, while *** refers to statistical significance at 1%.*

Cointegration relationship was confirmed by all tests for the model with constant and trend and partly for a model with individual intercept only.

Table 7.
FMOLS and PMGE estimation of cointegration relationship between real wages and productivity

	FMOLS	*MGE*	*PMGE*
PR_T^{TC}	0.43 (-46,28)***	0.466 (2.56)***	0.656 (12.21)***
Error correction	-	-0.184 (-4.71)***	-0.08 (-3.95)***
ARDL(p,q)		**ARDL (1,1)**	**ARDL (1,1)**

Note: Test statistics are given in brackets.

FMOLS and *PMGE* results are broadly in line with findings from cointegration analysis, but estimated coefficient of real wages elasticity is far from one. This suggests that it would be unlikely to expect significant effect of *BS* effect on inflation and real appreciation. These findings are in line with results of *Egert's* (2005) analysis for panel of European Union candidates (Bulgaria, Croatia, Turkey, Romania), and Former SSSR countries (Russia and Ukraine), those found real wage elasticity ranges from 0.5 to 0.8.

Table 8. Panel cointegration test

Variable: WAG_N^{TC}, WAG_T^{TC}				
	Model with individual intercepts		Model with individual intercepts and individual trends	
	statistic	p value	statistic	p value
Panel v	-0.1782	0.3927	5.569	0.000***
Panel rho	-1.5669	0.1169	-0.7233	0.3071
Panel PP	-8.9428	0.0000***	-3.2607	0.0020***
Panel ADF	-0.3438	0.3761	2.2137	0.034**
Group rho	1.4982	0.1299	2.7682	0.009*
Group PP	-3.2080	0.0023***	1.3286	0.1650
Group ADF	0.0314	0.3987	0.5576	0.3415
Kao ADF	-0.4408	0.3297	...	...

*Note: Symbol * refers to statistical significance at 10% significance level, ** refers to statistical significance at 5% significance level, while *** refers to statistical significance at 1%.*

In the next step, cointegration between wages in traded goods sector and in non-traded goods sector has been tested. Wages in construction, transport, trade, education and healthy weighted by number of employees in those sector were used as a proxy for non-tradable sector wages, while wages in industry were used as a proxy of tradable sector wages. In contrast to contegration analysis of long-run relationship between relative productivity and wages, relationship between wages in the tradable and non-tradable goods sector is less obvious and, which is more important, not confirmed by the test that we consider as the most appropriate (group ADF, panel ADF and panel). This result is of great importance for empirical testing BB effect. Namely, if assumption of wage equalization is not satisfied, difference of wages in tradable and non-tradable sector should be included as a factor of domestic inflation in addition to relative productivity.

In the third step, cointegration between relative prices and relative productivity has been tested.

Table 9. Panel cointegration test

Variables: **RP1, PRI**				
	Model with individual intercepts		**Model with individual intercepts and individual trends**	
	unweight. statistics	p value	statistic	p value
Panel v	2.3779	0.0236**	-0.1053	0.3967
Panel rho	-1.1151	0.2142	0.1922	0.3916
Panel PP	-6.4806	0.0000***	-6.4767	0.0000***
Panel ADF	-5.6037	0.0000***	-3.9147	0.0002***
Group rho	0.2682	0.3848	1.6862	0.0963*
Group PP	-5.2885	0.0000***	-4.3691	0.0000***
Group ADF	-7.2672	0.0000***	-5.2826	0.0000***
Kao ADF	-0.9108	0.1812	...	...

*Note: Symbol * refers to statistical significance at 10% significance level, ** refers to statistical significance at 5% significance level, while *** refers to statistical significance at 1%. Number of lags for Kao test is 4, while for Pedroni test differs across the individual members.*

Table 10. Panel cointegration test

Variables: **RP1, PRIA**				
	Model with individual intercepts		**Model with individual intercepts and individual trends**	
	statistic	p value	statistics	p value
Panel v	1.841933	0.0731*	-0.1002	0.3969
Panel rho	-1.058191	0.2279	0.3726	0.3722
Panel PP	-5.777619	0.0000***	-6.3652	0.0000***
Panel ADF	-5.387458	0.0000***	-5.4974	0.0000***
Group rho	0.239569	0.3877	1.7968	0.0794*
Group PP	-4.994709	0.0000***	-4.2618	0.0000***
Group ADF	-5.474198	0.0000***	-4.4545	0.0000***
Kao ADF	-1.565739	0.0587*	...	...

*Note: Symbol * refers to statistical significance at 10% significance level, ** refers to statistical significance at 5% significance level, while *** refers to statistical significance at 1%. Number of lags for Kao test is 4, while for Pedroni test differs across the individual members.*

Table 11. Panel cointegration test

Променљиве: **RP2, PRI**				
	Model with individual intercepts		**Model with individual intercepts and individual trends**	
	statistic	p value	statistic	p value
Panel v	-0.988779	0.2447	-0.1930	0.3916
Panel rho	1.805738	0.0781*	2.6075	0.0133**
Panel PP	0.926440	0.2597	0.3985	0.3685
Panel ADF	0.895487	0.2672	-0.1194	0.3961
Group rho	2.462654	0.0192**	1.6862	0.0963*
Group PP	0.801080	0.2894	-4.3691	0.0000***
Group ADF	0.681645	0.3162	-5.2826	0.0000***
Kao ADF	-0.576714	0.2821	...	...

*Note: Symbol * refers to statistical significance at 10% significance level, ** refers to statistical significance at 5% significance level, while *** refers to statistical significance at 1%. Number of lags for Kao test is 4, while for Pedroni test differs across the individual members.*

Cointegration relationship was strongly confirmed for relative prices and relative productivity if *GDP* deflators are used as a proxy of relative prices. On the other hand, long run relationship between relative prices and productivity is less clear if other two measures of relative prices are used.

Estimation of price elasticity to relative productivity growth, which is base for estimation impact o*f BB* on prices of non-tradable goods, was done by *FMOLS* method.

Table 12.
FMOLS estimation of cointegation between RP1 and PRI

	Coefficient	Test statistics
Czech Republic	0.49	-8.33***
Croatia	0.14	-11.58***
Poland	0.52	-5.66***
Hungary	0.53	-2.90***
Slovenia	0.56	-13.12***
Slovakia	0.65	-5.73***
Macedonia	0.20	-27.05***
Bulgaria	0.07	-6.87***
Average without time effects	0.40	-28.73***
Average with time effects	0.44	-16.74***

*Note: Symbol * refers to statistical significance at 10% significance level, ** refers to statistical significance at 5% significance level, while *** refers to statistical significance at 1%.*

Results of *FMOLS* method suggest that faster productivity growth in tradable goods sector for 1% cause increase prices of non-tradable goods measured by *GDP* deflators for 0.4 percentage points. Estimation of this effect for separate countries ranges from 0.1, which is estimation for Bulgaria, to 0.65, which is estimation for Slovakia. All estimated coefficients are positive and statistical significant.

Those findings are in line with *Blaszkiewicz* and others (2004). Estimated coefficient in the case of *Blaszkiewicz* and others (2004) is 0.44, positive

but not statistically significant for all countries included in analysis (*CEECs*, Latvia, Lithuania and Estonia).

For the sake of robustness check, *MGE*, *PMGE* and *DOLS* methods estimated the same relationship. In line with *FMOLS* results, *MGE*, *PMGE* and *DOLS* point to well behaved and statistically significant *BB* effect. In all three models, panel long run coefficients are positive and statistically significant. Elasticity obtained by *MGE* and *DOLS* method is similar to *FMOLS*, while elasticity obtained from *PMGE* is little bit higher.

Table 13.

MGE, PMGE and DOLS estimators of cointegration vector between relative prices measured by GDP deflators (RP1) and relative productivity (PRI)

	MGE	***PMGE***	***DOLS***
PRI	0.382 (3.86)***	0.558 (14.79)***	0.398 (14.31)***
Error correction term	-0.414 (-6.92)***	-0.309 (-5.29)***	
specification	**ARDL (1,1)**	**ARDL (1,1)**	**DOLS (2,2)**

*Note: Symbol * refers to statistical significance at 10% significance level, ** refers to statistical significance at 5% significance level, while *** refers to statistical significance at 1%. Test statistics are given in brackets.*

Estimates are not changed much if both industry and agriculture are included as tradable sector. Taking that share of agriculture in total gross value is low, except for Slovakia, Romania and Bulgaria, including agriculture does not change estimation of impact of productivity to non-tradable prices.

Only for Bulgaria, due to very low productivity in agriculture, coefficient is negative. In contrast to *FMOLS*, *MGE* method produces positive coefficient for Bulgaria too. Estimates obtained from *MGE*, *PMGE* and *DFE* are, like in a previous case, very close to *FMOLS* estimates.

Table 14.
FMOLS estimator of cointegration between RP1 and PRIA

	Coefficient	Test statistics
Czech Republic	0.47	-8.88***
Croatia	0.18	-9.42***
Poland	0.49	-6.00***
Hungary	0.32	-5.18***
Slovenia	0.56	-12.98***
Slovakia	0.57	-9.93***
Macedonia	0.23	-25.27***
Bulgaria	-0.14	-17.41***
Average without time effects	0.33	-33.62***
Average with time effects	0.37	-19.22***

*Note: Symbol * refers to statistical significance at 10% significance level, ** refers to statistical significance at 5% significance level, while *** refers to statistical significance at 1%.*

Table 15.
MGE, PMGE and DFE estimator of cointegration vector between RP1 and PRIA

	MGE	*PMGE*	*DFE*
PRIA	0.357 (4.7)***	0.540 (16.09)***	0.480 (11.49)***
Error correction term	-0.412 (-5.67)***	-0.312 (-4.3)***	-0.346 (-8.24)***
ARDL(p,q)	ARDL(1,1)	ARDL(1,1)	ARDL(1,1)

*Note: Symbol * refers to statistical significance at 10% significance level, ** refers to statistical significance at 5% significance level, while *** refers to statistical significance at 1%.Test statistics are given in brackets.*

If ratio of *CPI* and *PPI* indices is used as a proxy of relative prices, relationship between prices and productivity is less obvious. Results of *FMOLS* estimation suggest that contribution of productivity to inflation is approximately 0.2%, moreover in a case of *MGE* method, relationship is not statistically significant.

Table 16.
FMOLS estimation of cointegration vector between RP3 and PRIA

	Coefficient	Test statistics
Czech Republic	0.25	-7.58***
Croatia	0.86	-0.89
Poland	0.41	-2.91***
Hungary	0.59	-2.70***
Slovenia	0.42	-5.31***
Slovakia	0.55	-9.08***
Average	0.51	-11.62***

*Note: Symbol * refers to statistical significance at 10% significance level, ** refers to statistical significance at 5% significance level, while *** refers to statistical significance at 1%. Panel for six countries is used (excluding Romania, Bulgaria and Macedonia).Two lags for kernel estimators are used, but different specification does not alter estimated coefficient.*

Results of *FMOLS* method suggest that faster productivity in tradable sector relative to non tradable sector for 1% cause increase of relative prices measured by ratio of services in *CPI* and *PPI* for 0.5%. Although existence of *BB* effect is confirmed, for most countries, this effect is smaller than half a percent. Moreover, this effect is smaller than most of previous studies suggest. Even though, for all countries, except Bulgaria, no matters which measure of productivity and relative prices are used, elasticity coefficient is positive and statistically significant in panel framework.

Estimated coefficient of elasticity should be multiplied by the historical average of the domestic productivity differential to obtain the contribution of the productivity differential to the increase in relative prices in percentage points. Finally, this contribution should be multiplied by the share of non-tradable goods and services in the CPI to obtain BB effect.

Table 17.
Estimates of Baumol-Bowen effect

Country	Average inflation 1995-2007	Baumol-Bowen effect (RP1, PRI)	Baumol-Bowen effect (RP3, PRIA)
Czech Republic	4.27	1.121684	0.778311
Croatia	3.63	0.369285	2.268463
Poland	6.91	1.134061	0.894164
Hungary	9.39	0.803163	0.894088
Slovenia	6.64	1.469832	1.653561
Slovakia	6.34	1.65452	1.501795
Macedonia	1.95	0.81857	....
Bulgaria	35.8	0.062902	....
Romania	31.40	…..	....
Average	**11.82**	**0.940639**	**1.340411**

Those findings suggest that approximately one percentage point of inflation could be explained by *BB* effect. Results show that highest contribution of *BB* effect is in Slovenia, Slovakia and Croatia (measured by *RP3*), while the lowest effect is in Bulgaria, where is the lowest difference between productivity in the tradable and non-tradable sector. Estimation of *BB* effect depends of elected measure of relative prices only in the case of Croatia.

With a reference to check whether *BB* effect become stronger or weaker during the transition and catching up process, analysis was also conducted for sub-sample period from 1995 to 2003 for countries that started process of transition earlier (Poland, Czech Republic, Slovakia, Slovenia, Hungary and Croatia). Main policy implications of these results are that *BB* effect is not determining factor in the ability of *CEECs* to satisfy the Maastricht inflation criteria.

Both, *FMOLS* and *MGE* estimates suggest that *BB* effect is stronger in the first phase of transition (for period 1995:2003). Taking into account that Slovenia has already satisfied those criteria and in 2007 became a member of *EMU*, it is unlikely to expect that other countries would not be able to do the same.

Table 18.
FMOLS estimation of cointegration vector between RP1 and PRI for two periods

	1995-2003	1995-2007
Czech Republic	0.83 (-2.20)**	0.49 (-8.33)***
Croatia	0.44 (-10.49)***	0.14 (-11.58)***
Poland	0.79 (-1.53)	0.52 (-5.66)***
Hungary	2.13 (3.03)***	0.53 (-2.90)***
Slovenia	0.45 (-12.51)***	0.56 (-13.12)***
Slovakia	0.71 (-1.64)	0.65 (-5.73)***
Average	0.89 (-10.35)***	0.48 (-19.32)***

*Note: Symbol * refers to statistical significance at 10% significance level, ** refers to statistical significance at 5% significance level, while *** refers to statistical significance at 1%. Panel for six countries is used (excluding Romania, Bulgaria and Macedonia). Two lags for kernel estimators are used, but different specification does not alter estimated coefficient.*

Table 19.
MGE estimation of cointegration vector between RP1 and PRI for two periods

	MGE **(1995-2003)**	*MGE* **(1995-2007)**
PR1	0,754 (4.30)***	0.5063 (7.41)***
Error correction term	-0,459 (-3.83)***	-0.384 (-6.99)***
ARDL(p,q)	ARDL (1,1)	ARDL (1,1)

*Note: Symbol * refers to statistical significance at 10% significance level, ** refers to statistical significance at 5% significance level, while *** refers to statistical significance at 1%.Test statistics are given in brackets.*

Although in the case of *PMGE* method estimated coefficient is higher for the whole sample (0.56), those estimates are close to estimates for the shorter period (0.48).

Standard version of *BB* effect could be extended to alternative specification that captures fact that assumption on wage equalization is not necessary satisfied, due to differences in skills and human capital. Therefore, we could relax assumption on wage equalization and test extended version of

BB effect, including wage differential as additional factor of increase in relative prices:

$$\left(CPI^{TC} - PPI^{TC}\right)_t = \beta_1\left[(1-\alpha^{TC})(PR_T^{TC} - PR_N^{TC})_t\right] + \beta_2\left[(1-\alpha^{TC})(WAG_T^{TC}\right.$$

Previous equation shows that relative prices $\left(CPI^{TC} - PPI^{TC}\right)$ depend on sectoral productivity growth $(PR_T^{TC} - PR_N^{TC})$ and wage differential $(WAG_T^{TC} - WAG_N^{TC})$.

It was mentioned in previous section that empirical analysis of BB effect should include wage differential, if wages in the tradable and non-tradable sector do not tend to equalize or if difference between them is not stable.

From theoretical point of view, if empirics do not approve wage equalization, this means that *BB* and *BS* effect could not fully explain increase of non-tradable inflation and real exchange rate appreciation. As the previous analysis had not made clear evidence whether wage equalization happen in *CEEC* countries, extended version of *BB* was tested.

Table 20.

Johansen panel cointegration test for relative prices, productivity and wages

Null hypothesis	Panel trace statistics	p value	Panel max eigen value	p value
None	41.47	0.0000	41.33	0.0000
At most 1	12.80	0.3838	11.51	0.4856
At most 2	9.258	0.6807	9.258	0.6807

Note: Cointegration vector estimated under assumption that number of lags is 2. Panel for six countries is used (excluding Romania, Bulgaria and Macedonia)

Panel *Johansen* cointegration test proposed by *Maddala* and *Wu* commit that relative prices, wages and productivity differential are cointegrated, but not regressors among themselves. With a reference to this result, *FMOLS* method could be used.

Due to opposite coefficient of wage differential for some countries and almost unchanged coefficient for productivity, it could be concluded that including wage differential as additional factor of inflation does not contribute much to non-traded good prices.

Table 21.
FMOLS estimates of cointegration vector between relative prices, productivities and wages differential

	PR_T^{TC} - PR_N^{TC}		WAG_T^{TC} - WAG_N^{TC}	
	Coefficient	Statistics	Coefficient	Statistics
Czech Republic	0.60	-3.66***	1.28	1.12
Croatia	0.17	-11.65***	-0.86	-2.18**
Poland	-0.06	-8.43***	-1.46	-2.81***
Hungary	0.20	-2.66**	-0.82	-1.49
Slovenia	0.54	-8.80***	0.51	1.08
Slovakia	0.55	-6.92***	-0.12	-0.22
Average	**0.33**	**-17.19*** **	**-0.25**	**-1.84***

*Note: Symbol * refers to statistical significance at 10% significance level, ** refers to statistical significance at 5% significance level, while *** refers to statistical significance at 1%. Panel for six countries is used (excluding Romania, Bulgaria and Macedonia) .Two lags for kernel estimators are used, but different specification does not alter estimated coefficient.*

Most other research studies in this area assumed wage equalization in tradable and non-tradable sectors and wage differential was not explicitly used as factor, as in the case of *Cipriani* (2001) and *Egert* and others (2003). *Mihaljek* and others (2004), for instance, included wages as regressor in a case of two countries. On the other hand, *Lojschova* (2003) included wages as regressor and tested extended version of *BB* effect, but estimated coefficients of productivity were not changed significantly.

3.4 Testing Balassa-Samuelson effect

Testing *BS* effect has been put in place through several steps. In the first step, cointegration between real exchange rate and the difference in

relative productivity in transition countries relative to euro area (as the main trading partner for most of these countries) has been tested.

Most of implemented panel cointegration tests suggest long-run relationship of real exchange rate and the difference in relative productivity in transition countries and euro area.

Table 22.
Panel cointegration test of real exchange rate (RERP) and productivity differential (RPR1)

Variables: **RERP, RPR1**				
	Model with individual intercepts		Model with individual intercepts and individual trends	
Q1 1995 – Q3 2007	statistic	p value	statistic	p value
Panel v	-0.330731	0.3777	2.4798	0.0184**
Panel rho	0.806335	0.2882	2.0463	0.0492**
Panel PP	-0.966737	0.2500	-0.9801	0.2468
Panel ADF	-1.828111	0.0750*	-1.4209	0.1454
Group rho	1.914503	0.0638*	1.9243	0.0626*
Group PP	-0.463451	0.3583	-1.6637	0.1000
Group ADF	-1.320803	0.1668	-2.7563	0.0089***
Kao ADF	-1.679214	0.0466**	...	...

*Note: Symbol * refers to statistical significance at 10% significance level, ** refers to statistical significance at 5% significance level, while *** refers to statistical significance at 1%. Number of lags for Kao test is 4, while for Pedroni test differs across the individual members. RPR1 corresponds to productivity differential PRI.*

Table 22.
Panel cointegration test of real exchange rate (RERC) and productivity differential (RPR1)

Variables: **RERC, RPR1**				
	Model with individual intercepts		Model with individual intercepts and individual trends	
Q1 1995 – Q3 2007	statistic	p value	statistic	p value
Panel v	-0.866642	0.2740	1.0074	0.2402
Panel rho	1.258373	0.1807	2.5218	0.0166**
Panel PP	-1.029987	0.2347	-0.3822	0.3708
Panel ADF	-1.367675	0.1566	-0.0709	0.3979
Group rho	2.419250	0.0214**	2.5683	0.0147**
Group PP	-0.283652	0.3832	-0.9217	0.2609
Group ADF	-0.884476	0.2698	-1.7335	0.0888*
Kao ADF	-2.427357	0.0076***	...	...

*Note: Symbol * refers to statistical significance at 10% significance level, ** refers to statistical significance at 5% significance level, while *** refers to statistical significance at 1%. Number of lags for Kao test is 4, while for Pedroni test differs across the individual members.*

Kao and most of *Pedroni's* tests for model with individual constants and trend confirm cointegration between real exchange rate based on tradable goods prices (*RERP*) and productivity differential[(4)]. In the case of model with individual constants, only *Pedroni* group ρ statistics confirms cointegration.

Conclusions related to cointegration were not changed in the case of real exchange rate computed based on consumer prices (*RERC*) instead of producer prices. Most of *Pedroni's* tests for model with constant and trend confirm cointegration, while it is not the case with the model with individual constants only.

(4) Only results for RPR1 were presented for the practical reasons.

Table 23.
Panel cointegration test of real exchange rate (RERG) and productivity differential (RPR2)

Variables: **RERG, RPR2**				
	Model with individual intercepts		Model with individual intercepts and individual trends	
Q1 1995 – Q3 2007	statistic	p value	statistic	p value
Panel v	0.088457	0.3974	-0.8703	0.2732
Panel rho	0.366161	0.3731	1.1507	0.2058
Panel PP	-2.494480	0.0178**	-3.2581	0.0020***
Panel ADF	-1.833462	0.0743*	-1.5428	0.1213
Group rho	1.278552	0.1762	1.7076	0.0928*
Group PP	-2.147606	0.0398**	-3.5158	0.0008***
Group ADF	-1.116283	0.2140	-1.9943	0.0546*
Kao ADF	-0.318222	0.3752	...	...

*Note: Symbol * refers to statistical significance at 10% significance level, ** refers to statistical significance at 5% significance level, while *** refers to statistical significance at 1%. Number of lags for Kao test is 4, while for Pedroni test differs across the individual members. RPR2 corresponds to productivity differential PRIA.*

Cointegration between real exchange rate and productivity differential is more obvious and confirmed by more panel cointegration tests if Macedonia, Bulgaria and Romania are excluded from analysis.

Table 24.
Panel cointegration test of real exchange rate (RERG) and productivity differential (RPR2)

Variables: **RERG, RPR2**				
	Model with individual intercepts		Model with individual intercepts and individual trends	
Q1 1995 – Q3 2007	**statistic**	**p value**	**statistics**	**p value**
Panel v	0.151408	0.944	0.8111	0.2871
Panel rho	2.544116	0.0157**	3.9817	0.0001***
Panel PP	-1.901014	0.0655*	-2.0655	0.0473**
Panel ADF	-1.977824	0.0564*	-2.2185	0.0341**
Group rho	3.600786	0.0006***	4.5498	0.0000***
Group PP	-1.440104	0.1414	-2.5164	0.0168**
Group ADF	-1.452055	0.1390	-3.0724	0.0036***
Kao ADF	0.811197	0.2871	...	...

*Note: Symbol * refers to statistical significance at 10% significance level, ** refers to statistical significance at 5% significance level, while *** refers to statistical significance at 1%. Number of lags for Kao test is 4, while for Pedroni test differs across the individual members. Panel for six countries is used (excluding Romania, Bulgaria and Macedonia).*

Taking into account that all necessary conditions are fulfilled, next step of analysis is estimation of average contribution of productivity differential to inflation differential. Therefore, we estimated standard version of BS effect:

$$\left(CPI^{TC} - CPI^{EA}\right)_t = \beta_1 LNNK^{TC} + \beta_2\left[(1-\alpha^{TC})(PR_T^{TC} - PR_N^{TC})_t - (1-\alpha^{EA})(PR_T^{EA} - PR_N^{EA})_t\right] + \varepsilon_t$$

where inflation differential in a country and euro area $\left(CPI^{TC} - CPI^{EA}\right)$ depend on nominal exchange rate, $LNNK^{TC}$, and relative productivity differential.

Equation was tested in three variants: using producer prices in industry (*RERP*), consumer prices (*RERC*) and GDP deflators (*RERG*). Standard version of BS effect fully corresponds to testing cointegration between real exchange rate and productivity differential.

Table 25.
FMOLS estimation of cointegration vector between real exchange rate (RERP) and productivity differential (RPR1)

	Coefficient	Test statistics
Czech Republic	-0.77	-8.44***
Croatia	0.23	-10.78***
Poland	-0.44	-4.09***
Hungary	0.56	-2.06***
Slovenia	0.43	-7.51***
Slovakia	-0.83	-12.42***
Macedonia	0.11	-24.34***
Bulgaria	1.14	0.66
Romania	-0.53	-7.46***
Average	**-0.03**	**-25.48*** **

*Note: Symbol * refers to statistical significance at 10% significance level, ** refers to statistical significance at 5% significance level, while *** refers to statistical significance at 1%.*

Results of *FMOLS* method of estimation shows that in contrast to *BB* effect, which was confirmed for all transition countries, less evidence is in favor of *BS* effect. In the case of *BB* effect cointegration tests established robust cointegration relationships and estimation techniques produces correctly signed panel coefficients, which is not the case with *BS* effect. Even though average coefficient has right sign (negative), elasticity coefficients for some countries are positive and significant.

Table 26.
FMOLS estimation of cointegration vector between real exchange rate (RERC) and productivity differential (RPR1)

	Coefficient	Test statistics
Czech Republic	-0.95	-6.94***
Croatia	-0.18	-11.36***
Poland	-1.07	-3.61***
Hungary	0.40	-0.64
Slovenia	-0.16	-16.21***
Slovakia	-1.12	-9.24***
Macedonia	0.09	-20.91***
Bulgaria	1.49	2.28**
Romania	-0.21	-8.31***
Average	**-0.19**	**-23.81*** **

*Note: Symbol * refers to statistical significance at 10% significance level, ** refers to statistical significance at 5% significance level, while *** refers to statistical significance at 1%.*

Table 27.
FMOLS estimation of cointegration vector between real exchange rate (RERG) and productivity differential (RPR1)

	Coefficient	Test statistics
Czech Republic	-1.17	-7.49***
Croatia	-0.35	-8.02***
Poland	-0.87	-3.34***
Hungary	0.69	-0.30
Slovenia	-0.64	-20.55***
Slovakia	-1.06	-10.23***
Macedonia	-0.07	-28.78***
Bulgaria	0.24	-4.48***
Romania	0.04	-5.60***
Average	**-0.36**	**-29.60*** **

*Note: Symbol * refers to statistical significance at 10% significance level, ** refers to statistical significance at 5% significance level, while *** refers to statistical significance at 1%.*

Relationship is more obvious if *GDP* deflators or *CPI* prices are used instead of producer prices. Therefore, if *PPP* theory is confirmed, at least weaker version, it is unlikely to expected strong relationship between productivity and real exchange rate measured by tradable goods prices. Particularly, *BS* effect is not evident for Macedonia, Bulgaria and Hungary, while elasticity coefficients are not changed much no matter which measure of real exchange rate is used.

Analysis shows that relationship between productivity differential and real exchange rate is strongest in the case of using *RPR2* productivity measure, which includes agriculture as tradable sector too. Estimated elasticity in that case is –0.47 and has right sign for all countries except Romania and Bulgaria.

Table 28.
FMOLS estimation of cointegration vector between real exchange rate (RERG) and productivity differential (RPR2)

	Coefficient	Test statistics
Czech Republic	-1.19	-9.07***
Croatia	-0.28	-5.68***
Poland	-0.72	-3.40***
Hungary	-0.94	-3.45***
Slovenia	-0.62	-19.82***
Slovakia	-0.93	-16.07***
Macedonia	-0.14	-38.54***
Bulgaria	0.32	-3.42***
Romania	0.31	-7.64***
Average	**-0.47**	**-35.70*** **

*Note: Symbol * refers to statistical significance at 10% significance level, ** refers to statistical significance at 5% significance level, while *** refers to statistical significance at 1%.*

PMGE estimates suggest the same conclusion as *FMOLS*, *BS* effect is less evident compare to *BB* effect. *PMGE* estimates suggest existence of relationship between relative productivity differential and real appreciation, because estimated long run coefficient is negative and

statistical significant, as well as error correction term. This suggests empirical verification of *BS* effect.

Table 29.
DFE, DOLS and PMGE estimation of cointegration vector between real exchange rate (RERG) and productivity differential (RPR1)

	DFE	***PMGE***	***DOLS***
RPR1	-0.640 (-3.31)***	-0.541 (-5.86)***	-0.787 (10.72)***
Error correction term	-0.167 (-5.90)***	-0.216 (-4.17)***	….
ARDL(p,q)	**ARDL (1,1)**	**ARDL (1,1)**	**DOLS(4,4)**

*Note: Symbol * refers to statistical significance at 10% significance level, ** refers to statistical significance at 5% significance level, while *** refers to statistical significance at 1%.Test statistics are given in brackets.*

Table 30.
DFE and PMGE estimation of cointegration vector between real exchange rate (RERG) and productivity differential (RPR2)

	DFE	***PMGE***
RPR2	-0.495 (-2.75)***	-0.497 (-5.02)***
Error correction term	-0.174 (-5.64)***	-0.208 (-5.31)***
ARDL(p,q)	**ARDL (1,1)**	**ARDL (1,1)**

*Note: Symbol * refers to statistical significance at 10% significance level, ** refers to statistical significance at 5% significance level, while *** refers to statistical significance at 1%.Test statistics are given in brackets.*

As it was said earlier, the inability to empirically confirm stronger version of *PPP*, does not impact the *BB*, but on *BS* effect. Violation of *PPP* suggests including real exchange rate deflated by tradable prices in the testing model. For that reason cointegration vector was estimated for prices of tradable goods, productivity differential and real exchange rate. First, we have to ensure that there is only one cointegration vector, in other words that there is no cointegration among the regressors. To check these, we used *Johansen* panel cointegration test, while *FMOLS* and *PMGE* estimators were used to estimate relationship.

Table 31.
Johansen panel cointegration test for real exchange rate, productivity and tradable good prices

Null hypothesis	Panel trace statistics	p value	Panel max eigen value	p value
None	75.97	0.0000	77.23	0.0000
At most 1	18.80	0.1727	15.02	0.3770
At most 2	14.77	0.3943	14.77	0.3943

Table 32.
FMOLS and PMGE estimation of cointegration vector between real exchange rate (RERG), tradable price and productivity differential (RPR2)

	FMOLS	***PMG***
RPR2	-0.39 (-20.24)***	-0.37 (-2.65)***
*PPI - PPI**	0.27 (4.57)***	-0.11 (-0.96)
Error correction term	…..	-0.24 (-8.02)***

*Note: Symbol * refers to statistical significance at 10% significance level, ** refers to statistical significance at 5% significance level, while *** refers to statistical significance at 1%.Test statistics are given in brackets.*

Including tradable good prices has not contributed to explain the real exchange rate by productivity differential and, for *PMGE* case, it has opposite sign than expected, but not statistically significant.

Contribution of productivity differential to relative prices growth is obtained as a product of estimated elasticity coefficient and average productivity differentials based on historical trends.

Table 33.
Balassa-Samuelson effect

Country	Average real appreciation 1995-2007	***BS effect*** (RERG, RPR2)
Czech Republic	-4.90	-2.4833
Croatia	-1.55	-0.7526
Poland	-3.33	-1.3681
Hungary	-4.57	-0.7076
Slovenia	-1.32	-1.6525
Slovakia	-5.36	-2.3516
Macedonia	1.33	-0.7275
Bulgaria	-6.81	-0.0994
Romania	-4.78	0.6953
Average	**-3.48**	**-1.0293**

On average, *BS* effect contribution to real appreciation is 1%. This is a relatively small fraction of the rate of overall inflation. Taking into account that average real appreciation is approximately 3% in *CEECs* and *SEECs*, it could be concluded that BS effect is not the most important reason of currency real appreciation. Note that results seem to suggest that *BS* effect is stronger in more advanced economies. One of explanation why is *BS* effect less evident in Bulgaria, Macedonia and Romania is price liberalization process, that triggered both tradable and non-tradable goods and services prices, which could not be directly explained by the productivity growth and *BS* effect. Low share of non-traded goods in the *CPI* index could be also one of explanations. Moreover, what seems to characterize these countries is that productivity has been growing fast not only in tradable goods sector, but also in non traded goods sector. Process of liberalization and opening these economies for foreign direct investments, as well as growing of public expenditure through aggregate demand channel could contribute to real appreciation in those countries more than *BS* effect.

These results are in line with results of empirical analysis of *Cipriani*, *Egert* and others (2003), *Mihaljek* and others (2004), *Blaszkiewicz* and others (2004), *Lojschova* (2003). Results of these analyses suggest that on average 1.5% of real exchange rate appreciation could be explained by *BS*

effect. However, some of those analyses include Baltic countries (Latvia, Lithuania and Estonia), where this effect is more obvious, not Macedonia, Bulgaria and Romania, where this effect is less evident. Also, most of these analyses cover period prior to 2004, when most of those countries experienced strong productivity growth in tradable sector due to both capital deepening and labor quality improvements. The large productivity gains are unlikely to be sustained in next period due to convergence euro area process and finishing transition process.

CONCLUDING REMARKS

In this paper we investigated the importance of Baumol-Bowen and Balassa-Samuelson effect in nine transition countries, *CEECs* and *SEECs*. Using panel estimation techniques we find evidence in favor of the *BB* and *BS* effect. Panel cointegration test detected relationship between productivity and relative prices (*BB* effect) and partly relationship between relative productivity differential vis-à-vis euro area and real exchange rate (*BS* effect). Similar evidence resulted from *FMOLS*, *DOLS* and *PMGE* methods. While evidence of the *BB* effect is robust to alternative model formulation, the evidence concerning the *BS* effect is less convincing and sensitive to model formulation.

The econometric analysis shows that *BS* effect is less evident particularly for Romania, Bulgaria and Macedonia. Possible explanation for limited role of *BS* effect for overall inflation and real exchange rate appreciation is failure some of the most important preconditions (stronger version of *PPP* holds, real wages are proportionately linked to productivity in tradable sector, wage equalization).

Findings suggest that approximately one percentage point of inflation could be explained by *BB* effect. Results show that highest contribution of *BB* effect is in Slovenia and Slovakia, while the lowest effect is in Bulgaria, where is the lowest difference between productivity in the tradable and non-tradable sector.

With a reference to check whether *BB* effect become stronger or weaker during the transition and catching up process, analysis was conducted for sub-sample period from 1995 to 2003 for countries that started process of transition earlier (Poland, Czech Republic, Slovakia, Slovenia, Hungary and Croatia). Most of results pointed out that *BB* and *BS* effects are stronger in the first phase of transition. Main policy implications of these results are that productivity growth is not determining factor in the ability of those countries to satisfy the Maastricht inflation criteria. Slovenia has already satisfied these criteria and became EMU member, while Slovakia will become next year.

On average, *BS* effect contribution to real appreciation is 1 percentage points. This is a relatively small fraction of the overall inflation. Taking into account that average real appreciation is approximately 3% in *CEECs* and *SEECs*, it could be concluded that *BS* effect is not the most important reason of currency real appreciation nor in *CEECs* neither in *SEECs*.

Low inflation figures recorded last couple of years may not be sustained; increase of oil prices as well as food prices impair inflation target in most countries. This suggests that a concern to *BB* and *BS* effect still play role for inflation and real exchange rate, although not as significant as in the earlier stage of transition.

References

(1) Baltagi, Badi H., (2001). *Econometric analysis of panel data*. 2nd edition. New York: John Wiley & Sons. LTD,

(2) Banerjee, A. Marcellino, M., Osbat. C.. (2005). "Testing for PPP: Should we use panel methods?". Empirical Economics 30. 77–91,

(3) Bhagwati. J. N., (1984), "Why are services cheaper in the poor countries?", The Economic Journal. Vol 94. 279-286

(4) Blaszkiewicz M., P. Kowalski, L. Radwdanowicz, P. Wozniak (2004), "Harrod-Balassa-Samuelson effect in selected countries of Central and Eastern Europe", CASE Reports No.57,

(5) Breuss F., (2003), "Balassa-Samuelson effect in the CEEC: Are they obstacles for joining the EMU?", Working Paper No 52. Research Institute for European Affairs,

(6) Cipriani M., (2001), "The Balassa-Samuelson effect in transition economies". mimeo. IMF,

(7) Coricelli, F an B. Jazbec (2001), Real exchange rate dynamics in transition economies, CEPR Discussion Paper , no 2869

(8) De Broeck, M and T. Slok (2001), Interpreting real exchange rate movements in transition countries, IMF Working Paper, no 01/56

(9) Egert B., I. Drine, C. Rault (2002), „On the Balassa-Samuelson effect in the transition process: A panel study. economics of transition", 10. pp 1-16,

(10) Egert B., I. Drine, K. Lommatzsch, C. Rault (2002), „The Balassa-Samuelson effect in Central and Eastern Europe: Myt or reality?", William Davidson Workin Paper Number 483,

(11) Faria. J. R. and M. Leon-Ledesma, (2000), "Testing the Ballasa-Samuelson effect: Implications for growth and PPP. ISSN 1466-0814,

(12) Fernandez, F., C. Osbat, B. Schnatz, (2004), "Towards the estimation of equilibrium exchange rates for CEE acceding countries: Methodogical issues and a panel cointegration perspective", Working Paper Series No 353,

(13) Fischer, C., (2002), "Real Currency appreciation in accession countries: Ballasa-Samuelson and investment demand", Economic Research Centre of the Deutsche Bundesbank, Discussion paper 19/02",

(14) Halpern, L. and C. Wyplosz, (2001), "Econometric transformation and real exchange rates in the 2000s: The Balassa-Samuelson Connection", CEPR,

(15) Hansen, J. and Roeger. W., (2000), "Estimation of real equilibrium exchange rates", Economic Papers, No. 144, European Commision. Brussels,

(16) Kovacs M., J. Benes. et al (2002), "On the estimated size of the Balassa-Samuelson effect in five Central and Eastern European Countries", NBH Working Paper, 2002/5,

(17) Lojschova, A. (2003), "Estimating the impact of the Balassa-Samuelson effect in transition economies", Institute for Advanced Studies, Vienna,

(18) Kao, C. (1999), "Spurious regression and residual-based tests for cointegration in panel data when the cross-section and time series dimensions are comparable," Journal of Econometrics. 90, 1-44,

(19) Maddala, G.S and S. Wu., (1999), "A comparative study of panel data unit root tests and a simplified test," Oxford Bulletin of Economics and Statistics. Special Issue, 0305-9049,

(20) McCoskey, S. and Kao, C., (1998), "A residual-based test of the null of cointegration in panel data," Econometric reviews, 17, 57-84,

(21) Mihaljek, D. and M. Klau (2004), "The Balassa-Samuelson effect in Central Europe: A disagregated analysis, Comparative Economic Studies, " BIS

(22) Papell, D. and R. Prodan, (2003), Long run purchasing power parity: Cassel or Balassa-Samuelson?, University of Houston

(23) Pedroni, P., (1996), "Fully modified OLS for heterogeneous cointegrated panels and the case of purchasing power parity," Indiana University, Department of Economics,

(24) Pedroni, P., (1997), "Panel cointegration: asymptotic and finite sample properties of pooled time series tests with an application to the PPP hypothesis." Manuscript, Indiana University,

(25) Pedroni, P., (1999), "Critical values for cointegration tests in heterogeneous panels with multiple regressors," Oxford Bulletin of Economics and Statistics. special issue, 0305-9049,

(26) Pedroni, P., (2001), "Purchasing power parity tests in cointegrated panels,"Review of Economics and Statistics, 83, 1371-75,

(27) Pesaran, M.H., Y. Shin, R. Smith (1998), "Pooled mean group estimation of dynamic heterogeneous panels", Cambridge University,

(28) Rawdanowicz, L. (2004), Panel estimations of PPP and relative price models for CEECs: Lessons for real exchange rate modeling, Center for Social and Economic Research

(29) Rother, P (2000), The impact of productivity differentials on inflation and the real exchange rate: an estimation of the Ballasa-Samuelson effect in Slovenia, IMF Staff Country Report, no 00/56

(30) Sarno, L., Taylor. M.P., (2002), "Purchasing power parity and the real exchange rate", IMF Staff Papers 49, 65–105,

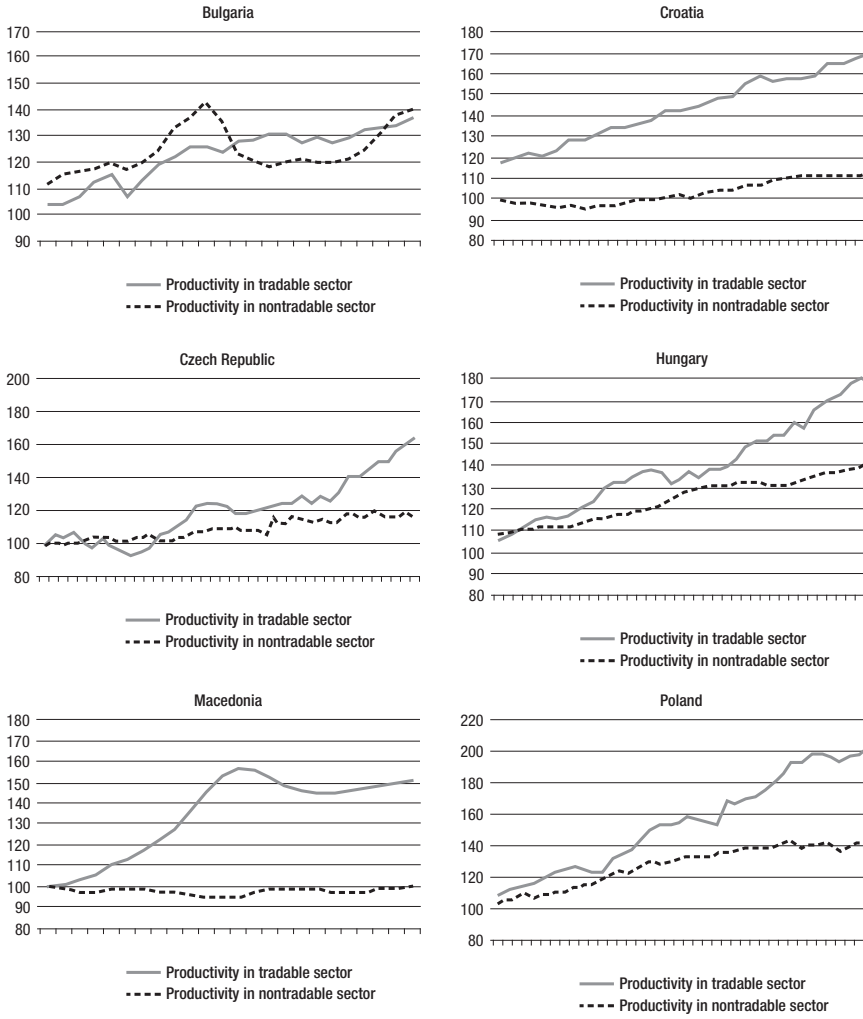
(31) Smidkova, K., Barrell, R. Holland. (2002),"Estimates of fundamental real exchange ates for the five EU accession countries", Czech National Bank. Working Paper, No 3, Prague,

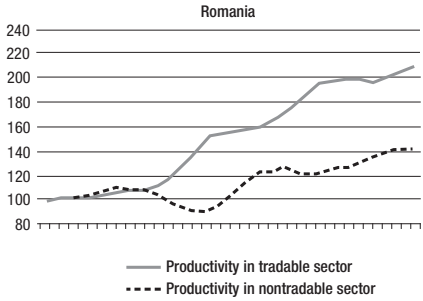
(32) Stein, J.L., G. C. Lim, (2002), "Exchange rates in Europe and Australia: fundamental determinants, adjustments and policy implications", Australian Economic Papers, Vol. 41, Issue 4. 329-341,

(33) Wagner, M and J. Hlouskova, (2004), "What's really the story with this Balassa-Samuelson Effect in the CEEs?, 04-16

APPENDIX

Figure 1.
Productivity in tradable and nontradable sectors





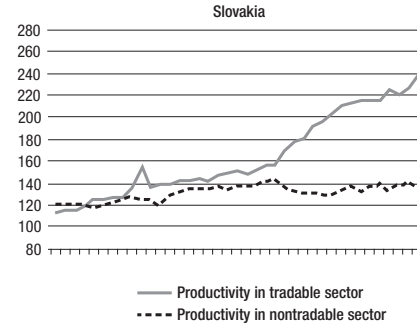
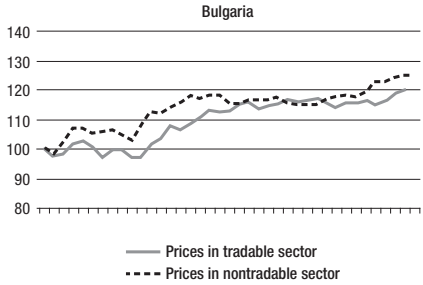
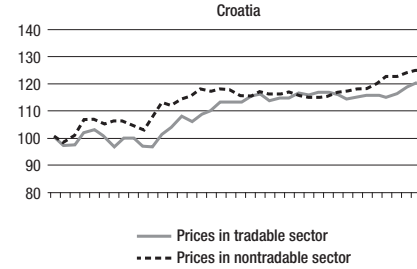
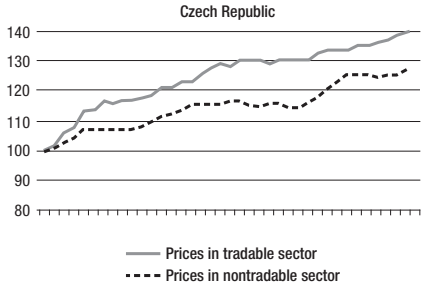
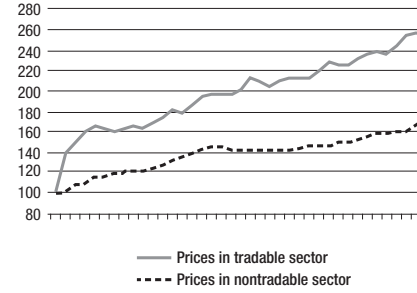


Figure 2.
Relative prices in tradable and nontradable sector









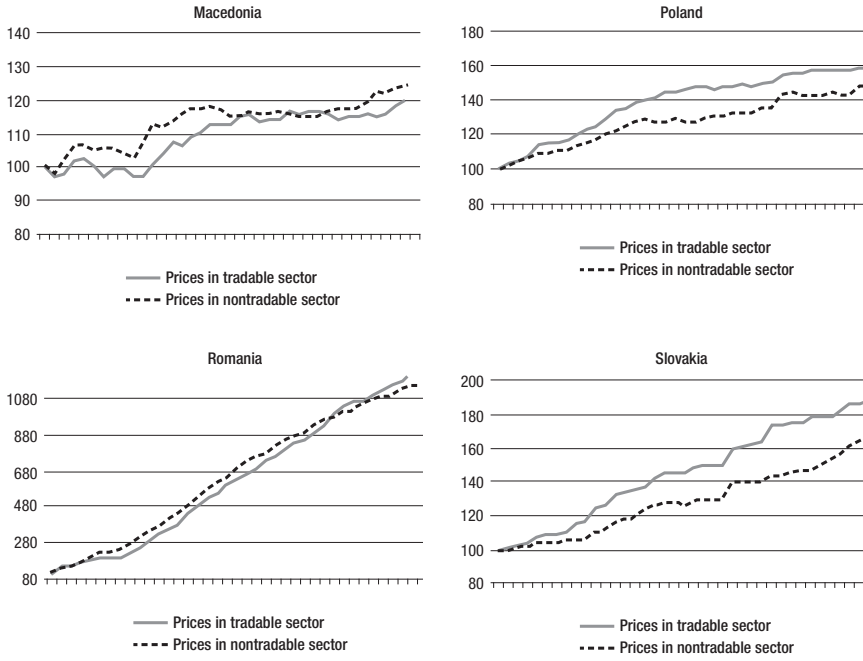
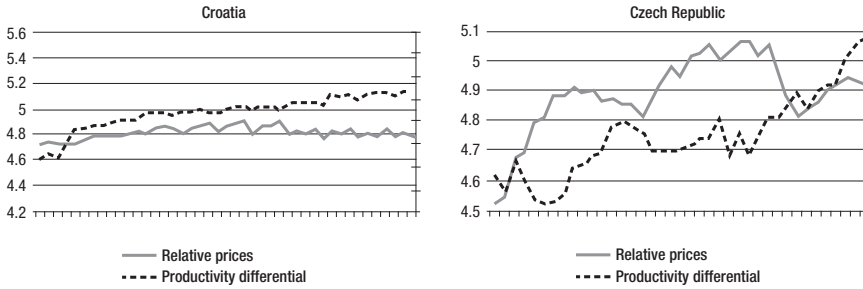
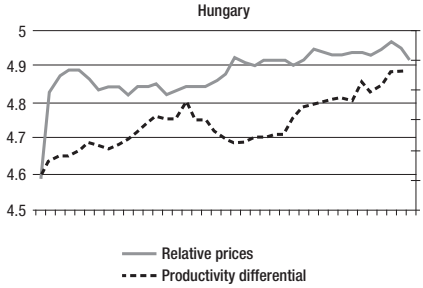
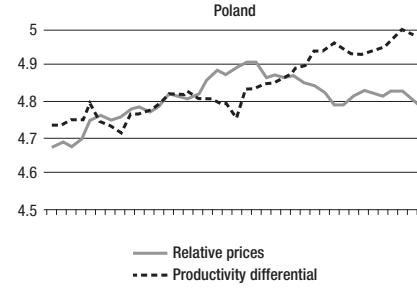


Figure 3.
Relative prices and productivity differential




Hungary
5
4.9
4.8
4.7
4.6
4.5
Relative prices
Productivity differential


Poland
5
4.9
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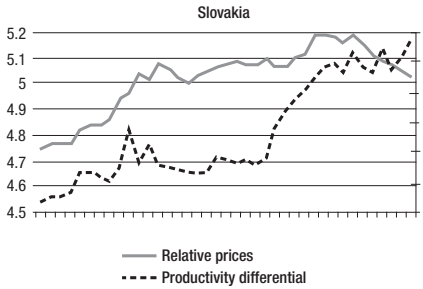
4.6
4.5
Relative prices
Productivity differential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Relative prices
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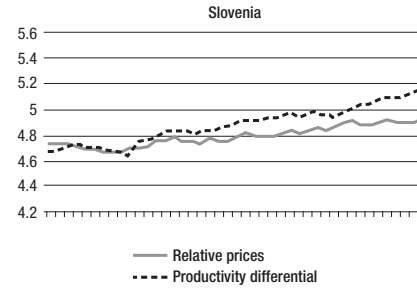
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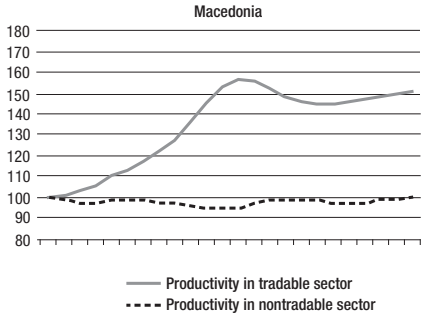
Relative prices
Productivity differential


Macedonia
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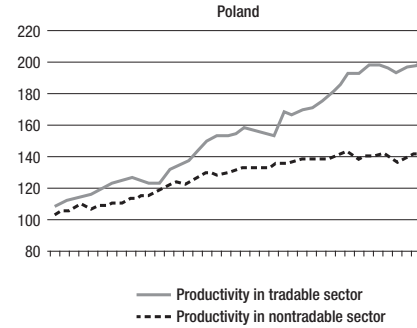
170
160
150
140
130
120
110
100
90
80
Productivity in tradable sector
Productivity in nontradable sector


Poland
220
200
180
160
140
120
100
80
Productivity in tradable sector
Productivity in nontradable sector

CAN THE EXCHANGE RATE REGIME INFLUENCE CORRUPTION?

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ABSTRACT:

This paper analyses the impact of the choice of exchange rate regime on corruption with respect to the interaction between monetary and fiscal policy. Using a simple theoretical framework based on Barro-Gordon-Model I compare independent monetary policy with a tight peg arrangement in order to find out which regime is more likely to induce governments to intensify the fight against corruption. It is shown that if corruption has a considerable positive impact on the output, a tight peg regime will increase corruption. However, if corruption has a negative impact on the output, an exchange rate pegging will lead to a lower allowed corruption.

JEL classification: E 52, E 58, E 61, E 63, F 33.

Keywords: Exchange Rate Regime, Monetary Policy, Fiscal Policy, Corruption.

INTRODUCTION

The design of monetary policy of developing and transition countries has been a subject of a long-running debate. Many developing and transition

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countries feature a deficit of credibility of monetary policy institutions, which has been systematically studied (e.g., CUKIERMAN [1992], PERSSON AND TABELLINI [1990]). Due to the lack of credibility, those countries are often recommended to choose a currency peg regime - whether as a unilateral peg to a dominant currency, or as a building of a monetary union, or in the form of a currency board, or dollarization. Another major feature of these economies is corruption, which includes inter alia rent-seeking behaviour of bureaucrats, weakness of public institutions, bribery and even "government pathologies", in terms of AIDT [2003]. What connection exists between this phenomenon and the desirability of certain exchange rate regimes?

My analysis is drawing on three different strands of economic research, which are rather disconnected from each other. Two of them concern monetary policy: the first one includes voluminous literature concerning the role of institutions for monetary policy (e.g., KYDLAND AND PRESCOTT [1977], BARRO AND GORDON [1983], ROGOFF [1985], ALESINA AND TABELLINI [1987], WALSH [1995]), whereby most authors attach great importance to the institutional design of monetary policy but corruption as a weakness of institutions is not explicitly modelled; and the second one is the literature about the interaction of fiscal policy and exchange rate regimes (DE KOCK AND GRILLI [1993], TORNELL AND VELASCO [2000]). As monetary policy can contribute to financing of public budget via seigniorage revenue, it must be considered as a part of fiscal policy. The focus of the analyses is put on the trade-off between lower inflation and higher taxation. The third strand is the research of the effects of corruption for the fiscal revenue (AIDT [2003], TORNELL AND VELASCO [1992]), which is too extensive to be referenced here(1). Corruption is perceived to be a cause of tax leakage reducing the fiscal capacity.

1 AIDT [2003] provides a detailed survey.

However, to my knowledge the impact of corruption on the choice of monetary regime has not been sufficiently studied before, there are only few approaches tackling this question. The first important step was made by HUANG AND WEI [2006]. They utilize a framework developed in ALESINA AND TABELLINI [1987] based on Barro-Gordon model and find out that currency peg regimes are not the best solution. In contrast, HEFEKER [2008] argues for pegging to a stable currency, because it can reduce the level of corruption. In addition, he claims that a monetary union has ambiguous impacts. In his analysis Hefeker uses a combination of the models of HUANG AND WEI and DE KOCK AND GRILLI [1993].

In my contribution I start from the idea found in the works of Huang and Wei and Hefeker and intend to analyse the effects of corruption on the choice of exchange rate regime. I aim at modifying the basic framework by changing the perception of the role of corruption. The thesis that corruption or low institutional quality has only negative effects on the economy by reducing the public budget is not beyond doubt. The impact of weak institutions on the output has been controversially disputed: while many researchers argue that weak institutions are associated with slow economic growth (e.g., MAURO [1995], HALL AND JONES [1999], OLSON et al. [2000]), a broad literature suggests that the lack of institutional quality can even lead to increase of economic activity (COPPIER AND MICHETTI [2006], KAUFMANN AND WEI [1999], BARRETO [2000], MÉON AND SEKKAT [2008]). The argument of "efficiency-enhancing corruption" in sense of the second best solution as a reaction to market or state failures can be incorporated in the analyses. Thus, my contribution differs from the previous works in two characteristics:

- corruption is considered not only as a leakage from the fiscal revenue but also as a factor influencing the real output;
- both negative and positive influence of corruption is modelled.

If corruption has a positive impact on the output but this impact is lower than the negative influence of corruption on the government`s budget, a tight peg regime will lead to a higher allowed corruption (if the positive

effect of corruption is considerable and the initial level of corruption is relative unimportant). The output will decrease and level of public spending will increase. If the positive effect of corruption exceeds its negative impact, a fix peg regime will unambiguously lead to a higher tolerated corruption if the distortion effect of taxation is sufficiently high. If corruption has a double negative effect, i.e. if it affects both the fiscal budget and the output, exchange rate pegging will lead to a lower allowed corruption accompanied by a higher taxation, by a lower output and by the fall in public spending. These findings show that a fix peg regime, which can help to import monetary credibility, can at the same time be risky with respect to higher tolerated corruption.

The paper is structured as follows. Section 2 describes a basic theoretical framework. Sections 3 and 4 show how the policy mix of the government is made up under two different monetary arrangements. Section 5 compares the results of sections 3 and 4 and discusses the findings. Section 6 concludes.

1. BASIC SETUP

My theoretical framework is an extension of the model developed in HEFEKER [2008], which combines ingredients of the models of DE KOCK AND GRILLI [1993], HUANG AND WEI [2006] and ALESINA AND TABELLINI [1987]. The economy is made up of three actors: the private sector, the central bank and the government. The private agents form rational expectations about the rate of inflation. The monetary and the fiscal authority act as two independent actors, playing a non-cooperative Nash-game against each other.

The real economy is represented by an in expectations augmented Phillips-curve, where output can be increased by unexpected inflation and it can be reduced by distortionary taxation. The extent of the negative impact of distortionary taxation is measured by α.

The main innovation of my approach, relative to HEFEKER [2008] and HUANG AND WEI [2006], is that the real output can be also influenced

by corruption, or more precisely, corruption can have either a negative or a positive impact on the output. The former effect does not need to be specified in more detail, a variety of arguments have been put forward to approve the thesis that the relation between corruption and growth is negative. This can be explained either by an adverse effect for investment (MAURO [1995], CAMPOS et al. [1999]), by reducing the efficiency of public expenditures (DEL MONTE AND PAPAGNI [2001]), by misgovernance (BLACKBURN AND FORGUES-PUCCIO [2007]), or by distorting the factor requirements of firms (DAL BÓ AND ROSSI [2007]).

The assumption of a positive impact of corruption on the output can be justified by the fact that corruption, considered as a lack of institutional quality, can be used by firms as a possibility to avoid taxes. As taxes are distortionary, corruption can act as a way to compensate the distortion caused by the burden of taxation. The "efficient corruption" hypothesis is not new. Since an important contribution of LEFF [1964], a variety of works was devoted to this idea. Corruption is thus considered as "grease money" which can lubricate the wheels of commerce or rigid administration (COPPIER AND MICHETTI [2006], KAUFMANN AND WEI [1999]). BARRETO [2000] found out that efficiency-enhancing effect of corruption results from the fact that corruption can reduce bureaucratic inefficiency. However, this view is not without controversy (AIDT [2003]).

Output is thus given by:

$$y=\bar{y}+(\pi-\pi^{e})-\alpha\tau+\beta\theta \qquad (1)$$

where y denotes the log of real output, $\bar{y}$ the log of the target level of real output, π and π^{e} are, respectively, the actual and expected inflation rates, $\alpha > 0$ is a parameter measuring how distortive taxes are, τ is taxation, β is a parameter measuring the impact of corruption on the output, and θ is corruption. β can be either negative or positive, i.e., corruption can have either negative or positive impact on the real economy. First, I consider the

positive impact of corruption since such approach can modify the findings of the previous works and then I turn to the negative effect of corruption.

Now let us look at the negative influence of corruption on the public budget, which can be considered as the reverse side of its positive impact on the output. The effects of corruption causing deterioration of the government`s budget have been sufficiently studied in the literature (e.g., FISMAN AND WEI [2004], AIDT [2003]). This may arise if tax inspectors tolerate tax evasion in exchange for a bribe, or through theft by corrupt officials, or through access of interest groups to the budget (TORNELL AND VELASCO [1992]). Corrupt politicians can divert public funds for personal use (HEFEKER [2008]). In short, corruption associated with weak institutions leads to a leakage of the fiscal revenue.

To finance the public goods provision, the government has two sources of revenue: corporate tax τ and seigniorage, which is thought to be transferred from the central bank to the budget. DE KOCK AND GRILLI [1993] argue that although it could be supposed that only unanticipated inflation brings revenues, also expected inflation contributes to the budget, since even in times of high inflation the private agents cannot do completely without money holdings. The government`s budget constraint follows thus

$$g=\tau+\varpi(\pi-\pi^{e})+s\pi^{e}-\theta \qquad (2)$$

where ϖ and s, respectively, measure the contribution of the surprise and expected inflation to the budget.

The central bank`s objective is summarized by a loss, which depends on values for the inflation and output. Costs rise with the departure of the output from its target level; changes to the zero-level of the inflation rate are also considered as generating costs (BARRO AND GORDON [1983], ROGOFF [1985]).

The more the central bank aims to stabilize inflation at zero, the higher is the degree of conservatism of the central bank, measured with c (ROGOFF [1985]). The objective function of the central bank can be thus described as:

$$L = c\pi^2 + (y - \bar{y})^2 \qquad (3)$$

The government aims to stabilize inflation and output, as well as to provide public goods by minimizing the deviations of spending from a target level ḡ (costs of such deviations are measured by b). This target level rises with the increasing activity of powerful interest groups influencing the government. Additionally, the government is responsible for the control of corruption. Both increase and reduction of corruption from the given initial level $\bar{\theta}$ can have negative consequences. On the one hand, the rise of corruption acts as a deterrent for foreign investors and causes concern of international financial organizations. On the other hand, the lowering of corruption can have a negative impact on the personal utility of the corrupt government parts or, if the government is benevolent, can result in a resistance of corrupt bureaucrats, which also leads to inefficiency (HEFEKER [2008]). Hence, deviations in both directions from a given level assumed to give rise to costs, which are measured by γ. The government`s objective function can thus be written as:

$$V = c\pi^2 + (y - \bar{y})^2 + b(g - \bar{g}) \qquad (4)$$

2. INDEPENDENT MONETARY POLICY AND CORRUPTION

The first regime I consider is monetary independence, i.e., monetary policy is completely nationally defined.

As aforementioned, the central bank is independent and chooses the optimal inflation rate. The government determines the optimal taxation and the optimal level of corruption – and that simultaneously. As taxation and corruption are the factors influencing the fiscal capacity, the government has to optimize the mix of these two instruments: increasing the taxation makes possible tolerating higher corruption and lowering the taxation is associated with fighting corruption more intensively. Hence, the optimal inflation rate, the optimal taxation and the optimal corruption level are chosen simultaneously.

The central bank aims to minimize the equation (3), subject to (1). It yields $\pi = \frac{\pi^e + \alpha\tau - \beta\theta}{c+1}$ or, with rational expectations,

$$\pi = \frac{\pi^e + \alpha\tau - \beta\theta}{c+1} \qquad (5)$$

where the index *N* indicates the nationally determined monetary policy. The optimal inflation rate is increasing in τ and decreasing in θ. This can be explained by the opposing effects of two parameters: taxation has a negative impact on the output and corruption can compensate this inefficiency. Then, if taxation increases, the central bank has to counteract by augmenting the inflation rate while an increase of corruption associated with a positive effect on the output would allow a lower inflation rate. An increase in the degree of conservatism of the central bank will also lead to a lower inflation.

The government minimizes the equation (4) in consideration of (1) and (2). This leads to

$\tau = \theta \frac{\alpha\beta + b}{\alpha^2 + b} - \frac{b(s\pi - \bar{g})}{\alpha^2 + b}$ for taxation

and to $\theta = \tau \frac{\alpha\beta + b}{\beta^2 + b + \gamma} + \frac{b(s\pi - \bar{g}) + \gamma\bar{\theta}}{\beta^2 + b + \gamma}$ for corruption. Solving these equations simultaneously, yields the optimal taxation as

$$\tau^N = \frac{\gamma\bar{\theta}\left[c(\beta\alpha + b) + bs\beta\right] + bc\bar{g}\left[\beta(\beta - \alpha) + \gamma\right]}{bc(\alpha - \beta)^2 + \gamma c(\alpha^2 + b) + \gamma bs\alpha} \qquad (6)$$

Taxation is increasing in the initial level of corruption since it implies that fiscal revenue is lower, all else equal.

Taxation is decreasing in the contribution of seigniorage to the budget s if $\bar{\theta}\beta < \alpha$. In contrast, if $\bar{\theta}\beta > \alpha$, taxation increases in s. This can be explained by the fact that without a considerable positive influence of corruption the government is forced to respect a distortionary effect of taxation, hence, the fiscal authority aims to lower taxation if the other

source of budget revenue increases. The positive effect of corruption makes it possible to raise taxation since the distortionary effect of taxation is compensated by an efficiency-enhancing corruption.

Corruption is allowed to be

$$\theta^N = \frac{\gamma\bar{\theta}\left[c(\alpha^2 + b) + bs\alpha\right] + bc\bar{g}(\alpha(\beta - \alpha))}{bc(\alpha - \beta)^2 + \gamma c(\alpha^2 + b) + \gamma bs\alpha} \qquad (7)$$

which is increasing in initial corruption. Tolerated corruption as also increasing in the spending target if (and only if) $\beta > \alpha$. That is, if the positive impact of corruption on the output is considerable, an ambitious spending target increases allowed corruption, and this phenomenon can be frequently observed not only in transition economies (GUPTA et al. [2001]).

The equilibrium inflation rate is then:

$$\pi^N = \frac{\bar{\theta}\gamma b(\alpha - \beta) + \bar{g}\alpha\gamma\beta}{bc(\alpha - \beta)^2 + \gamma c(\alpha^2 + b) + \gamma bs\alpha} \qquad (8)$$

increasing in the spending target.

The equilibrium inflation rate is falling in initial corruption if (and only if) $\beta > \alpha$. In other words, if the positive effect of corruption is considerable, a high level of initial corruption leads to a lower inflation rate because the distortion effect of augmented taxation can be compensated, so that the central bank can lower the inflation rate.

Equilibrium spending follows

$$g^N = \frac{\bar{g}b\left[((\beta - \alpha)^2 + \gamma)c + \alpha\gamma s\right] + \gamma\bar{\theta}\alpha c(\beta - \alpha)}{bc(\alpha - \beta)^2 + \gamma c(\alpha^2 + b) + \gamma bs\alpha} \qquad (9)$$

3. EXCHANGE RATE PEGS AND CORRUPTION

Due to problems of credibility of monetary policy, the independent monetary regime described above is often blamed to be suboptimal for developing and transition countries. As precisely these countries show a

high level of corruption, it makes sense to consider an alternative design of monetary policy, reflected in an exchange rate peg (CALVO AND REINHARD [2002], KELLER AND RICHARDSON [2003]). Following Hefeker, I analyze a tight peg regime in the form of currency board or dollarization since hard pegs provide more credibility than intermediate forms.

To cope with time-inconsistency in policy making and to import stability, the pegging country chooses an economy with a low inflation currency as an anchor country; to simplify the analysis one can assume that the latter has inflation rate $\overline{\pi} = 0$. The inflation in the pegging country is completely exogenous, there is no reaction of the central bank to the policy choice of the government. This means that the government loses its seigniorage revenues.

The government chooses a mix of taxation and corruption by taking into account the rate of inflation in the anchor country (denoted as $\overline{\pi} = 0$). This leads to

$$\tau^P = \frac{\gamma\overline{\theta}(\beta\alpha + b) + b\overline{g}\left[\beta(\beta - \alpha) + \gamma\right]}{b(\alpha - \beta)^2 + \gamma(\alpha^2 + b)} \quad \text{for taxation} \qquad (10)$$

and to

$$\theta^P = \frac{\gamma\overline{\theta}(\alpha^2 + b) + b\overline{g}(\alpha(\beta - \alpha))}{b(\alpha - \beta)^2 + \gamma(\alpha^2 + b)} \quad \text{for tolerated corruption,} \quad (11)$$

where P denotes the exchange rate peg.

The equilibrium spending follows

$$g^P = \frac{\overline{g}b\left[(\beta - \alpha)^2 + \gamma\right] + \gamma\overline{\theta}\alpha(\beta - \alpha)}{b(\alpha - \beta)^2 + \gamma(\alpha^2 + b)} \qquad (12)$$

4. COMPARISON OF MONETARY REGIMES

To find out which monetary regime is more likely to induce the government to reduce corruption it is necessary to compare the independent monetary regime with a tight peg arrangement. In doing so, I consider three possible

cases. Firstly, I place $0 < \beta < 1$. This is the case if corruption has a positive impact on the output, but this impact is lower than the negative influence of corruption on the government`s budget ($\beta\theta < \theta$). Secondly, I consider $\beta > 1$, meaning that the positive effect of corruption exceeds its negative impact. Finally, I set $\beta < 0$ to allow for a negative relationship between corruption and output. It is clear that the rate of inflation will be lower under pegging to a very hard currency (with a rate of inflation of zero) in all three cases.

a) $0 < \beta < 1$

$\tau^P > \tau^N$ if $\overline{\theta} < \overline{g}$, i.e., taxation will increase under a credible monetary regime if the initial level of corruption is not extremely high. This is not surprising: while losing seigniorage revenue, the government is forced to resort to the alternative source to finance the budget.

$\theta^P > \theta^N$ if β is sufficiently high and $\overline{\theta} < \overline{g}$. That is, if the positive impact of corruption on the output is considerable and the initial level of corruption is not exceedingly high, an exchange rate peg leads to an increase of allowed corruption. As corruption acts as a force compensating the distortionary effect of taxation, an increase of taxation has to be accompanied by an increase of tolerated corruption.

The output under a fix peg regime will decrease: $y^P < y^N$. As augmented taxation has a negative impact on the output and augmented corruption has a positive impact on it, one can assume that the distortionary effect of taxation overbalances.

$g^P > g^N$ if $\beta > \alpha$. That is, if the positive impact of corruption β is considerable, pegging will imply a higher public spending despite the loss of seigniorage revenue and augmented corruption which has also a negative impact on the fiscal capacity.

These findings can be summarized in the following result.

Result 1:

In the case of $0 < \beta < 1$ a tight peg regime will lead to a higher taxation associated to a higher allowed corruption, provided that corruption has

a strong positive impact on the output and the initial corruption is not extremely high. The output under a fix peg regime will decrease. The level of public spending increases under a fix peg if the positive impact of corruption is considerable.

b) $\beta > 1$

Again, taxation will increase under a fix peg regime if $\overline{\theta} < \overline{g}$.

If α is sufficiently high, $\theta^P > \theta^N$ is valid irrespective of the initial level of corruption. If α is relatively unimportant, $\theta^P > \theta^N$ is valid only on condition that $\overline{\theta} < \overline{g}$, i.e., if the initial level of corruption is not exceedingly high. In other words, if the positive effect of corruption exceeds its negative impact and the distortion effect of taxation is considerable, a fix peg regime leads to a higher tolerated corruption.

As for the output and for the level of public spending, one obtains the same results as in the case of $0 < \beta < 1$.

This can be recapitulated as:

Result 2:

In the case of $\beta > 1$ a fix peg regime will unambiguously lead to a higher tolerated corruption accompanied by a higher taxation if α is sufficiently high. If α is relatively unimportant, a fix peg regime increases allowed corruption only if $\overline{\theta} < \overline{g}$. The level of public spending increases under a fix peg if the positive impact of corruption is considerable. Pegging implies a lower output.

It is useful to study the effects of changes in taxation and corruption on the level of social welfare (or losses for the government) for two cases considered above. Comparing the level of utility for the government under an independent monetary policy to a fix peg regime, one obtains ambiguous results. It must be kept in mind that the government has multiple objectives: it aims to stabilize inflation and output, as well as to provide public goods and to control corruption. That is, higher inflation as well as deviations from target levels $\bar{y}$, $\bar{g}$ and $\overline{\theta}$ cause costs. The output will decrease under pegging and allowed corruption will increase – both changes represent negative effects on the level of social utility. Contrary,

the rise in the level of public spending and the decrease of inflation mean a positive influence on the social welfare. Depending on the relative importance of each objective, the government will tend either to an independent monetary policy or to a pegging; a well-defined proposition about the choice of exchange rate regime is not possible.

c) $\beta < 0$

Also a negative impact of corruption on the output must be taken into account, by setting $\beta < 0$ I incorporate this argument in my approach. This assumption implies the consideration of two negative effects of corruption: deterioration of fiscal capacity and lowering of the real output.

This leads to

$\tau^P > \tau^N$, i.e., if corruption has two negative impacts, taxation will rise with exchange rate pegging in either case.

Allowed corruption will go down:

$\theta^P < \theta^N$.

A government has to optimize both fiscal capacity and the output. As an exchange rate peg leads to a loss of the seigniorage revenue, the government is pushed into increasing taxation, which in turn causes a distortionary effect for the output. Hence, the government will intensify the fight against corruption for two reasons: to compensate a budget leakage caused by the loss of seigniorage and to compensate a distortion impact of increased taxation.

The level of public spending decreases under a fix peg regime ($g^P < g^N$) despite the fact that taxation has increased and corruption has been reduced. The output under pegging decreases as well.

This can be summarized as follows:

Result 3:

If corruption has a double negative effect, i.e., if it affects both the fiscal budget and the output, exchange rate pegging will lead to a lower allowed corruption and to a higher taxation. Both the output and the level of public spending decrease under a fix peg regime.

Comparing the level of utility for the government under an independent monetary policy to a fix peg regime for the case $\beta < 0$ yields again ambiguous results. The fall in inflation and the decrease of corruption mean positive effects on the social welfare, while the fall in output and in the level of public spending will increase the losses of the government. As before, no clear-cut proposition about the government`s choice of exchange rate regime is possible.

CONCLUDING REMARKS

In this contribution I analysed the effects of corruption on the choice of exchange rate regime since I think that the interaction between monetary policy, fiscal policy and corruption has not been sufficiently studied. I compared two different monetary arrangements in order to find out which regime is more likely to induce governments to intensify the fight against corruption. By utilizing an extension of the theoretical framework developed in HEFEKER [2008] and based on a Barro-Gordon-Model, I generated some interesting results.

It can be shown that if corruption has a considerable positive impact on the output, a tight peg regime to a low inflation country, which helps to cope with problems of monetary credibility, increases allowed corruption. Due to the distortion-compensating effect of corruption, the government will be forced to tolerate higher corruption if taxation is increasing. The stronger is the positive influence of corruption, the less is the motivation of the government to improve institutional quality. The output will consequently decrease and the level of public spending will, contrary, increase – despite the loss of seigniorage and the rise of corruption.

However, if corruption has a negative impact on the output, an exchange rate pegging will lead to a lower allowed corruption (accompanied by a higher taxation). In this case, the government will put more efforts to combat corruption in order to compensate a budget leakage caused by the loss of seigniorage and to reduce a distortion caused by increasing taxation. Both the output and the public spending will fall.

One can make no clear-cut proposition concerning the government`s choice of exchange rate regime because of multiple objectives in the loss function of the government. Changes in taxation and corruption cause a trade-off between these objectives, so that the government`s behaviour depends on the relative importance of each objective.

These findings counter the conventional wisdom that exchange rate pegs such as currency board or dollarization represent the most appropriate monetary regimes for transition countries. A pegging regime may be a solution of the problem of monetary credibility but at the same time it may have a discouraging effect on the government`s willingness to combat corruption. Subject to a definition of corruption, one can estimate a positive impact of corruption, relative to its negative influence on the basis of empirical data, e.g., regularly provided by KAUFMANN et al. (WORLD BANK) in reports of governance indicators measuring six dimensions of governance such as regulatory quality, rule of law, and control of corruption. This can be an interesting issue for further research.

REFERENCES

Aidt, T. (2003), "Economic Analysis of Corruption: A Survey", Economic Journal 113, 632-F652.

Alesina, A. and G. Tabellini (1987), "Rules and Discretion with Noncoordinated Monetary and Fiscal Policies", Economic Inquiry 25, 619-630.

Barreto, R. (2000), "Endogenous Corruption in a Neoclassical Growth Model", European Economic Review 44 (1), 35-60.

Barro, R. and D. Gordon (1983), "A Positive Theory of Monetary Policy in a Natural Rate Model", Journal of Political Economy 91, 589-610.

Blackburn, K. and G. F. Forgues-Puccio (2007), "Distribution and Development in a Model of Misgovernance", European Economic Review 51, 1534-1563.

Calvo, G. and C. Reinhard (2002), "Fear of Floating", Quarterly Journal of Economics 117, 379-408.

Campos, J. E., D. Lien, and S. Pradhan (1999), "The Impact of Corruption on Investment: Predictability Matters", World Development 27 (6), 1059-1067.

Coppier, R. and E. Michetti (2006), "Corruption vs. Production. A Non-Linear Relationship", Economic Modelling 23, 622-637.

Cukierman, A. (1992), Central Bank Strategy, Credibility and Independence, MIT Press: Cambridge.

Dal Bó, E. and M. A. Rossi (2007), "Corruption and Inefficiency: Theory and Evidence from Electric Utilities", Journal of Public Economics 91, 939-962.

De Kock, G. and V. Grilli (1993), "Fiscal Policies and the Choice of Exchange Rate Regime", Economic Journal 103, 347-358.

Del Monte, A. and E. Papagni (2001), "Public Expenditure, Corruption and Economic Growth: The Case of Italy", European Journal of Political Economy 17, 1-16.

Fisman, R. and S.-J. Wei (2004), "Tax Rates and Tax Evasion: Evidence from ´Missing Imports` in China", Journal of Political Economy 112 (2), 471-496.

Gupta, S., L. de Mello, and R. Sharan (2001), "Corruption and Military Spending", European Journal of Political Economy 17(4), 749-777.

Hall, R. and C.I. Jones (1999), "Why Do Some Countries Produce So Much More Output per Worker than Others?", Quarterly Journal of Economics 114, 83-116.

Hefeker, C. (2008), "Taxation, Corruption and the Exchange Rate Regime", HWWI Research Paper, 2-12.

Huang, H. and S.-J. Wei (2006), "Monetary Policies for Developing Countries: The Role of Institutional Quality", Journal of International Economics 70, 239-252.

Kaufmann, D., A. Kraay, and M. Mastruzzi (2006), "Governance Matters V: Governance Indicators for 1996-2005", World Bank.

Kaufmann, D. and S.-J. Wei (1999), "Does „Grease Payment" Speed Up the Wheels of Commerce?" NBER Working Paper Series No.7093.

Keller, P. and T. Richardson (2003), "Nominal Anchors in the CIS", IMF Working Paper 03/179.

Kydland, F. E. and E. C. Prescott (1977), "Rules Rather then Discretion: The Inconsistency of Optimal Plans", Journal of Political Economy 85 (3), 473-491.

Leff, N. H. (1964), "Economic Development through Bureaucratic Corruption", American Behavioral Scientist 8:3, 8-14.

Mauro, P. (1995), "Corruption and Growth", Quarterly Journal of Economics 110, 681-712.

Méon, P.-G. and K. Sekkat (2008), "Institutional Quality and Trade: Which Institutions, Which Trade?" Economic Inquiry 46, 2 (4), 227-240.

Olson, M., N. Sarna, and A.V. Svamy (2000), "Governance and Growth: A Simple Hypothesis Explaining Cross-Country Differences in Productivity Growth", Public Choice 102, 341-364.

Persson, T. and G. Tabellini (1990), Macroeconomic Policy, Credibility and Politics, Harwood Publishers: London.

Rogoff, K. (1985), "The Optimal Degree of Commitment to an Intermediate Monetary Target", Quarterly Journal of Economics 100, 1169-1189.

Tornell, A. and A. Velasco (1992), "The Tragedy of the Commons and Economic Growth: Why Does Capital Flow from Poor to Rich Countries?" Journal of Political Economy 100, 1208-1231.

Tornell, A. and A. Velasco (2000), "Fixed Versus Flexible Exchange Rates: Which Provides More Fiscal Discipline?" Journal of Monetary Economics 45, 399-436.

Walsh, C. (1995), "Optimal Contracts for Central Bankers", American Economic Review 85 (1), 150-167.

WORLD ECONOMY WHILE SECOND BRETTON WOODS DECLINES AND EVALUATION ON DEVELOPING COUNTRIES

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ABSTRACT:

This work is aiming primarily at discussing the thesis that the search for new currency systems in World Economy is not the reason but the result of production crisis. The approach initiated with the three works of Michael Dooley, David Folkerts-Landau and Peter Garber which are carried out since 2003, i.e. the development of "2nd Bretton Woods" monetary system, and proposals of Eichengreen, Goldstein, Kamin, McKinnon, Obstfeld, Roubini, Truman and Stiglitz, who participated in this development with their works, will be examined within the thesis in question. Mainly, the effects of these discussions to the developing countries. Considering that the world trade volume and movements of currency determines the type of industrialization in developing countries, labor markets and the relation between sectoral structures in developing countries and foreign capital will be discussed by proceeding from the studies which are carried out by transnational foundations. Therefore, we think that we can understand new world monetary system or unsystematicness of it better by looking to real indicators behind interest rate parameter.

JEL classification: F01,F02, F31, F32, F33

Keywords: Bretton Woods1-2, US Dollar, Foreign Exchange, Developing Countries, Crises

INTRODUCTION

In the first part of this work, the size of the international monetary system and/or unsystematicness of it, the conditions and expectations for future will be discussed. Afterwards, we will try to analyze the differences between Bretton Woods (BW) system and previous gold currency system; and new monetary balance in the post-90's called 2nd BW system by some economists.

1. COULD THERE BE AN "INTERNATIONAL CURRENCY" WHICH CONSTANTLY APPRECIATING?

NO!

First of all, we need to introduce the facts that make the currency international (world) currency. Marx puts value form of currency before circulation characteristic (De Brunhoff, Foley, 2006). By putting forward the value form of currency Marks opposed the quantity theory of money of classical economists.

According to K. Marx, for currency mass in a country to be the indicator of price of goods in that country as D. Hume first argued, the whole currency in that country must be in circulation. As we observe today, it is not possible to say that the money and the quasi money are fully in circulation in either the country or in international area.

On the other hand, as K. Marx emphasized, almost limitless variety of goods also leads to different analysis that can not be compared to money according to the use value of goods, i.e. the level that it meets the needs of man. If there was only one good subject to exchange in the world of goods, it would be easier to determine the exchange relationship of the amount of that good and currency or gold «in circulation". (Marx K., 1993, p.188)

Consequently, it is not always easy to establish a direct relationship between the price of goods and the amount of "currency". The third argument of D. Hume is used later as the main theme in forming

Cambridge equation (cash transactions) by A. Marshall, one of Classical economists, and again in developing the equation of exchange(cash balance) by another Classical economist I. Fisher. These two categories provided a basis for the explanation of Classical and Neoclassical economic thoughts (with understanding the Monetarists) for the relation of money and quasi money with real sector. According to D. Robertson, Cambridge equation accepts currency as active as I.Fisher's equation of exchange accepts it inactive (Stanford, 1973, p.6).

Nonetheless, Keynes argues against the quantity theory of money proceeding from the data that the velocity of circulation, which is accepted as stable in quantity theory of money, is nonstable. This fact has actually very realistic proofs compared to analysis of Mishkin.

We can conclude that value form and international mediation functions of currency are more realistic and directive for understanding the relation between the financial structure and productive sector. Moreover, when comparing the 1st and 2nd BW durations, the function of one international currency (such as U.S. dollars) as value form and international mediation is problematic and discontinuous.

It is clear that for productive investments, instead of the characteristic of being a value of exchange and circulation, characteristic of international mediation of currency, i.e. credit currency, should become prominent (Tymoigne Éric and Wray L. Randall, 2006, p.12). Reserve currency and the valuation problems between currencies of other developing countries disable the characteristic of money as a mediator for international settlements. Let's have a look at the problem from a historical point of view.

2. CHANGE IN INTERNATIONAL CURRENCY SYSTEM: 2ND BRETTON WOODS DEBATE

Bretton Woods (BW) currency system, which arose as a response for the search of a system alternative to the gold currency system failed after II. War, provided U.S. dollars the attribute of being the second convertible

currency after pound sterling. A fully convertible currency is in an important position for mediation in international settlements. After war USA had all the qualifications of a fully convertible currency that is conforming for reserve currency and international mediation. Thus, in 1944, 35 U.S. dollars is accepted international parity for 1 ounce gold with the decisions made in the meeting in BW town of USA and this paved the way for IMF and World Bank.

By conferring on IMF freedom for devaluation up to 10% was given to the countries which has chronic balance of payments deficit. Thus the country with current accounts deficit obtained the opportunity to close the deficit by reducing the export costs and increasing the import costs. Devaluation was made against U.S. dollars and if there is current accounts (CA) surplus, there was no suggestion to make a revaluation. Governors of the country anticipated that they will not confront a sanction when there is CA surplus but in order to meet the CA surplus a process of adaptation the exchange rate adjustments to other prices will be suggested and this pegged rate will systematize capital flows.

According to John Weeks, in accumulation period financial liabilities together with technical advances creates new value formation. This fact of creating new value formation was applied successfully in some zones (Weeks J., 1981, P.190). So that, in 1945, it is announced that U.S. and Canadian dollars transferred to full convertibility. In 1958, Germany, France and Italy among European countries other than Great Britain which was convertible before, announced full convertibility. Japan could pass to full convertibility in 1964. As a result of the problems in their economy, the currencies of developing countries could not be convertible for a long time. Therefore, two dilemmas of BW system revealed around 60's. Expansion of countries with CA surplus against the countries with CA deficit increased the disequilibrium. Second, the currencies of developing countries met the currency areas like U.S. Dollars, Deutsche Mark and Japanese Yen other than Great Britain pound sterling. Despite the problems in its economy, U.S. dollars appeared as currency with the most powerful quality of reserve currency. This fact also mediated for

the developments in U.S. economy to affect economies of other countries more. Since it did not expand in the same rate in all countries and there is always tendency for crisis, the first BW system became successful to some extent in 20 years after System was announced. As a reserve currency to U.S. dollars, two new currencies arose. U.S. dollars, which depreciated in a certain band against European currencies with the attempt of snake in the tunnel in 1971, became floating currency after 1973. It was though that since IMF and World Bank fell behind in the intervention to fast speculation and movements of currency (Kindleberger, 2007, P.290), fluctuation or flexible rate system would facilitate the work of these foundations.

The intention in entering Bretton Woods system was to control hot money or speculative currency flow, that corrupts national economy policies, to some extent. However, while the system was working, hegemony of USA was felt with all its oppression. This fact also revealed convulsive conditions for BW system. Inversion of the convertibility of U.S. dollars to gold, Vietnamese war and its aggravated circumstances (inflation etc.) followed and in 1973 BW declined.

On the other hand, Euromarkets which appeared in 50's ended American hegemony in international finance markets in 60's. Thus, in the international value of dollar 'catastrophic liquidation' conditions started (Gill S., 1993, pp.92-97). Short term currency flows and to apply independent macro economy became difficult as well as illegal financial flows could not be controlled by advancing technology. (Helleiner, 1993, pp.38-39).

Dooley and others objected to floating exchange rate system which is claimed to be applied since gold dollar parity had been abandoned in March 1973. According to them, in the last 15 years that financial deregulation became widespread, the developments in the environment created by the countries with high trading volume such as USA and China got more complicated.

Undervalued currencies arose in developing markets in Far East that benefit from the global investment environment. Proceeding from the

lesson they took from 1997 Asian crisis these countries continued to have a surplus in current accounts by intervening exchange rate system in order to market in-country production to abroad, especially to countries which are open to capital movements and by expanding export with their undervalued currency.

Naturally, although the same exchange rate was not applied in all Asia, undervalued exchange rate policy still continues with different versions. High foreign exchange reserves are in the size of foreign trade surplus of these countries (Dooley, Folkerts-Landau ve Garber, 2003). A significant part of these reserves are invested to USA long term bonds. These countries have structure based on trade balance. In the background of this structure, far East countries are known as producing and saving countries and at the same time they are known as high foreign productive investment areas.

On the other hand, USA is in the World System as a country with a high current accounts deficit. We are of the opinion that when current deficit of USA is compared to far Asia's current surplus, it is possible to argue that increase in the velocity of circulation of the currency mentioned in the first part determines the international currency system by predominating over value form function of currency. The countries other than USA with current deficit such as Turkey, Spain, England are joining to the process by an expansion predominated by capital account. While in Asian countries, especially in Japan and China, predominated by trade account, exchange rate reserves are continually increasing, the countries predominated by trade account presents a structure binding to capital flow from abroad.

This mechanism works with the results of Washington Consensus (1989) that foundations like IMF, World Bank, U.S. Treasury Department, The Wall Street and WTO reconciled. As in the first BW, exchange rates are dependent on the interest and foreign exchange transaction decisions of Central Banks. That is why it is called 2nd BW because there had been a world currency system predominated by a rate system called managed floating and similar to pegged system applied with Bretton Woods. Besides, although the role of IMF and World Bank as BW foundations had

declined, they still affect macro policies and credit systems. According to an econometric study (Saxena, 2008) made in BIS, even if independent monetary policies in developing countries determines foreign exchange rates as more flexible with financial deregulation implementation, not entirely a floating exchange rate but a exchange rate system, in which capital and amount of foreign exchange are effective and in which interest rates determined by the central banks decreases, is confronted. Impossible Trinity Hypothesis, which states the argument that fully free capital movements and pegged rate policies as the results of financial deregulation and Washington Consensus contradict with independent monetary policies, opened up for discussion.

Again here, according to study of Saxena from BIS, independent monetary policy is based on interest rates of U.S. FED from 2000. Therefore, 2nd BW system as in first BW manages international monetary system this time with a different medium, with interest rates, through USA. In the first BW, pegged rate mediated international settlements through gold dollar parity. Second BW for developing countries function of international mediation of currency is constituted by the relation between FED interests and domestic inflation targeting. The achievement of inflation targeting policy, which aims at shaping the inflation rate in domestic field in accordance with the expectations, is at the same time measured as real achievement of central banks in developing markets. (Saxena, 2008, p.95).

This achievement is actually dependent on the developments determining the exchange rate in long term. In other words, while in short term interest arbitrage is determinant in the centers like USA and Japan (carry trade), in long term efficiency level, balance of payments deficit, tariff and quota treatments and relative inflation levels of countries will be the actual determinants on their own currency. Present capital movements can only postpone this valuation process. (Mishkin, 2007, p.161).

So, let's state the problem. Considering the exchange rate regimes in Table 1-2, the countries, which attract high capital flows with financial deregulation, approach floating exchange rate rather than intermediate

regime implementations in which they choose to determine their currency as over valued by supporting their own currency over their purchasing power parity or undervalued below purchasing power parity by being trade-oriented as in Asian countries. In terms of exchange and interest, transition from intermediate regime to exchange rate regimes necessitates more in Second BW than first BW to get involved in the economic area determined by the state policies predominated by USA and G7.

Table 1 .

The profile of exchange rate regimes today

Pegged Regimes	Intermediate Regimes	Floating Regimes	
Hard pegs- Formal dollarization, currency union ad currency board supported by strict institutional and political stipulations in which retail is not possible.	Soft pegs- In this exchange rate regime, authorities aim to justify the predetermined value of exchange rate and its path without stipulations; and monetary policies only aim to only to support exchange rate. horizontal bands, crawling pegs and crawling bands.	Tightly managed floats- These are the regimes in which authorities have a strong surveillance and intervention on the exchange rate movements in order to peg the predetermined value of exchange rate and its path without stipulations.	Other floating regimes, freely floating regimes, managed floating regimes but excluding tightly managed floats.

Resource: Bubula, Andrea., Inci Ötker-Robe., (2004), "The Continuing Bipolar Conundrum" Finance and Development March, pp.32-35 (Washington DC : International Monetary Fund), p. 32

Table 2:
Different exchange rate regimes in developing countries and the effect of crises

Type of Transition	Voluntarily	Effect of crises
From Pegged Regimes to Intermediate Regimes	Czech Republic, 1996 Egypt, 1999 Hungary, 1994 India, 1995 Pakistan, 2000	Argentine, 2001 Philippines, 1997 Thailand, 1997 Venezuela, 1996
From Intermediate Regimes to Floating Regimes	Chile, 1999 Peru, 1999 Philippines, 2000 Poland, 2000 South Africa, 1997 Turkey, 2001	Brazil, 1999 Colombia, 1999 Indonesia, 1997 korea, 1997 Mexico, 1994

3. ON THE WAY OUT FROM SECOND BW SYSTEM, THE STATE OF DEVELOPING COUNTRIES

When Dooley and others (2003, 2004) commented on the studies of N. Roubini (2006, 2008) and Stiglitz (2006), it was clear that a new epoch started for developed central countries and developing countries.

Let's first have look on the state of developed central countries. Pegged exchange rate regime of first BW and U.S. dollars, floating against many European currency and Japanese Yen after the intervention of European Central Bank on March 19, 1973, became on the same condition. (Krugman, 2006, p.509). After the recession in the beginning of 2000's as a result of the capital movements which increased more, the transition of USA from production economics to consumption economics gain speed.

External and domestic deficit in USA and as a result the global disequilibrium, maintained the 2nd BW relation again by affecting developing countries in Asia, Latin America and Eastern Europe through U.S. dollars in different levels. This fact decreases the characteristics of

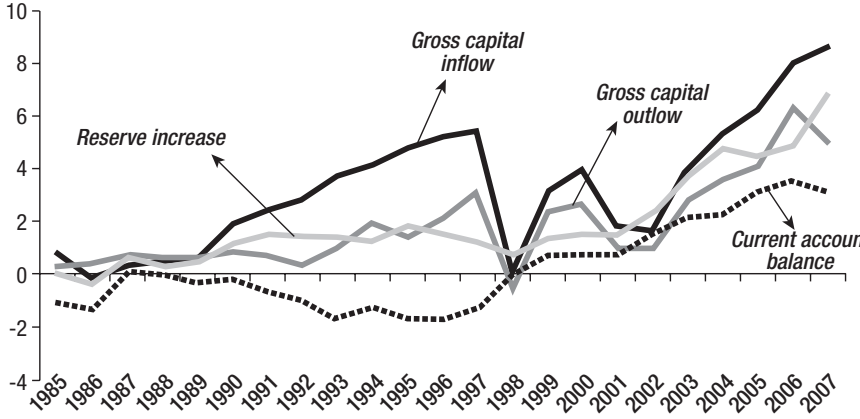
U.S. dollars as reserve currency and mediator for international settlements after a period of 60 years.

According to journal Economist, international reserves tripled and almost became 6 trillion dollars in the last 10 years. 1,4 trillion (now 1,9 trillion) dollars of these reserves belong to China and 1 trillion belongs to Japan. Moreover, the reserves of petroleum exporting countries increase significantly. According IMF resources these reserves are kept on U.S. dollar basis and used in U.S. bonds (The Economist, December 1st-7th 2007, p.75). Therefore, external and domestic deficit off USA are met in U.S. dollars from Far East with foreign trade surplus (China and Japan). Latin America and Eastern Europe benefits from this mechanism, to which European region gets involved, with their high capital inflow.

The problem here is that for all countries the increasing capital movement moves exchange rates away from real and purchasing power parity, albeit for different reasons; and it is as if under the name of intermediate regime exchange rate practices, the implementation resumed in pegged exchange rate regime. New corrective actions can be expected on these developments which carried first BW system to 2nd BW in different aspects. The subprime agitation (CRISIS), which started in USA after August 2007, is the repetition of speculative movements in foreign exchange in the first BW system collapsed in 1973, through interests.

On the other hand, the relation established between relative unit labor costs (RULCs) and exchange rates became problematic for U.S. dollars. The increase in exchange rate in terms of domestic currency (outright exchange rate), which affects RULCs negatively, are realized depending on the capital flows (interest rates) rather than trade, efficiency or external deficit. Unit labor costs calculated according to U.S. dollars does not seem to give realistic results. Because the real value of dollar and the real value of currencies of developing countries can not be known.

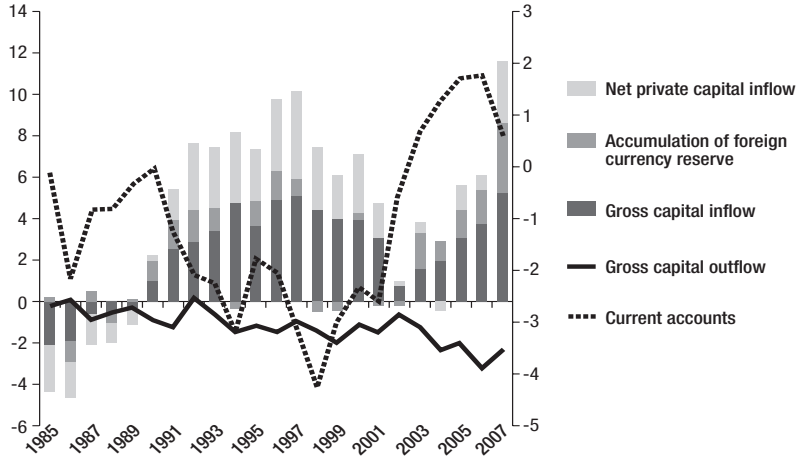
Figure 1:
Gross Flows, Current Accounts Balance and Reserve Movements
(As a percentage of GDP of developing markets)



Resource: International Monetary Fund.,(2007), "World Economic and Financial Surveys: World Economic Outlook; Globalization and Inequality", October pp.1-29 (Washington DC: International Monetary Fund)

The uncertainty in the real value of exchange rate is closely related to gross capital flow for developing countries. Gross capital flow for developing countries since the late 80's, as shown in Figure 1, helped some of them to have current accounts surplus as well as it caused reserve increase in these countries. Nonetheless, incisive attempts observed in the late 90's and beginning of 2000s since it was an appropriate ground for gross capital outflow. In terms of current accounts deficit, the effect of undervalued rate policies, in the countries other than the ones in the same position of Turkey and some developing Eastern European countries, is observed on current accounts surplus.

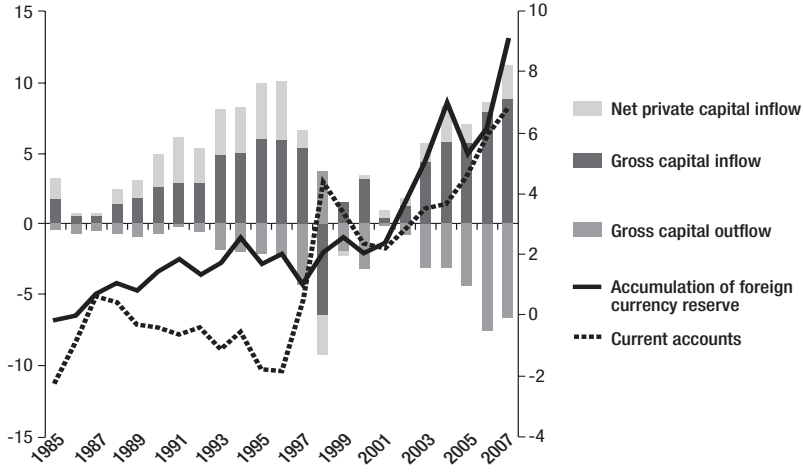
Figure2.
LatinAmerica
(as a percentage of regional GDP)



Resource: IMF (2007)

Net private capital flow to Latin America had been collected as a percentage of GDP since 2004 and this year it is expected to gain the level in 90's. Gross private capital flows are mostly balanced with constantly increasing gross capital outflows- It reached to its highest level in 2006-. The increase in the net private capital flow occurred in the same amount with current accounts position of region. The major external deficit in 90's and the significant reserve accumulation in 2006 resulted in an external surplus as a record. (Figure 2)

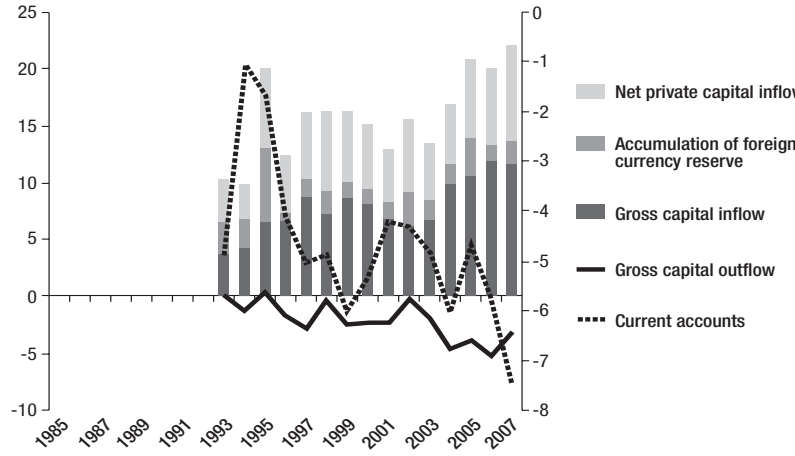
Figure 3.
Developing Asia
(percentage of regional GDP)



Resource: IMF (2007)

In Developing Asian countries, net private capital flows recovered from the level they came down in 1997-98 crisis. The gross capital flows to the region regained the level as it was before crisis but private capital outflow- especially portfolio flow- gather speed from the beginning of 2000s and this situation caused net flows to remain under the pre-crisis level. (Figure 3).

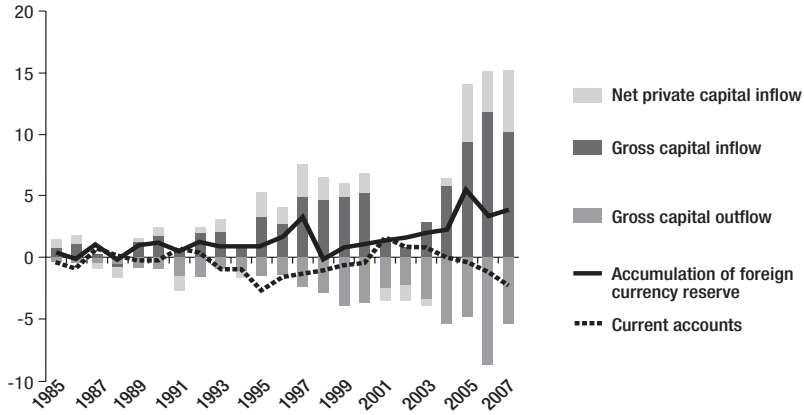
Figure 4.
Developing Europe
(As a percentage of regional GDP)



Resource: IMF (2007)

Developing Europe and Commonwealth of Independent States net capital flow gather speed from the beginning of 90's. Joining to European Union resulted in gross capital inflow to the developing market economies in a level never seen in the history. Distinct from other regions, net capital flows together with current accounts deficit caused foreign position to be corrupted. In 2006, there had been 6 percent current accounts deficit except for Russia. (Figure 4).

Figure 5.
Other developing market economies
(regional GDP percentage)



Resource: IMF (2007)

Other developing market economies The capital inflow in these countries promptly increased and became more than it was in the last three years by the mediation of Turkey and South Africa after the depression experienced in these countries in 2000. Lately gross capital inflow occurred by balancing the gross capital outflow trend. The countries, in which unit labor cost is affected by exchange rates, maintain their overvalued rate policies by having CA deficit. In this region net private capital inflows reveals as the main reason for overvalued exchange rate. (Figure 5).

The main factor, that distinguish the second floating of net capital flows occurred lately from floating in the beginning of 90's, is that in all four regions net direct foreign investments predominates compared to portfolio investments and financial flows named as other. (IMF, 2007, pp. 4-5).

Briefly, the point that the last trend in capital investments is that it is included in a broader country group and supported by a stronger current

accounts position (excluding developing European countries) and also it is financially more integrated with world economy, i.e. at least capital outflows are partially supported by capital inflows. (IMF, 2007, pp.4-5).

4. WHY SHOULD A PROBLEM EXPECTED IN 2ND BW?

Capital mobility in the developing countries as we try to state above might be a subject to different discussions among different schools of economics. The biggest dilemma of 2nd BW system is that as a result of China's incredible external surplus against USA Remninbi (Yuan) holds its overvalued condition although it has to appreciate around 15-25 % (Goldstein, 2005).

The overvalued condition of the currencies of other Asian countries, which has current surplus, is presented as second BW effect of China by Kamin (Kamin, 2005). As mentioned before, increase in the labor productivity of one country leads to an increase in the value of its currency. In order to decrease relative labor costs, China kept competition alive by not increasing the value of its currency even though it maintained four times more efficiency than USA between 1994 and 2003. (McKinnon, 2005, p.5)

As Stiglitz mentioned, it does not seem to be possible for USA on one hand, on the other hand for China and developing countries which attract capital to maintain this under the circumstances of present rate and interests(Obstfeld and Rogoff, 2005; Eichengreen, 2004; Truman, 2004). Stiglitz, who argues that USA has a savings deficit and therefore can prevent the danger of external budget deficit by meeting the saving deficit, warned USA in October 3, 2006 (before subprime crisis) in New York Times. Stiglitz, who does not use the concept of 2nd BW, made the assignation that Chinese Yuan is undervalued and USA had a big deficit from the trade with China.

After this assignation he emphasized that the main problem lies in changing the tax system in USA because even if China increases the value of Yuan, it is inevitable for USA to make capital imports of 2

billion dollars in a day. According to him, an increase in the savings and a decrease in expenses will be seen by undertaxing the ones with low income and overtaxing the ones with high income (Stiglitz, 2006). Here the opinion of considering monetary system with endogenous variables, as both Stiglitz and Keynes mentioned, predominates.

In Second BW unlike in first BW, rather than implementation that will fix the rates, it had to modify international trade policies and limitations by putting WTO in effect. Nevertheless, not proceeding in the meetings of WTO causes problems in rates (Panic, 2003, p.377). On the other hand, it is presupposed that Robert Wade Basel 2 standards will be ineffective and create herd behavior as Basel 1. (Wade, 2007, p.127).

U.S. dollars, of which intermediation power in international settlements diminishes, may cause developing countries to lose time by being affected negatively from the deadlock called "2nd BW system".

CONCLUSION:

Firstly, Tobin tax has been debated to prevent financial crises. The side effect of capital movements may forestall. Besides, currency areas will be more important all over the world, that's why integration among currency areas which different continents, and production and financial markets, should improve in order to overcome current world crisis.

BIBLIOGRAPHY

Bubula, Andrea., Inci Ötker-Robe, (2004), "The Continuing Bipolar Conundrum" Finance and Development, March, (Washington DC : International Monetary Fund), pp.32-35.

De Brunhoff (2006), Foley, Karl Marx's theory of money and credit *Suzanne de Brunhoff* and *Duncan K. Foley*, Money: an Alternative Story A Handbook Of Alternative Monetary Economics,(Ed. Arestis P, Sawyer M.), Edward Elgar, pp188.

Dooley, Folkerts-Landau and Garber, (2003), An Essay on the Revived Bretton Woods, NBER Working Paper 9971, September,. http://www.nber.org/papers/w9971

Eichengreen, Barry. (2004) "Global Imbalances and the Lessons of Bretton Woods."no100,2004/4
http://www.cairn.info/article.php?ID_REVUE=ECOI&ID_NUMPUBLIE=ECOI_100&ID_ARTICLE=ECOI_100_0039 (19 February 2008)

Gill, Stephan (1993), "Global finance, monetary policy and cooperation among the Group of Seven", in Finance and World Politics (Edited by P.G.Cerny), Edward Elgar, Cambridge,

Goldstein, Morris, and Nicholas R. Lardy, (2005) "China's Role in the Revived Bretton Woods System: A Case of Mistaken Identity.", IIE Working Paper, March http://www.iie.com/publications/wp/wp05-2.pdf

Kamin, Steven (2005). "The Revived Bretton Woods System: Does It Explain Developments in Non-China Developing Asia?", Presentation for conference on "The Revived Bretton Woods System: A New Paradigm for Asian Development?" Federal Reserve Bank of San Francisco, February 4,.

http://www.sf.frb.org/economics/conferences/0502/kamin.pdf

McKinnon, Ronald, (2005) "Exchange Rates, Wages, and International Adjustment: Japan and China versus the United States.", Stanford University, May http://www-econ.stanford.edu/faculty/workp/swp05007.pdf. (21 February 2008)

Obstfeld, Maurice, and Rogoff Kenneth (2005), "The Unsustainable U.S.

Current Account Position Revisited." The University of California and Harvard University, October, http://wwwtest.aup.edu/lacea2005/system/step2_php/papers/obtsfeld.pdf (20 February 2008)

Helleiner E. (1993), "When finance was the servant: international capital movements in the Bretton Woods order", in Finance and World Politics (Edited by P.G. Cerny), Edward Elgar, Cambridge,.

International Monetary Fund (2007), "World Economic and Financial Surveys: World Economic Outlook; Globalization and Inequality", pp.1-29 (Washington DC: International Monetary Fund), October.

Kindleberger C. (2007), Manias, Panics, and Crashes(Translated by. Halil Tunalı), Bilgi University publications,.

Krugman P., Obstfeld M. (2006), International Economics, Pearson Addison Wesley, Seventh Edition.

Marx, K. (1993), A Contribution to the Critique of Political Economy, Sol Publications, 5th edition, Istanbul.

Mishkin F., (2007) The Economics of Money, Banking and Financial Markets, (Translated by: İ. Şıklar, A.Çakmak, S.Yavuz), Bilim Teknik Publications.

Panic Mica (2003), "A new Bretton Woods", The Handbook of Globalization (Ed. Jonathan Michie), Edward Elgar,.

Rogoff Kenneth S. ,Reinhart Carmen M., (2008) "Is The 2007 U.S. Sub-Prime Financial Crisis So Different? An International Historical Comparison", National Bureau Of Economic Research Working Paper 13761, January. http://www.nber.org/papers/w13761

Roubini, Nouriel, and Brad Setser (2005). "Will the Bretton Woods 2 Regime Unravel Soon? The Risk of a Hard Landing in 2005–2006.", the Symposium on the "Revived Bretton Woods System: A New Paradigm for Asian Development?" organized by the Federal Reserve Bank of San Francisco and UC Berkeley, San Francisco, February 4th .

Saxena C.Sweta (2008), Capital flows, exchange rate regime and monetary policy, BIS papers, No 35, January. http://www.bis.org/publ/bppdf/bispap35.htm,

Stanford, J.D. (1973), Money Banking and Economic Activity, John Wiley & Sons, Sydney.

Stiglitz J. (2006), "How to fix global economy", NYT, 3 October.

The Economist (2007), 75, December 1st-7th.

Truman, Edwin (2004). "The U.S. Current Account Deficit and the Euro Area." Speech prepared for «The ECB andItsWatchersVI» Conference Frankfurt,Germany, July 2, http://www.iie.com/publications/papers/paper.cfm?researchid=213 (11 January 2008)

Tymoign Éric e and Wray L. Randall (2006), Money: an alternative story, A Handbook Of Alternative Monetary Economics,(Ed. Arestis P, Sawyer M.), Edward Elgar.

Wade R. (2007), “A new Global Financial Architecture?”, New Left Review, 46, July August.

Weeks, John (1981), Capital and Exploitation, Princeton: Princeton,.

DESCRIPTIVE AND EMPIRICAL ANALYSIS OF EASTERN EUROPEAN FINANCIAL MARKET INTEGRATION

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ABSTRACT:

The objective of this paper was to investigate the integration of Eastern European financial markets with the EU and world markets. Financial integration has been measured by the international investment position and a cointegrative VAR analysis of financial market returns. Results: The analysis of the international investment position as well as the cointegration analysis supported the thesis that a dynamic integration process has happened. The major driving forces are the EU and EMU accession expectations, economic integration, and legal harmonisation efforts to international standards. However, the current state of financial integration leaves room for more integration to come.

JEL classification: EE44, F15, F21, F36)

INTRODUCTION

International financial markets become more and more integrated. Foreign asset and liability positions are growing fast as well as international capital transfers. Financial integration is supported by a number of factors. Capital account restrictions have been lifted in many countries and cross-border transaction costs are declining. More efficient and new financial

trading platforms and instruments have been developed allowing an easier access to international markets. No wonder that investors are becoming more aware of higher return and better diversification potentials in foreign and newly emerging markets. Financial integration and corresponding rising capital flows can play a fundamental role in increasing growth and welfare in many recipient countries. Developing economies can profit from international capital flows since they can solve their inter-temporal saving-investment gap. However, financial integration leads to a growing dependence from foreign events that often occurred as exogenous shocks and resulted in financial, currency, and banking crisis. Central and Eastern Europe (CEE) was a particular case in this context. It was less affected by international crisis contagion than other Emerging Markets in Asia or Latin America because it profited from the accession towards the European Union. This accession process gave the financial integration of Central and Eastern Europe a unique characteristic that could be become a guidance for other regions in the world that aim to be more economically and financially integrated with industrialized countries.

In the first part of this paper, different theoretical driving forces for the integration process have been described including the role of the EU accession of Eastern European countries.

Then two different kinds of empirical integration measurements have been applied to assess the degree of achieved integration: The international investment position of some of Central European core countries and the degree of cointegration between market returns in the EU and in Eastern Europe.

1. FINANCIAL INTEGRATION STIMULUS FROM THE EU AND EMU ACCESSION

In 2004, Poland, the Czech Republic, Hungary, Slovenia and the Baltic states joined the European Union (EU). Before the membership into the EU happened, a long political and economical adjustment process took place. As a consequence of all these measures, trade between both regions

started to increase sharply and within a few years, the EU became the most important trading partner for Central and Eastern Europe[1]. The described accession towards the EU has caused a strong stimulus for financial integration through convergence expectations. Economic convergence can be expected if CEE economies will develop towards EU levels because intensified trade with the EU as well as legal harmonization should benefit economic growth, labor income, employment, tax payments and social stability[2]. The entire process will be supported by foreign direct investment inflows that usually follow trade linkages. Foreign direct investment creates employment, has valuable technological and organizational spillover effects, forces local governments to improve the infrastructure and thereby increases the efficiency of the overall economy[3]. Such a convergence in the real economy will also cause a convergence of corporate cash flows, financial market risk premiums and overall capital costs, resulting in a higher integration of financial markets. The formal integration into the European Monetary Union (EMU) became be possible from 2007 on. While only Slovenia of the candidate countries was able to fulfill the Maastricht Criteria for an EMU participation, the longer term chances for the other countries seem to be fairly good[4]. The prospect of an EMU membership is a strong supportive factor for the integration of CEE financial markets because it causes significant cross-border transactions[5].

2. OTHER DRIVING FORCES BEHIND FINANCIAL INTEGRATION

2.1 International Trade

Looking at the driving forces behind financial integration, the first obvious issue is international trade in goods and services. Goods trade

(1) Kommission der europäischen union [1970].

(2) International monetary fund [2001].

(3) Lane [2001].

(4) Deutsche bank research [2004].

(5) FRBSF economic letter [2004].

may be important for several reasons. Firstly, goods trade directly entails corresponding financial transactions such as trade credit and export insurance. Secondly, goods trade and financial positions are sometimes jointly determined such as in the case of FDI and intra-firm trade. Finally, openess in goods market may make a country more transparent to foreigners so that their willingness to conduct financial investments in this country may increase(6).

Table 1
Poland: Economic Integration based on the international trade position , Based on IMF Data and own Calculations

Date	Exports in Mio. USD	Imports in Mio. USD	Real Econ. Integrat.
1994	18355	18930	0,205
1995	25041	26687	0,214
1996	27557	34844	0,395
1997	30731	40553	0,489
1998	32467	45303	0,461
1999	30060	45132	0,491
2000	35902	48209	0,469
2001	41663	49324	0,421
2002	46742	53991	0,448
2003	61007	66732	0,507
2004	79309	81413	0,623

Table 2
Czech Republic: Economic Integration based on the international trade position, Based on IMF Data and own Calculations

Date	Exports in Mio. USD	Imports in Mio. USD	Real Econ. Integrat.
1993	14231	14748	0,851
1994	15964	17372	0,791
1995	21477	25162	0,898
1996	21950	27656	0,865
1997	22319	27257	1,022
1998	25886	28532	0,883
1999	26259	28161	1,029
2000	29019	32114	1,077
2001	33404	36482	1,091
2002	38480	40720	0,991
2003	48736	51242	1,064
2004	66874	67750	1,248

(6) Lane [2001].

Table 3
Hungary: Based on IMF Data and own Calculation, Economic Integration based on the international trade position

Date	Exports in Mio. USD	Imports in Mio. USD	Real Econ. Integrat.
1992	10097	10108	0,577
1993	8119	12140	0,575
1994	7648	11364	0,482
1995	14619	16078	0,763
1996	15966	17640	0,804
1997	19284	20611	0,951
1998	23698	25583	1,070
1999	25608	27778	1,183
2000	28762	31675	1,306
2001	31080	33318	1,210
2002	34792	36911	0,964
2003	43229	46594	1,005
2004	55368	58290	1,135

In all three countries an increasing economic integration with the rest of the world can be observed. The real economic integration has been calculated in analogy with international investment position. Exports and import have been added and than devided by GDP. Ironically, real economic integration in Poland and Hungary has been more dynamic than in the Chech Republic despite the fact that the latter one shows the deepest fincial integration according to the IIP[7]. So obviously, trade linkages and real economic integration can only partially explain financial integration.

2.2 Efficient global allocation of financial ressources

The basic theoretical argument for international financial integration is that it results from an efficient global allocation of savings. Efficient global allocation channels financial resources into their most productive uses, thereby increasing economic growth and welfare across the globe[8]. Under these standard assumptions, differences in income per capita between countries that are producing the same goods with the same

(7) See chapter 4.
(8) Imf [2001].

constant returns to scale production function, with the same production factors and the same technology can only occur if there are differences in capital per capita. If capital war allowed to flow freely, the return of investment in any location should be the same and financial integration would reach its final stage. However, empirical investigations show that generally, financial integration has remained at a much lower level than one would aspect under the assumptions of a frictionless neoclassical theory. This was particularly true for international capital movements between richer and poorer countries. This phenomenon has been called the Lucas paradox and has certainly it´s validity also for the state of financial integration of Eastern European countries. If only some modifications are introduced in this standard approach such as frictions for international capital flows and less flexible production structures, the adjustment process can be stopped before its completion. With respect to international capital market frictions, differences in sovereign risk, information asymmetries and barriers for capital movements or transaction costs can be mentioned. With respect to the production structure, issues such as differences in production factors, technologies, government policies or institutions do play an important role(9). If these frictions are investigated with respect to the case of Eastern Europe, one can assume that they all have been existent in the past but their weight is certainly declining in the course of the political and economical integration process into the EU. Therefore, a further deepening of financial integration is likely to happen in the next years to come.

2.3 Institutional, legal and political impact

Moreover, there are a few other hardly measurable forces at work that favour or prevent financial integration. Corruption is very likely to have a negative impact on foreign direct investment and to maybe a somewhat lesser extent on portfolio flows. Institutional quality such as the reliability of governmental institutions or the transparency of the

(9) Alfaro and Kalemli-Oczan and Volosovych [2004].

local legal system can have a long-term influence on capital inflows and financial integration because they influence the willingness of foreign investors to place capital in the specific country. This is particularly true for foreign direct investment with respect to the protection of intellectual and other property rights. Liberalisation and privatisation policies are also very likely to attract foreign capital because they enhance interesting investment opportunities and lead to a rise in the confidence of foreign investors that the local government is running a free-market orientated economic policy(10). One can reasonably assume that the corruption level, governmental institutional quality as well as liberalisation and privatisation policies have become more favourable for international capital flows in the course of of the EU integration process of Eastern European countries. Furthermore, the integration process has been reinforced by economic transformation measures that gave easier access for national and international investors to local financial markets and private equity as well as additional legal harmonisation efforts with EU standards in terms of investor´s rights. Particularly the latter measures have a direct and significant positive effect on financial market integration because they lead to a deepening of local financial markets in terms of available instruments (debt, equity, derivavtives), market capitalisation and market liquidity. Such a deepening process raises the attractivity of local financial markets for international investors and cross-border capital flows.

3. FINANCIAL INTEGRATION ACCORDING TO THE INTERNATIONAL INVESTMENT POSITION

One direct approach is to measure the level of financial integration the amount of a country´s portfolio of external assets and liabilities. This portfolio is describing the international investment position (IIP)(11). The larger the international investment position is the more the country is

(10) IMF [2004].

(11) Lane and Milesi-Ferretti [2004].

financially linked with the rest of the world. The data in the table below summarizes total holdings by domestic residents of financial claims on the rest of the world and nonresidents claims on the domestic economy. The data methodolgy is based on the IMF Balance of Payments manual. According to this methodology liabilities are divided into five categories: Foreign direct investment (FDI), portfolio equity investment, portfolio debt investmet, other investment and derivatives. Assets are classified into the same five as liabilities, plus official reserves.

Table 4

Poland: International Investment Position (in Mio. USD)

Based on IMF Data and own Calculations

Date	Assets	FDI	Equity	Debt	Other	Liabilities	FDi (stock)	Equity	Debt	Other	(A&L)/ GDP
1994	23506	461			15727	53075	3789	443	7988	40855	0,829
1995	31966	539			14527	59304	7843	663	8712	42086	0,731
1996	28746	735			8454	58515	11463	2279	7869	36904	0,647
1997	31908	678	2	837	8988	62439	14587	2672	8653	36527	0,703
1998	38399	1165	9	1084	7866	80205	22479	4969	8689	44068	0,751
1999	40101	1024	28	1115	10619	89257	26075	4980	9637	48565	0,838
2000	44672	1018	47	1528	14615	99999	34227	5350	12707	47715	0,840
2001	49299	1156	108	1203	20275	107128	41247	4301	14594	46986	0,830
2002	51016	1453	189	2540	17728	125128	48320	4399	19643	52766	0,869
2003	61303	1855	186	3855	21253	153548	55268	6133	26637	65510	1,062

Table 5

Czech Republic: International Investment Position (in Mio. USD)

Based on IMF Data and own Calculations

Date	Assets	FDI	Equity	Debt	Other	Liabilities	FDi (stock)	Equity	Debt	Other	(A&L)/ GDP
1993	17950	181	264	12	13621	14123	3423	1101	855	8744	0,942
1994	20471	300	334	99	13494	18088	4547	1331	1579	10631	0,914
1995	29396	345	693	62	14273	27182	7350	2642	2054	15136	1,090
1996	30629	498	748	624	16323	33151	8572	3398	1900	19280	1,112
1997	29779	548	417	615	18425	32863	9234	3028	1853	18749	1,292
1998	36426	804	449	752	21804	40361	14375	3793	1771	20422	1,247
1999	37645	698	1843	1057	21042	40548	17552	2724	1878	18394	1,475
2000	38304	738	2439	2333	19488	43378	21664	3059	1294	17242	1,439
2001	42609	1136	1894	3212	21469	49340	27092	3551	1423	16957	1,435
2002	52419	1473	2869	6233	17098	65598	38669	4250	2423	19504	1,477
2003	59926	2284	1845	11563	16336	80485	45287	5488	3229	25724	1,523
2004	68637	3061	3278	13240	18909	105523	56415	9339	7697	30650	1,685

Table 6
Hungary: International Investment Position (in Mio. USD)
Based on IMF Data and own Calculations

Date	Assets	FDI	Equity	Debt	Other	Liabilities	FDi (stock)	Equity	Debt	Other	(A&L)/ GDP
1992											
1993											
1994											
1995											
1996											
1997	15139	898	32	139	5634	41432	16325	2582	9914	12161	1,348
1998	17422	1301	87	206	6472	45881	18811	2317	12217	1254	1,375
1999	20384	1524	73	294	6629	50134	19542	4335	12599	13494	1,563
2000	20261	1976	221	447	5542	50177	20009	3014	11825	15053	1,523
2001	23314	2260	271	543	8320	54434	23099	2935	12786	15132	1,461
2002	24653	2745	363	573	9680	66496	28717	3825	17118	16212	1,226
2003	32123	3537	425	620	13157	102834	48320	5604	22189	24720	1,451
2004	42289	4484	908	661	17804	136764	60328	12079	31935	29817	1,643

The data shows that in all the three cases of Poland, the Czech Republic and Hungary the amount of assets and liabilities has risen considerably. These three countries have been chosen to take them as an example for the development in Eastern Europe. An inclusion of all countries would have been difficult for data and transparency reasons. In Poland and Hungary, the IIP has almost tripled while in the Czech Republic it even went up fourfold. However, to pose a reasonable assessment on the development of the IIP it is necessary to relate it to the gross domestic product (GDP). This has been done in the row (A&L)/GDP according to the formula: (Assets + Liabilities)/GDP. This measure delivers a somewhat different picture. While the Czech Republic still shows a significant increase in financial integration this is only partially true for Poland and Hungary. The differences between these countries are not dramatic with regard to FDI. But in equity and mainly in debt markets growth in the Czech Republic was considerably more dynamic than in the other two countries. This leads to the conclusion that by deepening their debt and equity markets Poland and Hungary could reach a much higher level of financial integration. This conclusion is basically true for the whole region of Central and Eastern Europe. So far, banks have become the main source

of financing for the economy while securities markets have grown at a more moderate pace. Most of the capital markets are still in their infancy. Particularly the smaller markets in Central and Eastern Europe are still very illiquid and difficult to access for international investors. Also the larger and more advanced markets still have a lot of leeway for improving market depth and liquidity, as well as regulations and institutions. The fixed income markets tend to be more developed than the stock markets although the latter ones have experienced a tremendous upswing in recent years. After the Russian crisis bond issues have declined significantly but are on a strong recovery trend since then. While most of the issuers are still government related and corporate and bank issuers still play a very minor role, the length of maturities in local markets has increased recently with a sizeable increase of paper with maturities of 2 to 5 years. Stock markets in the region have not yet reached a level of development that corresponds to the size of its population and the economy. Market capitalisation in terms of GDP has been the largest in Hungary and in the Czech Republic with around 20 % while the average in the region is below 15% in the year 2002. In Latin America market capitalisation is around 30% of GDP, in East Asia it is around 50% and in western industrialised countries it is usually above 100%(12).

The size and the quality of the domestic financial sector facilitates international asset trade in several ways. Domestic financial intermediaries deliver a platform for the distribution of international assets so that local investors can easier gain foreign asset exposure. This was especially the case for German but also other European banks that very aggressively provided Eastern European investment vehicles for their clients in their home countries. But also the Eastern European financial sector has progressed significantly so that local investors do have easier access to financial markets in the EU and the US. In this context, one has to stress the impact from foreign direct investment in the local Eastern European

(12) Lemierre [2002].

banking industry. Due to significant deregulation measures from local governments and the prospect of Eastern European countries to join the EU, a lot of foreign direct investment in the local banking sector could have been observed. After the deregulation of the banking sector the former dominating state banks lost large market shares to smaller emerging private banks. The number of smaller banks rose sharply as well as competition in the banking sector so that a consolidation in banking sector became unavoidable. Foreign banks began to buy into this consolidation process by accumulating easily accessible market shares. In many Eastern European banking industries foreign market shares have risen to above 50%. This deregulation and consolidation process has a very positive impact on financial market integration. It did not only helped to create a platform for international asset trades but also raised transparency and banking quality for foreign investors and has led to a much better credit risk and deposit diversification compared to the former monopolistic structures(13).

In addition, significant institutional and legal progresses have been made in the financial market sector such as the establishment of formal exchanges, the development of legal frameworks and regulatory institutions, the establishment of internationally compatible accounting standards, and improvements in transparency and corporate governance. All of the new EU member countries have harmonised their legal and institutional systems with those of the European Union and with international standards. Despite these progresses, more structural improvements are necessary. Particularly the implementation and enforcement of established laws and regulations is a problematic issue. Often regulatory institutions lack sufficient empowerment, judges hesitate to apply newly introduced laws, and important information is not widely distributed. On balance, the legal protection of investors has been more effective on paper than in reality. Mentioning this, of course one has to distinguish between the more

(13) Gelos and Roldós [2002] and Lane [2001].

and less advanced financial markets in the region. Solving these problems is one of the key challenges to deepen financial integration with the EU and the rest of the world further.

4. THE COINTEGRATION ANALYSIS OF MARKET RETURNS

Financial market integration analysis can be based on the cross-border application of the law of one price: two assets bearing the same amount of risk that are traded in two different national markets will have the same price once these markets are fully integrated. Aggregated to a country's market level this can mean that a national financial market can be considered as being more economically and financially integrated the more its return is explained by the world market return. This basic principle has been expressed in the international asset pricing model (IAPM), a theoretical extension of the capital asset pricing model (CAPM)(14). In this context, financial market integration shall be measured by the statistical significance of the cointegration of market returns. If no such statistical relevant cointegration can be found, it can be assumed that the Western and Eastern European markets are still segmented and no integration in the IAPM sense has taken place. If, however, statistical cointegration between returns of financial markets of these two regions can be found, it means that there exists a linear combination of market returns that is stationary in the statistical sense. In this case, the development of market returns between both regions is linked. Economically, such a linkage can be explained in the sense there is at least a group of investors that is active in markets of both regions. According to the return opportunities and risks in each market, these investors will allocate their capital in a way that maximizes their profit given a certain level of risk. If a market in one region has shown considerable stronger profits than the one in the other region, it would mean that in the future this market offers lesser return

(14) Alves and Ferreira [2003].

and higher risk potential. Investors will start to invest a larger proportion of their capital into the market that has profited less in the past. One could consider this mechanism as a weak form of arbitrage. Financial integration measured in the form of market returns is then possible if investors have access to markets in both regions. This requires a corresponding legal framework, banking facilities, a low level of restrictions with respect to international capital transfers and acceptable transaction costs – issues that have been discussed in the previous sections of this paper. The level of the international investment position of Poland, the Czech Republic and Hungary support the thesis for the existence of such a group of investors that is actively investing in both Western financial markets and Central and Eastern Europe(15). Another explanation for a cointegrating relationship between West and East European markets could be that markets in both regions react to the same global macroeconomic trends. For example, if economic growth in the world economy is accelerating then prices in the stock markets of both regions would rise due to expectations of higher corporate profit growth. In both regions, risk premiums in financial markets would decline supporting price increases in stock and bond markets. However, since risk premiums in Emerging Markets are much more volatile than in Western markets, this effect would be stronger felt in Central and Eastern Europe. Opposite developments could be expected in the case of a global economic slowdown. One can reasonably assume that the described mechanism of weak arbitrage and global macroeconomic trends are both at work. In the following section, financial integration of Eastern European markets shall be tested in the manner that price changes in CEE markets are analyzed against price changes of Eurozone financial markets that take the role of world markets in the IAPM context in this study. For the CEE markets, JP Morgan Indices for Eastern European local bonds (EEELMI), Eastern European bonds denominated in Western currencies (EEEMBI), and the Morgan Stanley Stock Index for Eastern

(15) Tomfort [2006].

European stock markets (EEMSCI) are used. For European markets the JP Morgan Euro bond index (GBIEMU) and the Morgan Stanley stock index for the Europe (EURMSCI) are taken. The bond indices include all available maturities in their markets. All indices have been transformed into logarithmic monthly returns. In the following statistical analysis, it shall be investigated whether cointegrated relationships between price changes in the CEE and the Eurozone bond markets exist and between price changes in the stock markets of both regions. The cointegration analysis is based on Johansen´s maximum likelihood approach. Augmented Dickey-Fuller tests showed that all analyzed time series for market returns were of integration order 1, a typical result for financial market data(16).

(16) Pesaran and Pesaran [1997].

4.1 Cointegration analysis for EEELMI with GBIEMU bonds

In the first step it shall be tested whether there exist one or more cointegrating vectors between CEE bonds in local currencies and Western bonds in Euro. The optimal lag length for the model specification was found to be 2 by testing non-differenced data. Analyzing the data and testing for different kinds of model specifications, the cointegration estimation with unrestricted intercepts and not trends was chosen.

Statstics1: *Panel A: Cointegration with unrestricted intercepts and no trends in the VAR. Cointegration LR Test is based on Maximal Eigenvalue of the Stochastic Matrix. 113 observations from 1995M3 to 2005M7. Order of VAR = 2.List of variables included in the cointegrating vector: EEELMI, GBIEMU. List of eigenvalues in descending order: .45907 .31402*

Nul	Alternative	Statistic	95% Critical Value	90% Critical Value
r = 0	r = 1	69.4338	14.8800	12.9800
r<= 1	r = 2	42.5901	8.0700	6.5000
Rank	Max. LL	AIC	SBC	HQC
r = 0	-630.6514	-636.6514	-644.8335	-639.9716
r = 1	-595.9345	-604.9345	-617.2077	-609.9148
r = 2	-574.6394	-584.6394	-598.2764	-590.1731

AIC = Akaike Information Criterion
SBC = Schwarz Bayesian Criterion
HQC = Hannan-Quinn Criterion
ML estimates subject to exactly identifying restriction(s)
Estimates of Restricted Cointegrating Relations (SE's in Brackets
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Testing the hypothesis that both markets are not cointegrated (r = 0) against the alternative of one (r=1) or more cointegrating vectors (r > 1), the corresponding values for λ_{trace} statistics 69.4338 and 112.0239 exceed their 95% critical values by far. Therefore, it is possible to reject the null hypothesis of no cointegrating vectors and accept the alternative of one or more cointegrating vectors. Testing the hypothesis that there exist one or less than one cointegrating vector against the alternative of two cointegration vectors, again the value for λtrace statistics of 42.5901 exceed the critical value significantly. Furthermore, also the tests using

the Akaike Information Criterion (AIC) and Schwarz Bayesian Criterion (SBC) show their maximum values for r=2. All three procedures point to the same number of cointegrating relations. It can be relatively safely concluded that there exist two cointegration vectors between the returns of CEE bonds in local currencies and the bond market of the Eurozone. According to these results, the development of market returns between both regions is linked so that financial integration can be observed. To some extent, investors consider both markets as investment alternatives and they are influenced by the same macroeconomic trends.

The error correction form of the cointegrating VAR model shall be analyzed to identify adjustment dynamics and assess whether the assumed relationships appear to be reasonable.

Statistics 2*: ECM for variable EEELMI estimated by OLS based on cointegrating VAR(2). Dependent variable is dEEELMI*

113 observations used for estimation from 1995M3 to 2005M7

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
Intercept	1.0720	.37255	2.8775[.005]
dEEELMI1	.19647	.10318	1.9042[.060]
dGBIEMU1	.13562	.10469	-1.2954[.198]
ecm1(-1)	-1.3633	.15134	-9.0078[.000]

R-Squared .55184 R-Bar-Squared .53951
S.E. of Regression 3.7391 F-stat. F(3, 109) 44.7395[.000]
Mean of Dependent Variable -.024425
S.D. of Dependent Variable 5.5100
Residual Sum of Squares 1523.9
Equation Log-likelihood -307.3324
Akaike Info. Criterion -311.3324
Schwarz Bayesian Criterion -316.7871
DW-statistic 2.0018
System Log-likelihood -595.9345

Test Statistics
A: Serial Correlation : CHSQ(12)= 6.1737[.907],
F(12, 97)= .46715[.929]
B: Functional Form: CHSQ(1)= .0070904[.933]

F(1, 108)= .0067771[.935]
C: Normality: CHSQ(2)= 2057.2[.000]
D: Heteroscedasticity: CHSQ(1)= .039671[.842]
F(1, 111)= .038983[.844]
A:Lagrange multiplier test of residual serial correlation
B:Ramsey's RESET test using the square of the fitted values
C:Based on a test of skewness and kurtosis of residuals
D:Based on the regression of squared residuals on squared fitted values
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The error correction model is highly significant as shown by the R^2 and the F-statistic for testing the joint null hypothesis that the coefficients of the included variables are zero (i.e. there does not exist a long-run relationship between them). Furthermore, the error correction term (ecm1(-1)) is highly significant according to the t-statistic, confirming the former results that EEELMI and GBIEMU returns are cointegrated. The error correction coefficient is negative and quite large which means that the equation moves quickly back to its equilibrium once it is shocked by events. Such a quick adjustment towards the equilibrium path of both markets is another important indication for the existence of arbitrage forces and financial integration in an economic sense. The t-statistic for dGBIEMU1 is not fully convincing, but does not seriously question the cointegrating relationship. Interestingly, the estimated coefficient for dGBIEMU1 is negative pointing towards an inverse cointegrated relationship. This statistical result would support the thesis that gains in Western bond markets correspond with a weaker global economy that leads to higher risk premiums and pressures in emerging financial markets with regard to exchange and local interest rates. Results for the diagnostic tests show that serial correlation and heteroscedasticity do not distort the estimations. The normality test show a bias towards skewness and kurtosis of residuals that can be typically found for Emerging Market return time series due to their high volatility and the regular occurrence of extreme shocks. However, in this case this effect seems to be quite small and still acceptable with respect to the credibility of the results.

4.2 Cointegration analysis for EEEMBI with GBIEMU bonds

This time, it shall be tested whether there exist cointegrating vectors between CEE and Western bonds both denominated in Euro. The optimal lag length for the model specification was 2. The model specifications with respect to the intercept and trend was kept unchanged.

Statistics 3: *Panel A: Cointegration with unrestricted intercepts and no trends in the VAR. Cointegration LR Test is based on Maximal Eigenvalue of the Stochastic Matrix. 13observations from 1995M3 to 2004M7. VAR-Order = 2*

List of variables included in the cointegrating vector: EEEMBI, GBIEMU

List of eigenvalues in descending order: .37017 .27464

Nul	Alternative	Statistic	95% Critical Value	90% Critical Value
r = 0	r = 1	52.2409	14.8800	12.9800
r<= 1	r = 2	36.2834	8.0700	6.5000
Rank	Max. LL	AIC	SBC	HQC
r = 0	-719.3532	-725.3532	-733.5353	-728.6734
r = 1	-693.2327	-702.2327	-714.5059	-707.2130
r = 2	-675.0910	-685.0910	-698.7280	-690.6247

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Analyzing the λ_{trace} statistics we find again the existence of two cointegrating relationships. Testing the hypothesis that there exist one or less than one cointegrating vector against the alternative of two cointegration vectors, the value for λ_{trace} statistics of 36,2834 exceeds the critical value of 8,07 significantly. The tests using the Akaike Information Criterion (AIC) and Schwarz Bayesian Criterion (SBC) also show their maximum values for r = 2. Again, all estimation procedures do reject the null hypothesis of no two cointegrating vectors between the returns of CEE bonds in Euro and Western bonds in Euro. Also in this case we can conclude that at least some financial integration has taken place.

***Statistics 4**: CM for variable EEEMBI estimated by OLS based on cointegrating VAR(2).Dependent variable is dEEEMBI / 113 observations used for estimation from 1995M3 to 2005M7*

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
Intercept	1.3344	.94557	1.4112[.161]
dEEELMI1	-.19773	.099261	-1.9920[.049]
dGBIEMU1	.56683	.28768	1.9703[.051]
ecm1(-1)	-.42998	.10999	-3.9092[.000]

R-Squared .28020 R-Bar-Squared .26039
S.E. of Regression 9.3874 F-stat. F(3, 109) 14.1438[.000]
Mean of Dependent Variable -.011858
S.D. of Dependent Variable 10.9156
Residual Sum of Squares 9605.5
Equation Log-likelihood -411.3527
Akaike Info. Criterion -415.3527
Schwarz Bayesian Criterion -420.8075
DW-statistic 2.1738
System Log-likelihood -693.2327

Test Statistics:
A:Serial Correlation: CHSQ(12)= 18.7785[.094]
F(12, 97) = 1.6110[.101]
B:Functional Form: CHSQ(1)= 17.2861[.000]
F(1, 108)= 19.5050[.000]
C:Normality: CHSQ(2)= 2509.1[.000]
D:Heteroscedasticity CHSQ(1)= 2.4068[.121]
F(1, 111)= 2.4156[.123]

The error correction model is still significant as shown by the R^2 and the F-statistic but to a somewhat lesser extent than with CEE bonds in local currency. The error correction term (ecm1(-1)) is highly significant according to the t-statistic, confirming the former results that EEEMBI and GBIEMU are cointegrated. The error correction coefficient is negative but smaller than in the EEELMI case. We have to assume that the equation moves slower to its equilibrium once it is shocked by events. This result is somewhat surprising because one would rather assume that

bonds denominated in the same currency are more affected by risk and return comparisons of international investors. One reasonable explanation for this statistical pattern can be that local investors in CEE markets have a higher degree of confidence in the economic integration of their home countries with Western Europe and thereby in the equilibrium path of their financial markets with EU financial markets once this has been shocked by crisis events. The t-statistic for dGBIEMU1 is close to 2 and confirms the impact of EMU bond returns on EMBI returns. This time, the estimated coefficient for dGBIEMU1 is positive, pointing towards comovements in the cointegrated relationship. These statistical results would support the thesis that bond yield declines in Western bond markets more than compensate rising risk premiums for CEE bonds (in a global macroeconomic downturn) as long as both markets are denominated in the same currency. The results for the diagnostic tests are not as good as in the error correction model for EEELMI bonds because they are somewhat distorted by serial correlation, heteroscedasticity, skewness, and kurtosis of residuals. However, the extent of these distortions is not so large that we would have to deny the estimates looking at the Lagrange Multiplier test and the F statistic. A likely reason for these distortions can be that in Emerging Market crisis situations one often has to deal with non-linearities and a significant impact from outliers.

4.3 Cointegration analysis for EEMSCI with EURMSCI stocks

Statistics 5: Panel A: Cointegration with unrestricted intercepts and no trends in the VAR. Cointegration LR Test is based on Maximal Eigenvalue of the Stochastic Matrix

113 observations from 1995M3 to 2005M7 . Order of VAR = 2.

List of variables included in the cointegrating vector: EEMSCI, EURMSCI

List of eigenvalues in descending order: .38719 .25664

Nul	Alternative	Statistic	95% Critical Value	90% Critical Value
r = 0	r = 1	55.3357	14.8800	12.9800
r<= 1	r = 2	33.5129	8.0700	6.5000
Rank	Max. LL	AIC	SBC	HQC
r = 0	-787.0132	-793.0132	-801.1953	-796.3334
r = 1	-759.3453	-768.3453	-780.6186	-773.3257
r = 2	-742.5889	-752.5889	--766.2258	-758.1226

****

The statistical estimates show that there exist two cointegrations between stock markets in Central-Eastern and Western Europe. This result has been confirmed by λ_{trace} statistics that exceed the 95% critical value for r = 2 as well as by the Maximum Likelihood statistics, the AIC, SBC and HQC criterion. Also with regard to stock markets, the thesis for financial integration with regard to the price and return building processes found statistical support. The error correction form of the cointegrating VAR model is again supporting the validity of the cointegration relationships between stock markets in Western and Central-Eastern Europe.

Statistics 6: ECM for variable EEMSCI estimated by OLS based on cointegrating VAR(2). Dependent variable is dEEMSCI.
13 observations used for estimation from 1995M3 to 2005M7

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
Intercept	1.0643	1.0403	1.0231[.309]
dEEELMI1	-.072625	.097261	-.74670[.457]
dGBIEMU1	.67420	.19007	3.5471[.001]
ecm1(-1)	-.78919	.10350	-7.6252[.000]

****

R-Squared .47575 R-Bar-Squared .46132
S.E. of Regression 10.9610 F-stat. F(3, 109) 32.9717[.000]
Mean of Dependent Variable -.056549
S.D. of Dependent Variable 14.9343
Residual Sum of Squares 13095.6
Equation Log-likelihood -428.8646
Akaike Info. Criterion -432.8646
Schwarz Bayesian Criterion -438.3193
DW-statistic 2.0607
System Log-likelihood -759.3453

```
**********************************************************************************************
Test Statistics  *                  LM Version       *       F Version
**********************************************************************************************
A:Serial Correlation: CHSQ(12) = 16.0125[.191]
F(12,  97)= 1.3345[.212]*
B:Functional Form: CHSQ(1) = .4872E-5[.998]
F(1, 108) = .4656E-[.998]
C:Normality: CHSQ(2)= 307.7981[.000]
Heteroscedasticity: CHSQ(1) = .044700[.833]
F(1, 111) = .043926[.834]*
**********************************************************************************************
```

The positive cointegration relationships between both markets with respect to price building processes were highly significant. T-Ratios for lagged difference of EURMSCI and for the error correction term point into this direction. The positive coefficient for dEURMSCI1 shows that stock markets in both regions move in line. This result is giving a strong hint for the economic integration of both regions. Obviously, they are affected by the same underlying business cycle that is driving corporate profits in the same direction. The error correction coefficient was negative and indicated a relatively fast movement of the equation towards equilibrium when it was shocked by events. Markets do not deviate for long from the cointegration path. The results for the diagnostic tests are as well somewhat distorted particularly with respect to skewness and kurtosis of residuals. This statistical finding is typical for Emerging Market residual distributions because in crisis situations outliers - that partly can be explained by extremely low market liquidity – have a strong impact on them. However, the extent of these distortions is not so large that we would have to deny the estimates since the diagnostic tests for serial correlation and heteroscedasticity do not give this much reason for concern. The error correction model results are supporting the results of the former statistical analysis with respect to the influence of European stock markets on price and return processes in Central and Eastern Europe. The positive relationship between both markets was highly significant. The error correction coefficient was negative and pointed to a fast movement of the equation towards equilibrium when it was shocked by events. As

it was the case with the bond markets, all three statistical investigations confirmed the assumption of a cointegrated relationship between CEE and Western European stock markets.

On balance, in all analyzed cases, price building processes showed the characteristics of financially integrated markets. However, the level of integration is still far below of what one would aspect in a neoclassical framework. Even if one abstracts of such model conditions, one has to acknowledge that the statistical impact from European markets on CEE markets is still a lot of smaller than the correlations in-between the EMU bond and stock markets(17). Partly this result can be explained by the existence of CEE currencies that can be regarded as an additional source of risk for investors. Limited market liquidity is another hurdle for cointegration with EMU returns. Finally, financial and economic integration is still not over.

CONCLUSIONS AND OUTLOOK

The used measurement for financial integration - the cointegrative VAR analysis - support the thesis that a dynamic financial integration process of CEE markets with EU markets has happened. The major driving forces behind that development are likely to be the EU accession, EMU participation expectations, economic integration and corresponding policy efforts, liberalization of local financial markets and legal harmonization efforts to international standards. However, the current state of the financial integration process leaves still a lot of room for more integration to come. According to the statistical cointegration analysis, the current integration level is still far below the level financial market theory or the empirical results for comparable markets would suggest. To accelerate the process of financial integration and the development of local financial markets several important political measures have to be

(17) Soyoung and Moshirian and Wu [2004].

taken: Financial market transparency has to be improved with respect to fiscal and monetary policy, banking supervision, accounting and auditing rules, securities and insurance regulation as well as corporate governance in general. Insider control, for example, has been singled out to be the most important governance problem for stock market developments. More management control has to be transferred to investors to gain their trust and insolvency regimes have to be more rigorously enforced. Particularly the implementation and enforcement of established laws and regulations is a problematic issue. Often regulatory institutions lack sufficient empowerment, judges hesitate to apply newly introduced laws, and important information is not widely distributed. The legal protection of investors has been more effective on paper than in reality(18). One has to stress, however, that a lot of progress has been made in these issues. CEE countries such as the Czech Republic, Poland, Hungary, and the Baltic states have subscribed to the Special Data Dissemination Standard of the IMF to provide best practices in the preparation and dissemination of economic data. Other areas of progress are the acceptance of the Basel Committee's Core Principles for Effective Banking Supervision and the OECD's Principles of Corporate Governance by many of these countries. Transparency initiatives could have been observed such as ongoing work to implement the International Accounting and Auditing Standards(19). Again, the integration into the EU has been one of the major driving forces to promote financial market reforms.

The consequences of financial integration have been widely discussed in academic literature. To summarize the discussion with respect to Central-Eastern Europe one could expect that capital has and will become easier available in these countries. This will be supportive for economic growth(20). Financial integration will help local financial markets to deepen in terms of the investor base and financial instruments. As

(18) Eller and Kaiss [2003].

(19) Nord [2000].

(20) IMF [2001].

statistical investigations have found out, a successful financial integration will benefit investors in these markets. That should also be positive for the economic climate in Central and Eastern Europe. On the negative side, financial integration will lead to a larger dependency from developments abroad. New risk factors emerge. A wrong exchange rate policy or inadequate financial supervisions could lead to economic and financial crisis results that happened in several emerging market economies in the past. Central and Eastern Europe, however, has overcome global crisis events and financial contagion relatively well. One major reason for that has been the described EU and EMU participation prospective and corresponding FDI and portfolio investment inflows. That stability was supported by the adjustment process towards the EU`s legal system. In addition, most CEE countries have relatively flexible exchange rate regimes so that exchange rate policy mistakes are unlikely. Many aspects are supporting the view that Central and Eastern Europe will rather profit from financial integration and can avoid the biggest drawbacks other emerging markets have suffered from.

REFERENCES

KOMMISSION DER EUROPÄISCHEN UNION [2000], "Die EU-Erweiterung – Eine historische Gelegenheit, Publication of the European Commission, Brussels.

INTERNATIONAL MONETARY FUND [2001], "International Financial Integration and Developing Countries," World Economic Outlook, IMF, pp. 152-162, Washington.

LANE, P.R. [2001], "An Empirical Analysis of International Financial Integration," Draft Paper, Trinity College, Dublin.

DEUTSCHE BANK RESEARCH [2004], "EU-Monitor," Deutsche Bank, pp. 6-36, Frankfurt.

FRBSF ECONOMIC LETTER [2004], "Monetary and Financial Integration: Evidence from the EMU," Federal Reserve Bank of San Francisco, San Francisco.

ALFARO, L., S. KALEMLI-OCZAN, AND V. VOLOSOVYCH [2004], "Capital Flows in a Globalized World: The Role of Policies and Institutions," NBER Conference on International Capital Flows, Washington.

LANE, P.R., G.M. MILESI-FERRETTI [2003], "International Financial Integration," IMF Staff Papers, Vol. 50, Washington.

LEMIERRE, J. [2002], "Eastern Europe – regional developments in the securities markets," in: The Handbook of World Stock, Derivavtive & Commodity Exchanges, 1-5, London.

GELOS, G., J. ROLDÓS [2002], "Consolidation and Market Structure in Emerging Market Banking Systems," IMF Working Paper 02/186, Washington.

ALVES P., M.A. FERREIRA [2003], "New Approach to Financial Integration: Importance of Size," Working Paper, ISCTE Business School, Lisbon.

TOMFORT A. [2006], "The Role of the European Union for the Financial Integration of Eastern European," FHW Working Papers No. 26, Berlin.

PESARAN H., B. PESARAN [1997], "Working with Microfit 4.0, Interactive Econometric Analysis," Oxford University Press, Oxford.

SOYOUNG K., F. MOSHIRIAN, AND E. WU. [2004],"Evolution of International Stock and Bond Market Integration: Influence of the European Monetary Union," Draft Paper, University of New South Wales, Sydney.

ELLER M., P. HAISS [2003], "Strukturschwächen im Bankensektor der Bewerberstaaten als Verstärker spekulativer Blasen," Österreichisches Bankenarchiv, 51(4), pp. 257-259.

NORD, R. [2000], "Central and Eastern Europe and the New Financial Architecture", Finance and Development 37, 3, pp. 32-35.

THE MONETARY POLICY RULES AND THE INFLATION PROCESS IN OPEN EMERGING ECONOMIES : EVIDENCE FOR 12 NEW EU MEMBERS

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ABSTRACT:

This paper has three objectives. First, it aims at revealing the logic of interest rate setting pursued by monetary authorities of 12 new EU members. We find that this setting was not always consistent with the official monetary policy. Second, we seek to shed light on the inflation process of these countries. Our main finding is that inflation rates were driven by both backward persistency and a forward-looking component. Finally, we assess the viability of existing monetary arrangements for price stability. We conclude that inflation targeting was preferable because it allowed decreasing the inflation rate and anchored its conditional variance.

JEL classification: E52, E58, F31, P24

INTRODUCTION

This study aims at presenting evidence on the monetary policy rules and sources of the inflation process for 12 new EU members using a dataset

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from a recent post-transitional period (1999-2007). Consequently, our principal objectives can be resumed as follows. First, we aim at revealing the logic of interest rate setting pursued by monetary authorities of 12 Central and Eastern European Countries (CEEC) by means of an estimation of an augmented Taylor rule (TR). Second, we seek to shed some light on the determinants of the inflation process in these countries. To this end, we carry out an estimation of the open economy Philips curve (PC). Third, we want to asses the viability of the monetary arrangements of these countries for their domestic price stability. The analysis of the conditional inflation variance obtained from Generalized Autoregressive Conditional Heteroskedasticity (GARCH) estimation of the PC is used for this purpose.

Since the celebrated paper by Taylor (1993), research on monetary policy rules has shown logic in the decision-making process of independent central banks. Most of the empirical evidence has been provided for the major central banks (the FED, Bank of England, Bank of Japan and the ECB) while the research aimed at emerging economies is scant. Studies focused on Asian and Latin American countries (FILOSA [2001], MOHANTY AND KLAU [2004]) confirmed that central banks responded very strongly to exchange rates. In some cases, this response was of higher magnitude than the response to domestic inflation. This does not come as a surprise given that exchange rates have been highly volatile in many emerging countries. The exchange rate volatility was in some cases related to severe balance of payment crisis. The reality of the CEEC has been different(1). These countries did not experience similar turbulences and their monetary policy was affected by a unique process of economic transition. In addition, unlike other emerging countries the CEEC are small and very open economies. They all opted recently for the EU membership and are expected to adopt the euro in the very near

(1) We use in the whole text the following country abbreviations: BUL – Bulgaria, CYP – Cyprus, CZE – the Czech Republic, EST – Estonia, HUN – Hungary, LAT – Latvia, LIT – Lithuania, MAL – Malta, POL – Poland, ROM – Romania, SLO – Slovenia, SVK – Slovakia.

future. Therefore, the period where we can reasonably link interest rate decisions to the developments of main macroeconomic variables is both very recent and very short[(2)]. The estimated monetary policy rule (or the central bank reaction function) is useful as a unifying framework to compare the de-facto monetary policy in the short-term to the official (de-jure) monetary policy regimes, which were very diverse in the CEEC. While the Czech Republic and Poland maintained the inflation targeting since 1997 and 1998 respectively, Hungary adopted this framework only in 2001 and Romania in 2005 (before 2005 Romania pursued a version of monetary targeting). Slovakia pursued inflation targeting only implicitly. Slovenia applied a regime with monetary target. All of these countries had relatively flexible exchange rate regimes until Slovakia and Slovenia joined the ERM II in 2005. During our period of analysis (1999-2007) the Romanian leu underwent a currency reform (in 2005) and the central parity of the Slovak koruna within ERM II was readjusted (in 2007) as a consequence of continuing appreciation against the euro. The remaining countries relied on different versions of exchange rate peg. Estonia had currency board with euro (originally DEM) and joined ERM II in 2004. Latvia used instead a currency board with SDR until 2005 when it joined ERM II. The Lithuanian lita was pegged to US dollar until 2002, when it was switched to euro and the country joined with ERM II in 2004. Cyprus had peg to the euro and Malta to currency basket, succeeded by ERM II membership in 2005. Finally, Bulgaria still maintains the currency board with the euro (introduced originally in 1997 with the German mark). Our study finds that while the inflation rate played a decisive role for setting the interest rate in countries with flexible exchange rates, countries with exchange rate pegs followed the lead of the European Central Bank

(2) There are a few studies aimed at the CEEC. MOHANTY AND KLAU [2004] included three CEEC (CZE, POL, HUN) in their larger sample of emerging countries. Their period of analysis (1995-2002) does not seem to be very reasonable for CEEC as they were still strongly affected by the economic transition and monetary policy making was rather discretional. MARÍA-DOLORES [2005] used data (1998-2003) for four CEEC, concluding that their interest rate setting could be reasonably described by simple TR. However, it is likely that these results are biased due to omitted variables. FROMMER AND SCHOBERT [2006] estimated policy rules of six CEEC including the exchange rate variable (1994-2005).

(ECB) in interest-rate setting. However, there are some exceptions when the estimated policy rule is not consistent with the official policy regime.

While most empirical studies on monetary policy rules terminate with the presentation of the estimated coefficient we go further and investigate what lies behind this interest rate setting. Given the prominence of price stability as the central bank implicit or explicit objective, we additionally pursue analysis of the determinants of the inflation process. The empirical research on the inflation process properties has been again vast for the developed countries, mostly within the framework of the New Keynesian Phillips curve – NKPC (GALÍ AND GERTLER [1999], GALÍ ET AL. [2001]). Proponents of the NKPC argue that expected inflation and marginal cost are the main drivers of inflation dynamics. Recent studies extended this model to adjust better to the data of open economies (BATINI ET AL. [2005] or RUMLER [2007]). The inflation process in the CEEC has several peculiarities. It has been strongly influenced by specific institutional events, such as price deregulation. Therefore, the cross-country studies of the inflation process in the CEEC are rather scarce and focused on related issues such as the exchange rate pass-through – the ERPT (CORICELLI ET AL. [2006]). We estimate a version of an open economy NKPC where inflation rate does not only depend on the lagged inflation and the stance of real economic activity, as in traditional PC, but also on inflation expectations and external variables (the exchange rate, the foreign inflation rate). We find that inflation has significant backward- and forward-looking components in all countries. However, besides the presence of the ERPT in countries with flexible exchange rate regimes, we have not identified any distinction between inflation processes of countries with flexible exchange rate (and autonomous monetary policy) and countries pursuing exchange rate pegs.

The inflation data of some developed countries were found to have time-varying volatilities (DOLADO ET AL. [2004]). Consequently, a GARCH process is likely to be present in the PC residuals. For this reason, we additionally apply the GARCH estimation of the open economy PC. We discover that the conditional inflation variance retrieved from this model

has rather distinctive patterns in the two groups of countries, pointing to direct inflation targeting (DIT) as a preferable strategy over an exchange rate peg.

The rest of the paper is organized as follows. In section 2, we review the econometric model. In Section 3, we present our dataset and basic properties of the time series used. Section 4 presents the estimates of monetary policy rules. Results on the inference of the inflation process properties are reported in Section 5. Section 6 evaluates the viability of monetary policy settings in the CEEC by means of the conditional inflation variance. The last section concludes.

1. ECONOMETRIC SPECIFICATION

1.1 Monetary policy rules

TAYLOR [1993] made a pioneer contribution to the modeling of monetary policy decisions of central banks. He proposed that the FED set its federal fund rate as a simple function of the observed inflation rate and the stance of the real economic activity. His interest rate rule can be written as:

(1) $$i_t^* = \overline{i} + \beta\left(\pi_t - \pi^*\right) + \gamma y_t + \varepsilon_t$$

where i_t^* is the short-term interest rate target, $\overline{i}$ is the nominal equilibrium interest rate, consisting of the real equilibrium interest rate and the inflation target π^*, π_t is the inflation rate, y_t is the output gap and ε_t is the error term(3). JUDD AND RUDEBUSCH [1998] observed that it is a common practice in most central banks to smooth the interest rate changes over time as not to have any disruptive effects on economy. The interest rate smoothing can be described by means of a partial adjustment mechanism:

(2) $$i_t = \rho i_{t-1} + (1-\rho) i_t^* + v_t$$

---

(3) The empirical studies mostly use the inflation rate as regressor instead of the inflation gap (difference between the inflation rate and its target). This is because the inflation target is not explicitly defined in many countries. As long as it can be assumed stable (constant) over the estimation period, the use of the inflation rate does not alter the estimation results.

where the actual short-term interest rate i_t is a combination of the interest rate target i_t^* implied from the policy rule, and the lagged value (usually one period) of the interest rate i_{t-1}. ρ is the smoothing coefficient. CLARIDA ET AL. [1998], [2000] proposed that some right-hand side variables of the equation (1) should enter rather as expected future values. This usually applies to the inflation rate since many central banks, especially those using the DIT, are more concerned with inflation forecast than with a currently observed inflation rate. Consequently, the right-hand side variables enter under expectation E formed on the basis of available information Ω_t:

(3) $$i_t^* = \overline{i} + \beta\left(E\left[\pi_{t+s}\middle|\Omega_t\right] - \pi_{t+s}^*\right) + \gamma\left(E\left[y_t\middle|\Omega_t\right]\right) + \varepsilon_t$$

However, it is rather complicated to collect information on the expected values of variables from the past for empirical study; therefore, the expectations are commonly substituted by actual realizations. Following this practice we can write our ultimate empirical model that has been used for the estimation of monetary policy rules as a combination of equations (2) and (3):

(4) $$i_t^* = \rho i_{t-1} + (1-\rho)(\alpha + \beta\pi_{t+s} + \gamma y_{t+k} + \delta x_{t+m}) + \upsilon_t$$

where all the variables have the previous meaning, α is a constant term and the rule is augmented by additional variables x_{t+m}. We have included five additional variables that were used in the empirical literature and some of them can be highly relevant for small open economies: the foreign interest rate, the long-term interest rate, the exchange rate, monetary growth, and asset prices. We have replaced the nominal equilibrium interest rate $\overline{i}$ with a generic constant term α. According to the equation (4) the rule could be either backward- or forward-looking since all the sub-indices can take positive or negative value. We have used one period lagged inflation in case of backward-looking rule (s=-1) and one period ahead inflation (s=1) in case of forward-looking specification. The output gap always enters in a present or a past value ($k \leq 0$) alike the additional variables ($m \leq 0$)(4).

(4) As most regressors are rather predeterminated than strictly exogenous we have instrumented them with their lagged values.

Because the error term v_t is a linear combination of forecast errors of the right-hand side variables and the original exogenous disturbance ε_t, it shall be orthogonal to the present information set Ω_t, which can be exploited as moment condition(5):

(5) $v_t = -(1-\rho)\left\{\beta\left(\pi_{t+s} - E\left[\pi_{t+s}|\Omega_t\right]\right) + \gamma\left(y_{t+k} - E\left[y_{t+k}|\Omega_t\right]\right) + \delta\left(x_{t+m} - E\left[x_{t+m}|\Omega_t\right]\right)\right\} + \varepsilon_t$

We have estimated different versions of the general model (4) by means of Generalized Method of Moments (GMM). Two lags of endogenous and exogenous variables of each specification have been used as instruments (IV)(6).

The GMM weighting matrix was chosen in accordance with the Newey and West (1997) covariance estimator, which is robust to the presence of both heteroskedasticity and autocorrelation of unknown form (HAC Consistent Covariances). The correlation in moment conditions was soaked up by means of previous VAR(1) estimation for IV (pre-whitening).

1.2 Inflation process in open economies

The predominant New Keynesian literature disregards the traditional backward-looking PC in favor of forward-looking PC derived from a model of price-setting behavior of monopolistically competitive firms:

(6) $\pi_t = \beta E\left[\pi_{t+1}\middle|\Omega_t\right] + \gamma mc_t + u_t$

where the current inflation rate π_t depends on its expected value, pursuant to the rational expectations of the economic subjects (based on the information set Ω_t), and on a measure of the marginal cost mc_t. However, this model has been found to be at odds with data, especially for open economies.

First, it does not account for the inflation persistence. Second, the marginal cost is an unobservable variable that must be proxied, typically by unit labor cost. Unfortunately, such measure of marginal cost may not be sufficiently representative for small economies that import significant part of intermediate products. Finally, the inflation of small economies may have numerous external determinants. Therefore, we depart from a hybrid

NKPC where inflation depends on its lagged value and its expectation (FUHRER AND MOORE [1995], GALÍ AND GERTLER [1999])(7):

(7) $\pi_t = (1-\beta)\pi_{t-1} + \beta E\left[\pi_{t+1} \middle| \Omega_t\right] + \gamma mc_t + u_t$

Given the controversy about the marginal cost mc_t, we have used a traditional cyclical measure of the economic activity – the output gap y_t instead. In addition, we have augmented this specification by variables that can have effect on inflation of open economies. SVENSSON [2000] derived the NKPC for open economy augmented by the exchange rate(8). Empirical studies aimed at the quantification of the effect of the ERPT (GAGNON AND IHRIG [2004], CAMPA AND GOLDBERG [2005], CORICELLI ET AL. [2006]) employed a similar inflation equation with two additional variables accompanying the exchange rate, the foreign inflation rate (representing a direct transmission of foreign prices to domestic ones) and the lagged domestic interest rate (tracing the effect of domestic monetary policy)(9). Consequently, we have used an open economy PC that takes into account the additional determinants of inflation dynamics:

(8) $\pi_t = \alpha + \beta_1 \pi_{t-1} + \beta_2 \pi_{t+1}^{\exp} + \gamma y_{t-1} + \delta \pi_t^{for} + \eta s_{t-1} + \mu i_{t-4} + u_t$

where α is an intercept representing variables having constant effect on the inflation rate. Unlike most empirical NK literature we have not imposed a priori that the coefficients of the backward-looking term π_{t-1} and the forward-looking term $\pi_{t+1}^{\exp}$ sum up to unity(10). The forcing variables are the output gap y_{t-1}, the foreign inflation rate π_t^{for}, the yearly change of the exchange rate s_{t-1} and the lagged domestic interest rate i_{t-4}. The lag of the output gap is set to one as in standard PC. The interest rate

(7) GALÍ AND GERTLER [1999] derive this hybrid PC from a setting where part of the firms set prices by means of backward-looking rule of thumb.
(8) BATINI ET AL. [2005] used NKPC augmented by variables of foreign competition, relative prices of imports and oil prices for the empirical analysis for the UK inflation.
(9) These studies used VAR methods since they are interested in the temporal dimension of the ERPT to domestic prices.
(10) This condition assures that there is no trade-off between inflation and output in the long-term.

enters with four lags since the horizon of the monetary transmission is around one year. The exchange rate enters with one or two lags pursuant to the VAR studies confirming that the ERPT has the strongest effect within one or two quarters.

The model specification brings about some econometric complications. The main issue is related to the forward-looking inflation term. Because inflation expectations are usually not available they must be proxied by realized values of inflation. The GMM estimator is typically employed as to deal with the endogeneity bias. Moreover, multicollinearity can arise if the backward- and forward-looking inflation terms are strongly correlated. To deal with both problems, we have proxied the expected inflation $\pi_{t+1}^{\exp}$ by the inflation gap one period ahead. This variable is constructed as a deviation of inflation in t+1 from its trend value obtained by HP filter. The correlation of this variable with the one lag of inflation is not very strong, therefore multicollinearity is avoided. The use of inflation gap in t+1 also deals with potential endogeneity because it is de facto an instrumental variable for the one-lead of inflation. It is very strongly correlated with inflation in t+1 but not necessary with the error term. If endogeneity does not arise, then OLS and GMM must provide reasonably similar estimates. We have used OLS as a benchmark and GMM for a robustness check. An important advantage of OLS is that it can be simply extended to ARCH model that allows capturing the time-varying volatility potentially present in inflation series. In particular, we have used GARCH (1,1) as the most general model of volatility. The corresponding variance equation can be written as:

(9) $\sigma_t^2 = \omega + \nu_1 \xi_{t-1}^2 + \nu_2 \sigma_{t-1}^2$

where σ_t^2 is the conditional variance (one-period ahead forecast variance), the constant term ω is the long-term variance, ξ_{t-1}^2 is the ARCH term (the squared residuals from the last period) representing the impact of new information about volatility from the last period, and σ_{t-1}^2 is the GARCH term representing the impact of the forecast variance from the last period. The GARCH estimates of the PC parameters are not only more efficient than OLS in case of conditional heteroskedasticity but this framework also

allows us to obtain series of the conditional variance σ_t^2. The conditional variance of inflation can be used apart from the inflation level as another measure of the price stability. Therefore, the estimates of the variance equations may shed some light on the viability of existing monetary policy.

2. DATA AND TIME SERIES ANALYSIS

2.1 Data description

Our dataset consists of quarterly data ranging from 1999/1.Q until 2007/4.Q. The series are slightly shorter for some variables or countries but in all cases, they cover at least 8 years. The principal data source is Eurostat but some data were obtained also from other sources, in particular the European Central Bank (Statistic Data Warehouse).

The short-term interest rate is the 3-month interbank interest rate. The overnight interbank interest rate is used for a robustness check in the TR estimation. The foreign interest rate (used in the augmented TR estimation) is represented by 3-month EURIBOR (EONIA is used for a robustness check). The inflation rate is measured as a yearly change in the harmonized consumer price index (HCPI, 2005 is the base year). The foreign inflation rate (used in the open economy PC estimation) is a yearly change in the HCPI of the Euro area. The long-term interest rate is 10-year government bond yield. The output gap is the difference between the logarithm of the current value of the seasonally adjusted GDP (in millions of euros in 1995 prices) and the trend value obtained by Hodrick-Prescott filter (the smoothing parameter set to 1600). The industrial production index has been used for a robustness check in the TR estimation. The exchange rate is the real effective exchange rate index (REER, against 12 main trading partners, deflated by CPI, 1999 is the base year) and the nominal exchange rate against the euro (in unit of euros for a unit of domestic currency). A yearly change of the exchange rate was used for the estimation. The monetary growth is a yearly change in

the seasonally adjusted M3 aggregate (in national currency[11], common definition by Eurostat). Finally, asset prices are proxied by the share index of local stock exchange. A yearly change of this variable was used for the estimation.

3.2 Time series analysis

The time series used for the empirical analysis were subject to thorough unit root testing (ADF, PP, KPSS tests). The stationary was confirmed for all variables besides the inflation rates and the interest rates. These findings lead us to test whether the nonstationary variables are cointegrated. The cointegration was tested by means of Augmented Engle-Granger (AEG) test (ENGLE AND GRANGER [1987], which is ADF tests of unit root applied at residuals of the auxiliary regression with nonstationary variables. The cointegrating vector in the augmented monetary policy rule usually consists of the short-term interest rate, the inflation rate (DIT countries) and/or the foreign interest rate (some DIT countries and countries with exchange rate pegs). For the nonstationary variables included in the Phillips curve, we have found that the cointegrating relation exists between the inflation rate, the foreign inflation rate and the lagged interest rate.

It has become common to use the foreign interest rate (of dominant economy) as an additional regressor in estimated policy rules (CLARIDA ET AL. [1998]). However, even thought the short-term interest rates of most CEEC are highly correlated with the interest rates in the Euro area it does not imply automatically any causal relationship. For this reason, we have first applied the Granger causality test. In particular, we have tested whether the lagged values of the euro short-term interest rate provided any additional information about the present values of the domestic short-term interest rate in each country. We have not rejected (at 5% significance level) that the euro short-term interest rate Granger-caused the short-term

(11) Therefore, an increase means appreciation. This has been done as to be consistent with the REER, whose increase means appreciation.

interest rate of Bulgaria, the Czech Republic, Estonia, Latvia, Lithuania, Malta and Slovakia. While the influence of the ECB interest rate setting is self-evident for countries with exchange rate pegs to the euro, it is an interesting finding for countries maintaining a flexible exchange rate.

The causality is also an issue for the relationship between the short-term and the long-term interest rates. They are correlated in all countries but the causal relationship is not self-evident. MEHRA [2001] argued that the long-term interest rate carries information about inflation expectations and should be included as an explanatory variable in the estimated monetary policy rule. For this reason, we have tested whether the long-term interest rate Granger-caused the short-term interest rate. This causality was confirmed for the Czech Republic, Estonia and Slovakia. Although the Granger causality test has various limitations, we consider its results as a preliminary indication of whether the foreign short-term interest rates and the domestic long-term interest rate could give any information about short-term interest rate setting in the CEEC.

3. EMPIRICAL EVIDENCE ON THE MONETARY POLICY RULES IN THE CEEC

The GMM estimates of the monetary policy rule (specification (4)) with the highest explanatory power are reported in Table 1. These specifications were subject to series of robustness checks confirming in overall the results below(12). The countries in the upper block of Table 1 maintained a flexible exchange rate during most of the analyzed period, the countries in the lower block used exchange rates pegs(13).

(12) First, the overnight interbank interest rate was used as a dependent variable instead of 3-month interbank interest. The fit of such specification has been worse in most cases. This is probably because the dynamics of overnight interest rates reflects more the liquidity conditions in the banking sector than the macroeconomic fundamentals. Second, we have used the output gap calculated from the industrial production instead of GDP series, which has not altered in general the previous results. Finally, the deviation from the trend value obtained by HP filter was used instead of yearly change of the exchange rate. Although the corresponding coefficients gained significance in a few cases, the overall fit of the model was always worse.

(13) All the specifications were originally estimated in levels. I(1) variables in the best adjusting model were tested for the cointegration. No reasonable cointegrating was found for Cyprus and Latvia. The results for Cyprus come from estimation in first differences. We have not found any well specified model for Latvia.

Table 1
GMM estimates of the monetary policy rule with the highest explanatory power

Country	ρ (i_{t-1})		$(1-\rho)\alpha$ (const.)		$(1-\rho)\beta$ (π_{t-1}, π_{t+1}*)		$(1-\rho)\gamma$ (y_{t-1})		$(1-\rho)\delta$ (i_{t-1}^f, i_t^{f*})		$(1-\rho)\zeta$ (x_{t-1}, x_t*)		R^2	LB	J-stat.
CZE	**0.63**	(0.04)	**-0.62**	(0.19)	**0.16***	(0.03)	**-0.23**	(0.08)	**0.41**	(0.10)			0.97	0.24	0.88
HUN	**0.71**	(0.11)	1.18	(0.92)	**0.20***	(0.08)	-0.12	(0.58)					0.87	0.17+	0.80
POL	**0.77**	(0.02)	0.00	(0.11)	**0.51***	(0.07)	-0.13	(0.12)					0.98	0.90	0.26
ROM			0.56	(1.52)	**1.29***	(0.05)	0.27	(0.22)					0.92	0.15	0.33
SLO	**0.78**	(0.12)	-0.66	(0.70)	**0.38***	(0.16)	-0.49	(0.38)					0.93	0.87	0.80
SVK	**0.90**	(0.03)	0.21	(0.41)	**-0.12**	(0.03)	**-0.24**	(0.08)	**0.23**	(0.11)			0.94	0.39	0.47
BUL			**1.46**	(0.43)	0.04	(0.08)	**-0.64**	(0.20)	**0.79**	(0.16)			0.44	0.58	0.73
CYP (diff.)	**0.22**	(0.08)	-0.07	(0.08)	**-0.14**	(0.05)	0.10	(0.12)	**0.69**	(0.19)			0.35	0.57+	0.69
EST	**0.54**	(0.02)	0.04	(0.13)	**0.09***	(0.03)	0.06	(0.05)	**0.39**	(0.08)			0.92	0.76	0.74
LAT (diff.)	**-**	-	-	-	**-**	-	**-**	-	**-**	-			-	-	-
LIT (x_t – REER)	**0.39**	(0.02)	0.14	(0.44)	**-0.10**	(0.01)	**0.30**	(0.05)	**0.69**	(0.14)	**0.11**	(0.04)	0.97	0.99	0.69
MAL			**1.03**	(0.14)	**0.12**	(0.03)	0.00	(0.03)	**0.79**	(0.03)			0.95	0.55+	0.28

Note: Standard errors in parenthesis. Coefficients statistically significant at 5% in bold. diff – relation estimated in first differences, otherwise in levels. x_t – REER – additional variable is the real effective exchange rate. LB is p-value of Ljung-Box test for 1. order serial correlation (+ indicated result after correction AR(1) in residuals). J-stat is p-value of Sargan overidentification test.

The specifications of policy rules with the highest explanatory power for the DIT countries (CZE, HUN, POL, ROM) are all forward-looking. This seems logical since the inflation forecast is used as an intermediate policy target under the DIT. The long-term inflation multiplier (estimated short-term coefficient adjusted for the interest rate smoothing) exceeds unity for Poland and Romania, consistently with the Taylor principle, but not for the Czech Republic and Hungary(14). The Taylor principle proposes that the nominal interest rate shall be increased by a larger amount than

(14) We simply assume that if the short-term coefficient $(1-\varrho)\beta$ is statistically significant, so is the long-term multiplier β. However, there is no simple procedure to calculate the standard errors in the long-term context.

the inflation rate so as to increase the real interest rate. In terms of the monetary policy rule estimates, the monetary policy has stabilizing effect only if the long-term inflation multiplier β is higher than unity (CLARIDA ET AL. [2000]). However, the interpretation for small open economies is less straightforward (LINNEMANN AND SCHABERT [2006]). For instance, for the Czech Republic we have found that the national central bank seems to have considered for policy decisions not only the domestic inflation rate but also the interest rate in the Euro area(15). This response can be interpreted as an additional anti-inflationist policy in so much the Czech inflation rate was correlated with the one of the Euro area. The irrelevance of other variables in the estimated policy rules of the inflation targeters is consistent with the fact that this regime is officially aimed only at price stability.

On the contrary, the estimated policy rules of Slovenia and Slovakia are not consistent with the proclaimed monetary policy regimes. The results for Slovenia resemble the rules of previous DIT countries, although Slovenia did not officially adopt the DIT. The specification with the highest explanatory power is clearly forward-looking in inflation, with long-term coefficient close to unity. On the contrary, we have not found any response to the euro interest rate. In fact, the euro interest rate neither was part of the cointegrating vector nor Granger-caused the Slovenian interest rate. This finding is surprising because even though Slovenia officially pursued a managed floating, it used the euro as a reference currency. Moreover, the exchange rate of the Slovenian tolar and the euro was relatively stable during most of the sample period. The insignificance of the monetary growth is also counter-intuitive, given that the Central Bank of Slovenia officially announced monetary targets. Slovakia is an opposite case since it claimed to pursue the DIT but we have not detected a positive and significant response to domestic inflation (it is even negative

(15) Let us recall that there is Granger causality running from the euro interest rate to the Czech one and the euro interest rate enters the cointegrating vector.

in our specification). On the other hand, we have found a very strong response to the euro interest rate[16]. One possible explanation can be that the inflation targeting in Slovakia was only implicit and the central bank exercised a lot of discretion. According to our results, it tried to mimic the euro interest rate.

The policy rules estimates obtained for countries that maintained a fixed exchange rate regimes feature a lack of autonomous monetary policy aimed at domestic macroeconomic developments. The principal variable driving the domestic interest rate is the euro interest rate. In addition, we have detected a positive and significant response to domestic inflation in Estonia and Malta and a positive and significant response to the real effective exchange rate in Lithuania. Latvia is the only country in the sample where we have failed to identify any consistent interest rate rule. The results for these countries can be interpreted that their exchange rate fixing was implemented by means of an interest rate peg. Our findings go against the argument of OBSTFELD AND ROGOFF [1996] that interest rate fixing cannot bring about interest rate peg, which was recently questioned on theoretical grounds by BENIGNO ET AL. [2007].

The results for the CEEC feature some general differences in comparison with the evidence established for developed countries. First, the importance of the output gap (coefficient γ) is smaller. A possible explanation can be that that neither the DIT nor policy of an exchange rate peg left room for output stabilization. Nevertheless, the estimated coefficients of the output gap can be also downwardly biased as the output gap is usually estimated with a lot of noise. Second, the interest rate smoothing parameter is smaller compared to the results obtained in studies for developed countries. This can be related to the fact that fast and strong response of the interest rate gives credibility to anti-inflationary monetary policy in emerging countries. In particular, the Romanian central bank does not appear to smooth the

(16) The importance of the euro interest rate for the Slovak interest rate setting has been also confirmed by Granger causality test and cointegration test.

interest rate changes at all. Third, other variables (the long-term interest rate, asset prices, monetary growth, and the exchange rate) proved to have negligible impact. In the case of the long-term interest rate, it may be because it reflects more country's sovereign risk than expected inflation in emerging economies. The central bank could be interested in stabilizing it if the risk premium was very variable or if the country's public sector was highly indebted. Yet, none of these applies to the reality of the CEEC. The negligence of asset prices developments can be linked to simple fact that in emerging countries the assets represent a smaller part of household holdings and are thus less important for policy decisions. Moreover, their variability is usually higher, which would imply too much interest rate volatility if the central bank decided to respond to them. The omission of monetary developments as relevant information for monetary policy is consistent with the findings for developed countries. Finally, the lack of any consideration of exchange rate developments for interest rates setting is rather surprising given that the CEEC are all very open economies. There are several possible explanations for this finding. The exchange rate is logically not an interesting variable in countries maintaining exchange rate peg. On the other hand, the DIT countries face a trade-off between a domestic inflation objective and exchange rate stabilization. MONATHY AND KLAU [2004] found a direct response of the interest rate to the exchange rate in emerging economies with significant exchange rate volatility. In particular, This is because a strong currency depreciation and the ERPT can drive significant increase in domestic price level. However, unlike some other emerging countries (Brazil, South Africa) the CEEC did not have to face such situation during our period of analysis.

4. EMPIRICAL ANALYSIS OF THE INFLATION PROCESS IN THE CEEC

We have already discussed above that the drivers of inflation dynamics can be quite complex in open economies. For this reason, we have used

an encompassing specification of an open economy PC (8). The OLS estimates of this model are shown in Table 2[17].

Table 2
OLS estimates of the open economy Phillips curve

Country	α (const.)		β_1 (π_{t-1})		$\beta 2$ (π_{t+1}^{exp})		δ (π_t^{for})		γ (y_{t-1})		η (s_{t-2}, s_{t-1}*)		μ (i_{t-4})		R^2	LB
CZE	-0.76	(0.55)	**0.49**	(0.04)	**0.40**	(0.10)	**0.80**	(0.27)	**0.31**	(0.11)	**-0.07**	(0.02)	**0.12**	(0.03)	0.91	0.40+
HUN	-0.33	(0.90)	**0.60**	(0.07)	**0.60**	(0.07)	0.64	(0.38)	-0.19	(0.31)	**-0.07**	(0.03)	**0.14**	(0.05)	0.95	0.89
POL	-0.59	(0.68)	**0.66**	(0.10)	**0.57**	(0.15)	0.40	(0.31)	0.15	(0.16)	**-0.04***	(0.01)	**0.09**	(0.04)	0.96	0.79
ROM	**6.07**	(2.73)	**0.87**	(0.14)	**0.45**	(0.14)	-2.41	(1.37)	-0.11	(0.23)	**-0.12***	(0.06)	-0.02	(0.10)	0.98	0.10
SLO	0.64	(0.82)	**0.31**	(0.11)	**0.45**	(0.20)	0.47	(0.29)	**0.36**	(0.18)	**-0.43***	(0.10)	0.11	(0.07)	0.96	0.67
SVK	-0.50	(1.76)	**0.64**	(0.05)	**0.56**	(0.07)	0.99	(0.52)	0.10	(0.27)	**-0.10**	(0.03)	-0.14	(0.10)	0.95	0.12+
BUL	0.21	(2.42)	**0.32**	(0.08)	**0.55**	(0.09)	1.74	(0.88)	**0.90**	(0.28)	0.02*	(0.05)	0.09	(0.30)	0.76	0.22
CYP	1.06	(0.50)	**0.84**	(0.05)	**0.59**	(0.05)	**0.82**	(0.29)	0.08	(0.05)	**-0.16***	(0.03)	0.05	(0.07)	0.83	0.41+
EST (diff)	0.02	(0.08)	**0.44**	(0.11)	**0.39**	(0.15)	**1.68**	(0.48)	-0.08	(0.10)	0.04*	(0.07)	0.02	(0.06)	0.56	0.23+
LAT (diff)	0.12	(0.11)	0.37	(0.21)	**0.36**	(0.12)	0.56	(0.31)	-0.29	(0.18)	-0.05*	(0.04)	0.10	(0.06)	0.29	0.26
LIT	-0.56	(1.14)	**0.89**	(0.07)	**0.46**	(0.12)	0.38	(0.51)	**0.43**	(0.16)	-0.03*	(0.06)	0.09	(0.05)	0.89	0.60
MAL	0.54	(0.75)	**0.66**	(0.08)	**0.62**	(0.06)	-0.21	(0.33)	-0.03	(0.03)	-0.01*	(0.02)	**0.17**	(0.04)	0.67	0.07+

Note: Standard errors in parenthesis. Coefficients statistically significant at 5% in bold. LB is p-value of Ljung-Box test for 1. order serial correlation (+ indicated result after correction for AR(1) in residuals). diff – relation estimated in first differences, otherwise in levels. s_t – yearly change of the nominal bilateral exchange rate w.r.t. the euro (countries in the 1. block) and yearly change of the real effective exchange rate (countries in the 2. block).

We can see that the inflation rates are driven not only by the backward persistency (coefficient β_1) but they also have significant forward-looking component (coefficient β_2). Studies critical with the NKPC (BARDSEN ET AL. [2004]) argued that the effect of the forward-looking term usually vanished once more lags of inflation were included. Consequently, we have included up to four lags of inflation. While these turned mostly

(17) As a robustness check, we have reestimated the equation by means of GMM (2 lags included as instrumental variables) but the estimates of most parameters were reasonably similar. The only parameter that significantly changed its size was the one of the foreign inflation rate. In some cases, the coefficient of expected inflation increased in detriment to the lagged inflation.

insignificant, the significance of the forward-looking term was not affected. Conversely, when the expected inflation was dropped, the backward-looking term did not increase substantially. There are countries where the forward-looking inflation component dominated the backward-looking one (BUL, CYP, SLO), where both the effects of forward- and backward-looking part were even (CZE, EST, LAT, MAL) and where the latter dominated (HUN, LIT, POL, ROM, SVK). A positive significant effect of the inflation rate in the Euro area on the domestic inflation (coefficient δ) was found in three countries (CYP, CZE, EST). A positive significant relation between inflation rate and the output gap (coefficient γ), in the spirit of the traditional PC, was found in four countries (CZE, SLO, BUL, LIT). We have also detected a negative significant response to a (nominal) exchange rate appreciation (coefficient η) in all countries with flexible exchange rate regimes. Therefore, if the exchange rate depreciates (decrease of our variable) the domestic inflation rate increases as the imports become more costly. Yet, given limited size of this coefficient, the ERPT is rather incomplete. For the countries that maintain exchange rate pegs to the euro, we have used the REER (against 12 main trading partners and deflated by CPI) instead but have not found a significant response to this variable (with an exemption of Cyprus). These findings are in line with empirical studies on the ERPT (GAGNON AND IHRIG [2004], CAMPA AND GOLDBERG [2005]), which confirmed its significant decrease over the last decades as a result of a low inflation environment. Moreover, the ERPT effect on consume prices was found weaker than on the import prices(18). Finally, the response to (four-periods) lagged interest rate, which tracks the effect of monetary policy, is mostly insignificant. However, there are four countries where this parameter is significant and displays positive rather than negative sign. This finding is counter-intuitive from the New-Keynesian point of view suggesting that

(18) ORLOWSKI [2005] confirmed in similar framework that the ERPT effect was very limited in CZE, HUN and POL. CORICELLI ET AL. [2006] found (in cointegration framework) a weaker ERPT in countries with flexible exchange rate (CZE, POL) and stronger for more rigid exchange rate regimes (HUN, SLO).

an interest rate increase must lead to a decrease of the inflation rate. On the contrary, the Post-Keynesian cost-push inflation theories argue that the interest rate is a cost in a productive process and its increase has positive rather than negative effect on the inflation rate.

5. INFLATION AND MONETARY POLICY

Our previous analysis gave some indications about the nature of the inflation process in the CEEC. However, besides the coefficient of the exchange rate (showing the intensity of the ERPT), we have not found any distinctive feature of inflation dynamics between the countries with flexible exchange rate regimes (and autonomous monetary policy) and countries with exchange rate pegs. This is surprising given that the prevailing NK literature (e.g. CLARIDA ET AL. [1998], [2000]) argues that an appropriate monetary policy rule is decisive for plausible inflation outcomes(19).

DOLADO ET AL. [2004] found that the inflation process of the US described by PC was conditionally heteroskedastic. If this is the case also in the CEEC, then ARCH model that assumes conditional heteroskedasticity should be used instead of OLS. We have reestimated the previous specification of the open economy PC by GARCH(1,1) but the results were only slightly different from the previous OLS estimates are not reported here(20). On the contrary, the estimates of the variance equation (9) obtained from GARCH analysis are of our interest and are resumed in Table 3.

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(19) The debate on the sources of the Great Moderation is still open and many argue that it was rather a good luck (benign environment) than a good policy what drove the overall decrease in the inflation rates.

(20) In particular, as the standard errors decreased, the significance of several estimated coefficients increased.

Table 3
The GARCH estimates of the variance equation from the open economy Phillips curve

Country	ω (const.)		v_1 (ξ_{t-1}^2)		v_2 (σ_{t-1}^2)	
CZE	0.05	(0.04)	**-0.33**	(0.14)	**0.99**	(0.16)
HUN	0.15	(0.10)	**-0.12**	(0.05)	0.61	(0.36)
POL	0.01	(0.01)	0.11	(0.14)	**0.68**	(0.15)
ROM	0.14	(0.07)	0.20	(0.13)	**0.48**	(0.11)
SLO	0.24	(0.34)	-0.20	(0.16)	0.02	(1.70)
SVK	0.00	(0.00)	-0.11	(0.08)	**1.01**	(0.25)
BUL	**0.19**	(0.09)	-0.27	(0.14)	**1.10**	(0.11)
CYP	**0.11**	(0.04)	**0.78**	(0.24)	**-0.57**	(0.29)
EST (diff)	**0.15**	(0.07)	-0.19	(0.12)	**0.69**	(0.26)
LAT (diff)	**0.17**	(0.05)	**-0.32**	(0.13)	**0.78**	(0.20)
LIT	**0.06**	(0.03)	-0.20	(0.11)	**0.88**	(0.02)
MAL	**0.04**	(0.00)	**-0.27**	(0.06)	**0.92**	(0.15)

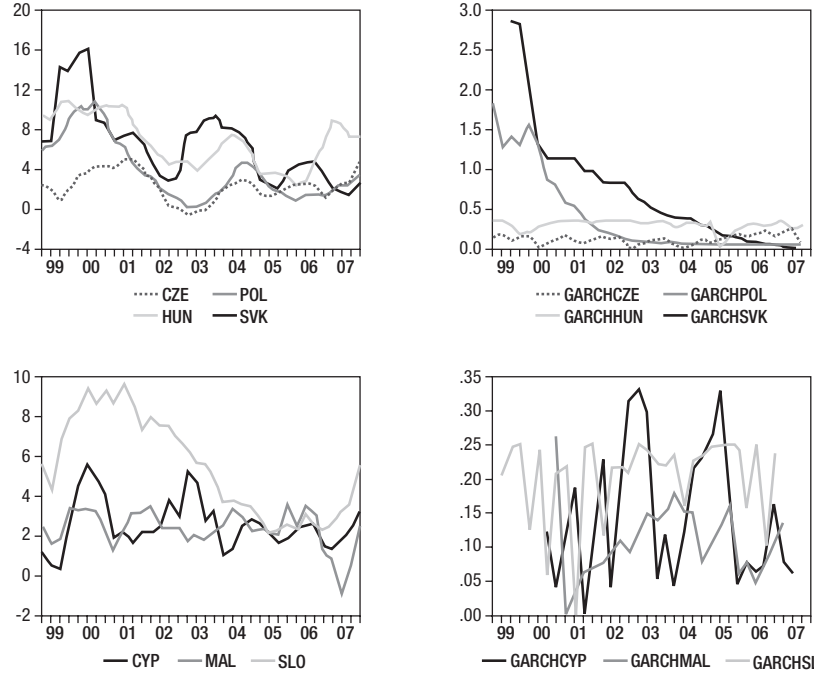
Note: Standard errors in parenthesis. Coefficients statistically significant at 5% in bold.

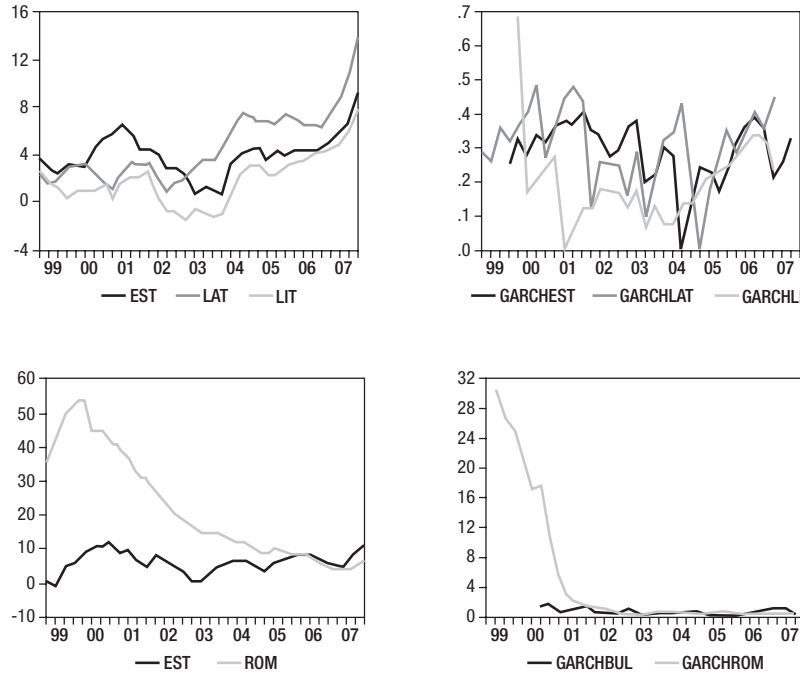
Since all three parameters of the variance equation are significant only in few cases, GARCH (1,1) may not be an appropriate model. However, the estimates give an insightful account of the conditional inflation variance. The constant term ω, which is an estimate of the long-term inflation variance, and the GARCH term v_2 representing the impact of forecast variance from the last period, are significant in all countries with fixed exchange rate regimes. On the contrary, the coefficient of the long-term variance is lower and not significant for countries with flexible exchange rates that pursued more independent monetary policy. However, the coefficient accompanying the GARCH term is almost unity in the case of the Czech Republic and Slovakia. Therefore, the conditional inflation variance is very persistent in these two countries. The coefficient of the ARCH term v_1 is mostly negative or insignificant, confirming that the

impact of new information from the last period is quite limited.

This evidence suggests that the policy of interest rate pegs pursued by countries with fixed exchange rate regimes was detrimental to their domestic price stability. This may be so because the inflation process of any of these countries but Cyprus was directly affected by the inflation developments of the Euro area (see Table 2). The DIT seems to be superior to an exchange rate peg because DIT countries were able not only to decrease their inflation rates but also keep low their long-term volatilities. Yet, the volatilities can be still persistent in the short-term (CZE, SVK). The series of conditional inflation variances are plotted together with HCPI inflation rates in Figure 1.

Figure 1
HCPI-based inflation rate (left figure) and conditional inflation variance (right figure)





Notes: 1. group – CZE, HUN, POL, SVK, 2. group – CYP, MAL, SLO, 3. group – EST, LAT, LIT, 4. group – BUL, ROM

The figure clearly documents that the experience of the countries, which adopted explicit DIT (CZE, HUN, POL, ROM, SVK) was the most fortunate with regard to the objectives of the price stability. Poland and Romania achieved a significant disinflation during this period, employing a monetary policy rule consisting in a very strong response to expected inflation. The decrease of the conditional inflation variance was also considerable in these countries. Although Romania adopted explicit inflation targeting only in 2005, the policy rule estimates reveal that this country pursued very strict anti-inflationist policy during the whole period of our analysis. This holds even thought the Romanian national bank officially sought to stabilize both the domestic prices and the exchange rate

between 1999 and 2004[21]. The response to expected inflation rate was weaker in Hungary and the Czech Republic. Consequently, the inflation rate decreased relatively less in Hungary than in Poland and Romania as the conditional inflation variance did. The Czech Republic achieved good outcomes with more flexible version of the DIT the interest rate developments in the Euro area. Although Slovakia claimed to apply the DIT, we have failed to detect any response to domestic inflation rate. On the contrary, the Slovak short-term interest rate responded very strongly to the euro interest rate. Slovenia did not adopt the DIT and proclaimed to pursue monetary targeting regime but we have identified only negligible response to monetary growth while the response to domestic inflation rate was very strong.

Any of the countries that aimed at exchange rate stabilization (CYP, EST, LAT, LIT, MAL) but one (BUL) experienced a significant inflation decrease since 1999. The common monetary policy, de facto imported to these countries by an interest rate peg, seems to have been too permissive to leash the inflationary tendencies embedded in the domestic economies. On the other hand, Lithuania experienced two-year period of deflation. Therefore, although the exchange rate peg had a positive impact on the initial disinflation, its subsequent maintenance proved problematic for countries whose economic fundaments differed from those of the anchoring economy.

CONCLUSIONS

This paper presents joint empirical evidence on monetary policy rules and on sources of inflation dynamics in small open economies, in particular in the 12 new EU members.

The estimated monetary policy rules point to a significant heterogeneity in interest rate setting in the CEEC. We confirm a significant response

(21) We have reported for Romania the rule with domestic inflation only because it has the highest explanatory power. However, even if we have added the exchange rate, we have still found very strong response to inflation.

of the short-term nominal interest rate to domestic inflation mostly for the inflation targeters. On the contrary, the policy rules of countries with fixed exchange rate regimes consisted in mimicking the interest rate setting in the Euro area without major consideration of domestic macroeconomic developments. This evidence supports the hypothesis of practical impossibility to pursue targets for the domestic inflation rate and the exchange rate simultaneously but also confirms that a credible interest rate peg constitutes a means to fix the exchange rate. The results obtained for some countries point to possible inconsistencies between proclaimed and de facto monetary policy.

Our estimates of the open economy Philips curve point to the drivers behind the inflation process of the emerging economies. The inflation rates are driven by not only backward persistency but also hold a forward-looking component. The stance of aggregate economic activity and foreign inflation development have direct impacts only in a few countries. In countries with flexible exchange rates, we have identified that the exchange rate passes through to domestic inflation, although rather incompletely.

The nexus between the estimated monetary policy rules and the sources of the inflation process gives some indications on the viability of the monetary policy setting for price stability. In particular, we have found that the long-term component of the conditional inflation variance is higher in countries with exchange rate pegs. Consequently, inflation targeting seems to be a preferable strategy to exchange rate peg because it allows decreasing not only the inflation rate but also its conditional variance.

REFERENCES

BARDSEN, G., E. JANSSEN, AND R. NYMOEN [2004], "Econometric Evaluation of the New Keynesian Phillips Curve", *Oxford Bulletin of Economics and Statistics*, 66, 671-686.

BATINI, N., B. JACKSON, AND S. NICKELL [2005], "An open-economy new Keynesian Phillips curve for the U.K.", *Journal of Monetary Economics*, 52, 1061-1071.

BENIGNO, G., P. BENIGNO, AND F. GHIRONI [2007], "Interest Rate Rules for Fixed Exchange Rate Regimes', *Journal of Economic Dynamics & Control*, 31, 2196-2211.

CAMPA, J.M., AND L.S. GOLDBERG [2005], "Exchange Rate Pass-Thought into Import Prices", *The Review of Economics and Statistics*, 87(4), 679-690.

CLARIDA, R., J. GALÍ, AND M. GERTLER [1998], "Monetary Policy Rules in Practice: Some International Evidence", *European Economic Review*, 42, 1033-1067.

CLARIDA, R., J. GALÍ, AND M. GERTLER [2000], "Monetary Policy Rules and Macroeconomic Stability", *The Quarterly Journal of Economics*, 115(1), 147-180.

CORICELLI, F., B. JAZBEC, AND I. MASTEN [2006], "Exchange Rate Pass-through in EMU Acceding Countries: Empirical Analysis and Policy Implications", *Journal of Banking & Finance*, 30, 1375-1391.

DOLADO, J.J., R. MARÍA-DOLORES, AND F.J. RUGE-MURCIA [2004], "Nonlinear Monetary Policy Rules: Some New Evidence for the U.S", *Studies in Nonlinear Dynamics & Econometrics*, 8(3), Article 2.

ENGLE, R.F., AND C.W.J. GRANGER [1987], "Co-integration and Error Correction: Representation, Estimation, and Testing", *Econometrica*, 55, 251-276.

FILOSA, R. [2001], "Monetary Policy Rules in Some Mature Emerging Economies", *BIS Papers*, 8, 39-68.

FRÖMMEL, M., AND F. SCHOBERT, F. [2006], "Monetary Policy Rules in Central and Eastern Europe", *Discussion Paper*, 341, University of Hannover.

GAGNON, J.E., AND J. IHRIG [2004], "Monetary Policy and Exchange Rate Pass-Through", *International Journal of Finance and Economics*, 9, 315-338.

GALÍ, J., AND M. GERTLER [1999], "Inflation dynamics: A structural econometric analysis", *Journal of Monetary Economics*, 44, 195-222.

GALÍ, J., M. GERTLER, AND J.D. LOPEZ-SALIDO [2001], "European inflation dynamics", *European Economic Review*, 45, 1237-1270.

JUDD, J.F., AND G. RUDEBUSCH [1998], "Taylor Rule and the FED: 1970-1997", *Federal Reserve Bank of San Francisco Economic Review*, 3, 3-16.

MARÍA-DOLORES, R. [2005], "Monetary Policy Rules in Accession Countries to EU: Is Taylor rule a pattern?", *Economics Bulletin*, 5(5), 1-16.

MAVROEIDIS, S. [2005], "Identification Issues in Forward-Looking Models Estimated by GMM, with an Application to the Phillips Curve", *Journal of Money, Credit, and Banking*, 37(3), 421-448.

MEHRA, Y.P. [2001], "The Bond Rate and Estimated Monetary Policy Rules", *Journal of Economics and Business*, 53, 345-358.

MOHANTY, M. S., AND M. KLAU [2004], "Monetary Policy Rules in Emerging Market Economies: Issues and Evidence", *BIS Working Papers*, 149, Bank of International Settlements, Basel.

NEWEY, W., AND K. WEST, K. [1994], "Automatic Lag Selection in Covariance Matrix Estimation", *Review of Economic Studies*, 61, 631-653.

OBSTFELD, M., AND K. ROGOFF [1996], *Foundations of International Macroeconomics*, MIT Press: Cambridge, MA.

ORLOWSKI, L.T. [2005], "Monetary Convergence of the EU Accession Countries to the Eurozone: A Theoretical Framework and Policy Implications", *Journal of Banking & Finance*, 29, 203-225.

RIGOBON, R., AND B. SACK [2003], "Measuring the Reaction of Monetary Policy to the Stock Market", *The Quarterly Journal of Economics*, 118(2), 639-669.

SVENSSON, L.E.O. [2000], "Open-economy Inflation Targeting", *Journal of International Economics*, 50, 155-183.

TAYLOR, J.B. [1993], "Discretion versus Policy Rules in Practice", *Carnegie-Rochester Conference Series on Public Policy*, 39, 195-214.

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