The role of fiscal discipline on the exchange-rate pass-through during inflation targeting

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Abstract

The purpose of this paper is to examine the role of fiscal discipline on the dynamics of exchange rate pass-through during inflation targeting. The present study analyses the Turkish economy for the period 2006-2022 by the use of threshold regression models. Our results suggest that fiscal discipline, measured by the IMF-defined primary budget balance as a share of GDP (which excludes the one-off government revenues balance such as privatization, interest earnings, and real estate sales) has a significant role in inflation dynamics. The degree of exchange rate pass-through is significantly lower and thus raises the effectiveness of inflation targeting when the government ensues strict fiscal discipline.

Keywords: Exchange rate pass-through, inflation targeting, fiscal discipline, monetary policy

JEL Classification: C24, E31, E52, E62

1. Introduction

Since the financial liberalization efforts, volatility in the exchange rates has impeded price stabilization efforts due to the exchange rate pass-through mechanism. Thus, the policy of inflation targeting has been widely used to tackle this problem. Although the effectiveness of monetary policy relies on factors such as global demand conditions, supply-side factors, current account balance, and/or credit growth rates, fiscal policy also has a critical role in curbing demand-side inflationary pressures and improving expectations on the sustainability of public debt. In Turkey, inflation expectations are to a large extent determined by fluctuations in the exchange rate and thus cause currency substitution. At the same time, since 1999 IMF has urged primary budget surpluses as fiscal discipline targets in its austerity programs. Therefore, it is crucial to see whether the IMF conditionality of fiscal targets has contributed positively to reducing the effect of this pass-through. This study aims to examine the role of fiscal discipline on the dynamics of exchange rate pass-through during inflation targeting in Turkey.

Empirical studies mainly focus on the determinants of exchange rate pass-through and the measurement of the degree of pass-through. Menon (1996) estimated the exchange rate pass-through elasticities of manufactured imports for Australia. Campa and Goldberg (2005) found higher pass-through elasticities amongst OECD countries with higher exchange rate volatility. Similarly, Ca'Zorzi et. al. (2007) documented that the degree of pass-through in emerging countries rises with the level of inflation. Schröder and Hüfner (2002) estimated that a 10 per cent depreciation in the euro nominal effective exchange rate index led to a 0.4-point increase in the euro-area consumer price index. Finally, Gagnon and Ihrig (2004) demonstrated the declining trend of the pass-through effect in 20 industrial countries since the 1980s due to the reduced variability in inflation rates.

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For Turkey, Kara and Öğünç (2008) showed that this pass-through effect weakens substantially by a switch to inflation targeting regime. Doğan (2013) concluded that under a favourable aggregate demand environment, the pass-through effect is stronger. Kal, Arslaner and Arslaner (2015) demonstrated that both import prices and the exchange rate pass-through moderate during periods of lower exchange rate volatility and currency appreciation.

Ersel and Özatay (2008) stated that during inflation-targeting policies, central banks should be cautious of high public debt since concerns about debt sustainability would raise interest rates and weaken the domestic currency. Aktaş, Kaya and Özlale (2010) analogously contend that concerns about the sustainability of public debt or capital outflows would subsequently ensue currency depreciation and deteriorate inflation dynamics. Akyürek, Kutan and Yılmazkuday (2011) also showed that the credible fiscal stance during the 2000s had a key role in the success of the inflation-targeting regime in Turkey. Similarly, Tekin-Koru and Özmen (2003) concluded that budget deficits lead to the growth of the broad money supply and restrict the effectiveness of the monetary policy.

2. Methodology and Data

In this study, a basic pass-through regression model is conducted to observe the extent of exchange rate pass-through both for consumer price index (CPI) and producer price index (PPI) inflation rates starting from January 2006 -when formal inflation targeting in Turkey began- to December 2022. All variables are in monthly frequency (quarterly GDP is converted into monthly GDP through interpolation). Our pass-through model can be stated as follows:

$$\dot{P}_t = \beta_0 + \beta_1 * \dot{P}_{t-1} + \beta_2 * \Delta FX_t + \beta_3 * Pm_t + \beta_4 * CNTL_t + u_t \qquad (1)$$

where $\dot{P}_t$ depicts the monthly per cent change of inflation. This variable is included by a one-month lag to capture the inertia of inflation. Another independent variable is the monthly change in the exchange rate ΔFX_t (USD/TL), whose coefficient expresses the degree of exchange rate pass-through. The coefficient of the import price index, Pm_t, depicts the extent of the pass-through from import prices to domestic prices. Four additional control variables are considered within the inflation dynamics; the *output gap* that controls the impact of aggregate domestic demand on price levels, the monthly difference of the real value of the *policy rate of the Central Bank of the Republic of Turkey (CBRT)* that represents the monetary policy stance, the IMF-defined *primary budget balance* as a share of GDP which indicates the role of the fiscal discipline (which is also the threshold variable), and finally the percentage change in inflation expectations that represents forward-looking behaviour. Detailed information about the variables can be found in Tables A.1 and A.2 in the annexe.

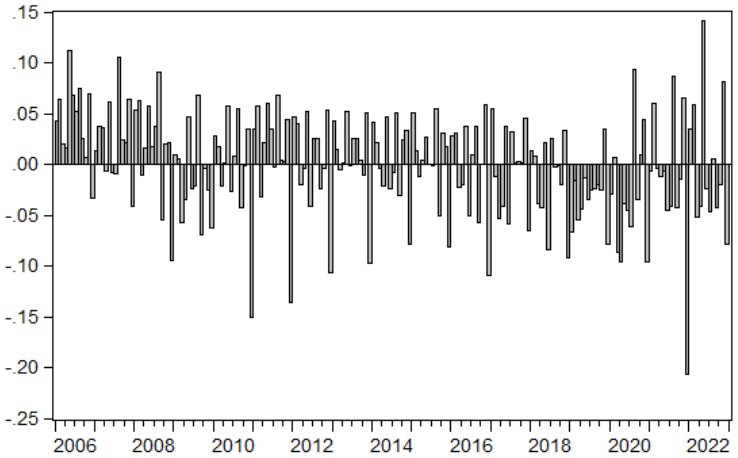
Once this basic analysis is completed, threshold models are implemented to observe the extent of exchange rate pass-through variation concerning the degree of the fiscal policy stance (Hansen, 2000). These models will mainly conduct two sets of regressions for the different values of threshold variables and yield two different sets of variable coefficients. We assume that zero and positive values of the primary budget balance as a share of GDP represent fiscal discipline and values below zero stand for profligate (or lack) fiscal discipline. Our models are, therefore, as follows:

$$\dot{P}_t = \alpha_0 + \alpha_1 * \dot{P}_{t-1} + \alpha_2 * \Delta FX_t + \alpha_3 * Pm_t + \alpha_4 * CNTL_t + e_t \qquad if \quad \frac{Primary\ Balance}{GDP} \geq 0 \qquad (2)$$

$$\dot{P}_t = \delta_0 + \delta_1 * \dot{P}_{t-1} + \delta_2 * \Delta FX_t + \delta_3 * Pm_t + \delta_4 * CNTL_t + \varepsilon_t \qquad if \quad \frac{Primary\ Balance}{GDP} < 0 \tag{3}$$

Below in Graph 1 fiscal discipline is observed in 107 months, whereas a lack of discipline is observed in 97 months in our sample. The threshold variable can also be observed on the same graph. Governments have generally been quite alert on fiscal discipline except in contractionary periods and/or elections. Nonetheless, we observe some fiscal relaxation during the global crisis of 2008/9 and since 2018 when political instability surged due to pending elections and due to the pandemic as it required excessive public spending.

Graph 1. Primary balance/GDP



3. Empirical Results

Our baseline pass-through regression results where CPI is the dependent variable are displayed in Table 1. In the first six regressions, the control variables are incorporated separately. The coefficients of inertia imply that a one per cent increase in the previous month's CPI inflation rate translates into around a 0.5 rise in the current month's inflation. The coefficient of the FX rate, which expresses the degree of exchange rate pass-through, shows that a 10 per cent monthly depreciation leads to around a 1.5 per cent rise in the monthly CPI. Import inflation has a positive connection with CPI too, as expected. Similarly, there is a positive-signed relationship between inflation expectations and the current inflation, but this significant connection disappears once the other regressors are incorporated into the model (7). The coefficient of the output gap is found insignificant. Nevertheless, primary balance (representing fiscal discipline) has a negative and statistically significant connection with the CPI. Following our expectations, the real CBRT policy rate has a negative impact on the inflation rate.

Table 1: Exchange rate pass-through to CPI[3]

Dependent var: CPI	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$CPI_{(t-1)}$	0.59*** (0.048)	0.538*** (0.047)	0.52*** (0.048)	0.442*** (0.045)	0.552*** (0.046)	0.501*** (0.05)	0.33*** (0.05)
FX Rate	0.151*** (0.017)	0.169*** (0.017)	0.17*** (0.017)	0.133*** (0.017)	0.161*** (0.017)	0.15*** (0.02)	0.099*** (0.019)
Import Inflation		0.131*** (0.03)	0.147*** (0.031)	0.09*** (0.03)	0.134*** (0.029)	0.121*** (0.03)	0.87*** (0.03)
Output Gap			-0.107 (0.35)				0.256 (0.303)
Policy Rate				-0.196*** (0.03)			-0.304*** (0.04)
Primary Balance					-4.56*** (1.46)		-3.49*** (1.3)
Inflation Expectation						0.032* (0.019)	0.02 (0.016)
Constant	0.247*** (0.095)	0.247*** (0.091)	0.242*** (0.091)	0.349*** (0.08)	0.243*** (0.09)	0.276*** (0.09)	0.414*** (0.08)
Observations	204	204	201	203	204	203	199
R-squared	0.546	0.587	0.591	0.66	0.606	0.596	0.72
Adjusted R-squared	0.541	0.58	0.582	0.653	0.60	0.588	0.71

Table 2 incorporates four different versions of pass-through models in which primary budget balance as a share of GDP is used as the threshold variable. Each model runs two regressions: one for the sample with fiscal discipline and another for the lack of discipline. The first model shows that, in times of lack of fiscal discipline, the exchange rate pass-through to CPI inflation is 0.213 and when the primary budget balance improves, the pass-through effect declines to 0.104. Similar results are obtained in the other models. We can thus conclude that the exchange rate pass-through to CPI is higher when government fiscal discipline is impaired and lower when the government runs a tighter budget. Likewise, the coefficient of the lagged CPI is lower in the case of fiscal discipline implying that inflation is much more persistent when fiscal discipline is weak. Table 2 demonstrates that the negative effect of real interest rates on CPI is stronger in times of fiscal discipline. This finding confirms that monetary policy is significantly more effective in stabilizing the CPI inflation during a healthier fiscal balance.

The same regression models are implemented but this time PPI is used as the dependent inflation variable (See Tables A.5 and A.6). Although the primary budget balance has again a negative-signed coefficient in the baseline pass-through model, this time it is no longer statistically significant. Probably, a deterioration in the fiscal discipline has a larger burden on the consumer rather than the producer price index since such a deterioration causes the aggregate demand to expand. Still, other results are very similar to those with the CPI, and therefore they enable us a robustness check.

[3] Although most of our variables are growth rates, ADF and Phillips-Perron tests are applied for non-stationarity and the null hypothesis of a unit root is rejected for all variables at a one per cent significance level (see Table A.3). Pairwise correlations are also held, and it is observed that multicollinearity is not a concern in our models (see Table A.4).

Table 2: Threshold regression results

Dependent var: CPI	Primary Balance/GDP		Primary Balance/GDP		Primary Balance/GDP		Primary Balance/GDP	
	< 0	**≥0**	**< 0**	**≥0**	**< 0**	**≥0**	**< 0**	**≥0**
CPI (t-1)	0.802***	0.445***	0.806***	0.428***	0.73***	0.302***	0.694***	0.463***
	(0.086)	(0.05)	(0.09)	(0.05)	(0.08)	(0.06)	(0.105)	(0.05)
FX Rate	0.213***	0.104***	0.218***	0.104***	0.17***	0.08***	0.176***	0.115***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)
Import Inflation	0.087**	0.135***	0.104**	0.137***	0.055	0.09***	0.066	0.143***
	(0.04)	(0.04)	(0.05)	(0.04)	(0.04)	(0.03)	(0.045)	(0.04)
Output Gap			-0.54	0.578				
			(0.46)	(0.487)				
Policy Rate					-0.17***	-0.27***		
					(0.03)	(0.06)		
Inflation Expectation							0.052*	-0.018
							(0.03)	(0.02)
Constant	0.078	0.29***	0.036	0.28***	0.173	0.41***	0.196	0.263**
	(0.14)	(0.107)	(0.14)	(0.107)	(0.125)	(0.1)	(0.153)	(0.11)
Observation	97	107	95	106	97	106	97	106
R-squared	0.686	0.579	0.693	0.588	0.752	0.647	0.696	0.591
Adjusted R-squared	0.676	0.567	0.679	0.571	0.741	0.633	0.682	0.574

Standard errors in parentheses. *** p<0.01044, ** p<0.05044, * p<0.1044

4. Conclusion

Our findings suggest that the deterioration of the primary budget balance incurs a rise in inflation rates. Exchange rate and import price pass-through are much larger in PPI inflation than CPI inflation, confirming the expectation that intermediate goods, as a major component of PPI, are more sensitive to exchange rate fluctuations. Although during fiscal lapse 10 per cent depreciation in the exchange rate invokes about a 2.1 per cent monthly increase in the CPI inflation rate; during a healthier fiscal rule, it only leads to a 1.04 increase.

Since the widespread adoption of the inflation-targeting regime, the monetary policy appeared to be the conspicuous policy in price stabilization, disregarding the potential contribution of fiscal policy. This paper shows that fiscal policy has a significant contribution in controlling the overall inflation rate both by retraining aggregate demand and through the cost-price mechanism or exchange rate pass-through to domestic prices. If fiscal discipline is completely unleashed, the central bank funding rate might also become an obsolete monetary tool. Fiscal discipline not only provides the reduction of the high burden of public debt but also delivers a positive signal to both consumers and investors that the government is concerned about fiscal sustainability which would also ameliorate expectations. By this strategy, risk premiums would decline, capital inflows would be sustained, and the exchange rate volatility could be reduced which would procure price stability.

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ANNEX

Table A.1: Definitions of the Variables

Variable	Definition	Source
CPI	% change in the consumer price index	TurkStat
PPI	% change in the producer price index	TurkStat
FX rate	% change in the foreign exchange rate ($/TL)	CBRT
Import inflation	% change in import unit value index	TurkStat
Output gap	The cycle component of the log of real GDP (seasonally adjusted) is obtained through Hodrick and Prescott (1997) (i.e., HP) filter. Then, it is divided by the log of real GDP.	IMF

Policy rate	The monthly difference in policy rate[4] (in real terms) of the Central Bank	CBRT
Inflation expectations	% change in inflation expectation for 12 months later	CBRT (survey of market participants)
Primary balance/GDP	IMF-defined primary balance/GDP at current prices	Ministry of Treasury and Finance

Table A.2: Descriptive Statistics

	CPI	PPI	FX rate	Import inflation	Output gap	Policy rate	Inflation expectation	Primary balance/GDP
Mean	1.11	1.418	1.387	0.241	-0.0006	-0.32	1.08	0.0003
Median	0.807	0.85	0.79	0.203	0.022	-0.25	0.00	0.002
Maximum	13.57	19.08	28.558	15.577	0.565	20.12	35.31	0.14
Minimum	-1.44	-3.54	-8.292	-8.69	-1.055	-15.77	-10.61	-0.21
Std. Dev.	1.62	2.48	4.415	2.63	0.219	2.59	5.28	0.05
Observations	204	204	204	204	201	203	203	204

Table A.3: Stationarity Tests

	ADF test statistic	p value	Phillips-Perron test statistic	p value
CPI	-4.33	0.0005	-6.86	0.00
PPI	-5.65	0.000	-5.77	0.00
FX rate	-10.02	0.000	-9.33	0.00
Import inflation	-5.05	0.000	-12.24	0.00
Output gap	-3.8	0.0035	-3.45	0.01
Policy rate	-8.08	0.00	-6.17	0.00
Inflation expectation	-7.11	0.000	-7.02	0.00
Primary balance/GDP	-2.50	0.01	-17.12	0.00

Table A.4: Correlations among Independent Variables

	FX rate	Import inflation	Inflation expectation	Output gap	Primary balance/GDP	Policy rate
FX rate	1.00	-0.22	0.51	0.14	-0.14	-0.34
Import inflation	-0.22	1.00	0.16	0.17	0.08	-0.23
Inflation expectations	0.51	0.16	1.00	0.26	-0.004	-0.45

[4] The Central Bank used overnight lending rate as a policy instrument until April 2010, but since then it used the one-week repo lending rate in inflation targeting.

Output gap	0.14	0.17	0.26	1.00	0.16	-0.05
Primary balance/GDP	-0.14	0.08	-0.004	0.16	1.00	0.117
Policy rate	-0.34	-0.23	-0.45	-0.05	0.117	1.00

Table A.5: Exchange rate pass-through to PPI

Dependent var: PPI	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
$PPI_{(t-1)}$	0.627*** (0.035)	0.572*** (0.04)	0.572*** (0.04)	0.533*** (0.04)	0.573*** (0.04)	0.549*** (0.04)	0.489*** (0.05)
FX Rate	0.28*** (0.02)	0.304*** (0.02)	0.304*** (0.02)	0.29*** (0.02)	0.302*** (0.02)	0.293*** (0.02)	0.273*** (0.02)
Import Inflation		0.14*** (0.03)	0.15*** (0.03)	0.12*** (0.03)	0.14*** (0.03)	0.136*** (0.03)	0.13*** (0.03)
Output Gap			-0.02 (0.37)				0.122 (0.37)
Policy Rate				-0.103*** (0.04)			-0.123*** (0.05)
Primary Balance					-1.19 (1.67)		-0.53 (1.59)
Inflation Expectation						0.02 (0.02)	0.028 (0.02)
Constant	0.14 (0.10)	0.15 (0.1)	0.142 (0.09)	0.189** (0.1)	0.15 (0.1)	0.177* (0.1)	0.217** (0.1)
Observations	204	204	201	203	204	203	199
R-squared	0.76	0.778	0.803	0.789	0.779	0.779	0.814
Adjusted R-squared	0.758	0.775	0.799	0.785	0.775	0.775	0.807

Table A.6: Threshold regression results for PPI

Dependent var: PPI	**Primary Balance/GDP**		**Primary Balance/GDP**		**Primary Balance/GDP**		**Primary Balance/GDP**	
	< 0	**≥0**	**< 0**	**≥0**	**< 0**	**≥0**	**< 0**	**≥0**
$PPI_{(t-1)}$	0.67*** (0.05)	0.476*** (0.05)	0.628*** (0.05)	0.523*** (0.05)	0.625*** (0.05)	0.477*** (0.06)	0.655*** (0.07)	0.469*** (0.06)
FX Rate	0.34*** (0.03)	0.243*** (0.03)	0.355*** (0.02)	0.228*** (0.03)	0.32*** (0.03)	0.24*** (0.03)	0.334*** (0.03)	0.24*** (0.03)
Import Inflation	0.12** (0.05)	0.149*** (0.05)	0.185*** (0.05)	0.106** (0.05)	0.104** (0.05)	0.14*** (0.05)	0.117** (0.05)	0.148*** (0.05)
Output Gap			-0.417 (0.47)	0.42 (0.57)				
Policy Rate					-0.11*** (0.04)	-0.016 (0.08)		
Inflation Expectation							0.01 (0.04)	0.007 (0.03)
Constant	0.02 (0.14)	0.278** (0.122)	-0.02 (0.136)	0.259** (0.118)	0.09 (0.14)	0.26** (0.13)	0.044 (0.16)	0.28** (0.13)
Observation	97	107	95	106	97	106	97	106
R-squared	0.841	0.715	0.866	0.738	0.852	0.721	0.841	0.714

Adjusted R-squared	0.836	0.707	0.86	0.728	0.846	0.71	0.834	0.703

Standard errors in parentheses. *** p<0.01044, ** p<0.05044, * p<0.1044