T.C.

MARMARA ÜNİVERSİTESİ

SOSYAL BİLİMLER ENSTİTÜSÜ

İKTİSAT ANABİLİM DALI

İKTİSAT (İNG.) BİLİM DALI

# EXAMINING GEOPOLITICAL RISKS AND CRIME RELATIONSHIP: INSIGHTS FROM EUROPE

M.A. Thesis

SELAHATTİN TOLGA ER

İSTANBUL, 2022

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Supervisor: ASSOC. PROF. YASEMİN ÖZERKEK

ISTANBUL, 2022

# ÖZET

## JEOPOLİTİK RİSK VE SUÇ İLİŞKİSİNİN İNCELENMESİ: AVRUPA ÖRNEĞİ

Daha önce yapılan araştırmalar, silahlı çatışma, terör ve uluslararası ilişkilerde barışçıl seyri bozan uluslararası anlaşmazlıklardan kaynaklanan jeopolitik tehditlerin, ekonomik eşitsizliğe ve ekonomik büyümede bozulmaya neden olarak toplum ve ekonomi üzerinde ciddi sonuçlar doğurduğunu göstermiştir. Bu çalışmada ise, jeopolitik risklerin ekonomik sonuçlarının yasal yollardan elde edilen faydayı baskıladığı, normlarda kırılma yarattığı ve toplumun savunmasız kesimleri üzerinde gerilime neden olduğu vurgulanarak, jeopolitik riskler ile mal varlığına karşı işlenen suçların ilişkisi 13 Avrupa ülkesi bağlamında 1995-2016 yılları için analiz edilmiştir. Çalışmanın bulguları, jeopolitik risklerdeki artış ve azalışların mal varlığına karşı işlenen yağma ve hırsızlık suçlarındaki değişimlerle aynı yönde ilişkide olduğunu göstermektedir. Araştırmanın sonuçları 13 Avrupa ülkesi örnekleminin yanı sıra 9 ülkeyi içeren Kuzey ve Batı Avrupa kümesine karşı sağlamdır.

**Anahtar Kelimeler:** Suç, Jeopolitik Risk, Hırsızlık, Yağma, European Sourcebook, GPR Index

## ABSTRACT

### EXAMINING GEOPOLITICAL RISKS AND CRIME: INSIGHTS FROM EUROPE

Previous research has shown that increasing geopolitical threats and events that arise from armed conflicts, terror, and conflicts among states that disrupt the peaceful course of international relations have severe consequences on society and the economy by causing economic inequality and harming economic growth. Arguing that the economic and social consequences of geopolitical risks lead to diminishing expected utility from legal work, disruption in the norms of the society, and increasing strain on vulnerable people of the society, this study analyzed the association between geopolitical risks and acquisitive crimes in the context of Europe with a sample of 13 countries. The findings revealed that the changes in geopolitical risks and acquisitive crimes, namely, robbery and theft, are positively associated from 1995 to 2016. The study results are robust to the sample of 13 European countries and the cluster of Northern and Western Europe, with 9 countries.



**Keywords:** Crime, Geopolitical Risks, Robbery, Theft, European Sourcebook, GPR Index

**TABLE OF CONTENTS**

**Page No.**

LIST OF ABBREVIATIONS……..iv

LIST OF TABLES……v

LIST OF FIGURES…….vi

1. INTRODUCTION……1

2. GPR INDEX AND ITS IMPLICATIONS IN THE LITERATURE……4

3. THEORETICAL FRAMEWORK……..……..7

4. DATA…….11

5. METHODOLOGY…….18

6. FINDINGS……..22

7. CONCLUSION……...26

REFERENCES……...28

APPENDIX…….…34

## LIST OF ABBREVIATIONS

| | |
|---|---|
| ADF | Augmented Dickey-Fuller Test |
| ES2 | European Sourcebook, 2nd Edition |
| ES3 | European Sourcebook, 3rd Edition |
| ES4 | European Sourcebook, 4th Edition |
| ES5 | European Sourcebook, 5th Edition |
| ES6 | European Sourcebook, 6th Edition |
| FBI | Federal Bureau of Investigation |
| GDP | Gross Domestic Product |
| GPR | Geopolitical Risk |
| GPRs | Geopolitical Risks |
| IPS | Im-Pesaran-Shin |
| No | Number |
| OLS | Ordinary Least Squares |
| U.K. | United Kingdom |

# LIST OF TABLES

Page No.

Table 1: List of Countries, Mean Crime Rates, and Mean GPR……13

Table 2: Correlation Matrix……16

Table 3: Descriptive Statistics……17

Table 4: Panel Unit Root Tests……...19

Table 5: Full Sample and Clusters……..21

Table 6: Estimations on the Association between GPR and Theft Rates……...22

Table 7: Estimations on the Association between GPR and Robbery Rates……...…...25

Table A1: Standard Definitions Met by Country and Criminal Offense for Robbery and Theft…...…34

Table A2: Deviations from the Standard Definition in Robbery……35

Table A3: Deviations from the Standard Definition in Theft……36

Table A4: Deviations from the Standard Definition in Total Criminal Offenses...……37

Table A5: Deviations from the Standard Definition in Intentional Homicide……...39

Table A6: Deviations from the Standard Definition in Assault……40

Table A7: Deviations from the Standard Definition in Rape……42

Table A8: Deviations from the Standard Definition in Theft of a Motor Vehicle……44

Table A9: Deviations from the Standard Definition in Burglary……...45

Table A10: Deviations from the Standard Definition in Domestic Burglary……47

Table A11: Deviations from the Standard Definition in Drug Offenses……48

Table A12: Summary Statistics: Between and Within Variation……..……49

# LIST OF FIGURES

Page No.

Figure 1. GPR Index from 1985 to 2022……..4

Figure 2. Average Theft Rate and GPR from 1995 to 2016……...……..…...14

Figure 3. Average Robbery Rate and GPR from 1995 to 2016……...…...……14

Figure A1. Theft Rates and GPR from 1995 to 2016……..……..…50

Figure A2. Robbery Rates and GPR from 1995 to 2016…….....……...51

# 1. INTRODUCTION

"What causes crime" and "how can it be prevented"? Since the seminal paper of Becker (1968), which concerns crime and crime prevention, the debate on the choice of committing a crime, the economic reasoning behind a criminal act, and the prevention of crime have been topics under focus in crime economics. The definition of crime and its associations vary through time and space; however, it is certain that crime is a widespread phenomenon that economically, psychologically, and physically costs individuals and society. According to the Federal Bureau of Investigation (FBI, 2019), the number of recorded property crimes was almost 7 million, and violent crime offenses exceeded 1.2 million at the end of 2019 in the United States, whereas Eurostat (2019) documented over 5 million acquisitive crime offenses in the same year in the European Union. The economic cost of total crime reached 58.8 billion pounds in 2015/16 only in England and Wales (Heeks et al. 2018)[1].

Another consequence of the crime is the severe and long-lasting harm to the psychological well-being of victims. As Kuroki (2012) suggests, victims' psychological non-pecuniary costs are much larger than the pecuniary losses. Moreover, the dire psychological consequences are not limited to the victims but involve families, friends, acquaintances, and even communities since increased levels of local crime cause psychological distress in a neighborhood (Astell-Burt et al. 2015). The other consequence is seen in violent crimes, where the victim suffers minor or permanent injuries or the victim is murdered. Again, the act of a violent crime affects not only victims but also the people close to the victim.

The vast literature on crime provides significant explanations regarding the causes of crime, including inequality (Kim et al. 2020), unemployment (Raphael and Winter-Ebmer, 2001; Edmark, 2005; Altindag, 2012), inflation (Rosenfeld, 2014; Rosenfeld and Levin, 2016), and deterrence (Becker, 1968). This thesis proposes that risks associated with geopolitical events such as war, international conflicts, and terror attacks, proxied by Caldara and Iacoviello's (2022) Geopolitical Risk (GPR) Index, are among the determinants associated with the crime rate.

The root of the suggestion on the association between GPRs and crime is based mainly upon the utility maximization and rational choice theory of crime. Theoretically, an individual commits a crime if the expected utility from committing an offense is higher than the expected utility from using resources in legitimate activities (Becker, 1968; Ehrlich, 1973). As evidenced in the literature, GPRs are associated with lower expected returns from legitimate activities due to increasing income

[1] For a comprehensive literature review about the cost of crime, see Wickramasekera et al. (2015).

inequality (Cheng and Chiu, 2018) and lower economic growth (Akadiri et al. 2020). In that regard, the increases in GPRs may impact the comparative costs and opportunities and act as a signal of bleak prospects, which may lead to the expectation of adverse events in the future and lower excepted utility from legitimate activities, altering the preferences. Thus, increasing GPRs may result in the tendency to commit crimes considering the increasing comparative utility expected from committing a criminal offense.

Furthermore, GPRs may cause anomie through major geopolitical events, such as war, terror attacks, and international conflicts. The state of anomie, coined by Durkheim (2005; originally published in 1897), has several different interpretations since Durkheim's use of the term "anomie" does not demonstrate a clear pattern. This thesis considers the anomie as the weakening of the collective and shared consciousness (DiCristina, 2016) and the result of distortion between the values of individuals and their community (Yamen et al. 2019). This thesis argues that the increases in GPRs may cause deviations from norms and disruptions in society, leading to an environment conducive to crime and social harm.

The final explanation for the possible association between GPRs and crime relies on the strain theory, which proposes that negative feelings such as fear, disappointment, depression, anger, and frustration lead to the need to cope, and one of the coping mechanisms is committing an offense (Agnew, 1992). Against this background, an increasing number of adverse geopolitical events might cause strains, while positive geopolitical development in a country might provide more space for opportunities and optimism, which may impact the overall crime rate.

In light of these implications, this thesis examines the association between GPRs and crime in 13 European countries between 1995 and 2016. Due to the data availability and comparability, this thesis considers acquisitive crimes, namely robbery and theft, for the research. Findings report that the changes in GPRs, proxied by the GPR Index, are positively associated with the changes in acquisitive crime rates.

To the best of my knowledge, this study is the first to empirically test the association between crime and GPRs using the GPR Index. Although the literature utilizes the GPR Index and examines the role of several geopolitical events in finance, banking, and macroeconomics, the implications of GPRs on the social dimension are limited. Against this background, this thesis aims to help fill this gap by documenting findings within the context of the economics of crime and geopolitics.

This section has attempted to introduce the study of the association between GPRs and crime. In the following section, GPR Index and studies on the GPR Index are reviewed, with their implications on the economy, inequality, and crime. Following the second section, Section 3 examines

the mechanisms that may underlie the GPRs and crime relationship in a theoretical framework in light of past studies. Section 4 introduces the data and control variables. Section 5 explains the methodology, whereas Section 6 reports the findings. Finally, Section 7 discusses the findings and concludes the thesis.

## 2. GPR INDEX AND ITS IMPLICATIONS IN THE LITERATURE

First coined by Rudolf Kjellén in 1899, the context of geopolitics has evolved throughout history in line with the changing dynamics of the power shifts and structure of the world order since the time it was introduced as a concept to describe the relationship between the physical earth and politics (O'Tuathail, 1998). In this thesis, however, GPRs refer to the threat, realization, and escalation of adverse events related to armed conflict, war, and terrorism, and those risks also capture the tensions among states and political actors that threaten the peaceful course of international relations (Caldara and Iacoviello, 2022). GPRs cover the realized geopolitical events and risks arising from the escalation of existing adverse geopolitical events. The GPR index is the share of news articles related to adverse geopolitical events to the total number of news articles in 10 newspapers (Chicago Tribune, the Daily Telegraph, the Financial Times, the Globe and Mail, the Guardian, the Los Angeles Times, the New York Times, USA Today, the Wall Street Journal, and The Washington Post). A higher GPR Index signifies an increased level of adverse geopolitical events. Figure 1 shows the course of the global GPR Index between 1985 and 2022.

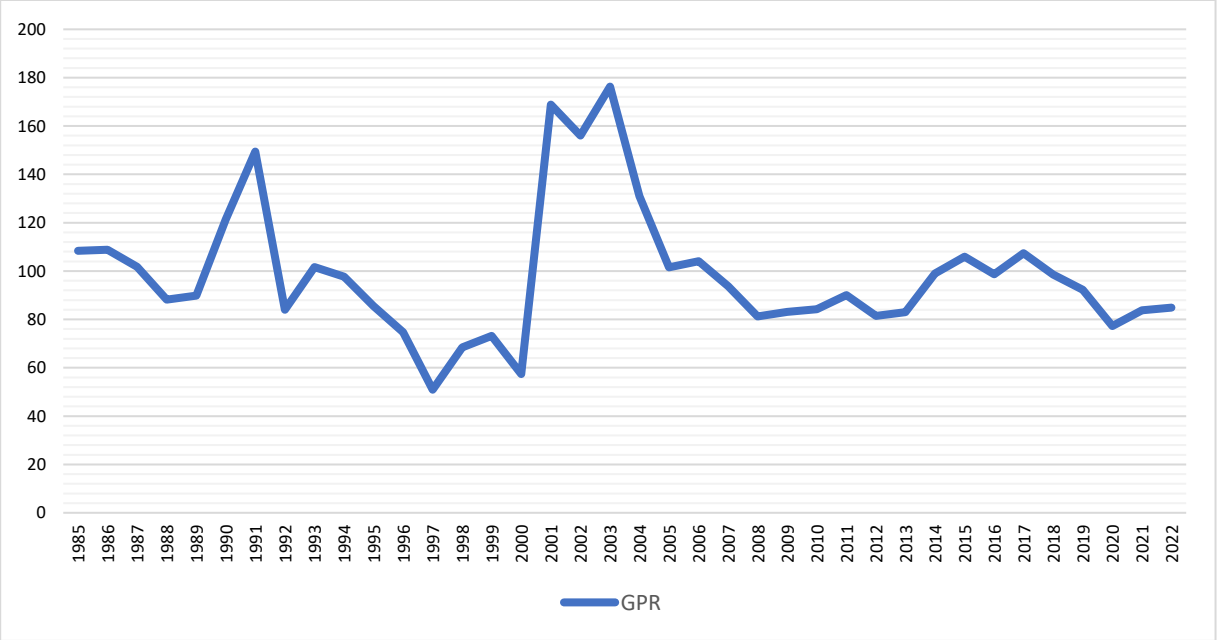


**Figure 1. Global GPR Index from 1985 to 2022**

**Note:** The figure presents the course of the Global GPR Index from 1985 to 2022. The monthly GPR Index is averaged into annual frequency. The year 2022 covers the available four months at the time of this writing.

**Source:** Caldara and Iacoviello (2022)

According to Figure 1, the global GPR Index spikes during the threat and the realization of the war and in correspondence with terror attacks. The causes of spikes are the Gulf War in 1991, the September 11 attacks in the United States in 2001, and the 2003 invasion of Iraq. What is striking in the figure is the steady decline of the risks associated with geopolitical events in the 1990s and the steady increase starting from the mid-2000s till 2017. The gradual increase in the mid-2000s is due to the increasing terror attacks in Europe.

The literature utilizing GPR Index focuses on various topics ranging from banking to housing markets and from income inequality to government investments. For instance, Demir and Danışman (2021) use a sample of 2439 banks from 19 countries from 2010 to 2019 on the role of GPRs upon bank credits. According to the findings, GPRs harm consumer and mortgage loans, while GPRs have no impact on corporate loans. In the same study, GPR's overall effect on bank credit growth is insignificant.

In another study, Chien and Setyowati (2020) examine the GPR shocks in global housing markets in 56 countries from 2001Q1 to 2018Q2. The results indicate that the impact of GPRs on housing markets differs across regions. According to the study, the investment risk in housing markets grows with an increase in GPRs in Europe and America, while increases in GPRs cause more stable housing prices in Asia. Another implication of the study is that GPR's association varies depending on the region, country, or culture.

Additionally, research utilizing GPR Index documents the adverse impact of GPRs on several economic indicators, including economic growth and income equality. Using the Granger causality approach, Akadiri et al. (2020) conclude a unidirectional relationship from GPRs to economic growth and from GPRs to tourism in Turkey in the years 1985-2017. According to the findings, GPRs have a detrimental impact on tourism and damage economic growth both in the short- and long- run. These results are similar to those reported by Cheng and Chiu (2018), whose results reveal the drop in consumption and investment with a one-standard-deviation shock to the GPR in 38 emerging countries for the period 1980-2011. Moreover, the impact of GPRs is not limited to investment and consumption, as increases in GPRs trigger depreciation in real exchange rates. Although the size of the impact changes depending on countries, Cheng and Chiu's (2018) findings hold for countries included in the entire sample.

Another notable study on the GPRs is by Wu et al. (2022), which covers 19 emerging economies from 1985 to 2020. The study reports the positive association between GPRs and income inequality, indicating that GPRs disrupt income equality. In another study, Bilgin et al. (2020) document the association between GPRs and general government investment. According to the study,

which covers 18 countries between 1985 and 2015, governments tend to increase investment to offset the negative impact of geopolitical events, and private investment complements government investment.

In summary, the main findings on GPRs are associated with increased perception of adverse outcomes and harmful effects on investment, income equality, and economic growth. The following section illustrates the theoretical framework and discusses the probable causation between GPR Index and crime.

## 3. THEORETICAL FRAMEWORK

The economics of crime in a theoretical framework starts with the seminal work of Becker (1968), who considers potential criminals as economically rational agents, influenced by mainly three factors. Becker's approach relies on the analysis of rational choice and utility maximization by assuming that an individual commits an offense if the expected utility from a criminal activity exceeds the utility from engaging with other resources at other activities. According to Becker's economic theory of crime, in addition to the benefit of criminal activity, the likelihood of apprehension and the form and the severity of the punishment are decisive factors that influence the choice of committing a crime. Another aspect of Becker's intuition is the role of willingness to take a risk. This explanation of crime implies that some commit crimes while others do not since individuals' benefits and costs differ (Becker, 1968). Accordingly, the supply function of a criminal offense ($O_j$) is as in Equation 1.

$$O_j = O_j(p_j, f_j, u_j) \tag{1}$$

, where $O_j$ is the number of offenses an offender would commit during a certain period, $p_j$ is the likelihood of conviction per offense, $f_j$ is the punishment per offense, and $u_j$ is a "portmanteau" variable representing all other influences, including a rise in the returns in legal activities or increasing tendency to abide the law.

Ehrlich (1973), on the other hand, is the first to empirically test Becker's model by developing a more comprehensive model. This version incorporates the likelihood of punishment, reward costs, and gains from both legitimate and illegitimate activities. According to Ehrlich's model, an individual can participate in an illegal or legal activity for a certain period and must make an optimal choice without any cost of movement between two activities. The findings based on the United States at the state-level indicate that the probability of apprehension and conviction is positively associated with the expenditure on police. Furthermore, an increase in the probability of apprehension and convictions is associated with a decrease in crime rates.

Moreover, the results document the strong association between income inequality and crime, particularly crimes against property. Overall, the results show that engaging in illegitimate activities as a group is no different from engaging in legitimate activities and emphasize the role of opportunities available in legitimate and illegitimate activities in addition to the likelihood of apprehension and the severity of the punishment. Ehrlich's expected utility model can be summed as in Equation 2.

$$EU = P * U[W_0 + G_L(t - t_I) + G_I(t_I) - F(t_l)] + (1 - P) * U[W_0 + G_L(t - t_I) + G_I(t_I)] \tag{2}$$

, where $P$ is the probability of apprehension and punishment, $W_0$ is the individual's initial wealth, $G_L$ is the return from legitimate activity, $G_I$ is the return from committing an offense, $F$ is the severity of the punishment, $(t - t_I)$ is the time allocated to legitimate activities, and $t_I$ is the time to illegitimate activities (Engelen et al. 2016).

Consequently, several studies explore the association between income and crime. For instance, by taking the ratio of mean to median household income in urban counties in the United States, Kelly (2000) empirically tests the impact of inequality, poverty, and police activities on seven different crime categories, which are assault, robbery, murder, rape, burglary, larceny, and auto theft. The findings show differing results for violent crimes (assault, robbery, murder, and rape) and property crimes (burglary, larceny, and auto theft). According to the results, while inequality does not affect property crime, violent crimes are strongly impacted by inequality. Moreover, findings reveal that poverty and the number of police impact both crimes. The study implies that property crimes are more likely to be explained by the economic theory of crime. The other implication is that the causes of crimes involving force and violence are related to strain theory. For the case of Europe, Altindag (2012) reports similar findings. Covering 33 European countries from 1995 to 2003, Altindag (2012) investigates the impact of unemployment on crime, where the findings indicate the positive influence of unemployment on property crime. On the other hand, Engelen et al.'s (2016) findings based on a sample of 100 counties in North Carolina between 2001 and 2005 contrast with Altindag's (2012) results. According to Engelen et al. (2016), unemployment is associated neither with violent crimes nor property crimes.

In addition to unemployment, inequality, and poverty, another income variable, gross domestic product (GDP) per capita, has been controlled for in the empirical analysis of crime. For example, Ochsen (2010), in a study based on 9 European countries for the period 1991-1999, which uses the data from the European Sourcebook, finds a positive association between the GDP per capita and robbery. However, the same study reports an insignificant relationship between income and theft. Altindag's (2012) findings differ from the findings of Ochsen (2010). Altindag's (2012) analysis documents no association between the GDP per capita and robbery. In contrast, theft appeared to be affected positively by the GDP per capita.

Considering the harmful effects on returns from legitimate work and investment evidenced in the prior literature in the light of the economic theory of crime, the initial expectation in this analysis is a positive association between GPRs and crime. Additionally, adverse geopolitical events may increase the willingness to commit a crime if tension and conflict cause social stress or risk-taking behavior. For example, an increase in adverse geopolitical events may increase the screen time of violent and risk-promoting media, leading to a higher level of aggression and risk-taking behavior

(Anderson and Bushman, 2002; Fischer et al. 2008). On the other hand, rising GPRs may also lead to an increased presence of police to deter and prevent crimes after major incidents such as terror attacks. For instance, Draca et al. (2011) show that increased police activity after the terror attacks results in a decrease in crime due to the increased risk of apprehension. Moreover, terror attacks and increasing adverse geopolitical events may lead to less crowded streets, reducing the potential targets for acquisitive crimes. Furthermore, terror attacks and other rising geopolitical tensions may enhance the solidarity in society and decrease the motivation to commit a crime (Gould and Stecklov, 2009).

Another mechanism that may underlie the association between GPRs and crime relies on the anomie and strain theory. Explaining crime as a social concept in the context of remarkable social changes in 19th-century Europe, Durkheim (2019) introduces the term anomie. Anomie has several different interpretations since Durkheim's use of the term "anomie" does not demonstrate a clear pattern. This thesis considers anomie as the weakening of the collective and common consciousness (DiCristina, 2016) and as the byproduct of distortion between the values of individuals and their community (Yamen et al. 2019). In other words, anomie refers to the disruption in shared values and widespread lack of commitment to shared standards and rules, resulting in deviant behavior, suicide, and crime. As Bernburg (2019) points out, existing rules in society may become irrelevant during rapid changes in social reality, and a new set of rules require some time to be established since they are the product of repeated social interactions.

Following Durkheim, Merton (1938) extends the concept and develops the classical strain theory, which suggests that some social structures exert pressure on individuals. By distinguishing between the social and cultural structure, Merton proposes that deviance, particularly the act of crime, is likely to happen if the "cultural goals" in society, such as success and wealth, are unattainable. According to the strain theory, the strain due to not achieving valued goals results in frustration and non-rational behavior.

Agnew (1992) revises the theory by addressing the limitations of Merton's strain theory. Highlighting that Merton's strain theory does not include goals other than monetary success and social status, Agnew proposes the general strain theory by taking into account that strain may occur due to the inability to escape legally from painful situations and incorporates all types of negative relations between the individual and others. Strains conducive to crime range from parental rejection to negative school experiences, from marital issues to race, ethnicity, gender, age, region, and religious discrimination (Agnew, 2015).

Against this background, increases in GPRs may result in disruptions in society and strains due to increasing tensions between people from different ethnicity, race, class, region, and religions.

Albornoz et al. (2020) and Piatkowska and Stults (2021) show the evidence of a substantial increase in hate crimes in the United Kingdom after the United Kingdom's exit from the European Union. Hanes and Machin (2014) report similar findings, documenting the empirical evidence of increasing hate crimes against Asians and Arabs in England in the wake of terror attacks in London and the United States of America. GPRs can, indeed, cause tension and conflict between people if the adverse GPR is international conflict related or caused by terror attacks. The disruption in shared values can strain certain groups, create an environment conducive to crime, and alter future expectations, or particular groups can be targeted more frequently by criminals.

# 4. DATA

Three main data collection initiatives prevail in the cross-country comparisons of crime rates: the United Nations Crime Trends Survey, Eurostat's crime statistics, and the European Sourcebook of Crime and Criminal Justice Statistics. According to Harrendorf (2018), European Sourcebook is not only the most detailed source for studies focusing on Europe but also its validation process is superior to the Eurostat and United Nations Crime Trends Survey. In line with Harrendorf's (2018) conclusion, this study uses the data from the European Sourcebook to analyze the association between crime rate and GPRs. Several other studies also utilize the European Sourcebook to research the nature of the crime. For instance, Altindag (2012) demonstrates that unemployment positively influences the theft rate in 33 European countries from 1995 to 2003, whereas Rodríguez-Menés and López-Riba (2020) analyze the impact of the economic crisis on imprisonment in the context of Europe in a more recent study. The study documents a decrease in imprisonment rates in welfare states and an increase in imprisonment rates in less comprehensive welfare states during the 2008/09 global financial crisis.

As of 2022, the European Sourcebook covers the years between 1990 to 2016 for 44 countries, consisting of six editions or waves. Each consecutive wave covers four to seven years, starting from the last year of the previous wave. In this thesis, I use the annual crime and police officer data from the latest five waves of the European Sourcebook of Crime and Criminal Justice, covering the years from 1995 to 2016. The first wave of the European Sourcebook between 1990 and 1995 is excluded because it does not include the prison data per country, which I use to control the deterrence of crime[2]. Other deterrence measures such as prosecutions and convictions are available in the first wave of the European Sourcebook; however, the data for these two measures are not consistently recorded between and within countries for each crime category, favoring the prison rate as the most efficient choice. Therefore, the number of prisoners per 1,000 persons in a country is the adopted deterrence measure in the analysis.

The sample of countries and crime categories in this thesis are established according to three sets of consideration: data availability, data reliability, and compatibility of data for the cross-country analysis. European Sourcebook comprises 44 countries, of which 16 are measured in the GPR Index. In other words, the maximum number of countries available for research on crime rates and GPRs is 16. In this initial sample, Turkey is the only country that is not consistently measured in each crime category, with crime statistics for more than half of the sample years missing. Hence, I exclude Turkey

[2] Starting from the second wave of the European Sourcebook, the police data are also available; however, police data are not consistently measured for Italy, France, Germany, Spain, and Switzerland.

from the sample countries since several missing years significantly impair the first difference estimator's explanatory power.

Another set of considerations in this study is the data reliability. Substantive factors such as the willingness of the public to report crimes, trust in the police, and police performance determine the changes in crime rates and the level of crime in a country (Aebi et al. 2014). In countries where the police are not trusted, some crimes may go unreported or even covered up, leading to inconsistencies between and within countries throughout the years. To avoid inconsistencies in the measurement, I discriminate between countries according to the police performance index constructed by Pare (2014). Considering Pare's (2014) study, which finds a negative association between police performance and homicide in 77 countries, the countries with competent police performance are included in the analysis, leading to the exclusion of Russia and Ukraine. Based on Van Dijk's (2008) police performance index, Pare's (2014) index is the result of a mixture of variables such as the public's willingness to report a crime to police, victims' satisfaction toward police, public's general satisfaction toward police, and business perception to trust the police. Pare (2014) distinguishes countries with "good" policing and ineffective policing. The findings of Pare's research imply that competent policing plays a role in decreasing crime rates, and this implication has relevance in a cross-country crime analysis.

The final set of considerations is the data compatibility for the cross-country analysis. As the design of criminal codes and national offense definitions differs between countries, the European Sourcebook establishes a standard definition for each crime category. Each wave of the European Sourcebook shares a list of deviations from the standard definition of the different crime categories for each country. After examining the validity of the data, this study concludes that theft and robbery rates are the crime categories that are recorded in line with the standard definition the most. Therefore, this thesis focuses on theft and robbery, as these two are the most compatible categories for a cross-country analysis[3]. This conclusion supports Harrendorf (2018), who states that theft and robbery are two of the five crime categories compatible for country comparison, along with sexual assault, domestic burglary, and homicide[4]. Besides, examining the association of GPRs with theft and robbery provided the opportunity to analyze the impact of GPRs on two types of crime that are different by characterization. Although both crimes are acquisitive crime types, robbery is a violent crime,

[3] See Table A1 in the Appendix for the standard definitions met by country and the criminal offense, and Tables A2 and A3 in the Appendix for standard definitions and deviations from the standard definition for robbery and theft, respectively.

[4] Other considered crime categories are as follows: total criminal offenses, intentional homicide, rape, theft of a motor vehicle, burglary, domestic burglary, and drug offenses. See Tables A4, A5, A6, A7, A8, A9, A10, and A11 for deviations from the standard definition, respectively. Sexual assault is not considered since the second edition does not document it as a separate crime category.

considering the force or threat of a force during the actualization of the act. In contrast, theft is a non-violent crime, as it is the act of deprivation of property without force and with the intent to keep it.

Each chosen crime rate is the number of criminal offenses per 1,000 persons per year. Equation (3) summarizes each crime rate.

$$\text{CRIME RATE} = \left(\frac{\text{OFFENSES}}{\text{POPULATION}}\right) * 1000 \quad (3)$$

Table 1 reports the final list of countries and the means of robbery rate, theft rate, GPR Index, and covered years. According to the table, Belgium, Spain, and France report the highest mean robbery rate with 2.0792, 2.0011, and 1.7798 per 1,000 persons, respectively. On the other hand, the mean rate for theft is the highest for Sweden (65.8249), which Denmark and the Netherlands follow with 50.7651 and 45.0874 theft offenses per 1,000 persons, respectively. As for the GPR Index, the United Kingdom reports the highest GPR mean (105.2899). France has the second highest mean (50.3563), followed by Germany (33.0385). Figure 2 illustrates the sample countries' average theft rate and GPR, whereas Figure 3 presents the average robbery rate and GPR. Finally, Figure A1 shows the theft rate and GPR, and Figure A2 demonstrates each country's robbery rate and GPR.

**Table 1. List of Countries, Mean Crime Rates, and Mean GPR**

| | **THEFT** | | **ROBBERY** | | **GPR** |
|---|---|---|---|---|---|
| | **MEAN** | **YEARS** | **MEAN** | **YEARS** | **MEAN** |
| Belgium | 38.6901 | 1995-2011 | 2.0792 | 1995-2016 | 11.9983 |
| Denmark | 50.7651 | 1995-2016 | 0.4268 | 1995-2016 | 2.8097 |
| Finland | 32.7352 | 1995-2016 | 0.3581 | 1995-2016 | 2.2472 |
| France | 31.6808 | 1995-2016 | 1.7798 | 1995-2016 | 50.3563 |
| Germany | 34.2395 | 1995-2016 | 0.6675 | 1995-2016 | 33.0385 |
| Italy | 34.1624 | 1995-2016 | 0.8050 | 1995-2016 | 12.8287 |
| Netherlands | 45.0874 | 1995-2016 | 0.9444 | 1995-2016 | 7.3403 |
| Norway | 34.5741 | 1995-2000 & 2007-2016 | 0.2948 | 1995-2000 & 2003-2016 | 4.5389 |
| Portugal | 14.9972 | 1995-2016 | 1.6802 | 1995-2016 | 2.4821 |
| Spain | 17.5899 | 1995-2003 & 2007-2016 | 2.0011 | 1995-2016 | 10.2500 |
| Sweden | 65.8249 | 1995-2016 | 0.9065 | 1995-2016 | 3.7931 |
| Switzerland | 34.6066 | 1995-2007 & 2009-2016 | 0.5635 | 1995-2007 & 2009-2016 | 5.5170 |
| United Kingdom[5] | 47.8816 | 1995-2016 | 1.4817 | 1995-2016 | 105.2899 |

**Note:** The table presents the mean rates for annual theft offenses and robbery offenses per 1,000 and the average GPR for each country. GPR is normalized to 100.

**Source**: Author's own calculations based on data from European Sourcebook and GPR Index

[5] United Kingdom (U.K.) refers to England and Wales.

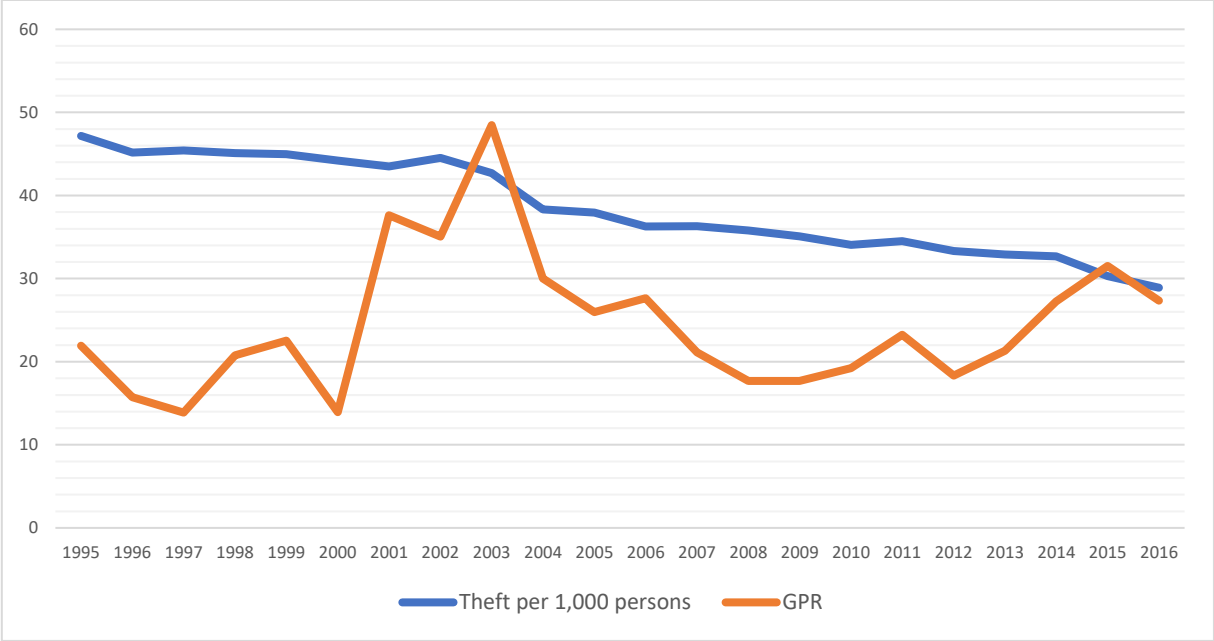


**Figure 2.** Average Theft Rate and GPR from 1995 to 2016

**Note:** The figure is based on the countries with non-missing years. The theft rate is theft offenses per 1,000 persons.

**Source:** European Sourcebook and GPR Index

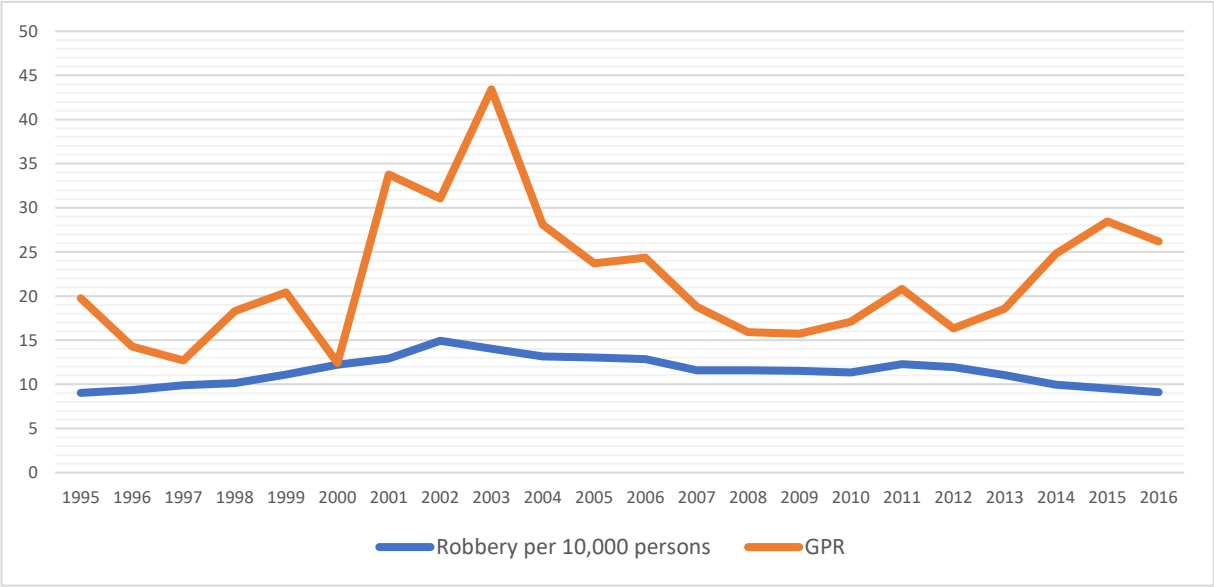


**Figure 3.** Average Robbery Rate and GPR from 1995 to 2016

**Note:** The figure is based on the countries with non-missing years. The robbery rate is robbery offenses per 10,000 persons for illustration purposes.

**Source:** European Sourcebook and GPR Index

To estimate the role of GPRs in crime, I use several control variables that are in line with the literature. The first control variable is the prisoner rate per country, which accounts for crime policy variables. In addition to the convicted persons, the prisoner rate per country includes pre-trial detainees. The role of prison in criminology has been the focal point of many studies, although the findings in the literature are often contradictory, resulting in several interpretations of prison's association with crime. For instance, even though the main discussion revolves around the argument that serving a sentence instills fear of crime since it may lead to a negative effect on future criminal behavior (Soares et al. 2021), Aebi et al. (2015) suggest that imprisonment rates and crime trends are not related in a study based on Western Europe for the years 1982-2011. Additionally, Nagin et al. (2009) cast doubt on the preventative effects of incarceration and imply that the association between reoffending and imprisonment is mild at best. In contrast, Rosenfeld and Messner (2012) state that a general-crime reduction effect from imprisonment growth might be spotted in a more extended period in a study based on the U.S.A. and Europe. This finding is in line with the study of Liedka et al. (2006), which demonstrates that imprisonment causes a decrease in the crime rate in the United States for over 30 years, depending on the scale of imprisonment.

As for the rest of the control variables, the analysis involves traditional control variables, including income, unemployment, inflation, the ratio of young to older people, and population density. Like prison rate, mixed findings exist for many control variables for crime, including the ones used in this study. The results mainly depend on the country or country-set and covered period.

The proxy for the income is the GDP per capita (constant 2015 United States $) to control the pecuniary returns from criminal activity. For example, Ochsen (2010), in a study based on 9 European countries for the period 1991-1999 by using the data from the European Sourcebook, presents evidence of a positive association between the GDP per capita and robbery. However, the same study reports an insignificant relationship between income and theft. Altindag's (2012) findings differ from Ochsen's (2010). Altindag's (2012) study, which utilizes a dataset for 33 European countries for the period 1996-2003 with the data obtained from the European Sourcebook, documents no association between the GDP per capita and robbery. In contrast, theft appears to be affected positively by the GDP per capita.

The third control variable is unemployment to control for labor market conditions. In the case of deteriorating labor market conditions, I argue that a person is more likely to commit a crime, especially acquisitive crime, considering that comparative benefit from crime increases. Although contrary cases where unemployment is not significantly associated with acquisitive crimes exist (Engelen et al. 2016; Rosenfeld, 2014), my interpretation of the relationship between unemployment

and acquisitive crimes is justified in numerous studies (Lin, 2007; Saridakis and Spengler, 2012; Jawadi et al. 2021).

As the fourth control variable, the inflation rate proxies economic conditions in line with the empirical evidence presented by Tang and Lean (2007) and Rosenfeld (2014). As suggested, inflation may be connected to acquisitive crimes due to the dynamics of markets for stolen goods. For instance, Rosenfeld (2014) argues that as prices in the market rise, the demand for stolen goods may increase since they are the cheaper choice, resulting in a higher acquisitive crime rate. The later study by Rosenfeld and Levin (2016) supports the evidence of Rosenfeld (2014) concerning European countries and the United States, with the implication that inflation is the only meaningful economic indicator to have a consistent association with acquisitive crime compared to other economic indicators such as income and unemployment.

Another control variable considered in this study is the age demographic of a country, proxied by the ratio of the population aged between 15 to 34 to the population over 34. According to Van Dijk et al. (2021), the changes in the proportion of youth in society are positively correlated with the changes in theft. In contrast to this finding, however, Altindag (2012) reports a negative association between the ratio of young to old population and property crimes. Altindag's (2012) findings on theft are similar for the case of robbery.

Finally, the population density is considered one of the control variables as increasing population density might result in anomie and thus increase the crime rate. Additionally, higher population density generates more potential offenders and targets but also more protection from crime, which may result in lower robbery and theft (Hipp and Kim, 2019).

Tables 2 and 3 present the correlation matrix and descriptive statistics, along with sources and definitions, respectively.

**Table 2: Correlation Matrix**

| Variables | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
|---|---|---|---|---|---|---|---|---|---|
| (1) Robbery | 1.00 | | | | | | | | |
| (2) Theft | -0.21 | 1.00 | | | | | | | |
| (3) GPR | 0.32 | 0.13 | 1.00 | | | | | | |
| (4) Prison | 0.60 | -0.41 | 0.46 | 1.00 | | | | | |
| (5) Income | -0.56 | 0.28 | -0.09 | -0.46 | 1.00 | | | | |
| (6) Unemployment | 0.35 | -0.34 | -0.07 | 0.32 | -0.59 | 1.00 | | | |
| (7) Inflation | 0.23 | -0.09 | 0.00 | 0.18 | -0.27 | -0.04 | 1.00 | | |
| (8) Young | 0.30 | 0.05 | 0.043 | 0.09 | -0.14 | -0.06 | 0.40 | 1.00 | |
| (9) Density | 0.17 | 0.05 | 0.11 | 0.14 | -0.05 | -0.23 | 0.04 | -0.11 | 1.00 |

**Source:** Author's own estimation

**Table 3: Descriptive Statistics**

| Variable | Obs. | Mean | Std. Dev. | Min. | Max | Source |
|---|---|---|---|---|---|---|
| **Independent Variables** | | | | | | |
| **Robbery** Robbery offenses per 1,000 persons | 283 | 10.83 | 6.65 | 1.54 | 26.58 | European Sourcebook |
| **Theft** Theft offenses per 1,000 persons | 271 | 36.58 | 15.25 | 7.55 | 82.29 | European Sourcebook |
| **Variable of Interest** | | | | | | |
| **GPR** Geopolitical Risk Index times 100 | 286 | 19.42 | 31.33 | 0.77 | 228.51 | Caldara and Iacoviello's (2022) |
| **Control Variables** | | | | | | |
| **Prison** Number of prisoners per 1,000 persons | 284 | 0.92 | 0.28 | 0.50 | 1.69 | European Sourcebook |
| **Income** GDP per capita in thousands (constant 2015 United States $) | 286 | 42.27 | 16.10 | 15.79 | 85.57 | World Bank |
| **Unemployment Rate** Unemployment rate times 100 | 286 | 7.92 | 4.09 | 2.12 | 26.09 | International Labor Organization |
| **Inflation** Inflation rate times 100 | 286 | 1.72 | 1.13 | -1.14 | 5.24 | World Bank |
| **Young** Ratio of the population aged between 15 to 34 to the population aged over 34 times 100 | 286 | 31.36 | 2.81 | 24.26 | 39.11 | U.S. Census Bureau & Office for National Statistics (U.K.) |
| **Population Density** People per square kilometer of land area | 286 | 165.90 | 130.40 | 11.93 | 505.80 | World Bank & Office for National Statistics (U.K.) |

**Note:** The table presents summary statistics for the independent variables, variable of interest, and control variables.

**Source:** Author's own calculations

# 5. METHODOLOGY

This thesis examines the association between acquisitive crimes and GPRs in 13 European countries between 1995 and 2016. One major drawback of a cross-country analysis of crime is the difficulty of comparing crime levels of countries. Although the literature is vast, with examples of level comparison of countries in almost all categories of crime using the European Sourcebook (Altindag, 2012; Goulas and Zervoyianni, 2013; Rodríguez-Menés and López-Riba, 2020), level comparison of crime levels across countries carries the risk of producing misleading results (Harrendorf, 2018). The numbers in Table 1 can evidence possible errors while interpreting a level comparison. For instance, the mean robbery rate is 0.4268 per 1,000 persons in Denmark and 2.0011 per 1,000 persons in Spain, whereas the mean theft rate for Spain (17.5899) is substantially smaller than the theft rate in Denmark (50.7651). These numbers do not necessarily indicate that Spain is almost five times more dangerous than Denmark in robberies and three times safer than Denmark in theft. The differences can be attributed to several factors, including differences in recording crimes and victims' willingness to report crimes.

Against this background, I first difference the criminal offenses and explanatory variables so that each variable reflects the change from the previous year in line with several studies in the field (Brush, 2007; Rosenfeld, 2014; Rosenfeld and Levin, 2016; Noghanibehambari and Maden, 2020). Using the first differenced data prevents us from spurious results and provides efficient results to interpret (Spelman, 2008). Furthermore, as in the case with most of the studies in crime economics, the robbery, theft, and prison data have a unit root in this study. The Im, Pesaran, and Shin (IPS, 2003) and the Fisher-type Augmented Dickey-Fuller (ADF) tests evidence the presence of unit root. Commonly used in the presence of unbalanced panel data, both tests share the same null hypothesis. Both tests have the null hypothesis that all panels contain unit roots, whereas the alternative hypothesis of the IPS test is the stationarity of some panels and the alternative hypothesis of the ADF test is the presence of stationarity at least in one of the panels. Table 4 reports the results of the unit root tests. In addition to crime and prison data, unemployment, population density, and the ratio of young people contain unit roots. As seen in Table 4, first differencing the data solves the unit root issue for all variables, except for the ratio of young people, and the series become stationary. Based on the results, I exclude the ratio of young people variable in the analysis.

**Table 4: Panel Unit Root Tests**

| | Variables in Levels | | First differences | |
|---|---|---|---|---|
| | IPS | ADF | IPS | ADF |
| Robbery | -1.11 (0.1324) | -1.74 (0.0409) | -6.73 (0.0000) | -5.87 (0.0000) |
| Theft | 0.55 (0.7078) | -0.82 (0.2042) | -6.91 (0.0000) | -6.43 (0.0000) |
| GPR | -2.62 (0.0044) | -4.10 (0.0000) | -10.06 (0.0000) | -9.27 (0.0000) |
| Prison | 0.35 (0.6376) | -0.16 (0.4363) | -6.69 (0.0000) | -7.15 (0.0000) |
| Income | -2.97 (0.0015) | -3.24 (0.0003) | -5.08 (0.0000) | -5.80 (0.0000) |
| Unemployment Rate | 0.84 (0.7993) | -2.10 (0.0177) | -4.31 (0.0000) | -3.80 (0.0001) |
| Inflation | -4.96 (0.0000) | -5.51 (0.0000) | -8.89 (0.0000) | -12.05 (0.0000) |
| Population Density | 4.89 (1.0000) | 3.53 (0.9998) | -6.31 (0.0000) | -4.96 (0.0000) |
| Young | 8.86 (1.0000) | -7.22 (0.0000) | 2.32 (0.9899) | -1.94 (0.0259) |

**Note:** Table reports findings of the IPS and ADF unit root tests. P-values are in parentheses, and test statistics are next to the P-values.

**Source:** Author's own calculations

For the choice of the model, I analyze the between and within variations of variables as reported in Table A12. For all variables, there is more variation over time (within variation) than across individuals (between variation), leading to the choice of the fixed-effects model to conduct the analysis. The adopted models in the study are as in Equations (3) and (4).

$$\Delta Theft_{i,t} = \beta_1 \Delta GPR_{i,t} + \beta_2 \Delta Prison_{i,t-1} + \beta_3 \Delta Income_{i,t} + \beta_4 \Delta Unemployment_{i,t} + \beta_5 \Delta Inflation_{i,t} + \beta_6 \Delta Population\ Density_{i,t} + \delta + \Delta\varepsilon_{i,t} \quad (3)$$

$$\Delta Robbery_{i,t} = \alpha_1 \Delta GPR_{i,t} + \alpha_2 \Delta Prison_{i,t-1} + \alpha_3 \Delta Income_{i,t} + \alpha_4 \Delta Unemployment_{i,t} + \alpha_5 \Delta Inflation_{i,t} + \alpha_6 \Delta Population\ Density_{i,t} + \delta + \Delta\varepsilon_{i,t} \quad (4)$$

, where dependent variables $Theft$ and $Robbery$ are theft offenses per 1,000 persons and robbery offenses per 1,000 persons for a country $i$ at year $t$, whereas $\delta$ denotes the trend, and $\varepsilon$ is the error-

term. The main variable of interest is the GPR Index, which is normalized to 100 and denoted as $GPR$. The set of control variables includes $Prison$ (the number of people in prison per 1,000 persons), $Income$ (GDP per capita in thousands, constant 2015 United States $), $Unemployment$ (unemployment rate times 100), $Inflation$ (inflation rate times 100), and $Population\ Density$. All variables are first differenced. Therefore, the model captures the association between changes in the independent variable of interest and crime instead of an association based on levels. Year fixed-effects are implemented to control for time-constant individual heterogeneity.

According to the model, $Prison$ enters the model as a lagged variable. This methodological choice has two reasons. First, as the prison data in the European Sourcebook includes pre-trial detainees, there exists the risk of reverse causality since an increase in the crime rate might lead to a higher prison population. According to Leszczensky and Wolbring (2022), using a lagged variable in a model protects against bias arising from reverse causality. Second, the impact of incarceration is accepted to have a lagged effect on crime (Levitt, 1996), and the lagged incarceration rate helps us to control for aftereffects (Soares et al. 2021). As evidenced by Vieraitis et al. (2007), increases in the number of prisoners released from prison have a positive association with increases in crime. Therefore, I expect the lagged incarceration rate to have a negative association with robbery and theft rates.

The entire sample in the analysis consists of 13 European countries, namely Belgium, Denmark, Finland, France, Germany, Italy, The Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and United Kingdom. For the estimation, I include first the whole sample, with all available years. Second, I use the whole sample again, but this time only for the years that countries meet the standard definition of crime. For instance, as seen in Table A1, theft recordings of Italy meet the standard definition of the European Sourcebook from the start of the first year to the end of the fifth wave, and recordings deviate from the standard definition only in the sixth wave. In this robust sample, each year, except the ones in the sixth wave, is considered in the analysis for Italy. This procedure is replicated for each country in the sample to construct a country sample that is entirely in line with the standard definition of the European Sourcebook. This study refers to the years that meet the standard definition as the "robust sample".

Furthermore, I construct another sample based on the country clustering of Smit et al. (2008), which is established through explorative data analysis of the existing country classifications and an empirical test. Considering that the study of Smit et al. (2008) adopts an approach considering geographical, geopolitical, and cultural elements, this analysis follows its steps. In the paper, the clusters are Central Europe, Eastern Europe, Northern and Western Europe (including the United

States and Canada), and Southern Europe. Since the sample in this study comprises countries only from Southern Europe and North/West Europe, the clusters for Central Europe and Eastern Europe cannot be established. Additionally, only three countries in our sample are within the Southern Europe cluster. Therefore, this study empirically tests the association between GPRs and acquisitive crimes in the entire sample and the North/West cluster. In addition to the estimations based on these two samples, I conduct another set of estimations to cover the "robust sample". Table 5 reports the clusters and countries.

**Table 5: Full Sample and Clusters**

| Full Sample | North/West | South |
|---|---|---|
| Belgium | Belgium | Italy |
| Denmark | Denmark | Portugal |
| Finland | Finland | Spain |
| France | France | |
| Germany | Germany | |
| Italy | Netherlands | |
| Netherlands | Norway | |
| Norway | Sweden | |
| Portugal | Switzerland | |
| Spain | United Kingdom | |
| Sweden | | |
| Switzerland | | |
| United Kingdom | | |

**Note:** The table presents the list of countries in the entire sample, Northern/Western Europe cluster, and Southern Europe cluster.

# 6. FINDINGS

This section presents the results of the estimations on the association between changes in GPRs and acquisitive crimes, namely theft and robbery rates. The interpretation of the estimations in this section is on the relationship between changes in variables rather than a level comparison since the models use first differenced variables. I control for year effects in all estimations. Only the prison rate enters the estimations lagged to avoid reverse causality.

First, I estimate the association between GPRs and theft offenses per 1,000 persons, covering the period between 1995 and 2016. Table 6 reports the association between changes in theft, GPRs, and the set of control variables, including prison rate, income, unemployment, population density, and inflation.

Columns 1 and 2 in Table 6 present the estimation results of the fixed-effects model for all available countries for the study period, whereas columns 3 and 4 report the results of the countries only in the North/West cluster for the same study period. The findings shown in columns 1 and 3 are the results for all available years. On the other hand, the findings reported in columns 2 and 4 are the results for the "robust sample", which is the years and countries that match the standard definition of theft in the European Sourcebook.

According to the results, changes in GPRs are positively associated with the changes in theft offenses in the sample with all available countries, with coefficients of 0.0789 (Column 1) and 0.0192 (Column 2). Thus, a one unit increase in GPRs is associated with a 0.0789 and 0.0192 unit increase in theft offenses per 1,000 persons. The results based on the North/West cluster confirm the association between changes in GPRs and theft in the entire sample. A positive relationship is documented for GPRs with coefficients of 0.0840 (Column 3) and 0.0248 (Column 4). These results imply that the increases in the realization and risk of adverse geopolitical events, such as terror, war, and international conflicts that may disrupt the peaceful course of relations, lead to an increase in the theft rate.

As for the control variables, the results document that the changes in prison rate are negatively associated with the changes in theft in all columns, implying that increases in prison rate have a deterrence effect to theft and cause the theft rate to decrease. The findings indicate that one unit increase in the prison rate is associated with a drop of 11.6415 (Column 1) and 10.3544 (Column 2) units in the theft rate. The findings on the North/West cluster further confirm the association, with coefficients of -15.3795 and -9.7861 (Columns 3-4). The result supports the theory that the severity of punishment and the detection of crime are essential measures to prevent crime (Becker, 1968; Ehrlich, 1973).

**Table 6: Estimations on the Association between GPR and Theft Rate**

| | ALL COUNTRIES | | NORTH/WEST | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| | Theft (All Available Years) | Theft (Robust Sample) | Theft (All Available Years) | Theft (Robust Sample) |
| ΔGPR | 0.0789*** | 0.0192* | 0.0840*** | 0.0248* |
| | (0.0196) | (0.0094) | (0.0204) | (0.0112) |
| ΔPrison Rate(t-1) | -11.6415** | -10.3544** | -15.3795* | -9.7861** |
| | (3.888) | (3.9185) | (7.1712) | (4.2179) |
| ΔIncome | -0.6184 | -1.1193* | -0.2782 | -0.7983 |
| | (0.3841) | (0.5337) | (0.4767) | (0.6323) |
| ΔUnemployment Rate | 0.2427 | 0.0209 | 0.6113 | 0.1955 |
| | (0.2013) | (0.202) | (0.4898) | (0.4408) |
| ΔPopulation Density | 0.2465*** | 0.2410*** | 0.2548** | 0.2571*** |
| | (0.0749) | (0.0754) | (0.0817) | (0.0728) |
| ΔInflation | 0.2696 | 0.2991 | 0.0246 | 0.2039 |
| | (0.2047) | (0.1967) | (0.2012) | (0.1861) |
| ΔConstant | 1.7037 | 3.0381 | 1.5765 | 2.8736 |
| | (1.2718) | (1.7382) | (1.7012) | (2.2141) |
| Year Fixed-Effects | YES | YES | YES | YES |
| Observations | 242 | 187 | 186 | 144 |
| R-squared | 0.2929 | 0.3672 | 0.3276 | 0.4147 |

**Notes:** ***, **, and * denote p<0.01, p<0.05, and p<0.1, respectively. Robust standard errors are shown in parentheses. Columns 1 and 2 document the fixed-effects results on the association between GPR and theft per 1,000 persons for all countries, whereas columns 3 and 4 report the results for the North/West cluster. Columns 1 and 3 present the results for all available years and counties in their respective sample, whereas columns 2 and 4 include only the years that countries meet the standard definition of theft according to the European Sourcebook.

**Source:** Author's own calculations

Changes in population density are also positively associated with changes in theft rate, with coefficients of 0.2465 (Column 1) and 0.2410 (Column 2). The North/West cluster findings support the results, with coefficients of 0.2548 (Column 3) and 0.2571 (Column 4). The interpretation of this finding is that increasing population in a certain area implies more potential targets for criminals, causing a higher theft rate.

The association between theft and income, proxied by GDP per capita in thousands, reveals mixed findings. A significant relationship is documented only for the robust sample of all available countries, with a coefficient of -1.1193, implying that decreasing income causes a decrease in expected returns and utility from legitimate work, leading to an increased tendency to pursue returns from illegal activities. However, the association between theft and income remains statistically non-significant for the North/West cluster estimations. The findings support Ochsen (2010), who reports an

insignificant relationship between income and theft with data obtained from the European Sourcebook for 1991-1999.

On the other hand, changes in the unemployment rate are not associated with the changes in the theft rate, which contradicts the findings of Altindag (2012), who reports that the unemployment rate and theft rate have a positive relationship. However, the findings in this study confirm the results obtained by Engelen et al. (2016), who document no association between unemployment and property crimes. Finally, the results report that changes in inflation and theft rate are not associated, contradicting the findings of Rosenfeld and Levin (2016). Nevertheless, this thesis does not rule out the overall association between these two variables and theft offenses since the cross-country analysis in this study does not concern the level of variables but the yearly changes in variables. Therefore, unemployment, inflation, and theft may have a relationship in a level comparison.

Second, I estimate the association between GPRs and robbery offenses per 1,000 persons, covering the period between 1995 and 2016. Table 7 reports the association between changes in robbery, GPRs, and the set of control variables, including prison rate, income, unemployment, population density, and inflation.

Columns 1 and 2 in Table 7 report the estimation results of the fixed-effects model for all available countries for the study period, whereas columns 3 and 4 present the results for the North/West cluster. Same as in Table 6, the findings shown in columns 1 and 3 are the results for all available years, and the findings reported in columns 2 and 4 are the results for the "robust sample".

According to the results, changes in GPRs and robbery are positively associated for all countries, indicating a one unit increase in GPRs is associated with a 0.0182 (Column 1) and 0.0180 (Column 2) unit increase in robbery rate. The results report higher coefficients for the North/West cluster in the analysis of GPRs and robbery, with 0.0216 (Column 3) and 0.0201 (Column 4). In other words, increased risk and realization of adverse geopolitical events cause an increase in the robbery rate.

The association between the robbery rate and income, proxied by GDP per capita in thousands, reveals mixed findings as in the association between theft rate and income. A significant relationship exists only for the robust sample of all available countries and years, with a coefficient of -1.1193 (Column 1), implying that decreasing income causes an increase in the robbery rate. However, the association between robbery and income remains statistically non-significant for the remainder of estimations, supporting the findings of Rosenfeld (2014).

Additionally, changes in population density and robbery have a positive relationship, as evidenced in each model, with coefficients of 0.1106 (Column 1) and 0.1031 (Column 2). As in the case of theft and GPRs, the increasing population density means more potential targets for criminals,

which might increase the opportunity to engage in criminal activities. The findings are robust to the results based on the North/West cluster sample, with coefficients of 0.1189 (Column 3) and 0.1030 (Column 4).

As for the other control variables, inflation and unemployment do not demonstrate a significant association with the changes in the robbery rate. However, as explained previously, this thesis does not rule out the overall association between other control variables and robbery offenses since the cross-country analysis in this study does not concern the level of variables but the changes in variables.

**Table 7: Estimations on the Association between GPR and Robbery Rate**

| | **ALL COUNTRIES** | | **NORTH/WEST** | |
|---|---|---|---|---|
| | **(1) Robbery (All Available Years)** | **(2) Robbery (Robust Sample)** | **(2) Robbery (All Available Years)** | **(4) Robbery (Robust Sample)** |
| ΔGPR | 0.0182* | 0.0180* | 0.0216** | 0.0201* |
| | (0.0088) | (0.0089) | (0.0083) | (0.0094) |
| ΔPrison Rate(t-1) | -2.1305 | -2.0945 | -2.4574 | -3.2971 |
| | (2.6851) | (3.6791) | (1.9107) | (2.0571) |
| ΔIncome | -0.1454* | -0.1195 | -0.1404 | -0.1586 |
| | (0.0705) | (0.0719) | (0.0951) | (0.0872) |
| ΔUnemployment Rate | 0.0368 | 0.0561 | -0.0595 | -0.0850 |
| | (0.0812) | (0.0974) | (0.1356) | (0.1425) |
| ΔPopulation Density | 0.1106*** | 0.1031*** | 0.1189*** | 0.1030*** |
| | (0.0234) | (0.0255) | (0.0232) | (0.0249) |
| ΔInflation | 0.0921 | 0.1179 | 0.0511 | 0.0775 |
| | (0.0763) | (0.0849) | (0.0763) | (0.0730) |
| ΔConstant | 0.5638 | 0.6130 | 0.3930 | 0.4131 |
| | (0.3194) | (0.4846) | (0.3581) | (0.4975) |
| Year Fixed-Effects | YES | YES | YES | YES |
| Observations | 254 | 221 | 194 | 170 |
| R-squared | 0.3233 | 0.3341 | 0.3955 | 0.4025 |

**Notes:** ***, **, and * denote p<0.01, p<0.05, and p<0.1, respectively. Robust standard errors are shown in parentheses. Columns 1 and 2 document the fixed-effects results on the association between GPR and robbery per 1,000 persons for all countries, whereas columns 3 and 4 report the results for the North/West cluster. Columns 1 and 3 present the results for all available years and counties in their respective sample, whereas columns 2 and 4 include only the years that countries meet the standard definition of robbery according to the European Sourcebook.

**Source:** Author's own calculations.

# 7. CONCLUSION

Escalating geopolitical events related to armed conflict, war, terrorism, and conflicts among states and political actors threaten not only the peaceful course of international relations but also daily life. In addition to causing distress across populations and leading to discrimination toward particular groups (Goodwin et al. 2017), adverse geopolitical events worsen income inequality (Wu et al., 2022), hurt investment (Cheng and Chiu, 2018), and harm economic growth (Akadiri et al. 2020). Considering the prevalence of the GPRs and international tensions and their disruptive influences on the economic reality of people, this study aimed to explore the association between GPRs, proxied by the GPR Index, and economically motivated crime, namely theft and robbery, in the European context for the period 1995-2016. Against this background, this thesis is the first study to utilize the GPR Index in the context of crime to analyze the association between crime and GPRs.

Following Harrendorf's (2018) suggestion, I obtained the data from European Sourcebook to conduct a cross-country analysis and took several measures to address issues arising from the cross-country analysis of the crime. First, to account for the data reliability, countries have been differentiated according to the police performance index constructed by Pare (2014), leading to the exclusion of Russia and Ukraine. Furthermore, I considered data compatibility by constructing a sample consisting of data that meets the standard definition of theft and robbery in the European Sourcebook, in addition to the full coverage of the sample countries and years.

With a sample of 13 countries, I demonstrated the evidence of the positive association between changes in GPRs and acquisitive crimes by using the first differenced variables in a fixed-effects model. Also, I tested the North/West Europe cluster consisting of 9 European countries as a robustness check, concluding that the association between GPRs and acquisitive crimes is valid in the North/West Europe context.

One explanation of the results can be found in the utility maximization and rational choice theories. As GPRs increase, the expectations related to the returns from legitimate activities might decrease due to the adverse impact resulting in increased economic inequality, decreased investments, and lower economic growth. Therefore, potential criminals might benefit more from illegal activities, leading to more theft and robbery offenses. Second, GPRs may harm the collective conscience by creating tension within and between a society, disrupting the cohesion of a society. In return, this may cause an increasing tendency to deviate from the norms and lead to increased illegal activities and offenses. Another explanation of the findings relies on the general strain theory, which posits that negative feelings result in the need to cope, and one of the coping mechanisms is committing an offense. In that context, adverse geopolitical events, such as war, international tensions, and terror,

might cause negative feelings and hinder the opportunities for vulnerable sections of the society, leading to strains. These may also increase criminal offenses.

In light of the findings of this study, one clear recommendation for policymakers is to adopt peace-oriented policies to avoid international conflicts and escalations and minimize the impact of economic consequences of geopolitical threats and risks to ensure the well-being of society as a whole. As robbery and theft are motivated by returns from legitimate and illegitimate activities, the government should consider intervening to enhance the well-being of the financially vulnerable. Since the impact of terror and rising GPRs are not limited to the socio-economic sphere, policymakers should observe and address the challenges of ethnic and religious groups arising from terror and international conflicts that divide societies. Additionally, the construction of inclusive democracy should be materialized to avoid consequences of these disruptions and acts of terror (Gleditsch and Polo, 2016).

The main limitations of this study are the issues related to conducting a cross-country crime analysis. Although the methodology adopted in this study took measures by examining the data reliability and comparability in addition to country clustering to control for the differences in people's tendencies to report the crime, different classifications of crime, and culture, research on a single country setting in a more extended period might reveal more about the underlying causality between GPR and crime. Moreover, this analysis can be extended to other crime categories in a single country setting since issues arising from data comparability would be prevented in a single country study.

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# APPENDIX

**Table A1. Standard Definitions Met by Country and Criminal Offense -Robbery and Theft**

| | Robbery | | | | | Theft | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **ES2** | **ES3** | **ES4** | **ES5** | **ES6** | **ES2** | **ES3** | **ES4** | **ES5** | **ES6** |
| BEL | √ | √ | √ | √ | √ | √ | √ | √ | √ | M |
| DEN | X | X | √ | √ | √ | X | X | √ | √ | √ |
| FIN | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| FRA | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| GER | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| ITA | X | √ | √ | X | √ | √ | √ | √ | √ | X |
| NLD | √ | X | √ | √ | √ | √ | √ | √ | √ | √ |
| NOR | X | M | X | √ | √ | X | M | M | √ | X |
| POR | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| SPA | √ | √ | X | √ | √ | X | √ | M | √ | X |
| SWE | X | X | X | √ | √ | √ | √ | √ | √ | √ |
| SWI | √ | √ | √ | √ | √ | X | √ | X | √ | X |
| U.K. | √ | √ | √ | √ | √ | X | √ | X | X | X |

**Note:** The table shows the standard definitions met by country in each wave of the European Sourcebook (ES). "√" is used to show when the standard definition is met. "X" indicates that the definition of the crime in a country does not match the standard definition, and "M" signifies that the data is not available. ES2 covers the years 1995-2000, whereas ES3 documents the data from 2000 to 2003. ES4 and ES5 comprise the years 2003-2007 and 2007-2011, respectively. Finally, ES6 covers the years between 2011 and 2016.

**Source:** European Sourcebook

**Table A2: Deviations from the Standard Definition in Robbery**

| Deviation | Second Wave | Third Wave | Fourth Wave | Fifth Wave | Sixth Wave |
|---|---|---|---|---|---|
| Pickpocketing included | - | - | - | - | - |
| Muggings excluded | Denmark, Italy, Norway, Sweden | Denmark, Sweden | Sweden | Italy | Sweden |
| Theft with violence excluded | Denmark, Italy, Norway | Denmark | - | - | - |
| Extortion included | - | - | - | - | Belgium |
| Blackmail included | - | - | - | - | U.K. |

**Note:** According to the European Sourcebook, the definition of robbery is "stealing from a person with force or threat of a force, which includes muggings and theft with violence, but excludes pickpocketing, extortion, and blackmail" (Aebi et al. 2003, p. 257). Starting from the fourth wave of the European Sourcebook, a robbery attempt is included. In the latest edition of the European Sourcebook, theft with force against property only is added as a category to be excluded from the standard definition.

**Source:** European Sourcebook

**Table A3: Deviations from the Standard Definition in Theft**

| Deviation | Second Wave | Third Wave | Fourth Wave | Fifth Wave | Sixth Wave |
|---|---|---|---|---|---|
| Burglary not included | Norway | - | - | - | Norway |
| Theft of motor vehicles excluded | Denmark | Denmark | | | |
| Theft of small values excluded | Spain, Switzerland | - | Switzerland | - | - |
| Receiving/handling stolen property included | U.K. | - | U.K. | U.K. | U.K. |
| Robbery included | - | - | U.K. | Belgium | - |
| Embezzlement included | - | - | U.K. | - | - |
| Theft by employees excluded | - | - | - | France | Norway, Switzerland |
| Attempts excluded | - | - | - | - | Italy, Norway, Spain |

**Note:** According to the European Sourcebook, the standard definition of theft includes "crimes with deprivation of property without force and with the intent to keep it. Theft includes burglary, theft of motor vehicles, theft of other items, and theft of small value, but excludes embezzlement and receiving and handling of stolen goods" (Aebi et al. 2003, p. 258). Starting from the fourth wave of the European Sourcebook, theft attempt is included, whereas robbery is marked as one of the categories to be excluded. In the latest version of the European Sourcebook, fraud is stated as another category to be excluded from the standard definition of theft.

**Source:** European Sourcebook

**Table A4: Deviations from the Standard Definition in Total Criminal Offenses**

| Deviation | Second Wave | Third Wave | Fourth Wave | Fifth Wave | Sixth Wave |
|---|---|---|---|---|---|
| Traffic offenses not included | Belgium, Denmark, France, U.K. | Belgium, Denmark, France, Germany, Switzerland | - | - | - |
| Minor traffic offenses included | Portugal, Sweden | Portugal | - | Spain | Spain, U.K. |
| Public order offenses included | Norway, Portugal, Sweden | Portugal, Sweden | U.K. | Norway, Switzerland, U.K. | Spain |
| Minor theft and other minor property offenses excluded | - | - | Switzerland | - | Finland |
| Minor assault and other minor violent offenses excluded | - | - | France, Switzerland | - | Spain, Finland |
| Major traffic offenses excluded | - | - | Belgium, France, Germany, Switzerland | Belgium, Denmark, France, Germany, Switzerland | Denmark, France, Germany, Switzerland |
| All other criminal subject to criminal proceedings excluded | - | - | Germany, Sweden, Switzerland, U.K. | - | Germany |
| Other offenses that are handled outside the criminal justice system included | - | - | Belgium | - | Spain, U.K. |
| Crimes according to a military penal code excluded | - | - | - | - | Italy, Spain, Sweden, Switzerland |

**Table A4: Continued**

| Deviation | Second Wave | Third Wave | Fourth Wave | Fifth Wave | Sixth Wave |
|---|---|---|---|---|---|
| Traffic offenses not included | Belgium, Denmark, France, U.K. | Belgium, Denmark, France, Germany, Switzerland | - | - | - |

**Note:** According to European Sourcebook, **"**total crime offenses should include all offenses defined as criminal by any law. This definition includes traffic offenses. Offenses processed directly by the police, such as minor traffic offenses or certain breaches of public order, are not included. Figures include minor theft and other minor property offenses, minor assault and other minor violent offenses, criminal offenses committed by minors, major traffic offenses, and all other criminal offenses subject to criminal proceedings" (Aebi et al. 2003, p. 252). With the introduction of the sixth edition of the European Sourcebook, crimes according to a military penal code have been included, whereas all minor offenses subject to proceedings outside the criminal justice system have been defined as a category to be excluded.

**Source:** European Sourcebook

**Table A5: Deviations from the Standard Definition in Intentional Homicide**

| Deviation | Second Wave | Third Wave | Fourth Wave | Fifth Wave | Sixth Wave |
|---|---|---|---|---|---|
| Assault leading to death excluded | Belgium, Denmark, Netherlands, Norway | Belgium, Denmark, Netherlands | Belgium, Finland, Netherlands | Belgium, Netherlands | Belgium, Netherlands, Spain |
| Cases of euthanasia excluded | Italy | Belgium | Belgium, Finland, U.K. | Belgium, Spain, Switzerland, U.K. | Belgium, Switzerland, U.K. |
| Infanticide is excluded | Norway | - | - | Spain | - |
| Assistance with suicide included | Norway, Switzerland | Belgium, France, Italy, Switzerland | Italy, Switzerland, U.K. | Switzerland, U.K. | Switzerland, U.K. |
| Attempted homicide excluded | - | - | Portugal | Portugal, Sweden, U.K. | Portugal, U.K. |
| Abortion included | - | - | - | Netherlands | Netherlands |
| Negligent killings | - | - | - | U.K. | U.K. |
| War crimes, genocide, and crimes against humanity included | - | - | - | - | France, U.K. |

**Note:** According to the European Sourcebook, "intentional homicide refers to the intentional killing of a person. The figures include assault leading to death, euthanasia, and infanticide but exclude assistance with suicide" (Aebi et al. 2003, p. 253). Negligent killing and war crimes, genocides, and crimes against humanity have been introduced as excluded categories with the fifth and sixth waves, respectively.

**Source:** European Sourcebook

**Table A6: Deviations from the Standard Definition in Assault**

| Deviation | Second Wave | Third Wave | Fourth Wave | Fifth Wave | Sixth Wave |
|---|---|---|---|---|---|
| Assault leading to death included | - | - | Belgium, Finland, Netherlands | Belgium, Netherlands, Portugal, Switzerland | Belgium, Netherlands, Switzerland |
| Threats included | Finland, Netherlands, U.K. | - | U.K. | | Norway |
| Acts just causing pain included | Denmark, Finland, Netherlands, Portugal, Sweden, U.K. | Denmark, Finland, Netherlands, Portugal, Sweden, U.K. | Denmark, Finland, Germany, Netherlands, Portugal, Sweden, U.K. | Belgium, Denmark, Finland, Germany, Netherlands, Portugal, Sweden, Switzerland, U.K. | Belgium, Denmark, Finland, Netherlands, Portugal, Sweden Switzerland |
| Acts just slapping or punching included | - | - | Denmark, Finland, Germany, Netherlands, Portugal, Sweden, U.K. | - | - |
| Sexual assault included | Norway, Ukraine | - | Finland | - | Norway |
| Minor bodily injury excluded | - | - | - | France | France |
| Bodily injury of a public servant excluded | - | - | Italy, Portugal, Sweden | Portugal | Portugal, Spain |
| Assault attempt excluded | - | - | - | - | Norway |

**Table A6: Continued**

| Deviation | Second Wave | Third Wave | Fourth Wave | Fifth Wave | Sixth Wave |
|---|---|---|---|---|---|
| Negligent bodily injury included | - | - | - | Finland, Sweden | - |

**Note:** According to the European Sourcebook, assault means "causing bodily injury to another person with intent. The figures exclude assaults leading to death, threats, acts causing only pain, slapping/punching, and sexual assault" (Aebi et al. 2003, p. 254). With the introduction of the fourth wave, minor bodily injury, aggravated bodily injury, bodily injury of a public servant or an official, and domestic violence have been highlighted as acts that are included in the figures. It is indicated that negligent bodily injury is excluded in the sixth wave.

**Source:** European Sourcebook

**Table A7: Deviations from the Standard Definition in Rape**

| Deviation | Second Wave | Third Wave | Fourth Wave | Fifth Wave | Sixth Wave |
|---|---|---|---|---|---|
| Acts other than vaginal penetration excluded | - | Denmark, U.K. | Switzerland | Switzerland | Switzerland |
| Violent intra-marital intercourse excluded | - | - | Switzerland | - | - |
| Sexual intercourse without force with a helpless person excluded | Denmark, Netherlands, Norway, Sweden | Denmark, Netherlands, Sweden | Netherlands, Switzerland, U.K. | Netherlands, Switzerland | Netherlands, Spain, Switzerland |
| Incestual sexual intercourse with or without force with a minor excluded | Denmark, Finland, Netherlands, Ukraine, U.K. | Denmark, Finland, U.K. | - | - | - |
| Sexual intercourse with a minor without force included | Belgium, Italy, Portugal, Spain | Belgium, Portugal | Belgium, France, Sweden | Belgium, France, Sweden, U.K. | - |
| Sexual intercourse with force with a minor excluded | - | - | Switzerland | - | - |
| Sexual intercourse of an adult with a child or any other person who cannot validly consent excluded | - | - | - | - | Netherlands, Portugal |
| Sexual intercourse between children, if factually consented by both partners included | - | - | - | - | Denmark, Spain, U.K. |

**Table A7: Continued**

| Deviation | Second Wave | Third Wave | Fourth Wave | Fifth Wave | Sixth Wave |
|---|---|---|---|---|---|
| Sexual intercourse between a child and a juvenile (age difference max. 3 year) is included | - | - | - | - | Belgium, Denmark, Spain |
| Attempts excluded | - | - | Portugal | Portugal | Portugal |
| Other forms of sexual assault included | Italy, Portugal | - | Italy, Switzerland | - | - |

**Note:** According to the European Sourcebook, rape refers to "sexual intercourse with a person against the person's will. Figures include vaginal penetration, violent intra-martial intercourse, sexual intercourse with force with a minor, incestual sexual intercourse with or without force with a minor, but figures exclude sexual intercourse with a minor without force and other forms of sexual assault" (Aebi et al. 2003, p. 255). With the introduction of the fourth wave, sexual intercourse without force with a helpless person is highlighted as one of the included criminal acts. In the sixth wave, European Sourcebook extended the definition of rape by centering it around consent and the ability to give it. This makes the data incomparable to the data documented in previous waves.

**Source:** European Sourcebook

**Table A8: Deviations from the Standard Definition in Theft of a Motor Vehicle**

| Deviation | Second Wave | Third Wave | Fourth Wave | Fifth Wave | Sixth Wave |
|---|---|---|---|---|---|
| Joyriding excluded | Netherlands | Netherlands | Netherlands, Switzerland | Netherlands | Netherlands, Spain |
| Theft of motorboats included | Finland, France, Italy, Norway, Spain, Sweden, U.K. | Finland, Sweden | Finland, Sweden, Switzerland, U.K. | - | - |
| Theft of motorboats excluded | - | - | - | Belgium, France, Germany, Netherlands, Portugal, U.K. | Belgium, Netherlands, Portugal |
| Receiving/handling stolen property included | Ukraine | - | - | - | France |
| Attempts | - | - | Portugal, Switzerland | Portugal | Portugal |
| Robbery included | - | - | - | Spain | Belgium, France |
| Theft of motor vehicle parts is included | - | - | - | - | France, Spain, Sweden |

**Note:** According to the European Sourcebook, "theft of a motor vehicle means depriving a person or organization of a motor vehicle with the intent to keep or use it. The figures should include joyriding, theft of trucks/lorries and motorcycles, and attempt of theft. The figures exclude robbery and receiving/handling a stolen vehicle" (Aebi et al. 2003, p. 259). The standard definition excluded the theft of motorboats until the fifth wave. In the latest wave, theft of motor vehicle parts appeared to be one of the excluded categories, along with robbery of a motor vehicle and receiving/handling a stolen vehicle.

**Source:** European Sourcebook

**Table A9: Deviations from the Standard Definition in Burglary**

| Deviation | Second Wave | Third Wave | Fourth Wave | Fifth Wave | Sixth Wave |
|---|---|---|---|---|---|
| Burglary from a factory, shop, or office excluded | Italy, Norway | Italy | - | - | - |
| Burglary from a military establishment excluded | Italy, Norway | Italy | - | - | Belgium |
| Burglary by gaining entrance with false keys excluded | Norway, Switzerland | Switzerland, U.K. | - | - | France |
| Theft from a car included | Netherlands | Netherlands | Netherlands, Sweden | - | - |
| Theft from a container included | Finland, Netherlands, Spain, Sweden, Switzerland, U.K. | Finland, Netherlands, Spain, Sweden, Sweden, Switzerland | - | Finland | Spain, Sweden |
| Theft from a vending machine included | Finland, Netherlands, Spain, Sweden, Switzerland | Finland, Netherlands, Spain, Sweden, Sweden, Switzerland | Netherlands, Sweden | Netherlands, Sweden | Sweden |

**Table A9: Continued**

| Deviation | Second Wave | Third Wave | Fourth Wave | Fifth Wave | Sixth Wave |
|---|---|---|---|---|---|
| Theft from a parking meter included | Finland, Netherlands, Spain, Sweden, Switzerland | Finland, Netherlands, Spain, Sweden, Sweden, Switzerland, U.K. | Netherlands, Sweden | Sweden | Sweden |
| Theft from a fenced meadow or compound | Finland, Netherlands, Spain | Finland, Netherlands, Spain, Sweden | Netherlands | Sweden | Sweden |
| Theft by using false keys excluded | - | - | France | France | - |

**Note:** According to the European Sourcebook, "burglary is gaining access to a closed part of a building or other premises by use of force with the intent to steal goods. Figures on burglary should, where possible, include theft from a factory, shop, or office, from a military establishment, or by using false keys; they should exclude, however, theft from a car, from a container, from a vending machine, from a parking meter, and from a fenced meadow/compound" (Aebi et al. 2003, p. 260).

**Source:** European Sourcebook

**Table A10: Deviations from the Standard Definition in Domestic Burglary**

| Deviation | Second Wave | Third Wave | Fourth Wave | Fifth Wave | Sixth Wave |
|---|---|---|---|---|---|
| Theft from an attic or a basement excluded | France, Norway, Sweden | France, Sweden | Finland, France, Sweden | Finland, France, Germany | Finland, France |
| Theft from a secondary residence excluded | Denmark, Norway, Sweden | Denmark, Sweden | Sweden | - | - |
| Theft from a factory, shop or an office included | Netherlands | Netherlands | - | | |
| Theft from a detached garage, shed, barn or stable included | Belgium, Netherlands | Belgium, Netherlands | Netherlands, Switzerland | Netherlands | Spain |
| Theft from a fenced meadow or compound included | Netherlands | Netherlands | Switzerland | | - |
| Attempts | | | Sweden | | |

**Note:** According to the European Sourcebook, domestic burglary is to "gain access to private premises by use of force with the intent of stealing good. Domestic burglary includes theft from an attic or a basement and theft from a secondary residence. Theft from a factory, shop or office, theft from a detached garage, barn or stable, or a fenced meadow/compound should be excluded" (Aebi et al. 2003, p. 263). With the introduction of the fourth European Sourcebook, attempts have been included in the definition.

**Source:** European Sourcebook

**Table A11: Deviations from the Standard Definition in Drug Offenses**

| Deviation | Second Wave | Third Wave | Fourth Wave | Fifth Wave | Sixth Wave |
|---|---|---|---|---|---|
| Possession of small quantities in connection with personal use not included | Italy, Netherlands, Spain | Italy, Netherlands, Portugal, Spain | Italy, Netherlands, Portugal | Netherlands, Portugal | Italy, Netherlands |
| Importation of drugs excluded | Sweden | Sweden | Sweden | - | - |
| Financing of drug operations excluded | Portugal | Portugal | - | Belgium | Belgium |
| Consumption excluded | - | - | Denmark, Germany, Italy, Portugal | Denmark, Germany, Portugal | |
| Attempts excluded | - | - | - | Denmark | - |

**Note:** According to the European Sourcebook, drug offenses include "possession, cultivation, production, sale, supplying, transportation, importation, exportation, and financing of drug operations" (Aebi et al. 2003, p. 264). With the introduction of the fourth wave, the possession of larger quantities, possession of small quantities, and personal use are included in the category. In the fifth wave, brokerage and attempts are included in the drug offenses, but offenses with respect to precursor substances are excluded.

**Source:** European Sourcebook

**Table A12: Summary Statistics: Between and Within Variation**

| Variable | | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| ΔRobbery | Overall | -0.0508 | 1.3243 | -4.5460 | 6.0858 |
| | Between | | 0.1672 | -0.3955 | 0.2353 |
| | Within | | 1.3143 | -4.2013 | 6.4305 |
| ΔTheft | Overall | -0.6707 | 3.2605 | -26.3759 | 20.3254 |
| | Between | | 0.7410 | -1.9440 | 0.9114 |
| | Within | | 3.1845 | -25.1026 | 18.7433 |
| ΔGPR | Overall | 0.2658 | 13.1314 | -92.1164 | 122.4593 |
| | Between | | 0.3938 | -0.0705 | 1.0344 |
| | Within | | 13.1260 | -92.7939 | 121.7817 |
| ΔPrison Rate(t-1) | Overall | 0.0043 | 0.0592 | -0.3518 | 0.1774 |
| | Between | | 0.0104 | -0.0097 | 0.0246 |
| | Within | | 0.0583 | -0.3482 | 0.1819 |
| ΔIncome | Overall | 0.5157 | 0.9012 | -3.9465 | 2.8653 |
| | Between | | 0.2422 | 0.0676 | 0.8655 |
| | Within | | 0.8705 | -4.0958 | 2.6029 |
| ΔUnemployment Rate | Overall | -0.0825 | 1.0527 | -3.4400 | 6.6100 |
| | Between | | 0.1383 | -0.3895 | 0.1910 |
| | Within | | 1.0442 | -3.3777 | 6.6723 |
| ΔPopulation Density | Overall | 0.8964 | 1.8986 | -4.3023 | 26.9575 |
| | Between | | 0.9490 | 0.0625 | 3.1124 |
| | Within | | 1.6644 | -3.4890 | 24.7414 |
| ΔInflation | Overall | -0.0891 | 1.1154 | -4.5426 | 3.0413 |
| | Between | | 0.0885 | -0.2538 | 0.0519 |
| | Within | | 1.1121 | -4.6558 | 2.9004 |

**Note:** The table summarizes the between and within variations for the variables included in the analysis.

**Source:** Author's own calculations

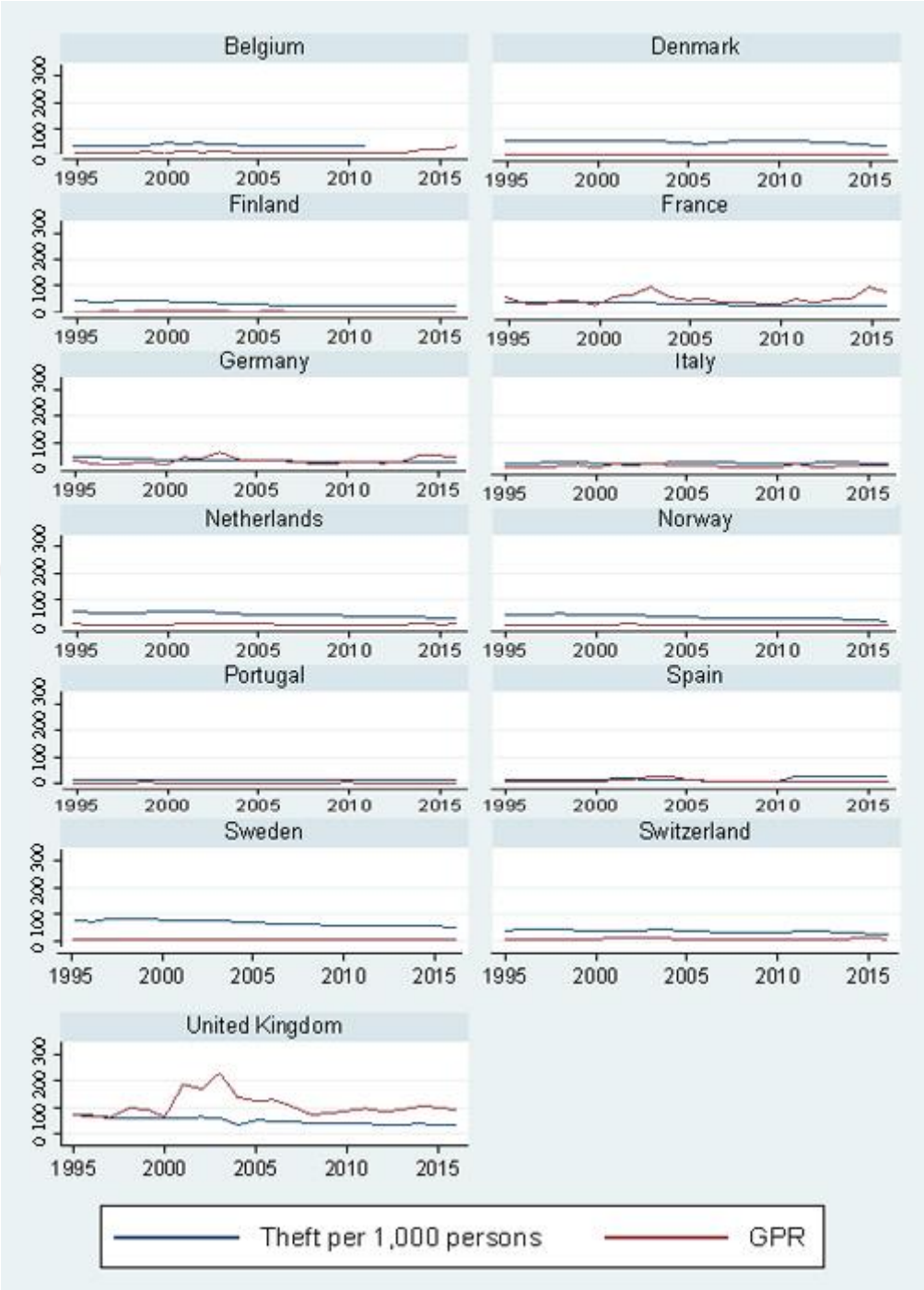


**Figure A1. Theft Rates and GPR from 1995 to 2016**

**Note**: The figure presents the theft offenses per 1,000 persons and GPR Index for countries in the sample from 1995 to 2016.

**Source:** European Sourcebook and Caldara and Iacoviello (2022)

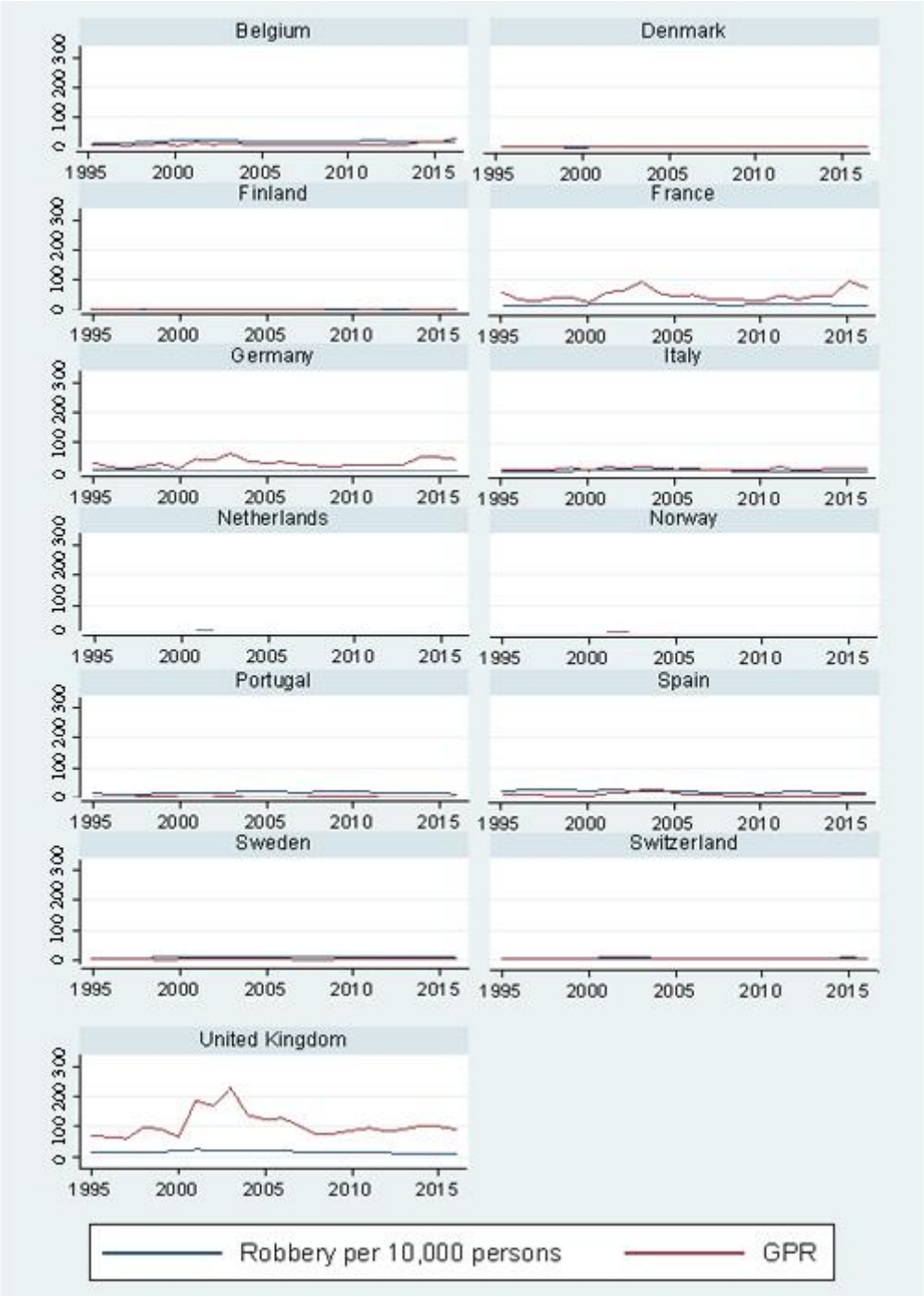


**Figure A2. Robbery Rates and GPR from 1995 to 2016**

**Note**: The figure presents the theft offenses per 10,000 persons and GPR Index for countries in the sample from 1995 to 2016.

**Source:** European Sourcebook and Caldara and Iacoviello (2022)