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S.S.D: SPS/12; SECS-S/05

CRIME AND SOCIAL INDICATORS:
MEASURING THE ASSOCIATION AND COMPARING TRENDS

TESI DI DOTTORATO DI: SILVIA BARTOLETTI

MATRICOLA: 003910668

Anno Accademico 2012/2013

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ABSTRACT

Measuring crime in Europe is problematic because many different legal concept definitions and statistic collecting practices have been embraced in each country. In recent years, numerous efforts have been made to further this overarching goal and today, there are sources that present more comparable information on crime in Europe.

At the same time, the European Union has produced broadly agreed upon structural indicators, called 'social indicators', to systematically report, monitor, and analyze living conditions and quality of life. These indicators help to contextualize crime by describing and relating to today's European realities.

On the basis of three macro theoretical paradigm indicators (the civilization theory, modernization theory, and opportunity theory), a set of social indicators will be selected and cross-examined with crime rates recorded in Europe. This endeavour will first test the relationship between the social indicators and different types of crimes in order to assess the validity of the theoretical frameworks across Europe as a whole. Second, it will identify a set of risk factors for the selected types of crimes.

After that, using advanced statistical techniques (cluster analyses) to identify homogeneous sets of countries across Europe, the comparison will take into account the evolution of crime levels in two selected, averaged periods between 1990 and 2007. Crime trends will be compared and cross-checked with social indicator tendencies to explain crime variations over time.

ACRONYMS

ANOVA = Analysis of Variance

CATI = Computer Assisted Telephone Interviewing

CA = Cluster Analysis

DMC = Domestic Material Consumption

EFTA = European Free Trade Association

HFA-DB = European Health for All Database

ESPAD = European School Survey Project on Alcohol and Other Drugs

ESS = European Social Survey

ESCCJ = European Sourcebook of Crime and Criminal Justice Statistics

EU ICS = European Survey on Crime and Safety

EU = European Union

EU-SILC = European Union Statistics on Income and Living Conditions

FBI = Federal Bureau of Investigation

GGP = Generations and Gender Programme

GDP = Gross Domestic Product

HETUS = Harmonised European Time Use Surveys

HLY = Healthy Life Years

HDI = Human Development Index

ICS = Index of Consumer Sentiment

ICVS = International Crime Victims Survey

LFS = Labour Force Survey

MS = Member State(s)

OSCE = Organization for Security and Co-operation in Europe

UNESCO = United Nations Educational, Scientific and Cultural Organization

UNCTS = United Nations Survey of Crime Trends and Operations of Criminal Justice Systems

US = United States

WHO = World Health Organization

INTRODUCTION

The creation of the European Union (EU) progressively built a unique economic and political partnership between 27 European countries in which people and goods move among the Member States (MS) as freely as they do within one country. This fact has highlighted the importance of providing, as the Amsterdam Treaty states, 'a common area of freedom, security and justice', because the progressive elimination of border controls within the EU have considerably facilitated the free movement of European citizens and may have also made it easier for criminals to operate.

The creation of a common area has accelerated the development of monitoring and reporting activities on the European level and has caused changes in spatial perspectives. With regard to crime, the question, 'How is crime in that country?' has been substituted or become level with, 'How is crime in Europe?' Having a more accurate European overview of crime has become the desired goal, so it remains perplexing that at the beginning of 2011, when this thesis was started, a statement written by Entorf and Spengler in 2002 still held true, namely, that 'evidence on crime in Europe is very rare'.

Discussion about crime began in the 19th century with the Belgian astronomer and statistician Quetelet, who was the first author to examine causes or factors related to crime. The process of European integration has increased the use of new instruments, called 'social indicators', which have been broadly used to monitor societal changes and understand processes and structures. As we will see in the literature review, the use of social indicators has stimulated the natural intersection of demography, economy, and sociology with criminology in examining the multiple linkages between drivers of crime.

The literature will show that there are several studies that have generally focused on a small group of European countries and that they have commonly applied a one-dimensional approach because they checked the weight that one particular dimension (age, gender, race, etc.) of contemporaneous society had on crime levels (Lodhi and Tilly 1973; Hirschi and Gottfredson 1983; Farrington 1986; Bovenkerk 1993; Eisner 2002; Georgiou 2010; Altindag 2011; Ceobanu 2011). Of note, Entorf and Spengler (2002) proposed a significant and important study that examined the causes of crime in the

EU15 by taking into account its economic, demographic, and social features. After this study, the European Union was enlarged[1], but at present there remains insufficient evidence on crimes committed in the 27 countries of the European Union.

Moving from these gaps in evidence, first, this thesis aims to describe crime in the 27 countries of the European Union because with regard to the aforementioned issues, having a EU27 vision of crime is a necessity for a powerful aggregation of States, like the EU. This view of crime will aim to address policy measures at a global, instead of a local, level. Second, this thesis aims to have a multifaceted approach. Founded from three macro theories (the civilization theory, modernization theory, and opportunity theory), a set of social indicators will be selected and tested empirically against crime rates to assess the significance of some features in driving crime. The empirical research will explain which features are predictors of crime rates and whether civilization theory, modernization theory, or opportunity theory may explain crime levels in Europe.

Focusing attention on the temporal element, the literature review will also show that there are studies that have analyzed the evolution of crime over the upcoming years (Aebi and Linde 2010, 2012a) and have formulated some hypotheses to justify the trends. These studies, however, have not analyzed if and how the social indicators that have a significant relationship with crime will change over time in the EU27. This means that there are currently no studies that check crime levels in Europe by distinguishing between the types of crimes committed and explaining any characteristics on the basis of significant social indicator trends that have evolved over time.

The second part of this thesis aims to explain criminal tendencies on the basis of the significant social indicators that will be identified in the first part of this thesis and to examine their trends over time. A final observation needs to be made regarding the statistical methods that will be employed in the thesis; multivariate statistical techniques will allow us to examine complex data sets, conduct more accurate analyses, and place this work on a solid base since only a few scholarly works have applied techniques that are more advanced than correlation analysis. In this thesis, as a reference to Entorf and Spengler's (2002) work, multiple regressions will permit the examination of the relationship between one dependent variable and one or more independent variables so as to test which set of

[1] When this thesis began, the European Union included 27 countries.

variables is influencing criminal behaviour.

After that, while remaining fully aware of the limitations of police statistics as accurate measures of crime levels, we will explore their potential as indicators of trends in crime (Aebi 2004, 2008, 2010). We will do this by comparing trends in homogenous groups of countries that are identified through a cluster analysis in a similar vein to Smit et al. (2008) work. This operation will permit us to explain crime tendencies on the basis of social indicator trends over time in groups of countries, called 'clusters', which have high similarity within themselves and low similarity between one another.

This thesis is organized into five chapters. A review of the existing literature on the subject is presented in Chapter 1. First, it introduces the concept of crime and social indicators in Europe and lists their relevant data sources. Second, it examines studies on the linkage between social indicators in Europe and crime trends. Chapter 2 discusses the limitations of the studies currently available, presents the objectives of the thesis, and presents its research questions. The samples, selected variables, and methodological steps adopted for this work are discussed in Chapter 3. Chapters 4 and 5 present the results for the first (measuring the association between crime and social indicators in Europe) and second (comparing crime and social indicators trends in Europe) aims of the thesis, respectively. The conclusions, research limitations, and suggestions for future investigations are presented in Chapter 6. A bibliography and five annexes complete the thesis.

CHAPTER 1 – LITERATURE REVIEW ON CRIME AND SOCIAL INDICATORS

This chapter is structured into three sections that are dedicated respectively to crime, social indicators, and the linkages between them in the existing literature. Section 1.1 briefly synthesizes the origins of interest in measuring crime in Europe, lists the main macro theories related to crime, and presents the most important data sources on crime, highlighting some critical aspects that will be taken into account for data source selection in Chapter 3. Section 1.2 explores the use of social indicators in criminal monitoring processes and presents the main data sources used to collect them in Europe. Section 1.3 reviews a selection of scholarly works that either assessed the relationship between crimes and social indicators or that examined crime trends.

1.1 THE MEANING OF MEASURING CRIME IN EUROPE

Fields of science that have a quantitative approach aim to measure phenomena and compare them in space and over time. In fact, one of the foundations of the scientific method is the ability to have comparable data so as to evaluate phenomena in space and over time; criminology is not an exception to this methodology.

Howard, Newman, and Pridemore (2000)[2] stated that comparative criminology is as old as criminology itself; in effect, crime level comparisons began in the 18th century when Beccaria, Quetelet, and Bentham compared their systems of justice to those of other nations. Then, during the 19th century, comparative criminology was left behind because each country was absorbed in solving its specific crime problems. At the end of the 20th century, however, there was renewed interest in it due to globalization processes and the creation and expansion of the European Union, which highlighted the lack of comparable crime data among EU countries. Such data could aid in conducting European evaluations, making it possible to propose spatial, long-term policies. Developments in the fields of

[2] Their work recalls Durkheim's statement that "la sociologie comparative n'est pas une branche de la sociologie, c'est la sociologie elle-même".

technology, communications, and transportation had transformed the world into a smaller place and the ability to make comparisons among countries became an essential component of scholarly criminological works. The creation of the EU also renewed interest in comparative criminology because the progressive elimination of border controls, which had facilitated the free movement of European citizens, had also likely made it easier for criminals to operate in multiple countries. Since the adoption of the Amsterdam Treaty, the EU has set for itself the objective of providing a common area ruled by freedom, security, and justice. The EU seeks to make it possible to compare the structures, levels, and trends of crime to the existent criminal justice measures between Member States and within them.

1.1.1 Macro Theoretical frameworks in criminology

Theoretical criminologists have identified two general theoretical frameworks that are used to explain crime; they are commonly distinguished into macro and micro theories (Messner, Krohn, and Liska 1989). A theory can try to explain crime for a large social unit or area (macro), or it can attempt to explain crime at the individual or smaller unit level (micro). Theories concerning the causes of crime and deviance fall on a continuum from a 'micro' focus on the characteristics of individuals to a 'macro' focus on the characteristics of the larger society (Akers and Sellers 2013). Macro theories, named 'grand theories', describe 'the big picture' of crime while micro or structural theories are employed within small units of analysis (e.g. cities) and explain individual criminal behaviour.

This thesis aims to explain the 'big picture' of crime, which in this case refers to 'crime across Europe', because as we will see in Section 2.1, not enough is known about crime in the EU27. As an initial step in this endeavour, this section illustrates three of the major, explanatory macro frameworks in contemporary criminological theory: the modernization theory, civilization theory, and opportunity theory.

The modernization theory is derived from Durkheim's anomie. Durkheim (1897) was one of the first authors to theorize the relationship between the modernization process and crime; he stated that societies with a high level of industrialization and urbanization have high levels of crime because the modernization processes increased their *anomie*, a term that refers to social change and the

breakdown of traditional values (it is a state of economic and social disorganization) (Howard et al. 2000).

Industrialization and urbanization are key elements in the rapid increase of the complexity in social and economic relations; they lead to political, economic, demographic, and cultural changes within a society (Strasser and Randall 1981, quoted by Howard et al. 2000) and their effects (e.g. socio-economic inequality) are the main contributors to crime (Heiland and Shelley 1992). Industrialization processes may create a state characterized by poverty, family disruption, inequality, and the breakdown of traditional values.

Louise Shelley (1981) synthesized the fundamental idea of modernization theory by stating that, 'the modernization process causes violent crime [to be] on the decrease and property crime [to be] on the rise. At the beginning of the modernization process, crime increases, but later, with modernization stability, societies develop new models of socio-economic organisation and crime is more likely to decrease'.

While the modernization theory asserts that crime rates will increase and then level off over time, the civilization theory anticipates decreasing crime rates as governments and their citizens become more humane and civilized (Elias 1969). Norbert Elias' theory of civilization addresses the long-term variation in homicide rates, especially the significantly declining trend of violence in Europe since the middle ages. Elias stated that the variations found over time were caused by two different structural dynamics: first, the gradual monopolization of power in the emerging nation states as manifested in their transition from medieval to modern society and the elimination of private revenge, which has fuelled many violent acts (Rousseaux 1999); and second, the 'extension of chains of interdependence', which has been caused by the growth of trade and has made people more dependent on sustained cooperation with others (Eisner 2012).

Lastly, opportunity theory combines some elements of the modernization and civilization theories: social and economic changes provide more opportunities to engage in criminal behaviour (Cohen and Felson 1979) and crimes occur when there is an intersection in time and space between a motivated offender and an attractive target not under capable guardianship. High impact changes in routine activities in society (e.g. women entering the workforce) can also affect crime rates.

1.1.2 MEASURING CRIME: DIFFICULTIES AND DATA SOURCES

Currently on the European level, numerous data sources on crime are available and some of them permit the collection of comparable information between countries; in some cases, the data is freely accessible through synthetic reports or websites. Before delving into criminal data sources, this section summarizes some definitions of crime and explains some of the difficulties encountered in measuring crime data. These challenges will be taken into account when selecting datasets for further elaboration in Chapter 3.

Ferri (1881), in talking about crime, distinguished two objects for analysis: real criminality and apparent criminality. This distinction highlights the main difficulties one may encounter while measuring crime. Due to its inherent nature, there is no way to directly measure illegal activities and any measurement will always be influenced by the hidden criminality, usually known as 'the dark number of crime'. This number, which is the difference between the real and the recorded criminality, may have a different weight across various categories of crime (Maguire, Morgan, and Reiner 2007). Quetelet (1869, 1998) thought that the dark number was constant, but it has been broadly proven that the dark number vary in space and over time. Not all crimes are reported to the police in the same manner (for example, some crimes are not reported at all because the victims find them too embarrassing to retell, because the individuals involved do not perceive themselves as victims, or because the victims do not trust the police, etc.) and the sensibility of reporting and recording crimes may vary depending on the type of crime committed, including its spatial and temporal features.

The operation of measuring crime in Europe is more problematic because along with the aforementioned factors, there are differences in the data sets obtained from different countries due to their individual legal and criminal justice systems and their data collection protocols (Aebi 2008, 2010; Von Hofer 2000). There are four types of factors—substantive, legal, statistical and criminal policy — that influence crime statistics. Von Hofer (2000) described and clearly explained the first three factors. Substantive factors are linked to the propensity of the population to report offences and to the propensity of the police to record the offences. Legal factors cover the differences in legal definitions among countries. Statistical factors refer to the way in which criminal data is elaborated; in this context, the rules that each country applies to count offences are defined as 'statistical counting rules'. Criminal policy factors (Aebi 2008, 2010) relate to the crime and crime prevention policies a

country institutes.

Aebi (2008) further stated that broad differences among countries are caused by:

- The lack or existence of written counting rules
- Diversity in the counting units used to collect data
- An offence committed by more than one person being counted differently in different countries
- Different rules being applied in recording offences that are committed at the same time or that are repeated
- The moment when data is collected for statistics. Some countries note when the offence is reported to the police, while others only count when the police have completed their investigation. Other countries even record their data at an intermediate stage of the process (i.e. at some point in time between the input and the output of a report).

Victimization surveys permit us to bypass some of these problems. They originated in the 1960s in the United States (US) with the aim of measuring dark numbers and are very useful because they allow us to identify how many people have been victims and of those individuals, how many have reported the crime to the police. The main advantage of this type of survey is that it bypasses the underreporting problem and provides more comparable data between countries. The main disadvantage comes from the time and money required to collect the data, because it is necessary to go out into the population and ask for information. Victimization surveys are a form of survey sampling and most countries' survey interviews are carried out with computer assisted telephone interviewing (CATI). The samples used in research are designed to provide the most complete coverage of criminal instances with the least amount of bias (Van Dijk et al. 2005). As useful as victimization surveys are, however, they should be taken into account with the main European crime data sources.

The *European Sourcebook of Crime and Criminal Justice Statistics*[3] (ESCCJ) collects data on crime and criminal justice statistics in an effort to offer comparative information for many European countries across a variety of subjects (e.g. offences and offenders known to the police; prosecutions,

[3] Available online at (last visit 04.11.2013): http://www.europeansourcebook.org

convictions, sentences, and corrections data; survey data; manpower indicators and budgets for police forces, prosecutors, and correction facilities) (Killias and Rau 2000) and crimes (e.g. homicide, assault, rape, sexual assault, robbery, theft, fraud, offence against computer data and systems, money laundering, corruption, and drug trafficking). The project started in 1996 and collected data on 37 European countries. At the moment, four editions have been edited and the available data covers the temporal period from 1990 to 2007, complete with all of the extensions and revisions that have been added to the editions over the years. The first ESCCJ edition covers the period from 1990 to 1996 and contains statistical data, information on counting rules, and legal definitions. The second edition (published in December 2003) covers the period from 1995 to 2000 for 40 European countries. The third edition (published in June 2006) covers the period from 2000–2003 for 37 European countries. It is a limited edition and not all of its tables were updated. The fourth edition (published in 2010) covers the years from 2003–2007; it includes data collected on some newer types of crime.

Eurostat[4], the European Union's statistical office, uses the methodology developed by the ESCCJ and collects data for total offences of homicide, violent crime, robbery, domestic burglary, motor vehicle theft, and drug trafficking from 1993 to the present for the EU27, Iceland, Norway, Liechtenstein, Croatia, Switzerland, Montenegro, the former Yugoslav Republic of Macedonia, Serbia, and Turkey. The collected data reflects crimes that are recorded by the police, the police officer population, and the prison population. This data is available on a national and, in some cases, city level.

The *European Health for All Database*[5] (HFA-DB) is a database collected by the World Health Organization (WHO)[6] that contains records for various causes of death and diseases, including death by injury or violence. Health statistics based upon death registrations are collected. They provide a selection of core health statistics covering basic demographic features, states of health, risk factors, healthcare resources, utilizations, and health expenditures in the WHO European Region. This data, based on vital statistical data, is not influenced by legal decisions, so the figures do not reflect any

[4] Available online at (last visit 04.11.2013):
http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/themes

[5] Available online at (last visit 04.11.2013): http://www.euro.who.int/en/what-we-do/data-and-evidence/databases/european-health-for-all-database-hfa-db2

[6] Available online at (last visit 04.11.2013): http://www.who.int/en/

decisions made regarding the prosecution or conviction of an offender. The collected data covers the period from 1970 until present for a sample of countries whose population has grown over time.

The *United Nations Survey of Crime Trends and Operations of Criminal Justice Systems* (UNCTS) collects data from the MS on recorded crimes and the resources of their criminal justice systems. The UNCTS data covers a total time period from 1970 through the present, which was collected through different survey rounds (12 with 2011). This data was collected as part of a survey sent to all MS, and almost all European countries in general. The most recent version collected data for homicides, five 'traditional' crimes (assault, rape, robbery, burglary, and motor vehicle theft), drug-related crimes, and drug trafficking; complex crimes, such as organized crime and human trafficking, were also separately analyzed.

The *International Crime Victims Survey* (ICVS)[7] monitors and studies the volume of crime, perceptions of crime, and attitudes towards the criminal justice system from a comparative international perspective set within both European and non-European countries. The ICVS plays an important role in providing more harmonized victimization data, which allows comparisons to be made between countries. The first ICVS publication came out in 1989 and it has since been edited in 1992, 1996, 2000 and 2004. Each of its editions has examined crime levels for a larger set of countries than its predecessor. During its fifth round, in 2005 data was collected from 30 countries and 33 capitals. All of the data related to European countries came from the European Survey on Crime and Safety (EU ICS).

The *European Crime and Safety Survey*[8] is the European version of the ICVS. It analyzes the level of victimization that has occurred and categorizes crime into vehicle crimes, burglaries, attempted burglaries, thefts of personal property, robberies, sexual offences, and assaults across a sampling of European countries.

[7] Available online at (last visit 04.11.2013): http://www.unodc.org/unodc/en/data-and-analysis/Crime-Victims-Survey.html

[8] Available online at (last visit 04.11.2013): http://www.europeansafetyobservatory.eu

1.1.2.1 COMPARING CRIME IN EUROPEAN COUNTRIES

The activity of comparing countries is as old as criminology itself (Howard, Newman, and Pridemore 2000), but performing cross-national comparisons is a Herculean task (De Candolle 1830). Notwithstanding current crime data's higher level of reliability and the availability of collected crime data from sources like the ESCCJ, differences in crime levels resulting from substantive criminal policies or statistical factors continue to make comparisons among countries almost impossible (Aebi and Linde 2012).

One broadly used research tactic is to take into account groups of countries instead of individual countries and then compare their trends (Killias and Aebi 2000; Aebi 2008, 2010; Aebi and Linde 2012; Smit 2008). In fact, this operation partly bypasses differences among countries. In the tables below, some data sets that enable the comparison of crime in the EU27 has been reported. In particular, on Table 1, there are percentages of change between 2003 and 2007 for police data according to offence (homicide, assault, rape, robbery, theft, and drug offences). Table 1 does not compare countries; it only examines trends for them individually. Different symbols (+, ++, -, --, 0) show cases of increasing or decreasing percentages.

Table 1. Trends in police data (changes in percentages between 2003-2007) recorded for some crimes in the EU27

Country	Homicide		Assault	Rape	Robbery	Theft				Drug offences	
	Total	Completed				Total Theft	Motor vehicle theft	Total	Burglary	Total	Drug Trafficking
Albania	-	-	0	-	-	+	+	+	+	++	-
Armenia	0	0	--	--	-	0	+	…	…	++	…
Austria	-	0	+	+	+	-	0	-	+	0	0
Belgium	…	…	…	…	…	…	-	…	…	…	…
Bosnia-Herzegovina	…	…	…	…	…	…	…	…	…	…	…
Bulgaria	-	-	-	--	-	0	--	-	-	+	+
Croatia	0	-	+	-	0	-	-	-	0	0	0
Cyprus	--	-	0	-	0	-	+	-	…	+	-
Czech Republic	-	…	0	0	…	-	-	-	-	-	-
Denmark	…	…	…	…	…	…	…	-	…	+	…
Estonia	-	-	++	+	--	-	--	…	--	+	+
Finland	+	+	+	+	-	-	-	-	-	0	-
France	-	-	+	0	-	-	-	-	-	+	0
Georgia	…	…	-	++	+	++	+	…	…	++	++
Germany	0	-	+	-	-	-	-	0	-	0	0
Greece	0	0	0	0	+	+	…	+	…	-	…
Hungary	-	-	0	-	0	0	-	-	0	-	0
Iceland	++	…	…	…	+	…	…	…	…	…	…
Ireland	…	+	+	0	-	0	0	-	…	+	+
Italy	…	…	…	…	…	…	…	…	…	…	…
Latvia	-	…	…	-	-	-	-	…	…	+	+
Lithuania	-	-	0	0	-	-	--	0	-	+	+
Luxembourg	…	…	…	…	…	…	…	…	…	…	…
Malta	…	…	…	…	0	…	…	…	…	…	…
Moldova	-	…	++	-	--	--	--	…	--	-	+
Netherlands	…	…	+	-	-	-	-	…	-	0	…
Norway	-	-	…	+	0	…	…	…	…	…	…
Poland	-	-	0	-	-	-	--	--	-	+	+
Portugal	…	…	…	…	…	…	…	…	0	…	-
Romania	-	-	+	0	-	-	+	…	-	…	…
Russia	-	…	0	-	0	+	-	0	-	+	+
Slovakia	-	-	…	-	-	0	-	-	0	+	-
Slovenia	-	+	-	+	+	+	+	0	0	+	+
Spain	…	-	…	…	0	…	-	…	-	…	+
Sweden	…	+	+	+	0	-	-	-	0	+	+
Switzerland	0	-	+	+	0	-	…	-	-	0	-

TFYR of Macedonia	…	…	…	…	…	…	-	…	…	…	…
Turkey	…	…	…	…	…	…	…	…	…	…	…
Ukraine	-	…	0	-	0	--	0	…	--	+	0
UK: England and Wales	-	-	-	0	-	-	-	-	-	+	+
UK: Northern Ireland	0	-	+	0	-	-	-	-	-	0	+
UK: Scotland	0	0	+	0	-	-	-	-	-	0	0

'--'decrease of 50% or more
'-'decrease of between 50% to 10%
'0' decrease or increase of less than 10%
'+' increase of between 10% to 100%
'++' increase of more than 100%

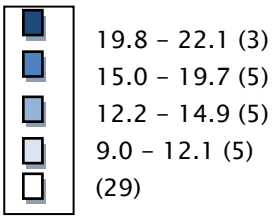
Copied from Aebi, M., et al (2010), European Sourcebook of Crime and Criminal Justice Statistics, WODC, Den Haag.

It is possible to read the table in two ways: by looking at the countries or looking at the crimes. Most countries alternate between decreasing, null, and increasing trends across different crimes. Slovenia (7) and Georgia (6) have higher increasing trends while some small countries (Luxemburg [11] and Malta [10]) and some northern countries (the Netherlands [9], Norway [9], Latvia [9], England and Wales [8], etc.) have lower decreasing trends. Looking at the crimes, it is evident that homicides, total thefts, and burglaries have decreasing trends in almost all of the countries, while drug offences and assaults have increasing trends.

Figure 1 reports the levels of crime across European countries in 2004 that have been collected from victimization surveys. The standardization of the questionnaires and other related aspects of data collection assure that the data can, within confidence margins, be reliably compared across countries (Van Dijk et al. 2007). The figure shows that Ireland, the United Kingdom, Estonia, Sweden, Poland, the Netherlands, Denmark, and Belgium have the highest victimization rates; Spain, Hungary, Portugal, France, and Austria are 'low-risk' countries because their risk assessment is significantly below the European average. The other countries (Italy, Germany, Greece, Albania, and Finland) have medium levels of crime and do not significantly differ from the European mean.

Figure 1. Levels of crime across Member States of the European Union in 2004

Note: One-year victimization rate for ten crimes in 2004

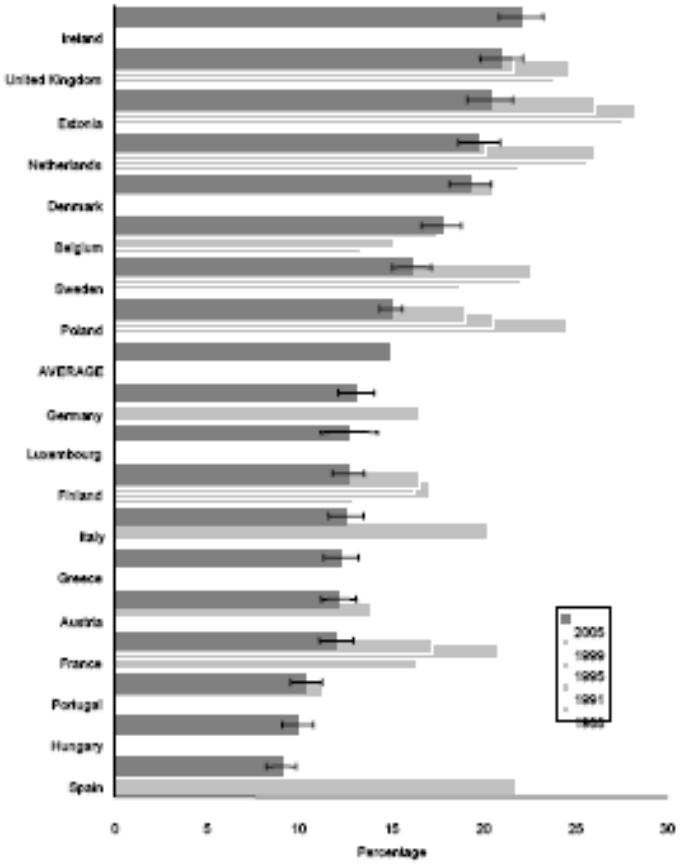


Copied from Van Dijk, J., et al (2005), The Burden of crime in the EU – Research report: a comparative analysis of the European crime and safety survey, EUICS.

Figure 2 illustrates crime rates for some common crimes in a sample of European countries for 2004 and for older years where ICVS survey results were available. This figure highlights differences over time. The countries with the highest rates of crime are Ireland, Denmark, the Netherlands, Poland, and Estonia, while those countries with low crime levels are Spain, Hungary, Portugal, Austria, France, Greece, Italy, and Finland. These groups are heterogeneous in terms of their geographical position, population density, and richness (i.e. GDP per capita) (Van Dijk, Van Kesteren, and Smit 2007). Observations made by Van Dijk et al. (2007) suggest that other sciences like demography, sociology,

or economy may help in explaining crime levels.

Figure 2. Prevalence of victimization rates for ten common crimes in 2004 and from results of earlier ICVS surveys



Copied from Van Dijk, J., et al (2005), The Burden of crime in the EU – Research report: a comparative analysis of the European crime and safety survey, EUICS.

1.1.3 CRIME AND ITS MULTIPLE LINKAGES

Quetelet, the Belgian astronomer and statistician, was the first author to analyze the multiple linkages of crime. In particular, he examined the relationship between crime and poverty in French administrative areas, observing that poverty was not in itself the cause of crime, but rather crime develops when the poor and disadvantaged 'are surrounded by subjects of temptation and find themselves irritated by the continual view of luxury and of an inequality of fortune' (Weisburd, Bruinsma, and Bernasco 2009). The Chicago School revived this direction of thinking in the 20th century in the United States. In particular, Shaw and McKay (1942) 'believed that juvenile delinquency

could be understood only by considering the social context in which youths lived' (Lilly, Cullen, and Ball 1995); they argued that three structural factors—low economic status, ethnic heterogeneity, and residential mobility—led to the disruption of social community organization, which in turn accounted for variations in crime and delinquency (Sampson and Groves 1989). In the second half of the 20th century, telecommunications, personal computers, and the Internet spread across Europe; these factors encouraged electronic financial transactions and a cashless economy, resulting in political and economic developments that offered a 'cornucopia of new criminal opportunities' (Shover, Coffey, and Hobbs 2003). Section 1.3 provides a brief overview of the factors that may act as mechanisms of crime.

1.2 THE ROLE OF SOCIAL INDICATORS IN EUROPE

In the middle of the 20th century, new instruments called 'social indicators' were widely diffused into the social sciences. In Europe, social indicators were broadly used to monitor societal changes and to understand processes and structures; this fact contributed to highlighting the natural intersection of demography, economy, and sociology with criminology. This section of the thesis is dedicated to social indicators because they will be used to examine the factors that have a relationship with crime. Their description begins with a brief introduction related to the birth of the social indicators movement (Section 1.2.1) and follows through to the use of social indicators in Europe (Sections 1.2.2, 1.2.3) and their main data sources (Section 1.2.4).

1.2.1 THE BIRTH OF THE SOCIAL INDICATORS MOVEMENT

Social indicators research, as a field of social science, was born in the United States in the mid-1960s and then spread out to European countries, where the diffusion was so rapid that there was talk about an entire 'social indicators movement' (Noll 2002). In particular, some phenomena, like increasing crime rates or the rise of social conflicts, were recorded in the most highly industrialized countries, which gave indications about the economy and wellness crisis and required further information collection in the form of statistics about social aspects and collective life. Therefore, from that period, the social indicator became a tool for measuring social phenomena.

Currently, social indicators collect quantitative information that is deemed useful in understanding specific aspects of reality and daily life. Zajczyk (1997) identifies three different phases in the social indicators movement:

- The first phase, from 1960 to 1970, was the birth of the movement and saw its diffusion into academic and scientific societies. In particular, this phase is characterized by the social indicators OSCE programme (the Organization for Security and Co-operation in Europe), founded in 1974, and the United Nations social and demographic statistics system, created in 1975.
- The second phase, from 1970 to 1980, was an intermediate phase.

- The third phase has continued from 1980 until the present time. During this phase, social monitoring and reporting will be essential to enhance European integration and to create the 'social Europe' of the 21st century (Noll 2002).

Social indicators can be defined as 'synthetic indexes [that] act to describe and measure a phenomenon that is the result of statistical data elaborations[,] transforming abstract concepts into measurable terms in the form of proxies' (Aureli 2002). The term 'social' has many nuances, but the main one is related to a 'company system' (Bisi 2006). In fact, social indicators may help in monitoring social changes and the knowledge of processes, structures, opinions, and objectives. Nuvolati (2002) identifies three main functions for social indicators:

- Description (to analyze the phenomenon in space and over time),
- Evaluation (to evaluate and program the basic tools of governance for state and local planning initiatives), and
- Prediction (to formulate a hypothesis about future trends).

1.2.2 The use of social reporting to describe twentieth century Europe

The creation of the European Union is one of those events that have predominantly characterized the second half of the 20th century. Nowadays, the EU is a unique economic and political partnership between 27 European countries with a single new currency (the euro). Furthermore, the EU is progressively building a distinctive market in which people and goods move among Member States as freely as they do within one country. The process of European integration has accelerated the development of monitoring and reporting activities; social indicators have been broadly used to monitor how people's living conditions have changed over space and time in this context. Eurostat, located in Luxembourg, has many tasks that revolve around producing and disseminating:

- Statistical language on the European level through the standardization of language and gathered models ('Statistics Explained', 'Statistical Books', etc.)
- Data that enables the evaluation of living conditions and the well-being of the population, including how it changes over time (*Eurostat Yearbook*, 'Statistics in Focus', etc.)
- Social surveys on the European level (e.g. Eurobarometer)

The EU27 population from 1960 to 2060 has been reported in Table 2. Data collected in the table

illustrates demographic changes that have occurred over the years; the total population in the EU27 has constantly increased from 1960 through 2010 and population projections show an inverse trend up to 2050 everywhere except for in Belgium, Denmark, Ireland, France, Sweden, and the United Kingdom, which are all projected to maintain their increasing trends.

The second half of the 20th century was a period of extraordinary transformation in terms of Europe's population structure, economics, society, and technology. In particular, the EU27's structural changes have steadily continued over time. The age framework has shifted to an older population. Eurostat identifies some of the main causes for this as:

- the post-war baby boom generations reaching retirement age,
- life expectancy continuing to increase, and
- fertility slowly increasing.

As a result, in the future, the EU27 will face a number of deficits associated with an aging society, which will impact some delicate fields, like labour markets, retirement funds, and healthcare.

Table 2. The EU27's total population and population projections

Country/Time	1960	1970	1980	1990	2000	2010	2013	2020	2030	2040	2050
European Union (27 countries)	402.607.070	435.474.042	457.048.603	470.388.225	482.377.256	501.084.516	n.a.	514.365.687	522.342.413	525.702.440	524.052.690
Belgium	9.128.824	9.660.154	9.855.110	9.947.782	10.239.085	10.839.905	11.183.350	11.592.534	12.204.065	12.717.855	13.125.523
Bulgaria	7.829.246	8.464.264	8.846.417	8.767.308	8.190.876	7.563.710	7.282.041	7.121.205	6.611.320	6.235.049	5.898.876
Czech Republic	9.637.840	9.906.474	10.315.669	10.362.102	10.278.098	10.506.813	10.516.125	10.816.080	10.839.979	10.740.155	10.667.723
Denmark	4.565.455	4.906.916	5.122.065	5.135.409	5.330.020	5.534.738	5.602.628	5.720.332	5.892.997	5.991.954	6.037.836
Germany (including former GDR)	72.542.990	78.269.095	78.179.662	79.112.831	82.163.475	81.802.257	82.020.688	80.098.347	77.871.675	74.814.316	70.807.016
Estonia	1.209.100	1.356.079	1.472.190	1.570.599	1.372.071	1.340.127	1.286.479	1.323.909	1.279.865	1.243.008	1.213.261
Ireland	2.835.500	2.943.300	3.392.800	3.506.970	3.777.565	4.467.854	4.598.029	4.814.602	5.276.163	5.757.624	6.207.343
Greece	8.300.399	8.780.514	9.584.184	10.120.892	10.903.757	11.305.118	n.a.	11.526.085	11.577.875	11.630.098	11.575.793
Spain	30.327.000	33.587.610	37.241.868	38.826.297	40.049.708	45.989.016	46.006.414	47.961.070	49.961.157	51.713.930	52.687.786
France (metropolitan)	45.464.797	50.528.219	53.731.387	56.577.000	58.858.198	62.765.235	63.703.191	67.820.253	70.302.983	72.186.344	73.183.970
Italy	50.025.500	53.685.300	56.388.480	56.694.360	56.923.524	60.340.328	n.a.	62.876.781	64.491.289	65.694.307	65.915.103
Cyprus	572.000	612.000	505.800	572.655	690.497	819.140	n.a.	885.452	973.354	1.036.127	1.090.050
Latvia	2.104.128	2.351.903	2.508.761	2.668.140	2.381.715	2.248.374	2.017.526	2.141.315	2.021.890	1.908.552	1.796.968
Lithuania	2.755.600	3.118.941	3.404.194	3.693.708	3.512.074	3.329.039	2.971.905	3.179.986	3.043.919	2.921.836	2.811.782
Luxembourg	313.050	338.500	363.450	379.300	433.600	502.066	537.039	573.066	625.941	669.947	703.696
Hungary	9.961.044	10.322.099	10.709.463	10.374.823	10.221.644	10.014.324	9.906.000	9.900.511	9.704.415	9.442.636	9.176.536
Malta	327.200	302.500	315.262	352.430	380.201	414.372	n.a.	415.271	416.886	407.555	397.089
Netherlands	11.417.254	12.957.621	14.091.014	14.892.574	15.863.950	16.574.989	16.779.575	17.218.675	17.577.605	17.619.916	17.357.798
Austria	7.030.385	7.455.142	7.545.539	7.644.818	8.002.186	8.375.290	8.488.511	8.591.180	8.849.533	8.977.982	8.968.861
Poland	29.479.900	32.670.600	35.413.434	38.038.403	38.263.303	38.167.329	38.533.299	38.395.403	37.564.978	36.112.044	34.542.704
Portugal	8.826.040	8.697.610	9.713.570	9.995.995	10.195.014	10.637.713	n.a.	10.727.813	10.779.647	10.767.057	10.598.409
Romania	18.319.210	20.139.603	22.132.670	23.211.395	22.455.485	21.462.186	21.305.097	21.006.219	20.250.626	19.437.293	18.483.288
Slovenia	1.580.535	1.717.995	1.893.064	1.996.377	1.987.755	2.046.976	2.058.821	2.142.217	2.154.609	2.141.070	2.114.985
Slovakia	3.969.682	4.536.555	4.963.301	5.287.663	5.398.657	5.424.925	5.410.836	5.576.326	5.579.504	5.467.229	5.326.176
Finland	4.413.046	4.614.277	4.771.292	4.974.383	5.171.302	5.351.427	5.426.674	5.577.269	5.704.485	5.727.038	5.726.934
Sweden	7.471.345	8.004.371	8.303.094	8.527.039	8.861.426	9.340.682	9.555.893	10.071.521	10.577.959	10.898.366	11.231.198
United Kingdom	52.200.000	55.546.400	56.284.863	57.156.972	58.785.246	62.026.962	n.a.	66.292.265	70.207.694	73.443.152	76.405.986

Note: Data refers to the population recorded on 1st January of a given year. The population is expressed in millions.

Source: Elaborated from Eurostat

1.2.3 A SOCIAL AND ECONOMIC PICTURE OF THE EU27 COUNTRIES

Through the aid of social indicators, this section describes some features that characterized the EU27 in 2007[9]. There were 500 million people and the sex ratio was about 105 women to 100 men; this is a stable number in nature. Ratios vary between countries: there were approximately 15% more women than men in the total population of the Baltic countries: Estonia, Latvia (both with 117 women per 100 men), and Lithuania (115 women per 100 men). The ratio was almost equal in Ireland, Sweden, and Malta (99–101 women per 100 men).

There were broad differences among the countries in terms of their population structure; Italy and Germany were the countries with the oldest populations (19.9% and 19.8%, respectively, over 65 years old), while Poland was the country with the youngest population (15.9%). There were also some differences in social indicators concerning fecundity behaviour; Ireland recorded the highest total fertility rate (2.01), while the Eastern countries (Romania, Slovakia, and Poland) had the lowest (1.3).

Life expectancy, school expectancy, and GDP per capita are some of the main developmental factors that will be examined to compare countries[10] in the following chapters. In the figures below, the European countries are ordered on the x-axis following a decreasing trend (from the highest rate to the lowest rate). Figure 3 shows that life expectancy levels were above the average (77.1) for the Northern, Western, and Southern EU countries, while they were below the average for all of the Central and Eastern countries. Lithuania had the lowest life expectancy at birth (70.3) while Italy (80.9) recorded the highest values.

[9] The reference year is 2007, which is the most recent year that will be taken into account in the data analysis.

[10] See Section 3.1.2.2

Figure 3. Life expectancy at birth in the EU27 countries, year 2007

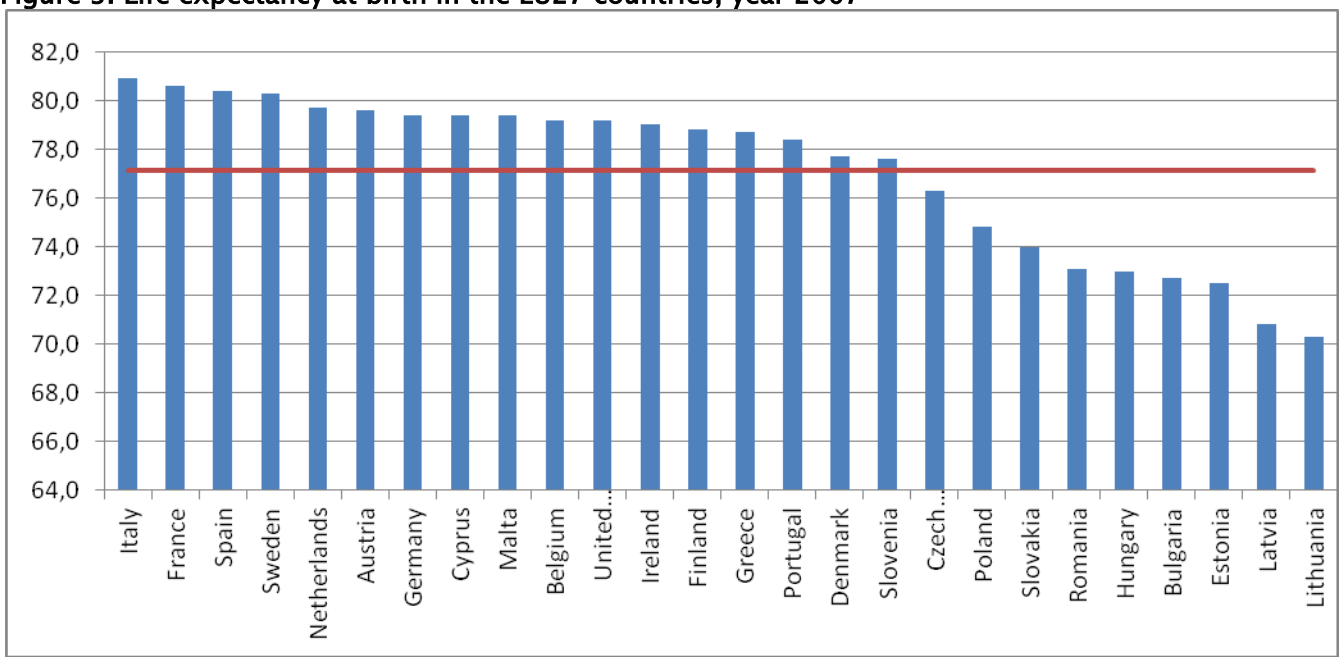


Figure 4 shows that school expectancy reached the lowest levels in the Southern countries (Cyprus and Malta), while Finland and Sweden recorded the highest values. Most countries are very close to the average level (17.4).

Figure 4. School expectancy in the EU countries, year 2007

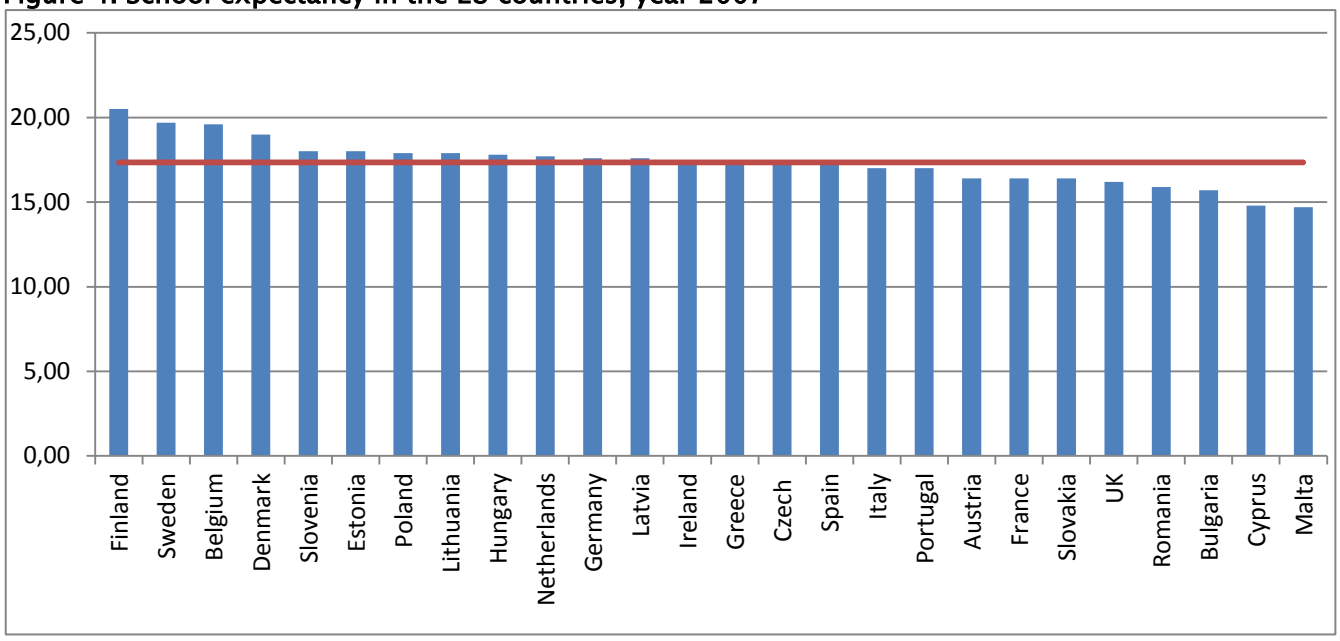


Figure 5 shows that GDP per capita was the social indicator that recorded the most fluctuations among various European countries. The Northern/Western countries recorded very high values (Ireland 147), while the Southern countries recorded intermediate levels and the Central/Eastern countries registered the lowest rates (Bulgaria 40).

Figure 5. GDP per capita in the EU countries, year 2007

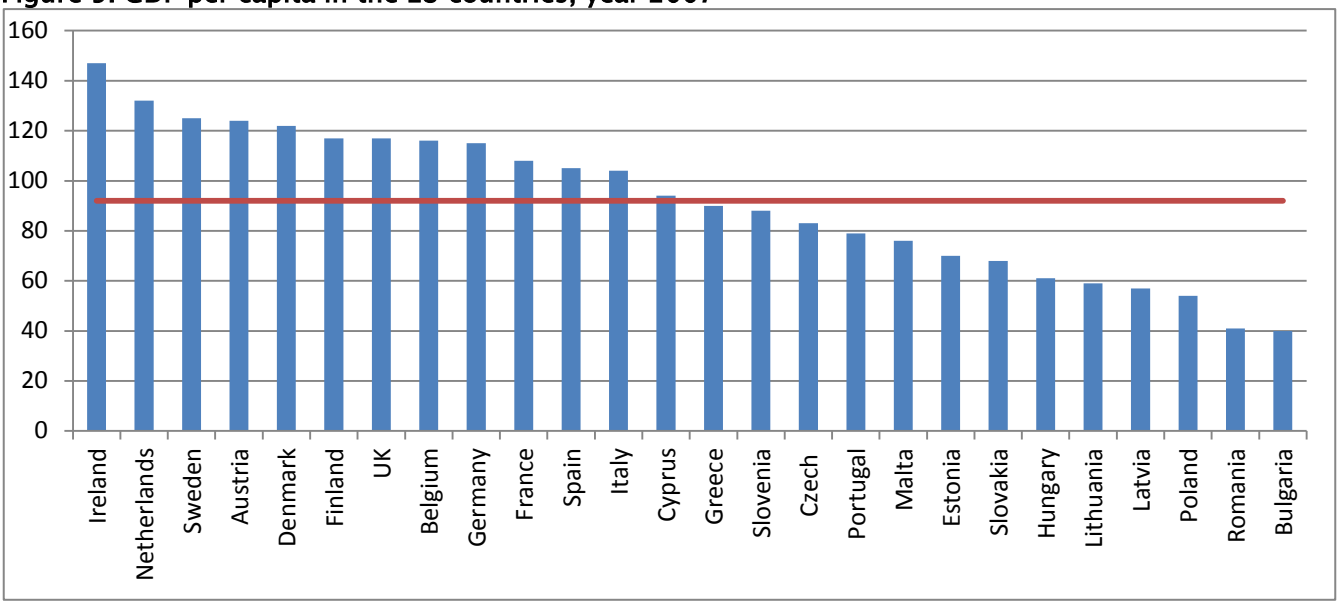


Figure 6 shows the unemployment rate in European countries, emphasizing which part is characterized by more than 12 months of unemployment (long-term unemployment) in red. The highest rate of unemployment was recorded in Slovakia (11.10), as was the highest long unemployment rate (86.5), while the lowest proportion of unemployment of any kind was recorded in the Netherlands (0.9).

Figure 6. Unemployment rate in the EU countries, year 2007

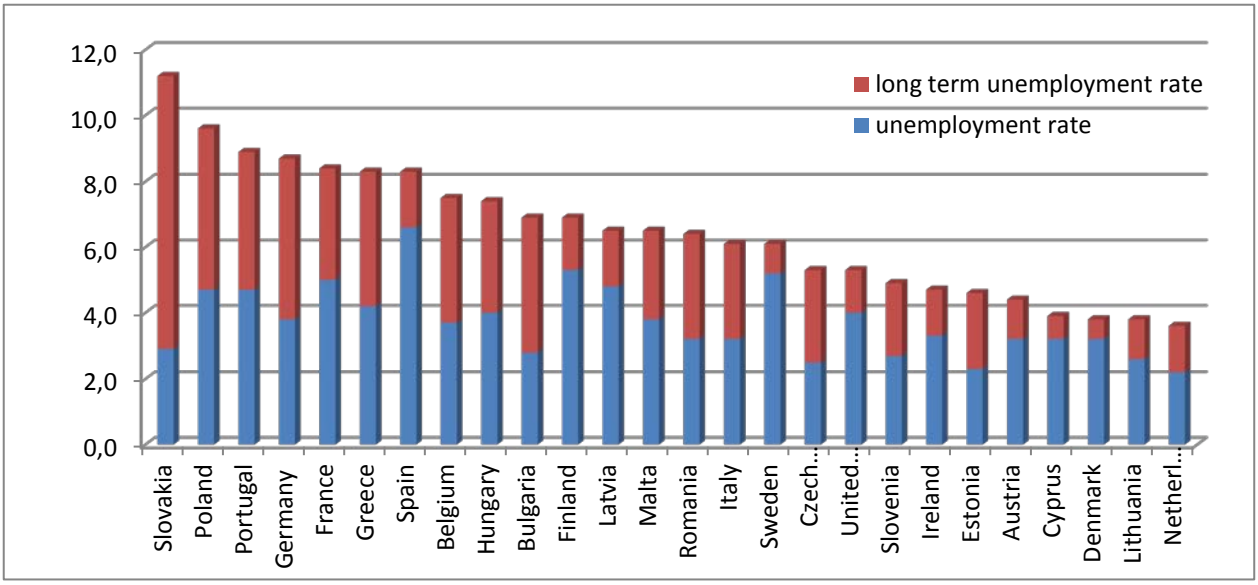
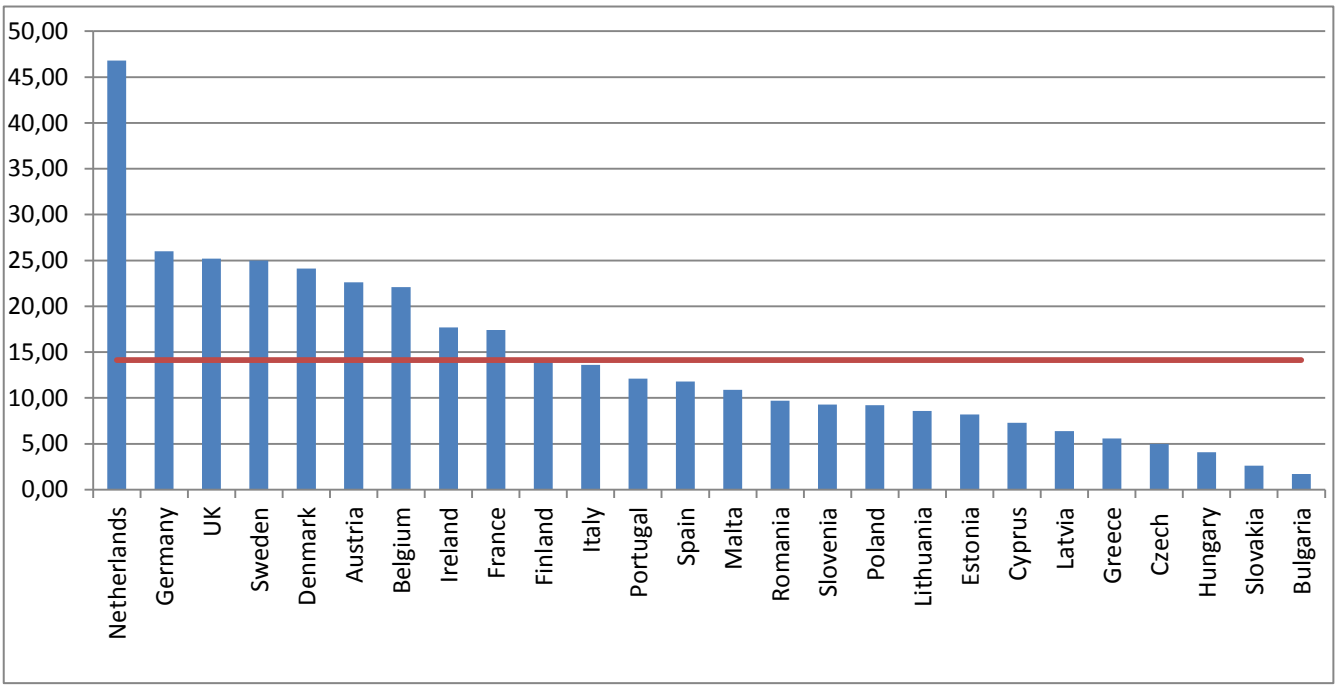


Figure 7 shows the part-time rate in the EU countries. The average value of people employed part-time is 14.12. In general, the Northern/Western countries recorded high proportions of people who were employed part-time and the Central/Eastern countries had the lowest rates. The highest proportion of people employed part-time was recorded in the Netherlands (46.80), while the minimum value was recorded in Bulgaria (1.7).

Figure 7. Part-time rate in the EU countries, year 2007



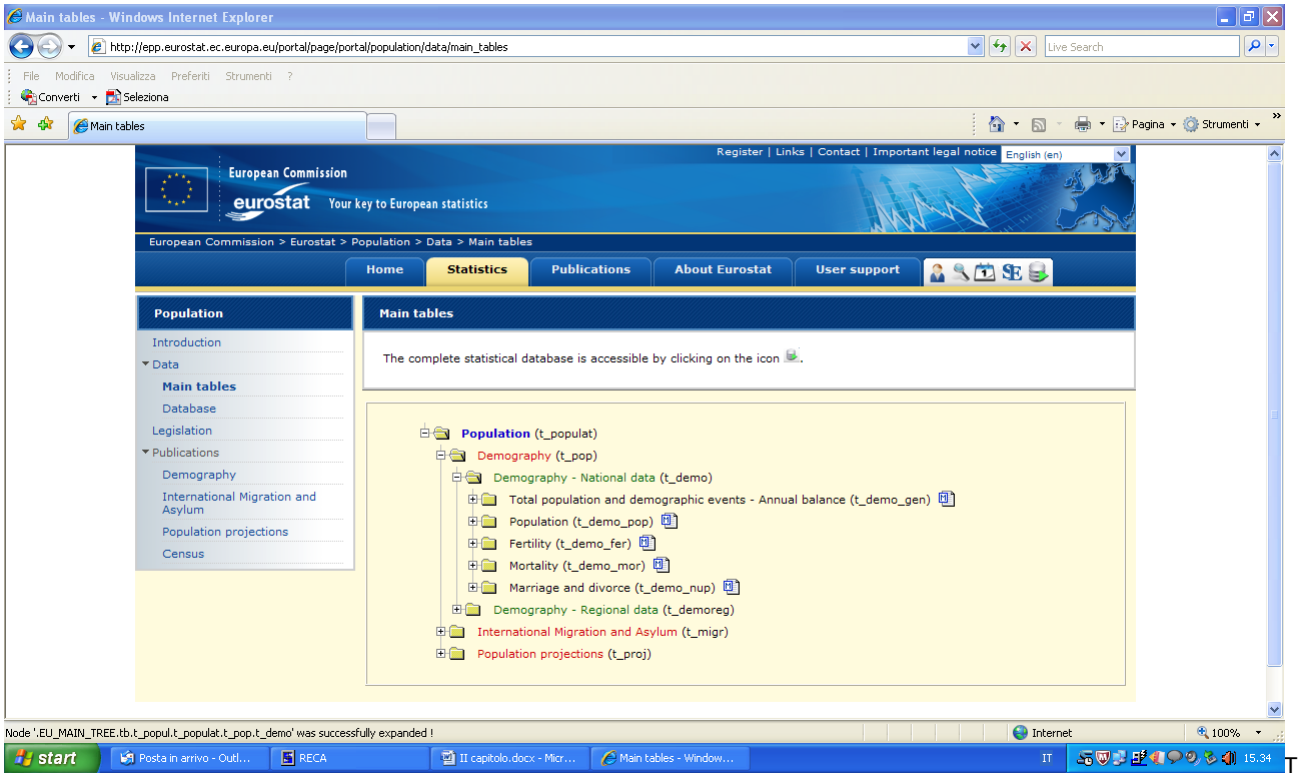
The examination of these figures has revealed similarities and differences among many countries. It is possible, in observing these data sets, to generally conclude that countries located in the same geographic area (North, South, East, West, or Central) have many common features and similar levels recorded by their social indicators.

1.2.4 SOCIAL INDICATORS AS DATA SOURCES

Social indicators are useful in analyzing and describing different aspects of life. These aspects are called 'thematic areas' and usually contain one or more topics that act as 'symbolic human creations or constructs that attempt to capture the essence of reality' (Hagan 2002). For example, life expectancy at birth is a social indicator that belongs to the topic of 'age' and 'demographic area'. The *Eurostat*[11] database collects indicators on populations and social conditions, economies and finances, industries, trades and services, agriculture and fisheries, external trades, transportation, environment and energy, and science and technology. Figure 8 shows the Eurostat tree-structure for their statistics.

[11] Available online at (last visit 04.11.2013):
http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/themes

Figure 8. Eurostat structure for their statistics



Source: Eurostat

From this diagram it is possible to observe that each theme has collected many topics and each topic includes many variables. For example, Eurostat population statistics include many themes, such as:

- Demographic data collected for births, deaths, marriages, and divorces
- Demographic indicators collected on total fertility rates, life expectancies at birth, age-dependency ratios, crude rates of births and deaths, and population growths.

In addition to data collected by Eurostat, there are social surveys. A 'survey' is a type of interview conducted through different means of communication (e.g. telephone, mail, etc.) in which answers are collected in relation to an aspect of behaviour that the researcher is interested in. There are numerous European surveys; some of the main surveys have been reported below:

- The *European Social Survey* (ESS)[12] collects facts about many aspects of everyday life in over 30 European countries. Topics analyzed are media, socio-political orientations, social exclusions, ethnic and religious aspects, demographics, and socio-economic features.
- The *Generations and Gender Programme* (GGP)[13] provides information on demographic and social behaviours. It focuses on demographic choices that have to do with forming and dissolving partnerships and having children.
- The *European Union Statistics on Income and Living Conditions* (EU-SILC)[14] gathers data on income, poverty, social exclusion, and living conditions.
- The *Labour Force Survey* (LFS) is a sample survey among private households that provides detailed data on employment, unemployment, and inactivity. Available data is disaggregated by age, sex, and education.
- The *Harmonised European Time Use Surveys* (HETUS)[15] measure the amount of time people spend doing various activities (e.g. work, family care, leisure, etc.).
- The *European School Survey Project on Alcohol and Other Drugs* (ESPAD)[16] assembles comparable data on substance use among students of the same age group across many European countries.

Table 3 presents further information on the main European data sources for social indicators, detailing what specific types of data are available.

[12] Available online at (last visit 04.11.2013): http://
[13] Available online at (last visit 04.11.2013): http://www.ggp-i.org
[14] European Union Statistics on Income and Living Conditions (2006), available online at (last visit 04.11.2013): http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-RA-07-007/EN/KS-RA-07-007-EN.PDF
[15] Data available online at (last visit 04.11.2013): https://www.h2.scb.se/tus/tus/
[16] ESPAD (2009), The 2007 ESPAD report Substance Use Among Students in 35 European Countries, available online at (last visit 04.11.2013):
http://www.espad.org/Uploads/ESPAD_reports/2011/The_2011_ESPAD_Report_FULL_2012_10_29.pdf

Table 3. A selection of the principal European data sources on social indicators

SOURCE	DATABASE	DATA
European offices	Eurostat	Populations and social conditions, economies and finance, industries, trades and services, agriculture and fisheries, external trades, transportation, environment and energy, and science and technology
European surveys	The European Social Survey (ESS)	Media; social trust; political interest and participation; socio-political orientations; social exclusion; national, ethnic and religious allegiances; attitudes towards and experiences of ageism; attitudes towards welfare provision and service delivery; and demographics and socio-economics.
	The Generations and Gender Programme (GGP)	Economic aspects of life, such as economic activity, income, and economic well-being; education, values, and attitudes; intergenerational relationships; gender relationships; household compositions and housing; residential mobility; social networks and private transfers; public transfers; health; and reproductive health.
	The European Union Statistics on Income and Living Conditions (EU-SILC)	Data on income, poverty, social exclusion, and living conditions
	The Employment and Unemployment (Labour Force Survey) (LFS)	A large sample survey among private households that provides detailed annual and quarterly data on employment, unemployment, and inactivity
	Harmonised European Time Use Surveys (HETUS)	Measures the amount of time people spend on various activities, such as paid work, household and family care, personal care, voluntary work, social life, travel, and leisure activities
	The European School Survey Project on Alcohol and Other Drugs (ESPAD)	Data on substance use among students of the same age group

Source: Elaborated from Eurostat, ESS, GGP, EU-SILC, LFS, HETUS, and ESPAD.

1.3 AN EXAMINATION OF THE EXISTING LITERATURE ON COMPARATIVE SCHOLARLY WORKS AT THE EUROPEAN LEVEL

In this section, two different research sectors for scholarly works are highlighted. A brief literature review on the social indicators that can act as causal mechanisms of crime is presented in Sections 1.3.1 and 1.3.2. After that, Section 1.3.3 describes studies that examine crime levels and explain trends on the basis of theoretical frameworks (Rosenfeld and Messner 2009; Aebi and Linde 2010, 2012a).

1.3.1. A BRIEF LITERATURE REVIEW ON THE SOCIAL INDICATORS THAT CAN ACT AS CAUSAL MECHANISMS OF CRIME

From Quetelet onwards, the contribution of quantitative analysis to understanding crime and society has often been examined (Ahearn 2008; Altindag 2011; Bovenkerk 1993; Britt 1997; Buonanno et al. 2010; Ceobanu 2011; Eisner 2002; Farrington 1986; Georgiou 2010; Greenberg 1985; Hirschi & Gottfredson 1983; Liska & Bellair 1995; Lodhi & Tilly 1973; McCall & Nieuwbeerta 2007; Rossow 2001; Sampson & Groves 1989; Sampson & Wilson 1995; Steffensmeier et al. 1989;; Steffensmeier & Clark 1980; Tittle & Meier 1990; Van Dijk et al. 2005; Welch 2009).

Currently, the general value of quantitative work for critical criminology is undeniable, and it dominates the discipline of criminology, having characterized a significant part of the articles published in criminology journals over recent years (Tewksbury, De Michele, and Miller 2005). The quantitative approach is often the best, or even the only way, of testing decisive topics within critical criminology. Frequently, a large body of quantitative evidence supports several central propositions of critical criminology so that quantitative analysis can be used and has been used in the service of a just society from a critical criminology perspective (Barkan 2009).

1.3.1.1 CRITERIA FOR CHOOSING STUDIES

In order to find relevant literature, we first used the La Cattolica University Database and entered the following keywords: age, gender, race, immigration, economic, unemployment, urbanization, family, social class, education, drug, alcohol, lifestyle, and time use. The studies described in this chapter belong to three thematic areas: sociological, demographic, and economic (Aureli 2002). Each area has

been subdivided into topics. In general, each study analyzes more than one topic and sometimes more than one area; in this case, the study has been associated with the main or prevalent one. The searches yielded the following journals:

- For the criminological area there was: the *Journal of Quantitative Criminology*, *Criminology: An Interdisciplinary Journal*; the *British Journal of Criminology*, the *Journal of Criminal Law and Criminology*, the *Journal of Research in Crime and Delinquency*, the *European Journal on Criminal Policy and Research Criminology*, *Critical Criminology*, *Crime, Law and Social Change*; and *Crime and Justice*.
- For the sociological area there was: the *American Social Review*, the *International Journal of Comparative Sociology*, the *American Journal of Sociology*, *Social Science Quarterly,* and the *British Journal of Sociology*.
- For the economic-political area there was: the *Journal of Economic Perspectives*, *Public Performance & Management Review*, the *Journal of Political Economy*, *Critical Social Policy*, and the *International Economic Review*.

From all the articles identified, the literature review reported in this section takes into account scholarly works that:

- Have a comparative perspective (An effort has been made to report European studies when available; the most influential criminological and sociological journals analyzed are American though, so the greater part of articles published have examined data collected in the US.)
- Are country-level studies
- Use social indicators to explain crime levels by taking into account criminological theories

1.3.1.2 The use of social indicators to explain crime levels in Europe

1.3.1.2.1 The demographic correlates of crime

The primary demographic characteristics of age, sex, and race are among the most powerful and robust individual-level risk factors for criminal offences and victimization (South and Messner 2000). They do not provide causal mechanisms but are often used as control variables. In Table 4, there is some data about the females, minors, and aliens suspected of being criminal offenders in 2006 in the EU countries. This data has been reported because demographic variables are very commonly used in

quantitative analysis (Steffensmeier and Allan 1996; Steffensmeier et al. 1989; Levit 1999) and their effects are usually more thoroughly examined.

Table 4. Percentages of females, minors, and aliens from EU countries among suspected criminal offenders, year 2006

Country	Total offenders per 100000 pop.	of which % of Females	of which % of Minors	of which % of Aliens	% of EU citizens
Albania	288	3,8	8,6	0,8	-
Armenia	215	8,4	5,7	2,1	2,7
Austria	2875	20,4	15,5	28,3	36
Belgium	-	-	-	-	-
Bosnia-Herzegovina	-	-	-	-	-
Bulgaria	840	9,2	14	1,4	26,4
Croatia	1505	10,7	10,5	6,1	36,2
Cyprus	695	-	-	33,3	-
Czech Republic	1193	13,6	7,2	6,7	-
Denmark	-	-	-	-	-
Estonia	1296	10,4	13,5	31,3	2,6
Finland	7244	28	12,3	9,2	37,7
France	1787	15,1	18,3	20,7	-
Georgia	385	5,9	5,9	-	-
Germany	2774	24,1	16,6	22	-
Greece	3790	13,6	6	16,4	-
Hungary	1233	14,2	12	1,4	69,9
Iceland	1303	17,8	2,7	9,2	-
Ireland	-	-	-	-	-
Italy	-	-	-	-	-
Latvia	194	40,2	47,8	7,2	67
Lithuania	1053	19	12,3	1,1	29,6
Luxembourg	-	-	-	-	-
Malta	-	-	-	-	-
Moldova	585	10,7	10,3	0,6	0
Netherlands	2192	14,2	19,6	-	-
Norway	-	-	-	-	-
Poland	1542	9,4	9,1	0,4	25
Portugal	2463	15,6	-	-	-
Romania	875	11,6	7,8	1	29,3
Russia	955	15,1	10,9	3,9	-
Slovakia	2136	6,5	2	1,2	-
Slovenia	2241	13,6	7,4	11,4	34,5

Spain	-	-	-	-	-
Sweden	1208	19,8	14	-	-
Switzerland	-	-	-	-	-
TFYR OF Macedonia	924	-	-	1,7	-
Turkey	-	-	-	-	-
Ukraine	459	13,1	7,9	0,8	-
UK: England and Wales	-	-	-	-	-
UK: Northern Ireland	-	-	-	-	-
UK: Scotland	-	-	-	-	-
Mean	*1580*	*15*	*12*	*9*	*31*
Median	*1221*	*14*	*11*	*5*	*30*
Minimum	*194*	*4*	*2*	*0*	*0*
Maximum	*7244*	*40*	*48*	*33*	*70*

Copied from: Aebi, M., et al (2010), European Sourcebook of Crime and Criminal Justice Statistics, WODC, Den Haag.

This table draws attention to three demographic features that are commonly monitored: age, gender, and race. In this case, there are two categories that generally have a high risk of becoming victims (females and minors). Their rates of suspected offenders show that in some countries, they rank high as being offenders themselves. Additionally, these results show that the highest rates for female offenders are recorded in Finland (28) and Germany (24.1), while the lowest rate is found in Albania (3.8). For minor offenders, high values were recorded in Macedonia and the Netherlands, while a low value was found in Iceland. Cyprus and Estonia had the highest percentage of criminal aliens, while Poland recorded the lowest number. Latvia has very peculiar rates with 40% for female, 47% for minors, and 67% for aliens.

Data reported in Table 4 shows that there are remarkable differences among countries with respect to age, gender, and race. This table suggests that it is not possible to look at crime data without considering the social features that a country has because they may help in interpreting existing crime levels. For example, the highest rate of female offenders in the Northern countries could be explained by their characteristic of being more advanced, and likewise, the highest rates of minor offenders in the Eastern countries could be explained by their weak social linkages (in families and institutions) caused by the collapse of Soviet system. Finally, the rate of alien offenders may be higher in countries that are subject to broad waves of immigrants.

Numerous studies have shown that young people, males, and aliens have a high risk of becoming

offenders (Steffensmeier and Allan 1996; Steffensmeier et al. 1989). It is essential to consider that the age pyramid changes over time and that this element can influence crime rates. Levitt (1999) explained the importance of considering crime trends that are attributed to changes in population composition, especially with regard to age, because future trends in crime are based on these projected demographic patterns (e.g. baby boomers or particular waves of migration).

Age

The assertion that crime is negatively correlated with age is well established and known in criminology. Quetelet observed in 1831 that crime tends to peak in adulthood and then decrease with age (Steffensmeier et al. 1989). There are studies that have analyzed how the crime and age relationship changes in space and over time (e.g. Greenberg 1985), and studies like Hirschi and Gottfredson's (1983) have observed how the age-crime curve is invariant in space and over time.

There have also been studies that highlight how different crimes peak at different ages (e.g. Levitt and Lochner 2001). Steffensmeier et al. (1989) proposed a study that took into account crime in the years 1940, '60, and '80 in the US and its correlation with age. They observed the societal context and in particular, the industrialization process that caused anticipated criminal behaviour in the population. In a similar vein, Imrohoroglu, Merlo, and Rupert (2004) analyzed property crime rates in the US over different years, observing that the baby boomer demographic has been a decisive factor in explaining and understanding crime rate trends in the US for the 1990s. Finally, Buonanno et al. (2010) showed that different age structures within a population have a significant effect on crime by comparing American and European pyramid populations and crime.

Gender

The demographic characteristic of sex has been the purpose of many studies; in general, males are more involved in crime as both victims and offenders. This view has been explained by 'the preponderance of male theorists in the field' and the fact that women have traditionally been perceived as 'exceptionally law-abiding' (Klein 1976, quoted by Arnot and Usborne 1999). Gender differences are lower where female social indicator rates are more similar to men's. This is an example of Steffensmeier's so-called 'dark side of female liberation' and it will be fascinating to see how female crime rates will change over space and time.

Race and Immigration

Results related to the relationship between race and crime are controversial. The Chicago School studied crime in multiethnic societies, analyzing if and how changing crime rates were influenced by race. They did this by following several studies. One of the most well-known studies is that of Wolfgang and Ferracuti (1967), which identified a 'subculture of violence' among African Americans. Contrary to popular belief, however, Wright et al. (2009) presented a study that showed that African American communities have lower crime rates than the white population. They argued that the real issue is the fact that African Americans have been and continue to be overrepresented as offenders.

Moreover, there are studies that introduce social indicators to the relationship between race and crime in order to explain, understand, and contextualize the results. For example, LaFree et al. (1992) proposed a study in which burglary, homicide, and robbery arrest rates in the United States since 1957 were compared between whites and African Americans. This study highlighted that white crime rates are positively correlated with economic conditions, while African American rates do not have this correlation.

Problems with the overrepresentation of immigrants as offenders was examined by Ceobanu (2011), who took data from the ESS and compared it with immigrants' perceptions and actual crime rates in a sample of European countries. The results showed that attitudes towards immigrants and crime were influenced by having immigrant friends or being a resident of an ethnic neighbourhood. In another study, Stowell et al. (2009) analyzed historical series of crimes and immigration waves in the US from 1994-2004 to assess the impact of the immigration waves on crime rates. Following a similar course of thought, Solivetti (2010) proposed a study in Western European countries that observed how immigrant crime rates are lower than native rates.

1.3.1.2.2 THE ECONOMIC CORRELATES OF CRIME

Although there are numerous studies and publications on crime and economic indicators, studies about crime and economic indicators in the EU countries are extremely rare. A study of this kind by Entorf and Spengler analyzed crime and social indicators in the EU15. In 2001, the European Commission funded a study by Horst Entorf and Hannes Spengler concerning the causes and consequences of crime in Europe (Entorf and Spengler 2002). This book contributed to a better

interdisciplinary understanding of the interactions between crime and economic, demographic, and social features. The Council of Europe and national governments regularly collect crime statistics, while Eurostat collects socio-economic indicators; the period covered by the national-level data used in the study spanned from 1990 through 1996 for the EU15. Entorf and Spengler described the most serious crime categories across many industrialized countries but they especially focused on the EU member states. They then performed a multivariate analysis of the causes and consequences of crime based on international and previously unexplored national data sets. Their empirical results identified the following influential crime factors:

- A small number of divorces and earlier marriages significantly reduced delinquency
- A high level of female labour rates increased crime
- Unemployment increased crime
- Low, fixed-term working contracts increased crime

In particular, the relationship between unemployment and crime has been the object of divergent points of view. Studies have produced mixed results, with some studies finding the expected positive effect, some finding no effect, and others finding a negative effect. Gottfredson and Hirschi (1990) held deep doubts about the association between unemployment and crime, while Becker (1968) and Ehrlich (1973) believed that unemployment is deeply associated with crime because utility from legitimate work decreases the opportunity costs of illegitimate work. Ehrlich (1973) found that crimes against property 'vary positively with…income inequality…and with the median income.'

Altindag's (2011) and Britt's (1997) investigations explored the impact of unemployment on crime in Europe. Even though their studies were conducted during different times, they came to the same conclusion that unemployment has a positive impact on monetary crimes. The unemployment rate can be disaggregated into various components like gender, education, and the unemployment status itself. Results from various studies have shown that about 65% of crime is due to the unemployment of males with low education. Georgiou (2010) analyzed crime rates from 2000-2008 in a sample of European countries and identified an optimum (minimum) level of crime within a critical level of poverty setting; any risk of poverty beyond this critical level would see a rise in crime.

1.3.1.2.3 THE SOCIAL CORRELATES OF CRIME

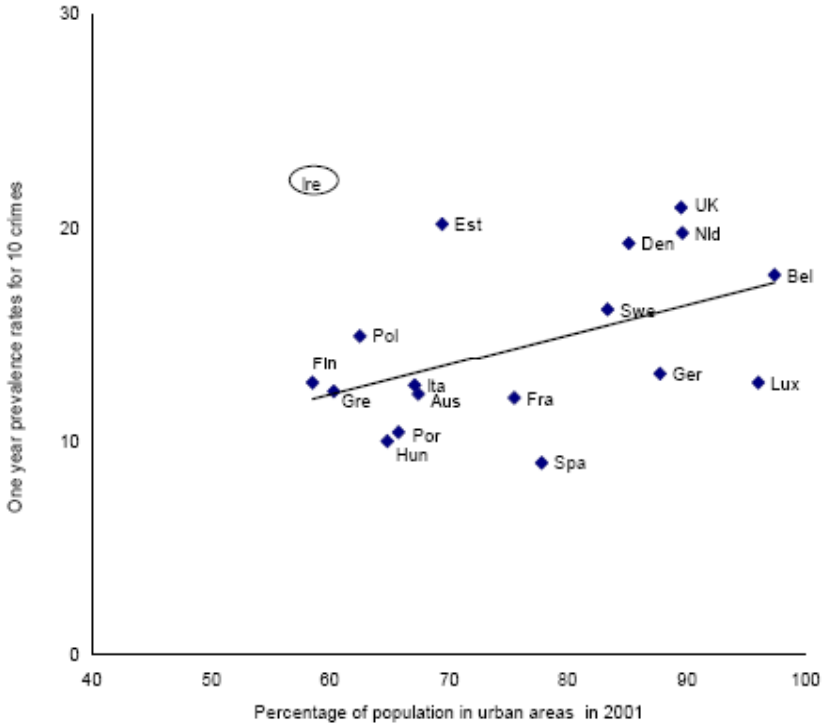
The studies in this area are the most delicate because quite often social indicators belonging to the sociological field are used in micro level studies. In this section, however, some studies that may reveal the use of social indicators in sociology at the macro level will be explored.

Cities and Urbanization

The literature concerning a city's dimensions and crime rates is broad and has arrived at different conclusions. In general, police, victimization, and self-reported data (Sutherland and Cressey 1978) all suggest a positive cross-sectional relationship between population settlements and crime rates. McCall and Nieuwbeerta (2007) analyzed homicides in 117 cities, representing 16 European countries, and their results showed that a city's dimension and urbanization level are significant predictors of homicide rates.

Van Dijk et al. (2005) examined the relationship between victimization rates from ICVS surveys and levels of urbanization in Western Europe. They observed that in Western Europe, the inhabitants of highly urbanized areas are at greater risk of becoming crime victims than those living in small towns. Figure 9 illustrates the association between crime levels and urbanization rates in a sample of European countries. It shows that countries with a high level of urbanization also have a high level of crime (e.g. the United Kingdom, the Netherlands, etc.) while low urbanization translates to a low crime rate (e.g. Portugal, Hungary, etc.). Ireland is an outlier because its urbanization and crime levels are not significantly correlated.

Figure 9. Urbanization and levels of common crime in 17 European countries, years 2004-2005



Copied from Van Dijk, J., et al. (2005), The Burden of crime in the EU – Research report: a comparative analysis of the European crime and safety survey, EUICS

Family links disruption

Hirschi (1969) hypothesized that people with strong social bonds (which are comprised of attachment, commitment, involvement, and belief) will conform to societal expectations and people with weak social bonds will commit crimes. In this context, marriage and divorce rates may be significant social indicators to monitor. Marriage rate appears to have an inverse relationship with crime; married people have a lower probability of committing crimes and benefit in terms of 'moral behaviour' from this institution. In general, people are less likely to be involved with crime with increasing age but the effect of marriage seems to be stronger than that of age, so it is possible to conclude that marriage at any age inhibits crime. In the United States, Ahearn (2008) analyzed divorce and its correlation with unemployment and crime as a whole, while Caceres-Delpiano et al. (2010) evaluated the impact of unilateral divorce on crime; both of their results highlighted that unilateral divorce has a positive impact on violent crime rates.

Social class

Controversy over the relation between social class and crime has occupied sociological literature since the late 1950s (Tittle and Meier 1990). In general, this relationship has been researched in terms of economic conditions and education. For example, Georgiou (2010) examined the effect of education levels on crime in a sample of EU countries; the results showed that education has a negative impact on crime.

Drugs and alcohol

The use of drugs or alcohol is one of the most common causes of crime and a number of recent studies have examined this aspect. Eisner (2002) analyzed violent crime and property crime within the context of alcohol abuse and drug use for a sample of European and non-European countries; the rates of crime were higher in less developed countries where there was high inequality and low levels of social control.

Welch (2009) analyzed alcohol consumption and homicide rates in a sample of Eastern countries before and after the fall of the Soviet Union. The conclusion was that higher drinking rates were correlated to higher homicide rates, but regression analysis did not confirm the hypothesis that government disorganization was the cause of high alcohol consumption. In a similar study, Rossow (2001) analyzed alcohol use and homicide rates in some EU countries through the use of correlation analysis, the results of which showed that alcohol sales are positively correlated with homicide rates. Gatti et al. (2013) suggested that the association between alcohol use and delinquency are reciprocal rather than unidirectional. In particular, they explained that alcohol use constitutes a risk factor for criminal behaviour, and involvement in delinquency increases the risk of alcohol consumption and, especially, of alcohol abuse. Aebi and Linde (2012b) reviewed studies examining homicide trends from 1960 to 2000 and concluded that annual changes in alcohol consumption are positively correlated with homicide rates.

1.3.2 Some considerations on the utilization of social indicators and types of crimes explored in the literature

This section will systematically classify the quantitative components (i.e. social indicators) that have been used in, and the types of crime that have been discussed by, the literature. The general consensus is that the social indicators used and analyzed in scholarly works are not clearly defined. In several cases, they are given a name that explains the topic of interest but no time is spent on the exact concept that they measure. The table below summarizes the main crimes and social indicators that are used in the scholarly works mentioned in Section 1.3.1.

Table 5. Main crimes and social indicators used in scholarly works

Study	Crime	Social indicator
Bjerk (2007)	all crime – aggregated	race, household income
Britt (1997)	homicide, rape, assault, robbery, burglary, larceny, motor theft	unemployment rate, age
Buonanno et al. (2010)	total offences, property, and violent crime	share of young males, immigration rate, abortion rate, unemployment rate
Cohen and Felson (1979)	rape, assault, robbery, personal larceny	age, types of jobs, marital status, time use
Entorf and Spengler (2002)	theft, burglary, rape, assault	divorce rate, female labour rate, unemployment rate, job contracts
Farrington et al. (2004)	crime – general	unemployment rate, school dropout rate
Hirschi and Gottfredson (1983)	personal and property offences	age, gender
Kapuscinski, Braithwaite, and Chapman (1998)	homicide	unemployment rate for males and females, marriage and divorce rates, % urban, % 18–24 year old males, GDP growth, % motor vehicles
McCall and Nieuwbeerta (2007)	homicide	household size, median income, population size, population per square kilometre

Rosenfeld (2009)	homicide	unemployment rate, real GDP per capita, Index of Consumer Sentiment (ICS)
Rosenfeld and Messner (2009)	burglary	GDP, unemployment rate, Gini ratio, police, infant mortality, social welfare, divorce rate, sex ratio, age
Solivetti (2010)	different types of violent and property offences	immigration flows, first and second generation immigrants, immigrant prison rate
South and Messner (2000)	rape, assault, robbery, violent crime	% non-white, population size, relative group size, heterogeneity, racial inequality
Steffensmeier et al. (1989)	20 different offences	age, median age, peak age

The following variables have been applied in relation to demographic correlates:

- Age: classes of three or four modalities with particular attention to the share of young people, ages 15-24, in the population. Other considerations are peak age, median, and mean age.
- Gender: the share of males/females in a population.
- Race and immigration: immigration flows, the share of foreigners in a population, nationality dummies, black/white dummies, interracial marriage percentages, heterogeneity index, first and second generation immigrants, and imprisoned immigrants' rate.

With regard to economic correlates, the succeeding variables have been employed:

- Economic conditions: median income, GDP per capita, Gini coefficient, ICS, and the types of jobs available.
- Unemployment: unemployment rate, percentage of a population below the poverty line, male/female workforce participation rate, share of workers working part-time, and the share of workers with fixed-term contracts.

Social correlates have been studied through the lens of the subsequent variables:

- Cities and urbanization: population per square kilometre, population density, population size, population change percentage, and percentage of motor vehicles.

- Family: proportion of separated adults among those who have ever been married, percentage of households with single parents with children, number of children, percentage divorced, percentage of children not living with both parents, abortion rate, and infant mortality.
- Social class: percentage of the population that attended high school or college and duration of education.
- Lifetime: households and time use.

Past scholarly works have examined a plethora of crime categories, among them are:

- Total offences
- Broad crime categories (e.g. against a person, against property)
- Very detailed types of crime like homicide, rape, aggravated assault, robbery, burglary, larceny, motor vehicle theft, etc.

It is worth noting that new crime categories, like 'crimes against computers', have yet to be examined by a substantial number of scholarly works.

1.3.3 Comparing crime levels in Europe

Section 1.3.1 mentioned some of the scholarly works that describe crime levels on the basis of theoretical paradigms. This section hones in on a selection of studies that have properly focused on crime trends in Europe and will seek to explain their findings.

Rosenfeld and Messner (2009) compared American and European trends in domestic burglary, suggesting that crime declines occurred in tandem because they were both influenced by upturns in the economy.

Aebi and Linde (2010, 2012a) analyzed the evolution of crime in Western Europe from 1988 to 2007, combining data from police statistics and crime victim surveys. Afterwards, Aebi and Linde (2011) studied the evolution of people convicted in 26 European countries from 1990 to 2006 for six offences—intentional homicide, assault, rape, robbery, theft, and drug-related offences. These trends were established for the whole of Europe as well as for a cluster of Western European countries and a cluster of Central and Eastern European countries. Their results showed that property offences and homicides have been decreasing since the mid-1990s, while violent and drug offences increased during the period under their study.

Aebi and Linde (2010, 2012a) explained that decreasing property trends are dependent on the combination of at least three factors: a saturation of the Eastern market, a reinforcement of police measures against transborder crime, and an improvement in security measures in Western European households (Lamon 2002). The increase in violent offences depended on the combination of several factors, like changes in a youth's free time, as provoked by the development of the Internet, demographic changes, the rise of episodic heavy alcohol consumption, and street gangs.

CHAPTER 2 – RESEARCH PROBLEM

This chapter describes the limitations of the existing literature, which is followed by an explanation of the objectives of the thesis and its research questions.

2.1 LIMITATIONS OF THE EXISTING LITERATURE

The literature review in Chapter 1 highlighted some gaps that will be explained in this section. This thesis builds upon Entorf and Spengler's (2002) work, which developed a significant and important study that examined crime and social indicators in the EU15. The first limitation relates to this work's spatial dimension in terms of the countries that belonged to the European Union in 2011, the moment in which this thesis was started[17]. In 2002, Entorf and Spengler's work covered the EU15 (at that time, the EU encompassed 15 countries) and notwithstanding how hard one looks for more literature that covers the same topic, there are no studies that have systematically and quantitatively examined the impact of economic and social factors within contemporary society on crime levels in the EU27.

As we have seen in the literature review, there are several scholarly works related to crime and social indicators, but they have generally focused on a sample of European countries and have only examined the weight that one particular dimension of contemporaneous society has had on crime levels. Just to mention some examples, Hirschi and Gottfredson (1983) addressed the topic of age and examined the similarity between the age-crime distributions through time (1835-1980) and across space (Argentina, the United States, France, Sweden, Japan, and England and Wales). Meanwhile, Bovenkerk (1993) primarily concentrated race by discussing crime patterns in Europe that have emerged as a result of societies becoming multiethnic. More recently, Georgiou (2011) studied the poverty factor and how it causes criminal actions in a sample of European countries. McCall and Nieuwbeerta (2007) examined the relationship between homicide and urbanization in 117 cities within 16 European countries. Solivetti (2010) explored the linkage between crime and immigrants in Western European countries and Welch (2009) analyzed alcohol consumption and homicide rates in a

[17] The European Union was established on 1 November 1993 with 12 Member States. Their number has grown to 27 as of 1 January 2007 through a series of enlargements; 1 July 2013 saw the establishment of the EU28: the EU27 + Croatia.

sample of Eastern countries.

The idea of combining different studies and results is attractive and could yield a clear description of social indicators that have significant relationships with varying types of crimes in the EU27. For example, an assortment of spaces, samples, variables, and methods have been used to analyze age-crime connections (Steffensmeier et al. 1989; Levitt and Lochner 2001; Farrington 1992) but extending such results remains a challenge. Such attempts continue to be hampered by methodological differences stemming from the studies and their numerous, conflicting conclusions.

Confusion about variables is another factor that causes difficulties. In fact, in many cases, they are ambiguous and not well explained; there is no clear definition for them. What tends to emerge from this situation is a collection of ambiguous and conflicting findings in the literature that do not facilitate the description of evidence based on crime categories or the systematization of social indicators that influence crime levels in the EU27. This means that no clear relationship between different types of crime and social indicators in the EU27 currently exists, even though such a correlation could be represented by a simple matrix (x*y) that crosses the 'type of crime' (x) by its 'social indicator' (y) in the EU27, effectively describing 'the big picture' of crime in Europe.

Not having a good understanding of the linkage between crime and social indicators in the EU27 is a problem caused by the fact that there is no crime evidence for the EU27 and no clear data on the potential risk factors for the whole of Europe. This reality exists even though the European Commission and the Amsterdam Treaty state that an overview of crime in the EU27 is strictly necessary. In this context, having a clear framework with statistical information on crime and social indicators for the EU27 can provide information concerning future risk factors that should be monitored.

The literature has highlighted another gap that relates to the temporal dimension of the crime-social indicator: there are no studies covering the EU27 that also explain crime trends on the basis of significant social indicator tendencies over time. Some studies that have attempted to analyze this aspect have focused on a particular case study. Steffensmeier et al. (1989) used arrest data from the FBI's Uniform Crime Reports for the years 1940, 1960, and 1980 as a means of examining the age-crime distribution. They sought to determine whether there is a single pattern that is constant over time and across crime categories. Similarly, Imrohoroglu, Merlo, and Rupert (2004) analyzed property

crime rates in the US across different years, observing that the baby boomer demographic has been a decisive factor in explaining and understanding crime rates in the 1990s. More recently, Buonanno et al. (2010) have shown that different age structures within the population have a significant effect on crime when comparing American and European pyramid populations against it.

Meanwhile, other studies have examined crime trends and explained them on the basis of theoretical evaluations (Aebi and Linde 2010, 2011, and 2012a). This gap is hugely significant because a study that explains crime trends on the basis of significant social indicator tendencies over time would allow for base considerations of crime trends in terms of measurable and quantifiable observations. These discussions could then potentially lead to the identification of significant social indicator trends instead of resulting in abstract concepts that are challenging to measure. Temporal comparisons are also essential for the development of a knowledge-based system of effective and efficient policies for the prevention of and fight against crime. They need to be more thoroughly developed in order to better address policies and interventions.

The last observation is related to the statistical methods employed in research. Descriptive statistics (e.g. average, etc.) have been used in many studies and can help describe the main variable's features, but in many cases, they do not permit us to pick out more complex connections. Multiple regression permits the examination of a relationship between one dependent variable (Y) and one or more independent variables (Xi) by testing which set of variables is influencing behaviour; at present, though, it has only been used in a limited number of studies (Entorf and Spengler 2002). Multivariate statistics, like cluster analysis, have been used in a small number of studies (Smit et al. 2008) even though these techniques would allow the identification of homogenous sets of countries, making it possible for temporal comparisons to take into account not just single countries, but also groups of countries. This development could reduce the impact that divergent definitions or statistical rules may have on trends (Aebi and Linde 2012a; Smit et al. 2008). Statistical techniques will permit us to conduct accurate analyzes and build this thesis on a solid foundation.

2.2 OBJECTIVES

This study has two objectives that seek to explain the linkage between crime and social indicators and to compare trends in the 27 EU countries. These objectives are represented by the titles 'Measuring the association' (first objective) and 'Comparing trends' (second objective), respectively.

1. The first objective of the thesis is to explain crime levels in the EU27[18], as distinguished by offence type, using a set of social indicators that describe the economic and social aspects of contemporary society. These indicators will be chosen on the basis of three macro theoretical frameworks (the modernization theory, civilization theory, and opportunity theory) in order to assess the validity and extensions of the three macro theories in Europe.

This first objective proposes a framework of 'crime-social indicators' that will be as exhaustive and broad as possible in order to emphasize the social indicators that are related to different types of crimes in Europe. In particular, satisfying this objective will make it possible to:

- Take into account a sample of EU countries that is broader than the one used by Entorf and Spengler (2002)[19].
- Propose a table of 'crime-social indicators' that identifies the social indicators for each type of crime that is relevant to the European context (i.e. a table that will identify risk factors).
- Analyze the existent link between dependent variables (crimes) and explicative variables (social indicators) and find the value (+ or -) of this link.
- Contribute to a better understanding of the interactions between criminality and economic and social factors so as to understand the social indicators that influence different types of crimes.
- Assess the validity of the three macro theories (the modernization, civilization, and opportunity theories) in explaining European levels of crime.

The second objective of the thesis is as follows:

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[18] When this thesis started (November 2011), the European Union was composed of 27 countries, so this thesis focuses on the EU27.

[19] In the selected period (2004-2005), HFA-DB collected homicide data for 30 European countries, while ICVS collected violent and property crimes data for 22 European regions (see Section 3.1.2.3).

2. On the basis of the significant social indicators selected at the conclusion of the first objective, the second part of this thesis will assess whether or not social indicator tendencies help explain crime trends in the EU27. This means that an effort will be made to dissect crime trends by taking into account measurable and quantifiable features (social indicator trends), which can further help in the evaluation of the selected social indicators to see whether or not they remain valid over time and can be relevant to future explorations of potential crime directions.

In Section 1.1.2.1, we saw that several authors (Aebi and Linde 2012a, etc.) suggested that examining crime trends not only in single countries, but also in groups of countries could reduce the impact of divergences in crime between countries due to legal definitions, statistical counting rules, etc., so a sub-objective of this section is the identification of homogenous groups of countries. In particular, achieving this objective would make it possible to:

- Identify homogenous groups of countries in terms of their social and economic features.
- Check crime and social indicator trends over time[20] in the EU27.
- Assess whether or not selected social indicators in the first objective have temporal validity in explaining crime trends in the EU27. This will be measured by an agreement between significance and trends and would permit the identification of a set of social indicators that could be used to monitor crime in the future.

[20] From 1995 to 2007

2.3 RESEARCH QUESTIONS

The following research questions will be examined in this thesis.

1. Is it possible to explain crime levels, distinguished by offence type, in the EU27, by using a set of social indicators that are selected on the basis of the three macro theories (the modernization, civilization, and opportunity theories)? Can macro theoretical frameworks explain linkages in crime?

This is the first set of research questions, connected to the first objective, and it contains a list of sub-research questions:

a. Which data sources are most useful in examining the association between crimes and social indicators?

b. How can we operationalize three macro theories (the modernization, civilization, and opportunity theories) into measurable variables (social indicators)?

c. Is it possible to apply the analysis in a sample that contains more than 15 European countries (Entorf and Spengler 2002), in particular, for the EU27?

d. How can we measure this association? Is there any linkage between the selected crimes and social indicators? Are there any associations between the types of crimes?

2. Is it possible to explain crime trends in the EU27 on the basis of significant social indicator (selected in the first objective) tendencies? Taking into account suggestions from researchers such as Aebi and Linde (2012a) and Smit et al. (2011) to examine crime trends in groups of countries, is it possible to sort for homogenous groups within European countries? Which countries would belong to each group?

This second set of research questions, connected to the second objective of the thesis, also contains a list of sub-research questions:

a. Which data sources are appropriate in comparing trends?

b. Which temporal periods may be used to compare trends?

c. How can we measure the variations in crime over time? Which variations translate into social indicators? Are they in agreement?

CHAPTER 3 – DATA AND METHODS

This chapter is divided into two parts, which explain the methods used for the first objective (measuring the association between crime and social indicators in Europe) and the second objective (comparing trends between crime and social indicators in Europe) of this thesis, respectively. Data analysis and outcomes will be presented and discussed in the following chapters (Chapters 4 and 5).

3.1 DATA SET FOR MEASURING THE ASSOCIATION BETWEEN CRIMES AND SOCIAL INDICATORS IN EUROPE

This thesis uses a quantitative analysis method that permits the empirical testing of the proposed objectives; such testing will allow us to move beyond the narrative-review approach of the qualitative method. The available data only allows for a non-experimental approach.

3.1.1 CRIMES FOR MEASURING THE ASSOCIATION BETWEEN CRIMES AND SOCIAL INDICATORS IN EUROPE

In order to measure the association between types of crimes and social indicators in Europe, seven categories of crimes were selected. Being aware of the limits of police statistics in accurately measuring crime levels (Aebi 2004, 2008, and 2010), victimization surveys are believed to be the most adaptable data source that can be used to achieve the first objective of this thesis because they present comparable data among different countries. The crimes selected for this study are: car theft, motorcycle theft, burglary, robbery, sexual offence, assault and threat, and intentional homicide. These crimes have been selected by taking into account the data's completeness and its analogous crime categories, as examined in the ESCCJ[21]. In particular, data related to car theft and motorcycle theft is related to the mean victimization rate for car and motorcycle owners. The data expresses the 'victimization prevalence rates', which refer to the percentage of the population 16 years of age or older who have been victimized in a specific crime in the course of the year 2004; this information is

[21] Chapter 5 presents the examination of crime trends. Data from the ESCCJ will be taken into account. The first part of the thesis (Chapter 4) is functional in relation to the second part (Chapter 5) because it permits the identification of social indicators that have a relationship with crime. These social indicators will then be used to explain trends.

organized by country (national one-year victimization prevalence rates).

Victimization surveys do not collect data related to homicides, so in order to measure the association between homicide and social indicators, the WHO data set (HFA-DB) was chosen for the following reasons:

- Comparable data: The WHO compiles annual transnational mortality data sets based on national mortality statistics so as to have comparable data on intentional homicides (homicides and intentional injuries) in Europe. The WHO measures homicides using the International Classification of Diseases codes and these attributes make the homicide statistics derived from death registration data more easily comparable across countries than the equivalent of those derived from criminal justice data (Small Arm Survey 2012).
- Accuracy and analogy: Some authors have argued that the WHO data is the most accurate extant dataset (LaFree 1999; Neumayer 2003; Small Arm Survey 2012) and it is one of the more often used data sources in transnational homicide studies (LaFree 1999). Moreover, Aebi (2012a, 2012b), is one researcher who has used the WHO dataset; he has greatly inspired my work and is another reason why the WHO dataset (HFA-DB) has been chosen for this work.

3.1.2 Social indicators for measuring the association between crimes and social indicators in Europe

In order to measure the association between types of crimes and social indicators in Europe, this section explains the data gathering process for the social indicators and the operationalization of the macro theories (the modernization, civilization, and opportunity theories) into measurable units.

3.1.2.1 An integrated approach for choosing social indicators for measuring the association between crimes and social indicators in Europe

Lisa R. Muftić (2009) presented an interesting article that mentioned some of the most important criminologists who have proposed an applied and integrated approach to crime research over the last 20 years. She explained that criminology has been dominated by theories that are based on rigorously macro or micro level theoretical propositions. These theories, however, have generally failed in their ability to explain crime and criminality, so in response, some criminologists have begun to seek the integration of theoretical frameworks. It may be argued that almost all criminological theories are in

some form 'integrated theories', because they use consolidated concepts and propositions (Osgood 1998). In recent years, some attempts (Paternoster and Bachman 2001) have proposed integrated approaches that mix macro level and micro level theories so as to obtain an integrated theoretical model that maximizes the explained variance (Wellford 1989).

Akers and Sellers (2004) discussed how theoretical integration is a process in which two or more competing theories are combined to make a new theory, which provides a more comprehensive view of crime. Theories and integrated approaches use demographic, economic, and social indicators to examine associations between crime levels and risk factors. In this study, the integrated approach is the only one possible because an approach that is based purely on a single theory would, at best, produce partial results addressing a small portion of variance in crime.

3.1.2.2 Theoretical frameworks and the operationalization problem for measuring the association between crimes and social indicators in Europe

On the basis of suggestions offered in Section 3.1.2.1, a set of social indicators will be collected to explain crime levels in Europe and these indicators will be used to assess the generalization of three theoretical propositions (the modernization, civilization, and opportunity theories) across European crime levels. One of the main problems in the social sciences is the question of how to evolve from abstract concepts to concrete observations; the process that identifies phenomena in order to represent abstract concepts is called 'operationalization', which means to 'quantify abstract concepts'. Three steps are required to do this: first, define concepts; second, identify properties; third, choose social indicators. Below is a brief description of the steps.

a. Define concepts: The first step is giving a definition for the 'civilization', 'modernization', and 'opportunity' theories, since they are concepts that do not have absolute definitions. For example, Weisner and Abbott (1975) defined 'modernization' as the product of multiple experiences (e.g. schools, farms, institutions, etc.), while Smith and Inkeles (1966) stated that 'modernization' generally means a national state characterized by a complex of traits, including urbanization, high levels of education, industrialization, and high rates of social mobility.

   'Development' is a 'trait d'union' between the modernization and civilization theories; this is why it is used to operationalize the concepts of 'civilization' and 'modernization'. Shelley (1981) used the

following definition of development, which has been provided by the United Nations Educational, Scientific, and Cultural Organization (UNESCO): 'Development is an integral and interacting process, both requiring and precipitating far-reaching social, political, cultural and economic changes. It is by no means a[n] unlinear process that moves steadily and smoothly toward some predetermined set of models and values...[I]t is typically turbulent, often a downright disorderly and painful process.'

For 'opportunity', the most sensible definition is the one proposed by Cohen and Felson (1979), which explains the condition that may cause predatory acts as 'the convergence in space and time of likely offenders, suitable targets, and the absence of capable guardians against crime'.

b. Identify properties: These definitions allow us to identify the concepts and then the principle concept can be broken down into its different properties, which can then be operationalized into statistical indicators.

   The civilization and modernization theories may be operationalized through the concept of 'development', which is characterized by these properties: quality of life, education, economic development, health, technology, economic well-being, family relationships, and multiracialism. The opportunity theory may be operationalized through the concept of 'likely offenders, suitable targets, [and the] absence of capable guardians' (Cohen and Felson 1979), which are components based on these properties: security, work, life balance, economic well-being, multiracialism, networks, and technology.

c. Choose social indicators: The third step is choosing social indicators for each property. This choice is grounded in the available literature as well as data and the author of this thesis is conscious that many different choices could be made. An important factor to consider is that the concept changes according to historical periods, places, and cultures and therefore cannot simply be defined according to a theoretical format. However, the employed indicators are commonly used in similar research (BES, Istat-Cnel). The process and the choices made are simply one possibility in the universe of possibilities, and this particular route was taken while accounting for some guidelines regarding the representativeness of the social indicators.

   Currently, commissions (European or local) frequently have the task of selecting a set of social indicators to monitor social, economic, and demographic conditions concerning the entirety of

Europe or individual countries. Scientific research in this field (Eurostat 2010; CNEL and Istat – BES) shows that at the moment, no single statistical indicator is capable of fully representing a society's state of well-being, leaving us to refer to a range of measures. It is very common for different commissions to propose varied sets of social indicators.

Table 6 synthesizes the concepts needed to operationalize the properties and social indicators selected for civilization theory, modernization theory, and opportunity theory while table 7 shows the list of social indicators and defines them.

Table 6. Statistical indicators selected to operationalize civilization theory, modernization theory, and opportunity theory

Theory	Concept to operationalize	Sources for operationalization	Properties	Social indicators
civilization theory and modernization theory	development	Eurostat 2010; CNEL and Istat - BES.	quality of life	HDI
			education	school expectancy
			economic development	GDP per capita
			health	life expectancy at birth, infant mortality, healthy years
			technology	science and technology
			economic well-being	severe material deprivation
			family relationships	divorce
			multiracialism	acquisition of citizenship
opportunity theory	likely offenders, suitable targets, absence of capable guardians	Cohen and Felson 1979; Eurostat 2010;; CNEL and Istat - BES.	security	part-time status, burglar alarms
			work and life balance	long-term unemployment, resource productivity
			economic well-being	severe material deprivation
			multiracialism	acquisition of citizenship
			family network	household type
			technology	science and technology

Below the social indicators selected are briefly explained and defined.

According to Sharpe and Smith (2005), the best known composite quality of life scale is the United Nations Development Program's Human Development Index (HDI). This index provides single values that measure the health and longevity, knowledge (literacy and school enrolment), and standards of living (GDP per capita) of a population. It permits us to compare development levels in different countries.

Concerning education, 'school expectancy' informs on the expected years of education over a lifetime, has been taken into account.

Concerning economic development, 'GDP per capita' is the gross domestic product at purchasing power parity per capita; this means that the GDP per capita is the gross domestic product divided by the mid-year population. As for the theme of 'income index', traditional scholarly works generally

focus on per capita income or GDP as the most crucial factor leading to democracy.

For health, 'life expectancy' informs us of the mean number of years that a newborn child can expect to live and replaces other social indicators that are commonly used like 'mean or median age'. 'Infant mortality' measures the number of deaths per year of children younger than one year of age against the number of live births in that same year. The indicator of 'healthy life years' (HLY) measures the number of remaining years that a person of a specific age is expected to live without any severe or moderate health problems. In education, 'school expectancy' takes into account the expected years of education over a lifetime.

Data on marital status is a good indicator of family level disruption. The 'divorce rate' will also be taken into account here.

Immigration flows reveal information about the heterogeneity level that is present in a country; in particular, the social indicator 'acquisition of citizenship' depicts how immigrants have integrated into the host society. Cultural heterogeneity, which is a product of modern society, may lead to weaker communities (Howard et al. 2000; Sampson and Groves 1989).

Social indicators concerning economic structure are commonly used to examine the economic well-being of a country (Eurostat 2010). World Bank collects some measures of long-term structural change to evaluate the development process. There are social indicators for several relevant concepts, including economic growth and structure, government finance, labour force and employment, and money and prices. The social indicator selected is 'severely materially deprived people', which speaks to a population's poverty level and economic inequality conditions. It permits the assessment of economic structure in macro units (i.e. by countries).

Moreover, 'science and technology' may be a representative factor of the technological degree that a country has achieved. These social indicators aptly describe recent changes in modern and civilized society. Some of the social indicators selected above are good predictors for opportunity theory as well. In particular, these indicators are: 'acquisition of citizenship', 'severely materially deprived people', and 'science and technology'.

After that, this study considers two social indicators concerning the work and life balance that may be used to assess crime opportunities: 'resource productivity' and 'long-term unemployment rate'. 'Resource productivity' is the GDP divided by the domestic material consumption (DMC), where DMC

measures the total amount of materials directly used by an economy. The 'long-term unemployment rate' is the share of people who have been unemployed for at least 12 months in comparison to the total number of active people in the labour market. This provides information on the volume of inoccupation. These social indicators reflect significant information on disposable income and allow us to represent the poverty element and the lack of resources that may lead to crime.

For the area of the 'family network', the social indicator 'size of household' gives information on the distribution of a population according to household types (e.g. single person, one adult older than 65 years, single person with dependent children, etc.). Two modalities have been chosen for this analysis: 'single person with dependent children' and 'two adults with at least one aged 65 years or over'. Finally, for the security section, the selected social indicators are 'people employed part-time' and 'burglar alarms'. 'People employed part-time' represents the number of people employed part-time. Eurostat advises that the distinction between full-time and part-time work is made on the basis of a spontaneous answer given by the respondent. It is impossible to establish a more exact distinction between the two types due to the variations in working hours between Member States and branches of different industries. After that, 'burglar alarms' demonstrate the security precautions that households have taken to protect their houses against burglary.

In summary, these are the social indicators that are used to test both the civilization and modernization theories: 'HDI', 'life expectancy at birth', 'school expectancy', 'GDP per capita', 'infant mortality', 'divorce', and 'healthy years'. ' Acquisition of citizenship, 'severe material deprivation' and 'science and technology' will be used to test the civilization and modernization theories as well as the opportunity theory. The social indicators used to test only the opportunity theory are as follows: 'resource productivity', 'long-term unemployment', 'household type', and 'burglar alarms'.

Table 7. Social indicators list

Social indicator	Definition
human development index	combination of social indicators regarding life expectancy, education, and income indices
life expectancy at birth	mean number of years that a newborn child can expect to live
school expectancy	expected years of education over a lifetime, which is calculated by adding the single year enrolment rates for all ages
GDP per capita	gross domestic product per capita. The volume index of GDP per capita in Purchasing Power Standards (PPS is expressed in relation to the European Union's [EU27] average set to equal 100. If the index of a country is higher than 100, this country's level of GDP per head is higher than the EU average and vice versa.)
infant mortality per 1000 live births	number of deaths of children under one year of age during a year compared to the number of live births in that same year. The value is expressed per 1000 live births.
divorce per 1000 persons	number of divorces during the year compared to the average population in that year. The value is expressed per 1000 inhabitants.
healthy life years	measures the number of remaining years that a person of a specific age is expected to live without any severe or moderate health problems.
acquisition of citizenship	refers to grants of citizenship from the reporting country to people who have previously been citizens of another country or who have been stateless.
severely materially deprived people - % and per 1000 persons	covers indicators relating to economic strain, durability, housing, and the environment of the dwelling. Severely materially deprived people have living conditions severely constrained by a lack of resources. They experience at least four out of the nine following deprivation items: they cannot afford i) to pay rent or utility bills, ii) to keep their home adequately warm, iii) to face unexpected expenses, iv) to eat meat, fish, or a protein equivalent on every second day, v) a week holiday away from home, vi) a car, vii) a washing machine, viii) a colour TV, or ix) a telephone.
science and technology	tertiary graduates in science and technology per 1000 persons of a population aged 20-29 years
resource productivity	GDP divided by domestic material consumption. DMC measures the total amount of materials directly used by an economy.
long-term unemployment rate	the share of unemployed people for 12 months or more in the total number of active people in the labour market.
distribution of population by household types	distribution of population by household types (e.g. single person, one adult older than 65 years, single person with dependent children, etc.)
people employed part-time	number of people employed part-time.
burglar alarms	percentage of households with a burglar alarm

Sources: Elaborated from Eurostat, EU-SILC, LFS, HETUS, and WHO.

In the interest of transparency, Table 8 shows the data sources that were used to collect the social indicators reported in Table 7.

Table 8. Data sources for selected variables

DATABASE	VARIABLES
Selected Eurostat indicators	life expectancy at birth, infant mortality per 1000 live births, healthy life years, divorce per 1000 persons, science and technology , acquisition of citizenship, school expectancy
The European Union Statistics on Income and Living Conditions (EU-SILC)	GDP per capita, resource productivity, severely materially deprived people - % of 1000 persons
The Employment and Unemployment (Labour Force Survey)	people employed part-time, very long-term unemployment rate
Harmonised European Time Use Surveys (HETUS 2000)	distribution of population by household types
European Health for All Database (HFA-DB)	human development index
ICVS – EU ICS	burglar alarms

3.1.2.3 Spatial and temporal dimensions for measuring the association between crimes and social indicators in Europe

This section summarizes the spatial and temporal coordinates used in measuring the association between types of crimes and social indicators in Europe. For the WHO, the HFA-DB's most recent data is related to the year 2011 for a sample of 55 European and non-European countries, while the most recent data from ICVS and the EU ICS are related to the years 2004-2005 for a sample of 22 European countries. The EU ICS collects data from Austria, Belgium, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, the Netherlands, Poland, Portugal, Spain, Sweden, and the United Kingdom, while the ICVS collects data for a larger set of European countries (the same countries as the EU ICS, as well as Bulgaria, Iceland, Norway, and Switzerland) and some non-European countries.

For homicides, a broader set of countries (30) has been taken into account and more recent data is available. The selected countries for this crime are: Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Iceland, Italy, Latvia, Lithuania, Luxemburg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, and the United Kingdom. Altogether, these countries account for the

EU27 and three of the four States that belong to the EFTA[22]: Iceland, Norway, and Switzerland[23]. Without taking into consideration the existence of newer accessible data (from the year 2011), the year 2004 has been selected for temporal homogeneity within the study.

Table 9 shows European crime data that has been collected by the WHO and the ICVS/EU ICS in 2004/2005. The table also indicates which countries belong to the EU27. For homicides, the regions included are the EU27, as well as Iceland, Norway, and Switzerland, while the victimization surveys of crimes include 19 of the EU27 countries, as well as Iceland, Norway, and Switzerland.

[22] The European Free Trade Association (EFTA) is a free trade organization between four European countries that operates in parallel with—and is linked to—the European Union.

[23] There is no data from the WHO for homicide in Liechtenstein.

Table 9. WHO and ICVS/EU ICS crime data for European countries, years 2004-2005

Country	WHO homicide	ICVS and EU ICS crimes	EU27
Austria	x	x	x
Belgium	x	x	x
Bulgaria	x	x	x
Cyprus	x		x
the Czech Republic	x		x
Denmark	x	x	x
Estonia	x	x	x
Finland	x	x	x
France	x	x	x
Germany	x	x	x
Greece	x	x	x
Hungary	x	x	x
Iceland	x	x	
Ireland	x	x	x
Italy	x	x	x
Latvia	x		x
Lithuania	x		x
Luxembourg	x	x	x
Malta	x		x
the Netherlands	x	x	x
Norway	x	x	
Poland	x	x	x
Portugal	x	x	x
Romania	x		x
Slovakia	x		x
Slovenia	x		x
Spain	x	x	x
Sweden	x	x	x
Switzerland	x	x	
the United Kingdom	x	x	x

3.1.2.4 Data Matrices for measuring the association between crimes and social indicators in Europe

Having sufficient data is not enough to apply statistical elaboration; the information needs to be organized into a format that permits further elaboration. In general, to combine statistical data into a matrix, it is necessary to identify the 'object' (x) component and the 'attribution' (y) component. Usually, the objects are displayed in rows, while the attributions are in columns. In this case, the table

is set up to present 'individual features', where the objects are the statistical units and the attributions are the features (variables) (Bolasco 1999).

The first data set (Appendix A) collects data for crimes from the ICVS and social indicators in 22 European countries while the second data set (Appendix B) collects data for completed homicide from the HFA-DB (WHO) and social indicators in 30 European countries. In summary, both datasets (Appendices A and B) collect figures respecting these conditions:

- Time: 2004-2005
- Space: 22 European countries for the ICVS offences (Appendix A) and 30 European countries for the WHO homicides (Appendix B)
- Variables: 15 social indicators and seven types of crimes

The temporal interval choice may be unpopular because it does not account for the most recently available data but it does have the following advantages for crime data. It:

- Has data for a broad sample of countries
- Avoids the utilization of different data sources, which would imply different definitions in terms of rules, units, time, etc.
- Uses 'old' data, thereby reducing the amount of missing data. In the case of missing data, however, the gap has been populated with the previous year's value, if it was available.

The social indicators data is complete and seldom yields missing data. For household information, the missing values have been refilled with values recorded in previous years; otherwise it would not have been possible to obtain a representative variable. The spatial choice to take into account two different country samples was fuelled by the desire to test data in a broad sample; in fact, crimes collected from victimization surveys were only available for 22 regions, while the WHO homicide data set was larger. This decision permitted the testing of statistical elaborations in a wider sample of European countries (30).

3.2 METHODOLOGY FOR MEASURING THE ASSOCIATION BETWEEN CRIMES AND SOCIAL INDICATORS IN EUROPE

In order to examine the relationship between crimes and social indicators, we must first measure their degree of association with an index named the 'Pearson coefficient' (Section 3.2.1). It is then possible to estimate the regression equation that permits us to predict the values of a dependent variable after identifying the values of the independent variables (Section 3.2.2). This means that correlation analysis will facilitate the punctual identification of social indicators that have a significant linkage with different types of crimes. In addition, multiple regression analysis can then attempt to synthesize a model for different kinds of crimes and social, economic, and demographic features.

3.2.1 CORRELATION ANALYSIS *FOR MEASURING THE ASSOCIATION BETWEEN CRIMES AND SOCIAL INDICATORS IN EUROPE*

Correlation analysis explores the link that exists between a dependent variable (crime) and explicative variables (social indicators), the value (+ or −) of this link, and the link type (linear or nonlinear). When variables are quantitative, there are many ways in which to analyze the relationship between them. It is possible to measure their degree of association (correlation) with an index, usually called the 'Pearson coefficient' or the 'linear correlation coefficient' (r). This method is broadly used and is particularly useful because the correlation between two variables reflects the degree to which they are related. The Pearson correlation reflects the degree of linear relationship between two variables. It has values that go from −1 (a perfect negative correlation) to +1 (a perfect positive correlation), thus $-1 \leq r \leq +1$. The mathematical formula for computing r is:

$$r = \frac{n\sum xy - \left(\sum x\right)\left(\sum y\right)}{\sqrt{n\left(\sum x^2\right) - \left(\sum x\right)^2}\sqrt{n\left(\sum y^2\right) - \left(\sum y\right)^2}}$$

where n is the number of pairs of data. The Pearson correlation can be used in tandem with a two-tailed level test. This will be a good point to control in cases where two or more variables with the same meaning have been inserted.

3.2.2 MULTIPLE REGRESSION ANALYSIS FOR MEASURING THE ASSOCIATION *BETWEEN CRIMES AND SOCIAL INDICATORS IN EUROPE*

The correlation analysis may highlight partial correlations between variables and after that, it can be interesting to combine variables, because in social research, phenomena are generally complex; many factors interact within them at the same time, so it is important to see which factors are significant and how they interact. Multiple regression analysis is useful in these instances because it examines the relationship between one dependent variable Y (crime) and one or more independent variables Xi (social indicators). It can contribute a better understanding of the interactions between criminality and economic, demographic, and social topics, aiding to our understanding of the social indicators that influence different crimes. To theorize, the equation is:

$$Y = \beta_0 + \beta_1 X_1 + \ldots + \beta_m X_m + \varepsilon$$

while the general model is:

$$Y = f(X, \beta_0 \ldots \beta_m) + \varepsilon$$

where Y is the dependent variable, X is the independent variable, $\beta_0 \ldots \beta_m$ are the regression coefficients, and ε is the error term. For this problem, the dependent variables are the crimes and the independent variables are the social indicators. To apply the regression model, there are some assumptions that have to be respected:

- The function is linear
- The predictors are linearly independent
- The error is a random variable with a mean of zero that is conditional based on the explanatory variables
- The errors are uncorrelated and the variance of the error is constant (this property is named 'homoscedasticity')

The regression's main approaches are:

- Forward selection, which involves starting with no variables in the model. The variables will be tried one by one and inserted into the model when they are statistically significant.
- Backward elimination, which involves starting with all of the variables. They will be tested one by one and deleted if they are not statistically significant.

- Methods that are a combination of the above. In this category, there is the stepwise regression that includes variables, as in the forward selection, and then tests the model on the basis of backward elimination.

In this case, before proceeding, it is necessary to evaluate if the distribution fits like a normal model. If the selected variables have asymmetric distribution, a standardization/normalization procedure will be used. Standardization recodes a variable with average μ and variance σ^2 to become one that has a 'standard' distribution, which means that its average equals zero and its variance equals 1. To obtain a standardized variable (Z-score), the mean (μ) must be subtracted the variable and then divided by its standard deviation (σ):

$$Z = \frac{X - \mu}{\sigma}$$

After that, a backward elimination approach will be used, so some significant linkages that do not emerge within correlation analysis may come out.

There will be some indices in the tables related to the regression analysis (Section 4.1.3); in these *R* is the determination coefficient and R^2 evaluates how well the model fits reality because it explains the interrelation among the selected variables and the model. Significance F depends on the results of the regression analysis and the confidence level chosen. In this elaboration, a confidence level of 95% has been designated. If Significance F is < 0.05, then the null hypothesis is rejected (there is a statistically significant association between X and Y). If Significance F is > 0.05, then the null hypothesis is accepted (there is no statistically significant association between X and Y). The selected variables do contribute significantly to the model. In fact, the p-values are significant at < 0.05.

The parameterized model is an equation function of the main factors of crime that can be used as 'predictors', so ANOVA (Analysis of Variance) shows that if a model has statistical significance, its Y variability (crimes) is not random. Looking at the standardized coefficients, it is possible to identify the ones that have a greater weight in the model. After this process is complete, it is important to compare partial correlation and zero order correlation; if the zero order correlation is higher than the partial correlation, then it means that there are collinearity problems.

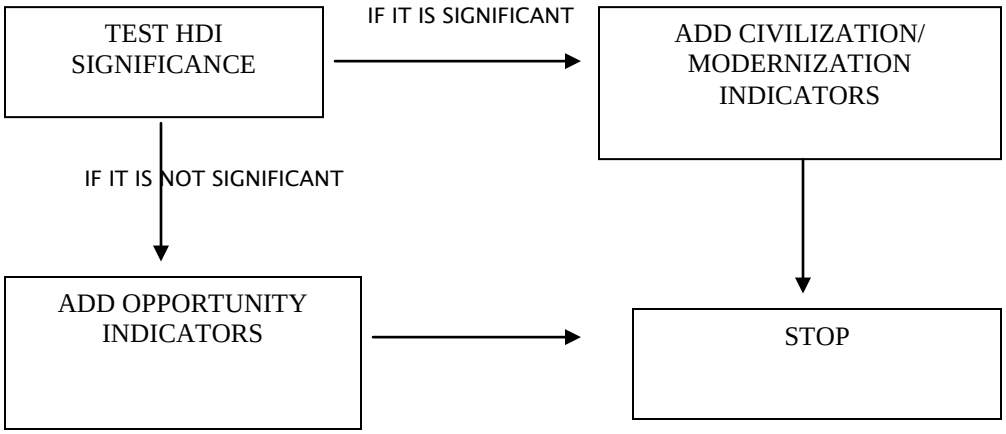
3.3 HYPOTHESES FOR MEASURING THE ASSOCIATION BETWEEN CRIMES AND SOCIAL INDICATORS IN EUROPE

The first step is to test for the types of crimes selected with regard to their correlation to the HDI:

- If the association is significant (a direct or inverse link), the social indicators that are representative of the civilization and modernization theories are added and correlation analysis is conducted.
- If it is not significant, the social indicators that are representative of opportunity theory are added and the correlation analysis is conducted.

Figure 10 displays the criteria used to include social indicators before proceeding with the correlation analysis.

Figure 10. Criteria for including social indicators that will be tested for measuring the association between crime and social indicators in Europe



For the corroboration of the modernization theory, crime correlations should increase in terms of the function of the development factors, while for the validation of the civilization theory, the crime trend should decrease in terms of the function of the development factors. Operatively, we can conclude that:

- If crime is positively correlated to HDI, it confirms the modernization theory.
- If crime is negatively correlated to HDI, it confirms the civilization theory.

For the corroboration of the opportunity theory, crime correlations should increase in the function of

the opportunity factors. This operation will result in a table of 'crime-social indicators' that succinctly identifies the social indicators (risk factors) for each type of crime that is relevant for it in Europe. The results allow us to assess the generalization of these three theoretical propositions and evaluate the soundness of different criminological theories in explaining the varying levels of crime in Europe.

3.4 DATA SET FOR COMPARING TRENDS BETWEEN CRIMES AND SOCIAL INDICATORS IN EUROPE

3.4.1 CRIMES FOR COMPARING TRENDS BETWEEN CRIMES AND SOCIAL INDICATORS IN EUROPE

In the second part of the thesis (comparing trends between crimes and social indicators in Europe), it is not possible to use the same crime data sources that were used for the first objective (measuring the association between crimes and social indicators) (see Section 3.1.1) because at the moment, the ICVS and the WHO (HFA-DB) data sets would limit us to comparing trends for a very small sample of European countries. There are several missing values with reference to these databases, so instead, the ESCCJ has been chosen because it allows for the comparison of trends in a larger sample of EU countries.

Police statistics are collected in every country, but sometimes they do not provide a comprehensive measure of crime. For example, victims may choose not to report a crime that has occurred to the police or they may not be aware that they have been the victim of a crime. Even when a crime is reported to the police, it may not have been recorded in the official statistics. Moreover, countries differ in the way they define various offences; what might be considered a petty offence in one country may be classified differently in another. The selected data source is the ESCCJ because its collected police statistics are good indicators of crime trends (Aebi 2008, 2010).

The initial screening has identified six crimes (homicide, rape, robbery, theft, burglary, bodily injury) that are consistent with the crimes examined in Section 3.1.1 Drug offences have been added to the list because they have a historical series that is as long as the other crimes selected. Therefore, including them in the analysis is an added value, because these seven types of crimes make it possible to apply a temporal variation analysis, since they are collected in all the editions of the ESCCJ from 1990 to 2007[24]. Using Aebi's (2010) standard definitions for all seven crime types, Table 10 organizes the information to clarify what specific actions fall within the criminal classification and

[24] There are two selected interval periods: 1995-1999 and 2003-2007. The utilization of average periods will bypass problems linked to missing data (see Section 4.1.2).

what actions are excluded.

Table 10. Offences selected for the analysis

CRIME	DEFINITION
Homicide	According to the standard definition, intentional homicide means the intentional killing of a person. Where possible, the figures include: - assault leading to death, - euthanasia, - infanticide, and - attempted suicide but excludes assistance with suicide.
Rape	According to the standard definition, rape means sexual intercourse with a person against his/her will (vaginal penetration or other). Where possible, the figures include: - penetration other than vaginal (e.g. buggery), - violent intra-marital sexual intercourse, - sexual intercourse without force with a helpless person, - sexual intercourse with force with a minor, and - attempted rape but exclude: - sexual intercourse with a minor without force and - other forms of sexual assault.
Robbery	According to the standard definition, robbery means stealing from a person with force or threat of force. Where possible, the figures include: - muggings (bag snatchings), - theft immediately followed by force or threat of force used to keep hold of the stolen goods, and - attempted robbery but exclude: - pick-pocketing, - extortion, and - blackmailing.
Theft	According to the standard definition, theft means depriving a person/organization of property without force with the intent to keep it. Where possible, the figures include: - minor (e.g. low value) theft (even if subject to proceedings outside the criminal justice system), - burglary, - theft of motor vehicles, - theft of other items, and - attempted theft but exclude: - embezzlement (including theft by employees), - robbery (see above), and - the receiving/handling of stolen goods.
Burglary	According to the standard definition, burglary means gaining access to a closed part of a building or other premises by the use of force with the intent to steal goods. Where possible, the figures include: - theft from a factory, shop, office, etc.;

	- theft from a military establishment; - theft by using false keys; and - attempted burglary but exclude: - theft from a car, - theft from a container, - theft from a vending machine, - theft from a parking meter, and - theft from a fenced meadow/compound.
Bodily injury	According to the standard definition, bodily injury means inflicting bodily injury on another person with intent. Where possible, the figures include: - minor bodily injury (even if subject to proceedings outside the criminal justice system), - aggravated bodily injury, - bodily injury of a public servant/official, - domestic violence, and - attempts at bodily injury but exclude: - assault leading to death, - threats (except in the case of an attempt), - assault only causing pain, - slapping or punching, and - sexual assault.
Drug offences	The definition is largely uniform through international conventions. Where possible, the figures include: - cultivation, - production, - sale, - supplying, - transportation, - importation, - exportation, - financing of drug operations, - consumption, - possession of larger quantities, and - possession of small quantities.

Source: Adapted from Aebi, M., et al (2010), European Sourcebook of Crime and Criminal Justice Statistics, WODC, Den Haag.

Harrendorf (2012) explained the changes in the definitions for offences that appeared in the fourth edition of the ESCCJ as compared to its earlier editions. He said that the highest overall conformity rates could be found for robbery (78%), theft (64%), and drug offences (50%), while the lowest conformity rates were seen in sexual assault (17%) and bodily injury (19%). Low conformity rates were more often associated with newly introduced offences rather than 'classic' ones. Meanwhile, Aebi and Linde (2012) suggested that the changes in legal definitions have occurred over time; many countries have enlarged their concept of rape to include violent intra-marital sexual intercourse (France in

1994, Switzerland in 1992, Germany in 1997, and Greece in 2006). Then, there have been some legal changes in the definitions of assault (France in 1993 and 2004), property crimes (Switzerland in 1995), and drug offences (Austria, France, and Italy).

Particular emphasis should be placed on burglary's definition, which varies widely between countries. For example, some countries have adopted a relatively narrow definition, while others have applied the concept of aggravated theft, which is found in continental law. In this context, one must take into account that in continental Western European countries that apply civil law legal systems, domestic burglary is usually not a legal category on its own but is instead an aggravated theft or a combination of different legal dispositions, including breach of domicile, theft, and often, property damage. The ESCCJ aligns with the classification of offences used by countries that apply the common law legal system and considers theft with violence as a violent offence. In contrast, the continental countries of Western Europe following a legal system based on the civil law, which finds its roots in Roman law, consider theft with violence a property offence. Below are a few considerations on differences related to the types of crimes selected for this analysis:

- Homicide: There are some differences among countries because some of them exclude categories like assault leading to death, infanticide, and euthanasia. The number of completed homicides is included in this work because the number of intentional homicides varies widely from one country to another (Aebi and Linde 2012b).
- Rape: There are some differences among countries, but in general, they have adopted the standard definition.
- Robbery: There are large differences in levels between countries.
- Theft: There are some differences among countries.
- Burglary: The concept of burglary varies widely between countries.
- Bodily injury: Most countries have not adopted the standard definitions at the moment that bodily injury has been included in the study.
- Drug offences: The definition is largely uniform throughout international conventions.

3.4.2 Spatial and temporal dimension for comparing trends between crimes and social indicators in Europe

The two selected temporal intervals correspond to five year averages from 1995 to 1999 and from

2003 to 2007. Data from 1995-1999 does not represent the oldest data available from an edition of the ESCCJ, because the first edition includes data from 1990 to 1996, but this particular time interval has been chosen because crime data covering some Central and Eastern countries was influenced by the effects of the communist regime in 1990-1996 period (Aebi and Linde 2010). Additionally, the 1990-1996 timeframe has a weaker set of data because there were less countries participating in the reporting process at that time. At the moment, data from 2003 to 2007 represents the most recently available information from the ESCCJ.

Not all countries have participated in all of the editions of the ESCCJ and in many cases, there data is still missing. As in any crime data collection exercise, the ESCCJ suffers from missing data and sudden changes both within and between editions. The justification for using averaged data is the inherent advantage of having a complete dataset where each European country has comparable crime data. The analysis units are the 27 countries that belong to the European Union: Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxemburg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and England and Wales. With regard to the ESCCJ and its records for the United Kingdom, crime figures are collected for three separate countries: England and Wales, Scotland, and Northern Ireland. England and Wales cover 90% of the total population in the United Kingdom (Eurostat) so notwithstanding the name 'England and Wales', it may be that this territorial reference is a good estimator for the whole country.

3.4.3 DATA MATRICES FOR COMPARING CRIME TRENDS IN EUROPE

In collecting data sets (Appendix C) for the comparison of crime trends in Europe, the following conditions have been observed:

- Time: averaged data for the time interval 1995-1999 and 2003-2007[25]
- Space: 26 European countries[26]

[25] Each new edition of the ESCCJ also includes data for the previous year, allowing the authors to make corrections to the data; whenever possible, the most recent data has been taken into account.

[26] The 27 countries that belong to EU have been taken into account, but there is no crime data for Luxembourg in 2003-2007.

- Variables: seven types of crimes

Initially, the intention was to consider the years 1995 through 2007 but the crime data set suffered from missing data and sudden changes both within and between editions. At the same time, there was a need to avoid using different data sources because that would imply differences in crime definitions, rules, units, time, etc. There are numerous possible solutions to treat the missing data problem. In criminology, some authors have proposed using the interpolation procedure or the average. The mean method has been broadly used in the literature (Solivetti 2004, 2010; Aebi and Linde 2010) and in this case, it has yielded values for a broad sample of European countries. There are different kinds of means (e.g. average, geometric, harmonic, etc.) that could be utilized; in this case, the mean average will be applied. There is no particular reason to choose one kind with respect to another, so the average mean has been chosen. It records higher values in comparison to the other types of means.

This is the rule that has been used for the data sets:

- For each EU country, there has to be at least three out five values (three out five years in the time interval 1995-1999 and 2003-2007) for each type of crime selected.

From this preliminary analysis of the time interval 2003-2007, it is possible to observe that:

- Luxemburg is missing data for all crime types.
- Spain is missing data for three types of crimes, while Malta is missing data for two types.
- Italy, Latvia, and Slovakia are missing data for one type of crime.

Therefore, Luxemburg has been excluded from the following steps of the analysis, and from this preliminary analysis of the time interval 1995-1999, it is possible to observe that:

- Belgium, Latvia, Lithuania, Romania, Slovakia, and Spain are all missing data for one type of crime.

While calculating the average data in 1995-1999 and 2003-2007, it was possible to observe clear breaks in the time series within and between the periods for some of the countries. In the data set for comparing crime trends in Europe, notwithstanding the average values that result in a more complete data set and a few other missing values, there were some cases of gaps possibly due to definition changes. All of these difficulties represent why we will not look at a single country, but will instead explore groups of countries (Smit et al. 2008).

3.4.4 DATA MATRICES FOR COMPARING SOCIAL INDICATOR TRENDS IN EUROPE

This section describes the data set used for comparing social indicator trends in Europe. For the 2000s, the social indicator data is complete and seldom has any missing data, but the situation is very different prior to the year 2000. Therefore, it is not possible to interpolate the data because there simply is no data at all for many European countries. For example, for social indicators concerning the LFS, there is data for the EU15 but the whole Central/Eastern bloc (Latvia, Lithuania, Slovakia, Poland, Bulgaria, the Czech Republic, Estonia, and Romania) and some Southern countries (Slovenia, Cyprus, and Malta) have no data. Appendices D and E collect the values recorded in 2007 and in 2000 by the social indicators listed in Table 7.

Choosing a single year value can be explained by two main motivations. First, Eurostat social indicators seldom have missing data because Eurostat rebuilds data, if at all possible, using interpolation, previsions, and average estimations. Second, the social indicators have low variability over a short period. The years for the HDI are 2000 and 2009 because there is only data for 2000, 2005, and 2009. The latest year available (2009) is preferred to 2005 because this section assesses trends, and the years 2000 and 2005 are very close in time so they will probably record low variability. Furthermore, severely materially deprived people, healthy life years, and households are all social indicators that have several missing pieces of data for the year 2000, so the missing values were replaced with the last available data (from 2001-2004).

3.5 METHODS FOR COMPARING TRENDS BETWEEN CRIMES AND SOCIAL INDICATORS IN EUROPE

In order to compare trends between crimes and social indicators, diachronic analysis (diakro'nia, δια-χρόνος, 'through time') may be a useful technique because it examines phenomena in terms of its developments through time. It evaluates data from a dynamic perspective and permits a comparative-longitudinal analysis. The methods used to assess the second aim of this thesis move away from comparing the main statistical indicators over time. This factor highlights the difficulties in making comparisons due to missing data and differences in definitions. The solution, as is often used in the literature, is to compare groups of similar countries (Aebi 2008; Aebi and Linde 2012a; Smit et al. 2012). Advanced statistical techniques will be a valid means of identifying homogenous sets of countries. After that, crime trends and social indicator trends will be conjointly observed to assess whether or not they are in agreement.

Taking into account Aebi and Linde's (2012a) indications has suggested that using groups of countries will reduce the impact of differences in crime among the countries that usually arise due to varied legal definitions, statistical counting rules, etc. Multivariate techniques will identify homogenous groups of countries in terms of their economic and social features in Smit's vein (Smit et al. 2008). From there the thesis will compare crime and risk factor trends to evaluate if the selected social indicators may explain crime levels over time in homogeneous sets of European countries.

3.5.1 DESCRIPTIVE STATISTICS FOR COMPARING TRENDS BETWEEN CRIMES AND SOCIAL INDICATORS IN EUROPE

Descriptive statistics yield some information on social indicators and crimes selected at the European level. The main statistical results will be compared over time for the following crimes: completed homicides, violent crimes (rapes, robberies, and bodily injuries), property crimes (thefts and burglaries), and drug offences.

The statistical indicators selected are the:

- Mean: The sum of a set of data divided by the number of available data pieces.
- Median: The middle value, or the mean of the two middle values, when the data is arranged in

numerical order.

- Standard deviation: Shows how much variation or dispersion from the average exists.
- Minimum: The lowest value.
- Maximum: The highest value.
- Percentiles: A measure used in statistics indicating the value below which a given percentage of observations in a group of observations will fall. The 25th percentile is also known as the first quartile (Q1), the 50th percentile as the median or second quartile (Q2), and the 75th percentile is also known as the third quartile (Q3). In general, percentiles and quartiles are specific types of quantiles.

3.5.2 The problem in comparing countries and the use of clustering Countries

The method used in the section above (Section 3.5.1) may highlight clear breaks in the time series between the periods 1995–99 and 2003–07; this is usually influenced by missing data or changes in crime definitions. We have already seen in Section 1.1.2.1 that many authors who have examined crime trends in Europe did not conduct their work on individual countries because their crime levels are less stable than group levels (Aebi 2008; Aebi and Linde 2012a; Smit et al. 2012).

Smit, Marshall, and Van Gammeren (2008) clustered countries in a manner that matched up well in terms of their crime levels. They identified four European regions that fall within a geographic distribution: North/West, South, Central, and East Europe.

Austria, Belgium, Denmark, Finland, France, Germany, Iceland, Ireland, Luxembourg, the Netherlands, Norway, Sweden, Switzerland, and the United Kingdom are defined as the 'North/West'. Bosnia-Herzegovina, Croatia, Cyprus, Greece, Italy, Malta, Portugal, Slovenia, Spain, TFYR of Macedonia, and Turkey are classified as the 'South'. Albania, Bulgaria, the Czech Republic, Hungary, Poland, Romania, and Slovakia are classified as 'Central'. Armenia, Estonia, Georgia, Latvia, Lithuania, Moldova, Russia, and Ukraine are classified as the 'East'. This clustering distribution takes into account several factors. The East region includes all the countries that used to be Soviet states while the Central region includes developing countries. The remaining countries are divided into two groups, 'North/West' and 'South', based on their geographical distribution.

In this thesis, Smit's clustering will be tested to assess whether or not it works well with the HDI social indicators; such testing will identify homogenous sets of countries that will fit well within this thesis. The main principles behind the use of cluster analysis (CA) in this study are: first, there are no comparisons between countries, only between groups of countries (Aebi 2010; Smit et al. 2012); and second, clustering is useful because differences in crime patterns may depend on cultural, political, socio-economic, or demographic features that are generally shared by countries that belong to the same cluster (Marshall 2002).

Cluster analysis is an exploratory data analysis tool that organizes data into groups that have similar features, maximizing similarities within the groups and differences between the groups. This technique is broadly used in the social sciences, biology, chemistry, statistics, etc.

CA methods can be classified as hierarchical or non-hierarchical. The hierarchical method is usually used; each case is considered a separate cluster and they are combined into clusters sequentially, reducing the number of clusters at each step. The hierarchical method can be agglomerative or divisive (in general, agglomerative methods are used more often than divisive ones). In divisive methods, all subjects belong to the same cluster and the reverse strategy is applied to the divided clusters. In non-hierarchical or k-means clustering, the desired number of clusters is specified in advance and the 'best' solution is chosen. The main methods for hierarchical agglomerative approaches (nearest neighbour, furthest neighbour, average [between groups] linkage, centroid, and Ward) are reported in Table 11.

Table 11. Main methods for hierarchical agglomerative approaches

Method	Description	Advantage	Disadvantage
Nearest neighbour	The distance between two clusters is defined as the distance between the two closest members (neighbours).	It is simple.	It does not take into account the cluster structure.
Furthest neighbour	The distance between two clusters is defined to be the maximum distance between members (neighbours).	It produces compact clusters of similar size.	It does not account for the cluster structure and is also sensitive to outliers.
Average (between groups) linkage	The distance between two clusters is calculated as the average distance between all pairs of subjects.	It is robust.	
Centroid	The mean value for each variable is calculated and clusters whose centroids are closest together are merged.	It is robust.	
Ward	All possible pairs of clusters are combined and the sum of the squared distances within each cluster is calculated.	It produces equal-sized clusters.	It is sensitive to outliers.

Elaborated from Fabbris (2003)

A difficult point in CA is selecting the optimum number of clusters. The CA process can be represented on a diagram named a 'dendrogram' that illustrates which clusters have been joined at each step; if there is a broad jump in the distance between clusters from one step to another, then the clusters that are relatively close together will be used on the following step.

3.5.3 Comparing trends in Europe

Social indicators and crime trends will be examined over the groups of countries that result from cluster analysis. Clusters have within their units similar features, so this comparison is more suitable than just comparing countries (Smit et al. 2008). In the interest of creating the best groupings possible, the following two kinds of analyses will be utilized:

- Comparing weighted averages as a function of the resident population in Europe (Eurostat 2010)[27] for social indicators and crimes over time. This features average values that have been weighted by population and gives each cluster a value for the types of crime and social indicators. Using a weighted mean is useful in this situation because different population groups are contributing to an overall average and the countries have different influences on the cluster. Using an arithmetic mean is a special case of the weighted mean where all the weights are equal.

- Examining differential variations (Δ) for social indicators and crimes. This technique is useful because it evaluates how much and in which direction (positive or negative) crimes and social indicators vary over time. It is calculated as seen below, respectively, for crimes and social indicators.

$$\Delta_{2003\text{-}2007;\ 1995\text{-}1999} = (\text{Crime}_{2003\text{-}2007} - \text{Crime}_{1995\text{-}1999}) / \text{Crime}_{1995\text{-}1999}$$

$$\Delta_{2003\text{-}2007;\ 1995\text{-}1999} = (\text{Social Indicator}_{2003\text{-}2007} - \text{Social Indicator}_{1995\text{-}1999}) / \text{Social Indicator}_{1995\text{-}1999}$$

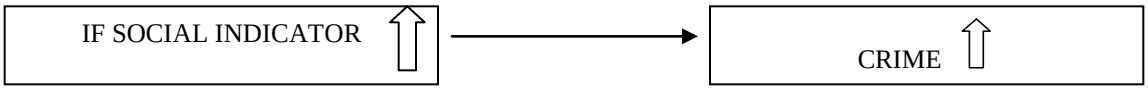
3.5.4 Hypothesis for comparing crime and social indicators trends in Europe

The hypothesis is that significant social indicators selected in the first part of the thesis (objective 1) (that have a significant relationship with crime) are sufficient measures in explaining crime trends. There can be two resultant cases (Cases 1 and 2) and for each case, there are two sub-cases (Sub-cases A and B, C and D).

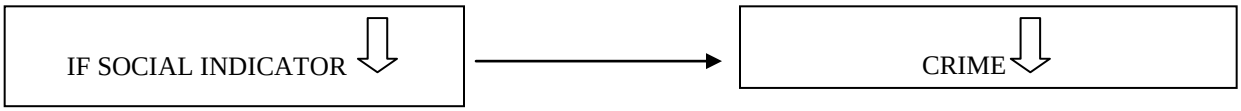
[27] To calculate a weighted average:
1. Multiply each value by its weight (the population in a country).
2. Add up the products of value multiplied by the weight to get the total value.
3. Add the weights themselves to get the total weight.
4. Divide the total value by the total weight (the total population in Europe).

1. The social indicator is positively correlated to crime.

   a. Increasing trends: Means that if the social indicator increases, crime increases.

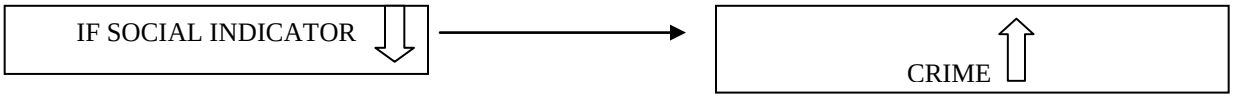


   b. Decreasing trends: Means that if the social indicator decreases, crime decreases.

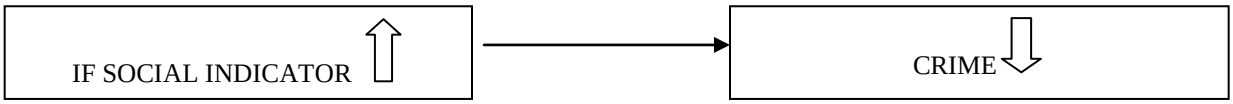


2. The social indicator is negatively correlated to crime.

   c. Decreasing trend for the social indicator and increasing trend for crime: Means that if the social indicator decreases, crime increases.



   d. Increasing trend for the social indicator and decreasing trend for crime: Means that if the social indicator increases, crime decreases.



CHAPTER 4 – MEASURING THE ASSOCIATION BETWEEN CRIMES AND SOCIAL INDICATORS IN EUROPE

This chapter has collected the data analysis and results in their entirety to satisfy the first aim of this thesis (measuring the association between crime and social indicators in Europe). It seeks to better understand the relationship between crime and social indicators within a distinctly European context.

4.1 CRIME AND SOCIAL INDICATORS: AN EVALUATION OF THEIR INTERDEPENDENCE

This section collects correlation analysis results 1) between different types of crimes so as to underscore possible linkages between and within property and violent crimes, and 2) between crimes and social indicators so as to assess the validity of three theoretical frameworks (modernization theory, civilization theory, and opportunity theory).

4.1.1 CORRELATION BETWEEN DIFFERENT TYPES OF CRIMES

Table 12 shows the correlation levels between property and violent crimes. First, the Pearson coefficient (*r*) explains the strength of the relationship between two variables; second, the probability is compared to the significance level. If the probability is less than or equal to the significance level, then the null hypothesis is rejected and the outcome is said to be statistically significant. Traditionally, experimenters have used either the 0.05 level (sometimes called the '5% level') or the 0.01 level (the 1% level) for this measurement, although the choice of levels is largely subjective.

Table 12 collects property and violent crimes correlation in EU countries. Looking at property crimes, it can be concluded that burglary is positively correlated with car theft ($r = 0.628$) and motorcycle theft ($r = 0.476$), while a couple of the violent crimes are correlated with each other; sexual offences against women and assault are statistically significant at the 0.01 level ($r = 0.664$). Finally, robbery is significantly correlated to burglary ($r = 0.416$) but it does not correspond to other types of violent crimes. Robbery has a hybrid nature, characterized by violence and a property offence, its definition has a different connotation in continental versus Anglo-Saxon countries.

Table 12. Property and violent crimes correlated in the EU countries, years 2004-2005 (ICVS)

		car theft	motorcycle theft	burglary	robbery	sexual offences against women	assault and threat
car theft	Pearson Correlation	1	,263	**,628****	,278	-,201	,183
	Sig. (2-code)		,249	**,002**	,210	,371	,414
	N	22	21	22	22	22	22
motorcycle theft	Pearson Correlation	,263	1	**,476***	,286	,325	,426
	Sig. (2-code)	,249		**,029**	,208	,151	,052
	N	21	21	21	21	21	21
burglary	Pearson Correlation	**,628****	**,476***	1	**,416***	-,151	,289
	Sig. (2-code)	**,002**	**,029**		**,050**	,503	,192
	N	22	21	22	22	22	22
robbery	Pearson Correlation	,278	,286	**,416***	1	,178	,352
	Sig. (2-code)	,210	,208	**,050**		,427	,108
	N	22	21	22	22	22	22
sexual offences against women	Pearson Correlation	-,201	,325	-,151	,178	1	**,664****
	Sig. (2-code)	,371	,151	,503	,427		**,001**
	N	22	21	22	22	22	22
assault and threat	Pearson Correlation	,183	,426	,289	,352	**,664****	1
	Sig. (2-code)	,414	,052	,192	,108	**,001**	
	N	22	21	22	22	22	22

** The correlation is significant at 0,01level (two-tailed).* The correlation is significant at 0,05 (two-tailed).

4.1.2 Assessing theoretical frameworks for measuring the association between crime and social indicators in Europe

This section represents one of the culminations of the data analyses by testing three theoretical frameworks (modernization theory, civilization theory, and opportunity theory) through correlation analysis. Table 13 collects the Pearson correlations and significance levels for seven types of crimes (intentional homicide data was collected from the WHO mortality statistics; sexual offences against women, assault and threat, robbery, car theft, motorcycle theft, and burglary data sets were collected from the ICVS) and the HDI. This phase assesses the validity of the modernization and civilization theories across the whole of Europe. For the corroboration of the modernization theory, crime correlations should increase as a function of development factors, while for validation of the civilization theory, crime trends should decrease in the function of development factors. These outcomes can mean one of two things:

- If crime is positively correlated to HDI, then the modernization theory is confirmed.
- If crime is negatively correlated to HDI, then the civilization theory is confirmed.

Table 13 shows that the four selected crimes are significantly correlated to the HDI index; two types of violent crimes (sexual offences against women; assault and threat) are positively correlated to the HDI (R=0.673 and R=0.456 respectively, while homicide (R=-0,480) and car theft (R=-0.434) are inversely correlated to the HDI. These associations lead to the following conclusions:

- Homicide decreases when development factors increase.
- Violent crimes like rape or bodily injuries increase when development factors increase.
- Car theft decreases when development factors increase.

Two types of property crimes (motorcycle theft and burglary), along with robbery, are not significantly correlated to the HDI. The homicide and car theft correlations fall in line with the civilization theory while violent crimes having a positive correlation with the HDI could be explained through the modernization theory.

Table 13. HDI and crime correlation (from the WHO and ICVS) in European countries, years 2004-2005

HDI	Pearson Correlation	Sig. (2-code)	N
intentional homicide	*-,480***	*0,007*	30
sexual offences against women	*,673***	*0,001*	22
assault and threat	*,456**	*0,033*	22
robbery	-0,143	0,525	22
car theft	*-,434**	*0,044*	22
motorcycle theft	0,297	0,191	21
burglary	-0,29	0,19	22

** The correlation is significant at the 0,01 level (two-tailed). * The correlation is significant at 0,05 (two-tailed).

There is no singular theoretical paradigm that can account for the trends in homicides, violent crimes, and property crimes. Aebi and Linde (2010) rejected the explanations provided by the classical theories of crime and proposed a multi-factor model. In this vein, In this vein tables 14-16 will evaluate the correlations between different types of crimes and the social indicators listed in Table 7 so as to extrapolate the most the relevant macro level risk factors.

Table 13 reveals significant correlations between completed homicides and the HDI, so in Table 14,

there is a correspondence between homicides and the social indicators that have been collected to test the civilization theory. The expectation is that the homicides will be negatively correlated to the social indicators with regard to development factors. The correlation analysis compares the social indicators that explain the degree of development that a country has (life expectancy, school expectancy, and GDP per capita) and a set of social indicators concerning changes across society (infant mortality, healthy life years, divorce, severe material deprivation, acquisition of citizenship, and science and technology). The results confirm that low development factors increase homicide rates: life expectancy (−), GDP per capita (−), healthy life years (−), and infant mortality (+). In conclusion, a society that has high levels of life expectancy at birth, elevated healthy life years, high GDP per capita, and low infant mortality will also generate lower intentional homicide rates.

Table 14. Social indicators and intentional homicide (from the WHO) correlation in a sample of European countries, years 2004-2005

intentional homicide	Pearson Correlation	Sig. (2-code)	N
life expectancy (total)	*-,727***	*0*	30
school expectancy	0,091	0,631	30
GDP per capita	*-,512***	*0,004*	30
infant mortality	*,456**	*0,011*	30
divorce	0,308	0,104	29
healthy years	*-,509***	*0,007*	27
acquisition of citizenship	-0,249	0,211	27
severely materially deprived people	-0,194	0,488	15
science and technology	0,021	0,731	28

** The correlation is significant at the 0,01 level (two-tailed).* The correlation is significant at 0,05 (two-tailed).

Table 15 provides the correlation results for violent crimes. Sexual offences against women and assault and threat are positively correlated to the HDI (which is in line with the modernization theory), while robbery is not (Table 13). For sexual offences against women and assault and threat, the correlation analysis takes into account the social indicators that are related to the modernization theory. Household information (single parent) was added because aside from the fact that it has been classified as belonging to 'opportunity theory', it is an interesting indicator to test in the case of rape or assault.

One can see that there is a net differentiation between violent crimes: sexual offences against women and assault and threat can be paired versus robbery. The first two crimes can be explained through the combination of several factors: technology (+), severe material deprivation (-), households composed of single parents with dependent children (+), and school expectancy (+).

Robbery is not correlated to the selected social indicators. It is a strange category of crime, because it merges the violent and the property crime components, which have dissimilar weights in different countries. Adding social indicators concerning the HDI, as seen in Table 15, demonstrates an inverse correlation with GDP per capita. This operation was conducted despite the fact that it is not correlated to the HDI. This result calls to mind Messner and Rosenfeld's (1997) institutional anomie theory: 'the effects of poverty on property crime depend on [the] levels of structural indicators of the capacity of noneconomic institutions to increase the crime impact of economic deprivation' (Chamlin and

Cochran 1997). Chamlin and Cochran's (1997) scholarly work has shown that the interaction between economic and other social institutions (e.g. church, family, and society) establishes the level of anomie within a collective and consequently, a given level of crime within a population. Collecting social indicators to test the anomie level of a country is a very difficult task.

Table 15. Social indicators and violent crime correlation in a sample of European countries, years 2004–2005

Crime/Social indicator	robbery			sexual offences against women			assault and threat		
	Pearson Correlation	Sig. (2-code)	N	Pearson Correlation	Sig. (2-code)	N	Pearson Correlation	Sig. (2-code)	N
life expectancy (total)	-0,281	0,206	22	***,438****	***0,041***	22	0,22	0,325	22
school expectancy	0,128	0,57	22	0,408	0,06	22	***,554****	***0,007***	22
GDP per capita	***-,498****	***0,018***	22	0,035	0,876	22	-0,1	0,657	22
infant mortality				-0,39	0,073	22	-0,206	0,359	22
divorce				-0,048	0,833	22	0,101	0,656	22
healthy years				0,208	0,379	20	0,255	0,277	20
acquisition of citizenship				0,06	0,807	19	0,255	0,291	19
severe material deprivation				***-,526****	***0,044***	15	**-,544***	0,036	15
science and technology	0,372	0,106	20	***,534****	***0,015***	20	**,467***	0,038	20
resource productivity	-0,335	0,137	21						
long-term unemployment	0,149	0,519	21						
single person with dependent children	-0,061	0,799	20	***,508****	***0,022***	20	***,514****	***0,021***	20
two adults, at least one aged 65 years or older	-0,399	0,073	21						
part-time worker status	-0,393	0,107	18						

** The correlation is significant at 0,01level (two-tailed). * The correlation is significant at 0,05 level (two-tailed).

Table 16 contains the correlation results between property crimes and a set of social indicators. Car theft is tested with civilization theory social indicators. It is correlated to infant mortality (-), which is in line with the results in Table 13 and the civilization theory, while motorcycle theft and burglary are tested with opportunity theory social indicators. The social indicator 'burglar alarms' has only been tested for burglary. The expectation is that an increase in opportunities increases crime.

All of these types of crimes (car theft, motorcycle theft, and burglary) belong to the category of 'property crimes', but they are very dissimilar in terms of modalities, victims, and offenders. Motorcycle theft is positively correlated with resource productivity (+), science and technology (+), and the acquisition of citizenship (+); the presence of suitable targets in society may increase crime because it translates to the existence of high income in a population (opportunity theory).

Burglary is inversely correlated with part-time work (-), while high part-time rates increase the number of people that spend their time at home and these people may fulfil the role of 'capable guardians' in defending their homes.

The social indicator 'burglar alarm' is also included in the analysis but it is just below the significant level and can be interpreted as "more security where burglary is higher" (Van Dijk, Van Kesteren, and Smit 2007). However, despite the data, it is not possible to make general assumptions for property crimes based on the significance of social indicators for the whole category.

Table 16. Social indicators and property crime correlation in a sample of European countries, years 2004-2005

Crime/Social indicator	car theft			motorcycle theft			burglary		
	Pearson Correlation	Sig. (2-code)	N	Pearson Correlation	Sig. (2-code)	N	Pearson Correlation	Sig. (2-code)	N
life expectancy (total)	-0,242	0,278	22						
school expectancy	0,062	0,785	22						
GDP per capita	-0,159	0,48	22						
infant mortality	***,458****	***0,032***	22						
divorce	-0,128	0,571	22						
healthy years	0,331	0,154	20						
acquisition of citizenship	-0,01	0,968	19	***,476****	***0,046***	18	0,067	0,785	19
severe material deprivation	0,085	0,763	15	0,516	0,059	14	0,055	0,846	15
science and technology	0,182	0,442	20	***,540****	***0,017***	19	0,163	0,491	20
resource productivity				***,498****	***0,025***	20	-0,094	0,684	21
long-term unemployment				-0,215	0,364	20	0,015	0,949	21
single person with dependent children				0,202	0,406	19	0,003	0,989	20
two adults, at least one aged 65 years or over				0,242	0,305	20	-0,042	0,856	21
part-time worker status				0,33	0,195	17	***-,416****	***0,052***	18
burglar alarm							0,375	0,086	22

** The correlation is significant at the 0,01 level (two-tailed). * The correlation is significant at 0,05 level (two-tailed).

4.1.3 MULTIPLE INTERACTIONS IN CRIME

This subsection contributes to a better understanding of the interactions between criminality and economic, demographic, and social considerations, delving in to identify the social indicators that influence different crimes. It is important to remember that crime is a multifaceted phenomenon and can only be adequately investigated using a large set of explanatory variables.

Looking at the elaborations in the following tables[28], it can be seen that the model is particularly good for motorcycle theft, sexual offences against women, assault and threat. With regard to homicide, the significance is not sufficient to explain and predict crimes, but it can be useful in providing some suggestions concerning the social indicators worth monitoring. The model is not significant for robbery, burglary, and car theft so they are not included in the thesis. The main advantage of using a backward elimination regression model is that collinearity among the social indicators situated in the model is reduced to its lowest possibility. In examining the models, it is clear that the main predictors of property crimes (motorcycle theft), violent crimes (sexual offences against women, assault and threat), and homicides are significant social indicators resulting from the correlation analysis, but in some cases, they disappear because of multi-collinearity problems. In addition, some of them were not significant enough to find a place in the model.

For motorcycle theft, the most suitable model records $R^2 = 0.78$. The model shows that at each step, R^2 varies as the number of variables decreases (table 17).

Table 17.Motorcycle theft regression models

Model	R	R^2
1	,909[a]	,827
2	,909[b]	,826
3	,898[c]	,806
4	,883[d]	,780

ANOVA (in Appendix F) demonstrates that the model resulting from the combination of part-time

[28] Before proceeding, it should be noted that all the variables have been standardized.

status, severe material deprivation, science and technology, single person with dependent children, and resource productivity is significant (p < ,000) and the part of variability explained by the regression is four times the portion explained by the residuals. Looking at the standardized coefficients, it is possible to identify the ones that have greater weight in the model. In this case they are: part-time status (-), severe material deprivation (+), science and technology (+), single person with dependent children (+), and resource productivity (+).

Next, it is important to compare the partial correlation and zero order correlation. If the zero order correlation is higher than the partial correlation, there are collinearity problems. In this case, they are lower, so there are no collinearity problems. Another good point to note is that the eigenvalues are not next to zero, meaning that the predictors do not present collinearity problems.

For sexual offences against women, the most suitable model records $R^2 = 0.79$ (table 18).

Table 18. Sexual offences against women regression models

Model	R	R^2
1	,924[a]	,853
2	,924[b]	,853
3	,922[c]	,851
4	,917[d]	,842
5	,907[e]	,823
6	,902[f]	,814
7	,888[g]	,789

ANOVA (in Appendix F) reflects that the resultant model from the combination of single person with dependent children, healthy years, divorce, and severe material deprivation and the HDI is significant (p < ,000). The part of variability explained by the regression is four times that of the residuals. Looking at the standardized coefficients, it is possible to identify the ones that have greater weight in the model. In this case, they are HDI (+), severe material deprivation (-), and science and technology (+). Moreover, the zero order correlation is higher than the partial correlation, and the eigenvalues are not next to zero, so these predictors do not present collinearity problems.

For assault and threat, the most suitable model if found when $R^2 = 0.67$ (table 19).

Table 19. Assault and threat regression models

Model	R	R^2
1	,850[a]	,722
2	,848[b]	,719
3	,844[c]	,713
4	,838[d]	,702
5	,829[e]	,687
6	,826[f]	,682
7	,814[g]	,663

ANOVA (in Appendix F) reveals that the model's outcome from the combination of life expectancy (total), healthy years, severe material deprivation, school expectancy, and infant mortality is significant ($p < ,002$) and the segment of variability explained by the regression is twice the part explained by the residuals. Violent offences can be explained through the combination of several factors related to development features. Looking at the standardized coefficients, it is possible to identify the ones that have greater weight in the model. In this case, they are: life expectancy (+), school expectancy (+), infant mortality (–), healthy years (+), and severe material deprivation (–). Moreover, zero order correlation is higher than the partial correlation, and the eigenvalues are not next to zero, indicating that the predictors do not present collinearity problems.

For homicide, the most suitable model records $R^2 = 0.57$ (table 20) that is not significant.

Table 20. Homicide regression models

Model	R	R^2
1	,774[a]	,600
2	,774[b]	,600
3	,774[c]	,600
4	,774[d]	,599
5	,774[e]	,599
6	,773[f]	,598
7	,769[g]	,591
8	,763[h]	,582
9	,755[i]	,570

ANOVA signals that the model revealed from the combination of school expectancy and life

expectancy is significant ($p < ,000$), but the part of the variability explained by regression is not of consequence when compared to the portion explained by the residuals. The zero order correlation is not higher than the partial correlation, meaning that the predictors may present collinearity problems.

The models highlight the dimensions that have low correlation levels but in these models, their specificity contributes to its low weight. At the same time, variables that have high correlation levels disappear because they explain the same part of variability that has already been described by particular variables included in the model. In motorcycle theft's model, school expectancy disappears and part-time status, severe material deprivation, and single person with dependent children are seen. In assault and threat, healthy years, infant mortality, and life expectancy as well as sexual offences against women all have significant correlation.

The models are not significant for burglary, robbery, and car theft because R^2 is less than 0.6 and the collinearity diagnostics highlighted several problems. The multiple regression results will not be taken into account for the following discussion due to the fact that there are no significant models for several types of crimes, which would engender the utilization of disparate criteria for different categories of crime.

4.2 DISCUSSION ON THE LINKAGE BETWEEN CRIME AND SOCIAL INDICATORS IN EUROPE

This section discusses and summarizes the main findings related to the association between crimes and social indicators in Europe.

1. ***Broad sample:*** The first gap was the lack of studies related to the relationship between crime and social indicators in more European countries than the EU15. The analysis took into account a sample of 30 European countries (the EU27 + Switzerland, Norway, and Iceland) for homicide and a sample of 22 countries for rape, assault, robbery, car theft, motorcycle theft, and burglary. Such a broad sample allows for considerations regarding a larger set of countries than those that were previously used (Entorf and Spengler 2002).

2. ***Quantitative linkage between 'type of crime–social indicators'***: The methodology used assessed the social indicators that have a relationship with different types of crimes and their linkage type. This point clearly and univocally presents the relationship between the type of crime and the social indicators with regard to the variables employed. Correlations and significance levels have permitted us to quantitatively and unambiguously assess the relationship. Table 21 synthesizes the main findings collected in Section 4.1.2. There are six types of crimes: intentional homicides, sexual offences against women, assaults and threats, car thefts, motorcycle thefts, and burglaries shown in the table. Robberies are not included in the table because they do not have significant relationships with the selected social indicators (see Section 4.1.2). Symbols are used in the table to explain the relationships: '+' means 'direct correlation', '–' means 'inverse correlation', '0' means 'no correlation', and a blank means that the social indicator was not tested following the criteria laid out in Section 3.3.

Table 21. Final correlation results between types of crimes (ICVS and WHO) and social indicators in Europe, years 2004-2005

Social indicator	homicide	sexual offences against women	assault and threat	car theft	motorcycle theft	burglary
HDI	-	+	+	-	0	0
infant mortality	+	0	0	+		
healthy life years	-	0	0	0		
divorce	0	0	0	0		
severely materially deprived people	0	-	-	0		
acquisition of citizenship	0	0	0	0	+	0
science and technology	0	+	+	0	+	0
resource productivity					+	0
long-term unemployment rate					0	0
households					0	0
part-time worker status					0	-

Note: '+' means 'direct correlation', '−' means 'inverse correlation', '0' means 'no correlation', blank means that the social indicator was not tested

3. ***Homicide and the civilization theory***: The first remarkable result is that homicide is inversely correlated to development factors in Europe; this means that as development factors increase, the homicide rate decreases. This result aligns with several scholarly works that have discovered a negative association between modernization or development and homicide (Eisner 2012; Eisner and Nivette 2012; UNODC 2011), and it can be explained through the civilization theory. The correlation results suggest that socio-economic growth, as measured by development factors, may be linked to a decrease in homicide rates and be characterized by high levels of social inequality and poverty in less developed cultures. In these cases, the rate tends to be high; therefore, homicide decreases when HDI is high (-), infant mortality is low (+), and healthy life years is high (+). When comparing homicide rates against the development indicators, quite a consistent pattern emerges: globally, low levels of homicide are related to higher stages of development (UNODC 2011).

4. ***Multi-factor explanation***: Homicide results orient toward validating the civilization theory.

Supposing that this theory explains crime levels in Europe, the expectation is that there will be an inverse relationship between all types of crimes and the development factors. The correlation results reported in Table 21 are discouraging and the operation of finding the 'fil rouge' that can explicate the connections between crimes and the HDI seems like a difficult task. Looking at violent crimes alone is sufficient to confute Elias' paradigm of orienting through the modernization theory. In fact, sexual offences against women and assaults and threats are positively correlated to the HDI. After that, car theft is inversely correlated to the development factors in Europe (meaning that as development factors increase, car theft decreases), while other types of property crimes (motorcycle theft and burglary) cannot be explained by either the civilization or modernization theories, but are explainable through the opportunity theory.

This issue can be further developed through a multi-factor explanation. As Aebi and Linde (2010) suggested, the opportunity theory is very flexible and fits dissimilar circumstances very well. For violent crimes (sexual offences against women and assaults and threats), the risk factors identified using correlation analysis describe a developed and modern society. Cohen and Felson's (1979) routine activity theory explains lifestyle risk by examining changes in how leisure time is spent (technology) and in family composition (single adult). Violent crimes are strictly correlated to changes in free time that have been caused by Internet use (science and technology [+]) and a broad and generalized sensitivity concerning violent topics (HDI [+]) (Aebi and Linde 2012). Most developed countries are characterized by low poverty rates, so an inverse correlation to the deprivation factors (severe material deprivation [-]) can be read as socio-economic growth that has awakened people to violence.

Robbery is a strange crime category because it merges the property and violence component. The selected social indicators did not explain it, but perhaps anomie could (see Section 4.1.2). Aebi and Linde (2010) observed that, 'in contemporary developed societies, the population is confronted [with] an anomic situation in which the material goods offered are unlimited, but the economic resources are limited. This situation would generate strain or stress that could lead to delinquency'. At the same time, 'the disorganizations of a society can lead to crime because...a community that is not strong enough to organise its members can produce humans capable of committing crimes' (Shelley 1981).

The category of property crimes is variegated; car theft, motor theft, and burglary all record different associations with the social indicators, but they do belong to crimes that are different from one another and have a different sample of offenders and victims. Car theft is inversely correlated to the HDI, which means that as a society becomes more civilized, cars thefts decrease. The results support a positive relationship between motorcycle theft and economic development in the sense that economically advanced nations tend to have higher rates of it than poorer countries. This outcome leads to the conclusion that there is a close connection between car theft and resource productivity (+), which is a conventional indicator of industrialization, development, and recorded crime rates. In addition, the relationship in terms of heterogeneity level (acquisition of citizenship [+]) is representative of a society where the links between people are weak and mutual aid among neighbours is less frequent. Burglary is inversely correlated with part-time occupation; high part-time rates increase the number of people that spend their time at home and may increase the number of 'capable guardians' who are defending them (Cohen and Felson 1979).

Expanding economies increase the expendable income in the average household, which gives people the opportunity to spend on a growing variety of consumer goods; this subsequently increases opportunities for property offences (Cohen and Felson 1979). Similarly, work and leisure activities may translate into less time being spent at home for many individuals, while cultural heterogeneity activities may produce people who are less willing to guard their personal safety and the private property of their neighbours (Howard et al. 2000). Moreover, some variables related to lifestyle and opportunity characteristics (routine activity theory by Cohen and Felson 1979), which are extremely flexible, were included in the study. Crime rates appear to be better explained by changes in routine activities and other opportunities than by deterrence variables (Killias, Lamon, and Aebi 2005).

CHAPTER 5 – PATTERNS OVER TIME

Taking into account the evolution of crime and social indicators in two averaged periods, 1995-1999 and 2003-2007 (spanning across available data from the ESCCJ), it is possible to describe the patterns in crime rates across Europe for homogenous sets of European countries. Multivariate techniques will identify homogenous groups of countries in terms of economic and social features and then, the thesis will compare crime and risk factors trends so as to evaluate if the selected social indicators can explain crime levels over time. In particular, by comparing and contrasting crime and social indicator trends, this chapter assesses the evolution of risk factors over time to explain crime trends, while still accounting for the significant correlations found in Chapter 4. There are some graphical elaborations in this chapter that reveal crime levels for a specific country, but the main principles behind the use of the data are: 1) that there are no comparisons made between countries (only between groups of countries) and 2) that only trends over the selected averaged periods are considered (Aebi and Linde 2010, 2011, and 2012a; Smit et al. 2012).

5.1 DESCRIPTIVE STATISTICS FOR PROPERTY AND VIOLENT CRIMES TO COMPARE CRIME TRENDS IN EUROPE

This section collects the main statistical indicators for completed homicides, violent crimes (rapes, robberies, and bodily injuries), property crimes (thefts and burglaries), and drug offences. The selected statistical indicators are the mean, median, standard deviation, minimum, maximum, and quantiles. Table 22 organizes the statistical indicators for completed homicides and violent crimes. From 2003-2007, there are two missing pieces of data for completed homicide (the Czech Republic and Latvia), no missing data for rape and robbery, and three missing values for bodily injury (Malta, Spain, and Slovakia). The period 1995-1999 is also incomplete; there is no missing data for rape, robbery, or assault but there is one missing value for completed homicide (Romania). The data highlights the low variance among violent crimes and the percentile values show that the third quartile (75) has values significantly lower than that recorded by the maximum value. The maximum for 2003-2007 is recorded in Lithuania for homicide, in Sweden for rape and bodily injury, and in

Belgium for robbery. In contrast from 1995-1999, the maximum is recorded in Estonia for homicide and robbery, in Ireland for rape, and in Sweden for bodily injury.

Table 22. Descriptive statistics for violent crimes in the EU27

		homicide completed		rape		robbery		assault/bodily injury	
		1995-1999	2003-2007	1995-1999	2003-2007	1995-1999	2003-2007	1995-1999	2003-2007
N	Valid	25	24	26	26	26	26	26	23
	Missing	1	2	0	0	0	0	0	3
Mean		2,96	2,14	7,83	9,70	83,06	87,84	181,95	252,64
Median		1,75	1,64	6,02	7,15	66,54	63,90	78,66	145,80
Std. Deviation		2,97	2,06	5,55	8,75	66,77	64,27	199,83	237,79
Minimum		1,00	0,68	1,56	2,00	3,36	10,80	11,14	15,20
Maximum		13,56	9,16	23,08	39,80	251,48	213,00	632,26	807,60
Percentile	25	1,39	1,09	3,70	4,25	28,05	34,45	27,76	57,33
	50	1,75	1,64	6,02	7,15	66,54	63,90	78,66	145,80
	75	3,02	2,08	10,28	10,55	137,07	122,65	382,06	439,00

Table 23 reveals statistical indicators for property crimes. Two countries each have missing data for theft and burglary in the 2003-2007 timeframe; they are, respectively, Malta and Spain for theft, and Italy and Latvia for burglary. Belgium, Latvia, and Lithuania all have missing data for burglary from 1995-1999. The selected median values for property crimes are always lower than their average values, which can be interpreted as the property crimes having asymmetric distributions. For both the 1995-1999 and 2003-2007 periods, maximum values were recorded in Sweden for theft and in the Netherlands for burglary.

Table 23. Descriptive statistics for property crimes in the EU27

		theft		burglary	
		1995-1999	2003-2007	1995-1999	2003-2007
N	Valid	26	24	23	24
	Missing	0	2	3	2
Mean		2670,28	2490,53	926,90	701,83
Median		2126,47	2141,30	746,72	580,40
Std. Deviation		1915,46	1642,10	709,91	489,30
Minimum		270,50	216,60	126,16	37,00
Maximum		7801,34	6801,20	3163,86	2068,00
Percentile	25	1261,84	1135,65	497,20	393,15
	50	2126,47	2141,30	746,72	580,40
	75	3874,49	3777,35	1024,32	939,58

Table 24 reveals statistical indicators for drug offences. Spain is missing data for both 1995-1999 and 2003-2007 while Slovakia is only missing data from 1995-1999. Drugs levels appear to have greatly increased over the years across the EU27, having almost doubled.

Table 24. Descriptive statistics for drug offences in the EU27

		drug offences	
		1995-1999	2003-2007
N	Valid	24	25
	Missing	2	1
Mean		95,44	169,99
Median		49,36	87,20
Std. Deviation		110,33	155,36
Minimum		2,70	10,80
Maximum		408,26	611,80
Percentile	25	15,94	47,60
	50	49,36	87,20
	75	145,47	305,90

This type of analysis allows for some generalized considerations. By comparing descriptive statistics between 2003-2007 and 1995-1999, it is possible to observe that mean values:

- Decrease for homicide
- Increase for rape, assault, and robbery
- Decrease for theft and burglary
- Increase for drug offences

5.2. GROUPING OF THE EU COUNTRIES

Cluster analysis allows us to compare trends between groups of countries. Clusters have similar features within their members, so this comparison is more suitable than comparing singular countries (Smit et al. 2008). In order to reduce the impact of changes in legal definitions, we do not analyse trends for every nation, but instead consider the countries for which data is available as a single cluster (Aebi and Linde 2012a). Aebi and Linde (2012a) have said that evolutions in legal definitions should have a stronger impact on conviction statistics than police statistics because conviction statistics are based on the articles of the criminal code, while police statistics may be based on operational definitions. Aebi and Linde (2010, 2011) and Smit et al. (2012), for practical and theoretical reasons, have examined crime levels not only for individual countries, but also for (respectively, two and four) groups of European countries. Practically, the data for a few groups of countries tends to be stabler than data for many individual countries, and it can be more easily examined. It is also advantageous to hone in on changes in this manner because the effect of varied crime definitions (in particular, the definition of total crime is subject to a variety of implementations in each country) is of less import than at the absolute levels (Smit et al. 2012).

The statistical units are the 26 European countries[29] and the social indicators listed on Table 7 related to life expectancy, school expectancy, and GDP per capita are the active variables (Matrix E). The intention is to only consider social indicators that will stay constant even on the basis of contingency factors–only those features that are structural elements of a country. A hierarchical agglomerative method was the chosen technique. The specific agglomeration technique employed is the average (between groups) linkage, where the distance between two clusters is calculated as the average distance between all pairs of subjects. The main advantage of this method is its robustness, which means that it is not very sensitive to outliers.

Table 25 collects the distribution of European countries and indicates the cluster to which each country belongs. The first cluster (Cluster 1) includes Austria, Belgium, Denmark, Finland, France, Germany, Ireland, the Netherlands, Sweden, and England and Wales (North/West). The second cluster

[29] The 27 countries that belong to the EU have been taken into account, but there is no crime data for Luxembourg in 2003–2007.

(Cluster 2) includes Cyprus, Greece, Italy, Malta, Portugal, Slovenia, and Spain (South). The third cluster (Cluster 3) includes Bulgaria, the Czech Republic, Hungary, Poland, Romania, Slovakia, Estonia, Latvia, and Lithuania (Central/East).

Table 25. European countries clustered

Country	Cluster
Austria	1
Belgium	1
Denmark	1
England and Wales	1
Finland	1
France	1
Germany	1
Ireland	1
Sweden	1
the Netherlands	1
Cyprus	2
Greece	2
Italy	2
Malta	2
Portugal	2
Slovenia	2
Spain	2
Bulgaria	3
Estonia	3
Hungary	3
Latvia	3
Lithuania	3
Poland	3
Romania	3
Slovakia	3
the Czech Republic	3

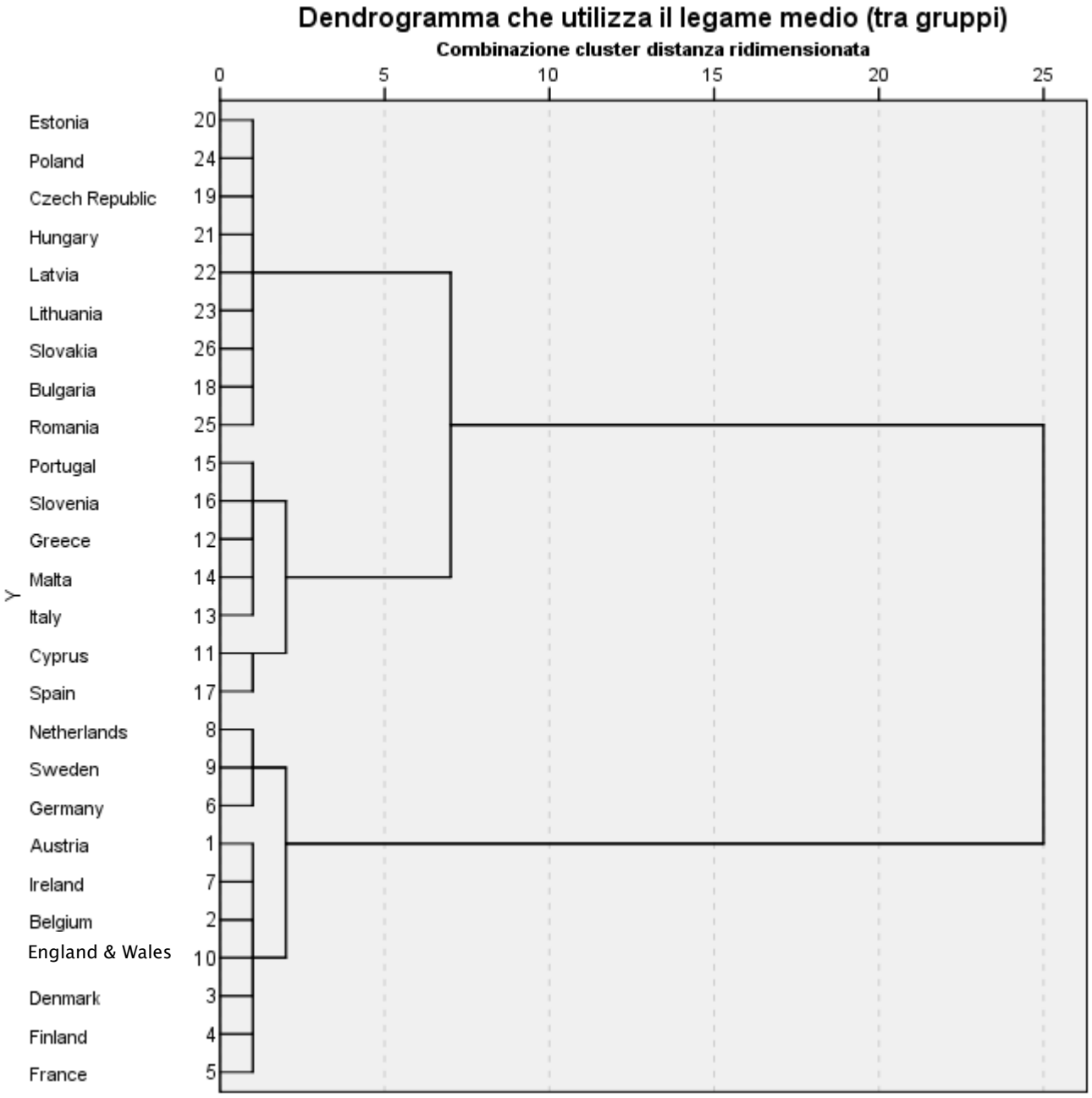
Comparing these results to Smit's reveals differences in the third group (Cluster 3) but Smit et al. (2008) evaluated some countries (Iceland, Luxembourg, Norway, Switzerland, Bosnia-Herzegovina, Croatia, TFYR of Macedonia, Turkey, Albania, Armenia, Georgia, Moldova, Russia, and Ukraine) that are not applicable to this study. One of the principles of CA is to have groups of countries that are similar in their number of units but splitting the third cluster (Bulgaria, the Czech Republic, Hungary, Poland, Romania, Slovakia, Estonia, Latvia, and Lithuania) into two groups would be nonsensical. In

this way, the first cluster includes the Northern/Western countries, the second cluster includes the Southern countries, and the third cluster includes the Central/Eastern countries.

Figure 11 represents the dendrogram that denotes the linkage points for the European countries in their group formations. It illustrates, for example, that Sweden, the Netherlands, and Germany belong to the same group, while Austria, Ireland, Belgium, England and Wales, Denmark, Finland, and France belong to another group. The goal of the clustering algorithm is to join objects together into successively larger clusters using some measure of similarity or distance. Looking at Figure 11 it is possible to see that at the beginning, each object is in a class by itself. By selecting the criterion of aggregation, we link more and more objects together and amalgamate larger and larger clusters of increasingly dissimilar elements. Finally, in the last step, all of the objects are joined together as one cluster (Burns et al. 2009).

Furthermore, the dendrogram reveals three Clusters (North/West, South and Central/East) and shows the impossibility of splitting the third group into two smaller clusters.

Figure 11. Dendrogram for the EU countries



5.3 CRIME TRENDS

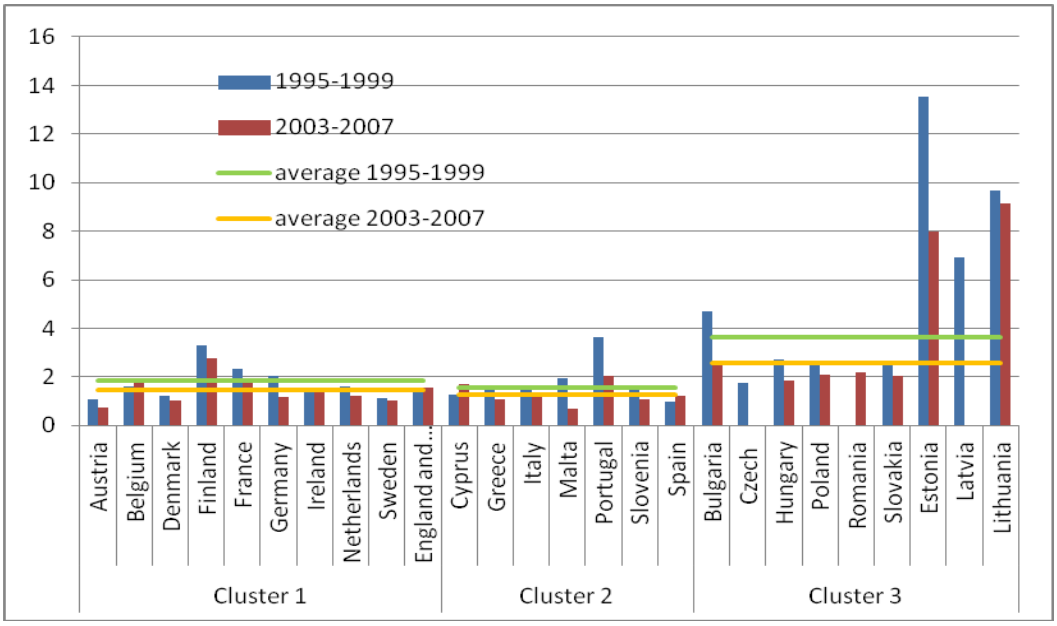
The graphics found in Figures 12-18 show averaged levels for different types of crimes that occurred between 1995-1999 and 2003-2007. The European countries are distributed on the x-axis following the cluster analysis results. On the left, there are countries that belong to Cluster 1, the North/West, in alphabetical order. Then there are the countries that belong to Cluster 2, the South, and finally, there are the countries that belong to Cluster 3, the Central/East. For Cluster 3, alphabetical order is applied, but in keeping with Smit's (2008) philosophy, the Eastern countries (Estonia, Latvia, and Lithuania) are positioned at the end. In the following section, there are graphics that exhibit trends for homicide, rape, assault and robbery, theft, burglary, and drug offences between 1995-1999 and 2003-2007. These figures are enriched with the averaged values for all three clusters. The average is calculated for each cluster as a function of the recorded crime rates weighted for the population so as to have one averaged value for the cluster that proportionally represents the countries it includes.

5.3.1 HOMICIDE AND VIOLENT OFFENCES TRENDS

Figures 12-15 illustrate trends for homicide, rape, assault, and robbery. The average in green is related to the period 1995-1999 and the average in orange is related to the period 2003-2007.

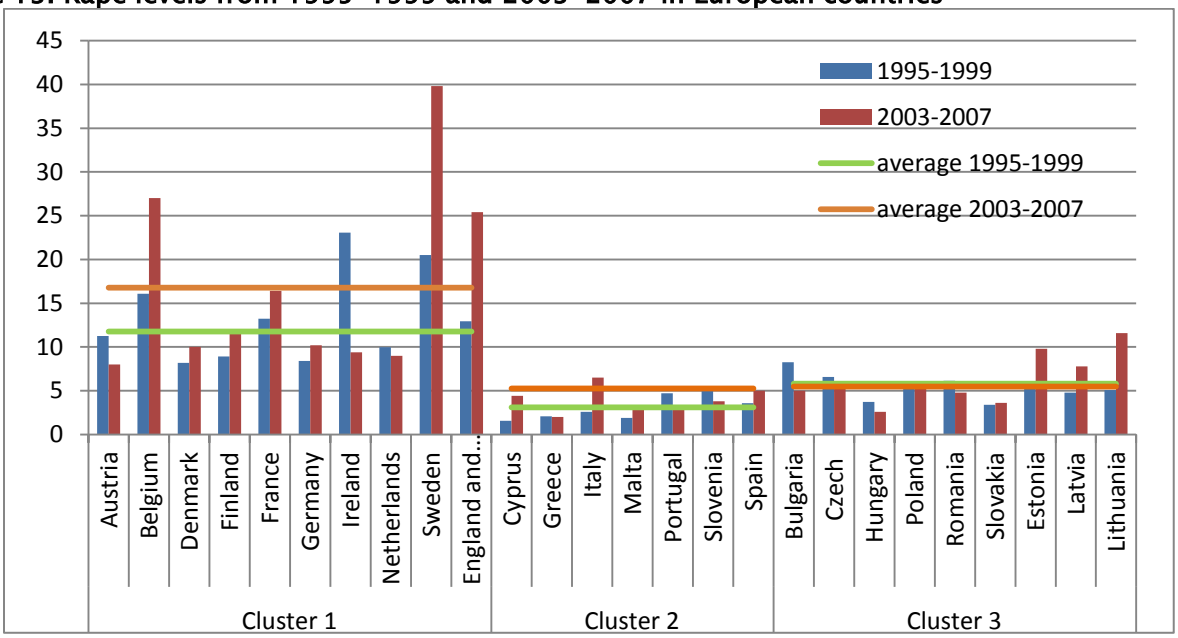
Completed homicide levels significantly decreased from 1995-1999 to 2003-2007 in all three of the country clusters. Higher levels were recorded in the Eastern countries from 1995-1999 (3.63) and from 2003-2007 (2.57) while the Northern/Western and Southern countries had lower rates (less than 2 in 1995-1999 and less than 1.5 in 2003-2007).

Figure 12. Completed homicide levels from 1995-1999 and 2003-2007 in European countries



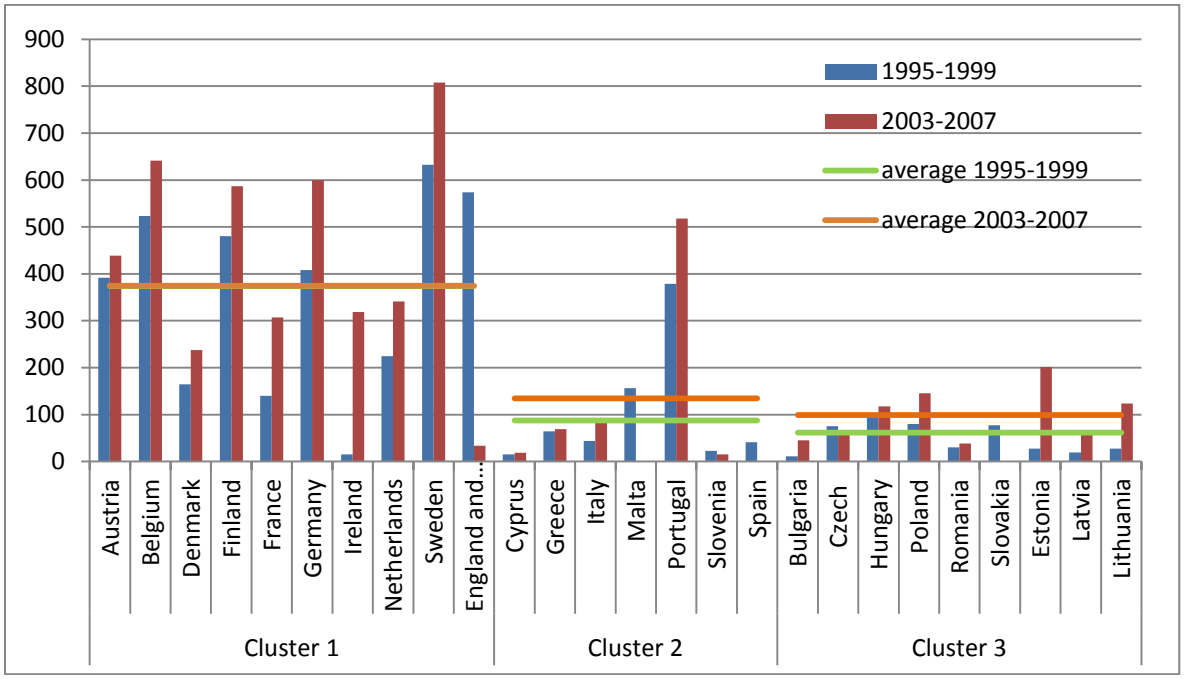
The rape trends are not as homogenous as the homicide trend in Europe, but generally, there has been an increase in crime levels from 1995-1999 to 2003-2007. Cluster 1 had raised rape levels, except for some Catholic countries (Austria and Ireland), and in general, their cluster trend increased from 11.7 in 1995-99 to 16.7 in 2003-07. Cluster 2 increased its trend from 3.1 to 5.3 while Cluster 3 has demonstrated an uncertain trend that has tended towards increased rates (see Lithuania, Estonia, and Latvia).

Figure 13. Rape levels from 1995-1999 and 2003-2007 in European countries



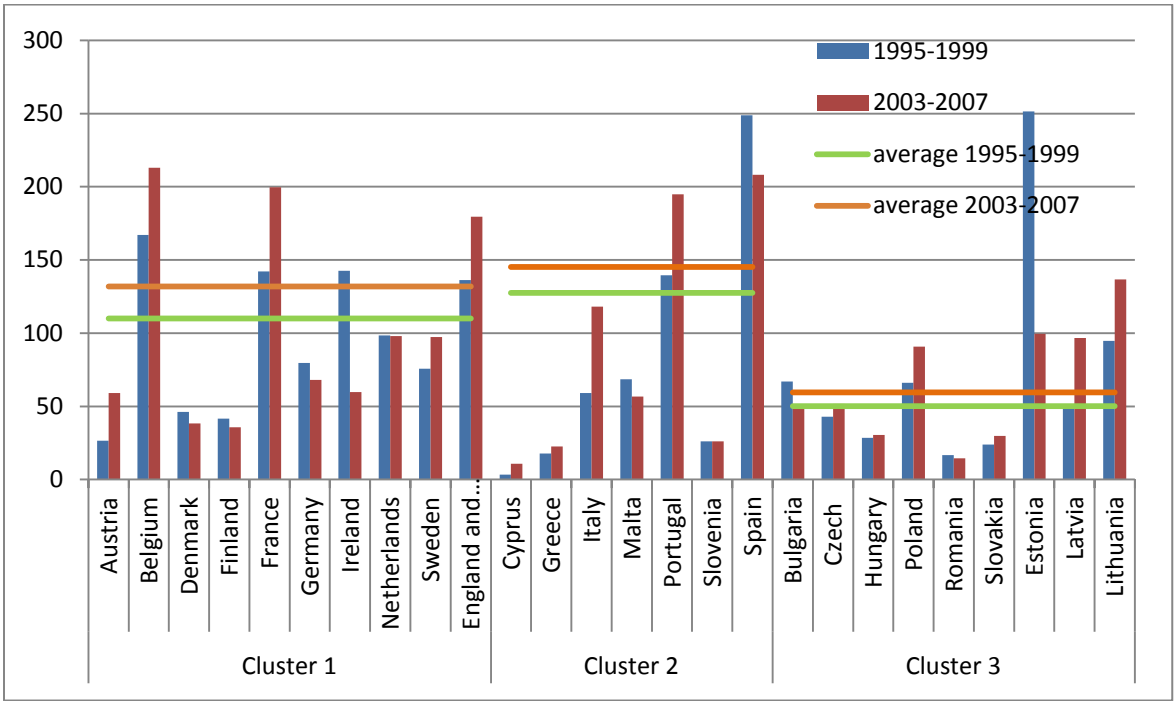
Bodily injuries have remained stable in the Northern/Western countries (374) but they increased in the Southern (from 88 to 135) and Central/Eastern countries (from 61 to 98). While potentially alarming in some cases, the higher levels have been partly caused by differences in the definitions of 'bodily injury' over the years.

Figure 14. Bodily injury levels from 1995-1999 and 2003-2007 in European countries



Robbery records present dissimilar trends in different countries, but the trends are generally increasing. The instances of robbery grew from 110 to 131 in Cluster 1 (with some exceptions like Denmark, Finland, Germany, and Ireland); it rose from 128 to 145 almost everywhere in Cluster 2 and from 50 to 60 in Cluster 3.

Figure 15. Robbery levels from 1995-1999 and 2003-2007 in European countries

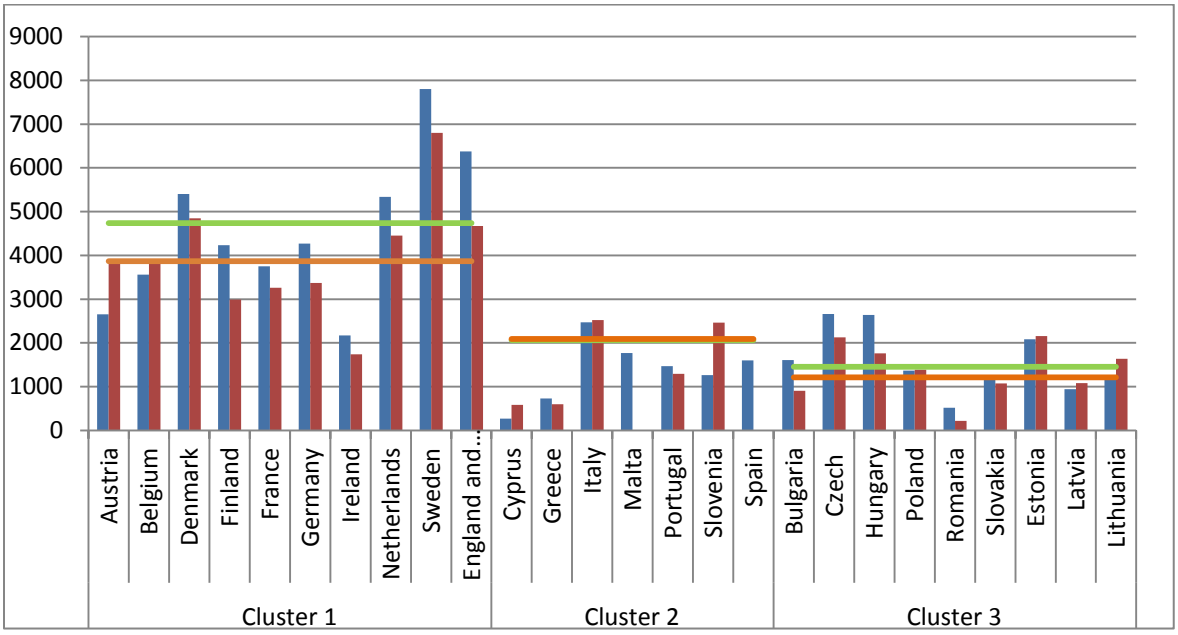


5.3.2 PROPERTY AND DRUG OFFENCES TRENDS

Figures 16-18 exhibit trends for thefts, burglaries, and drug offences. The average in green denotes the years 1995-1999 and the average in orange signifies the years 2003-2007. Trends for property crimes are indicated in Figures 16 and 17. Upon closer inspection, it is clear that theft and burglary rates have decreased almost everywhere.

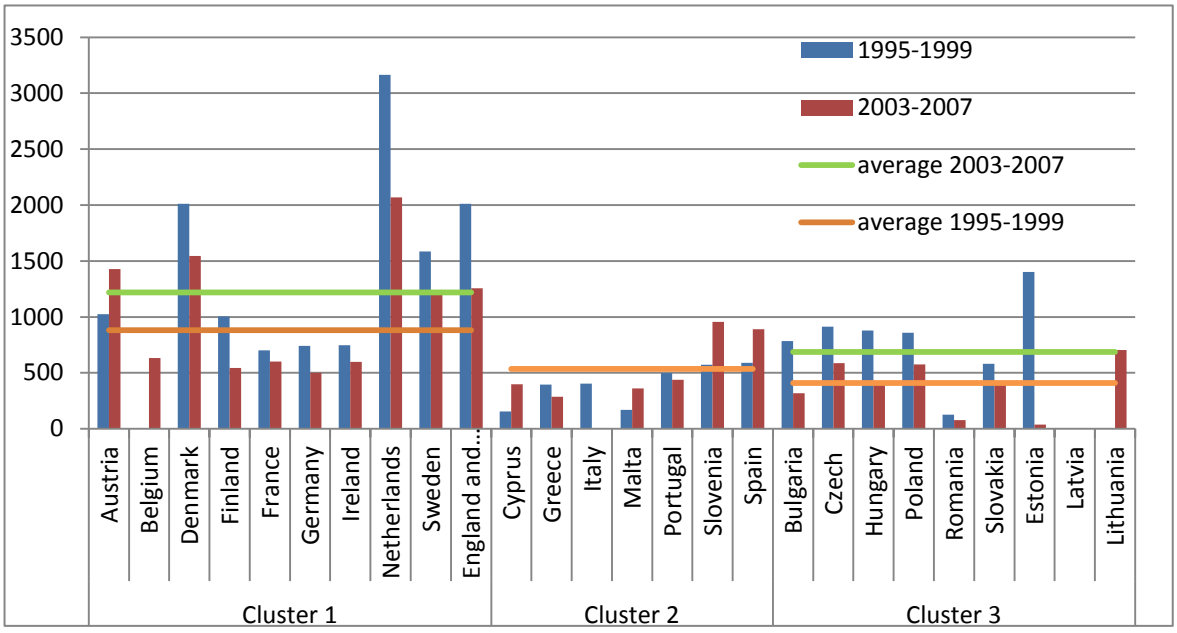
In Figure 16, there are theft levels from 1995-1999 to 2003-2007 for European countries: the Northern/Western countries increased their levels (from 4737 to 3869), the Southern countries held stable levels, and the Central/Eastern countries also saw their levels rise (from 1455 to 1210).

Figure 16. Theft levels from 1995-1999 and 2003-2007 in European countries



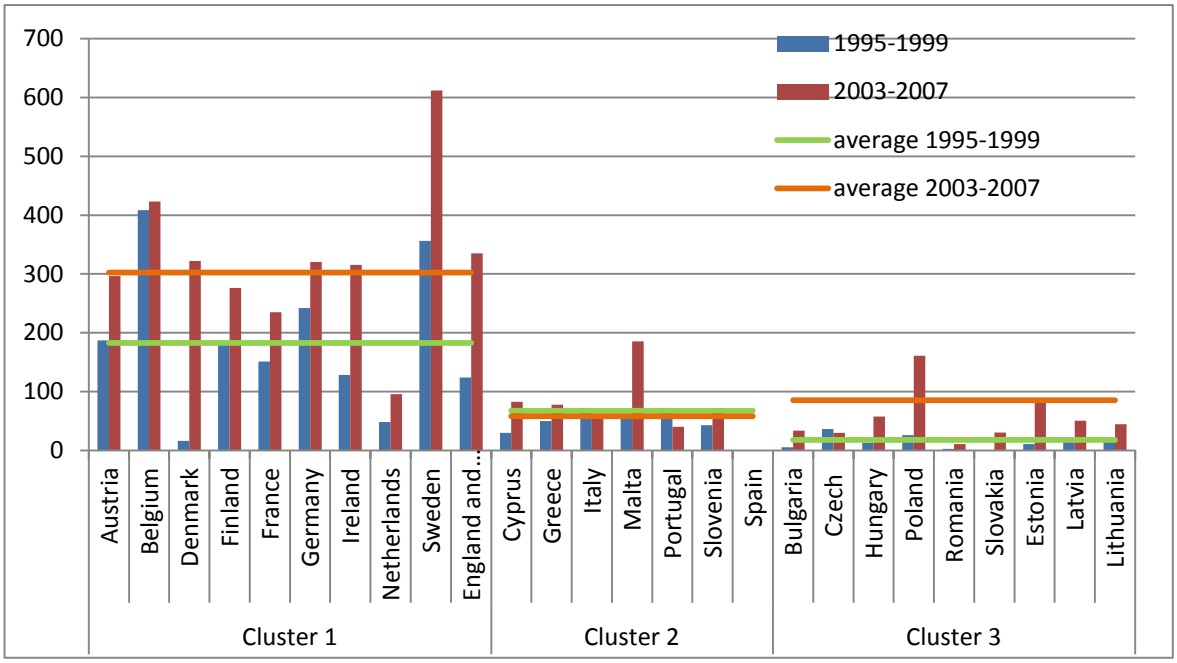
European burglary levels from 1995-1999 to 2003-2007 have been highlighted in Figure 17. There is no mean for burglary from 2003-2007 because there was no data related to the country with the highest population, Italy, and there were changes to the definition of burglary in Spain at that time. Therefore, the average in Cluster 2 is not reported since only partial results were attained. Clusters 1 and 3 both recorded declining trends with the Northern/Western countries changing from 1217 to 880) and the Central/Eastern countries similarly decreasing from 686 to 409.

Figure 17. Burglary levels from 1995-1999 and 2003-2007 in European countries



Drug offence levels for Europe from 1995-1999 and 2003-2007 are assembled in Figure 18. Closer examination of the data reveals that this particular phenomenon increased almost everywhere except in Italy, Portugal, and the Czech Republic. The highest variation was recorded in the Central/Eastern region (+3.42).

Figure 18. Drug offence levels from 1995-1999 and 2003-2007 in European countries



5.3.3 An overview of trends in the EU countries

Table 26 represents crime levels from 1995-1999 and 2003-2007 for completed homicide, rape, robbery, and assault. The differential variation (Δ) makes it possible to compare crime levels over the years; it is calculated as follows:

$$\Delta_{2003\text{-}2007;\,1995\text{-}1999} = (\text{Crime}_{2003\text{-}2007} - \text{Crime}_{1995\text{-}1999}) / \text{Crime}_{1995\text{-}1999}$$

For completed homicides, the differential variation spans from -0.43 (Germany) to 0.13 (Belgium) in Cluster 1, from -0.65 (Malta) to 0.34 (Cyprus) in Cluster 2, and from -0.47 (Bulgaria) to -0.05 (Lithuania) in Cluster 3. With regard to rape, the differential variation ranges from -0.59 (Ireland) to 0.96 (England and Wales) in Cluster 1, from -0.31 (Portugal) to 1.82 (Cyprus) in Cluster 2, and from -0.39 (Bulgaria) to 1.29 (Lithuania) in Cluster 3. The differential variation is spread from -0.58 (Ireland)

to 1.23 (Austria) in Cluster 1, from -0.16 (Spain) to 2.21 (Cyprus) in Cluster 2, and from -0.60 (Estonia) to 0.98 (Latvia) in Cluster 3 for the crime of robbery. In the case of assault, the differential variation extends from -0.94 (England and Wales) to 19.53 (Ireland) in Cluster 1, from -0.33 (Slovenia) to 0.93 (Italy) in Cluster 2, and from -0.16 (the Czech Republic) to 6.28 (Estonia) in Cluster 3. Cyprus has recorded significant increases in several categories of violent crimes. It is well known that Cyprus is a small country, so having used a weighted mean is an important consideration because each country has a weight in the cluster that is proportional to the dimension of the population that it represents. In several cases, high differential variations have likely been caused by changes in legal definitions or the application of different counting rules (see Ireland or Estonia for assault).

Table 26. Completed homicide, rape, robbery, and assault levels and variations from 1995-1999 and 2003-2007 in Europe

Cluster	Country	Completed homicide			Rape			Robbery			Assault		
		1995-1999	2003-2007	Δ	1995-1999	2003-2007	Δ	1995-1999	2003-2007	Δ	1995-1999	2003-2007	Δ
1	Austria	1,1	0,72	-0,35	11,24	8,00	-0,29	26,5	59,00	1,23	391,76	439,00	0,12
	Belgium	1,62	1,825	0,13	16,08	27,00	0,68	167,06	213,00	0,27	523,16	641,25	0,23
	Denmark	1,2	1,05	-0,13	8,18	10,00	0,22	46,3	38,25	-0,17	164,32	237,50	0,45
	Finland	3,32	2,76	-0,17	8,9	11,80	0,33	41,52	35,80	-0,14	480,26	586,60	0,22
	France	2,32	1,82	-0,22	13,24	16,40	0,24	142,08	199,60	0,40	140,44	307,00	1,19
	Germany	2,02	1,16	-0,43	8,4	10,20	0,21	79,62	68,00	-0,15	408,26	599,60	0,47
	Ireland	1,38	1,52	0,10	23,08	9,40	-0,59	142,66	59,80	-0,58	15,52	318,60	19,53
	Netherlands	1,62	1,2	-0,26	9,96	9,00	-0,10	98,44	98,00	0,00	224,82	341,00	0,52
	Sweden	1,12	1,04	-0,07	20,5	39,80	0,94	75,74	97,40	0,29	632,26	807,60	0,28
	England and Wales	1,4	1,56	0,11	12,94	25,40	0,96	136,28	179,60	0,32	573,54	33,80	-0,94
2	Cyprus	1,28	1,72	0,34	1,56	4,40	1,82	3,36	10,80	2,21	15,56	18,80	0,21
	Greece	1,45	1,06	-0,27	2,06	2,00	-0,03	17,78	22,60	0,27	64,3	69,40	0,08
	Italy	1,66	1,2	-0,28	2,6	6,50	1,50	59,18	118,00	0,99	44,26	85,25	0,93
	Malta	1,95	0,675	-0,65	1,9	3,00	0,58	68,45	56,60	-0,17	156,65		
	Portugal	3,64	2,05	-0,44	4,72	3,25	-0,31	139,44	194,75	0,40	378,82	518,00	0,37
	Slovenia	1,68	1,06	-0,37	5,36	3,80	-0,29	26,12	26,00	0,00	22,52	15,20	-0,33
	Spain	1	1,2	0,20	3,575	5,00	0,40	248,74	208,20	-0,16	41,2		
3	Bulgaria	4,72	2,52	-0,47	8,26	5,00	-0,39	66,9	48,60	-0,27	11,14	45,20	3,06
	Czech R.	1,75			6,56	6,00	-0,09	42,96	51,75	0,20	75,28	63,20	-0,16
	Hungary	2,72	1,84	-0,32	3,74	2,60	-0,30	28,56	30,40	0,06	103,5	117,40	0,13
	Poland	2,46	2,08	-0,15	5,9	6,00	0,02	66,18	90,80	0,37	80,26	145,80	0,82
	Romania		2,18		6,14	4,80	-0,22	16,78	14,40	-0,14	30,66	38,20	0,25
	Slovakia	2,5	2,06	-0,18	3,4	3,60	0,06	23,96	29,80	0,24	77,06		
	Estonia	13,56	7,98	-0,41	5,56	9,80	0,76	251,48	99,60	-0,60	27,68	201,40	6,28
	Latvia	6,92			4,78	7,80	0,63	48,74	96,60	0,98	19,56	57,33	1,93
	Lithuania	9,66	9,16	-0,05	5,06	11,60	1,29	94,8	136,60	0,44	27,78	123,60	3,45

As seen in Table 27, differential variation for theft encompasses ranges from -0.17 (Netherland) to 0.48 (Austria) in Cluster 1, from -0.18 (Greece) to 1.17 (Cyprus) in Cluster 2, and from -0.58 (Romania) to 0.30 (Lithuania) in Cluster 3. Also include in the table, burglary's differential variation is spread from -0.46 (Finland) to 0.39 (Austria) in Cluster 1, from -0.27 (Greece) to 1.55 (Cyprus) in Cluster 2, and from -0.97 (Estonia to 0.33 (Poland and Slovakia) in Cluster 3. Finally, for drug offences in Table 23, the differential variation fluctuates from 0.04 (Belgium) to 18.99 (Denmark) in Cluster 1, from -0.21 (Italy) to 2.18 (Malta) in Cluster 2, and from -0.17 (the Czech Republic) to 6.81 (Estonia) in

Cluster 3.

Table 27. Property crime and drug offence levels and variations from 1995-1999 and 2003-2007 in Europe

Cluster	Country	Theft			Burglary			Drug offences		
		1995-1999	2003-2007	Δ	1995-1999	2003-2007	Δ	1995-1999	2003-2007	Δ
1	Austria	2.651,3	3.913,40	0,48	1.024,32	1.427,80	0,39	187,2	296,20	0,58
	Belgium	3.558,62	3.913,50	0,10		633,50		408,26	423,25	0,04
	Denmark	5.406,86	4.849,50	-0,10	2.010,76	1.546,00	-0,23	16,12	322,20	18,99
	Finland	4.236,5	2.988,60	-0,29	1.003,54	542,80	-0,46	180,62	276,20	0,53
	France	3.753,82	3.263,80	-0,13	702,08	600,00	-0,15	151,2	235,20	0,56
	Germany	4.271,64	3.369,20	-0,21	741,68	499,80	-0,33	242,28	320,40	0,32
	Ireland	2167,5	1.735,80	-0,20	746,72	599,20	-0,20	128,28	315,60	1,46
	Netherlands	5.334,62	4.452,60	-0,17	3.163,86	2.068,00	-0,35	48,55	96,00	0,98
	Sweden	7.801,34	6.801,20	-0,13	1.584,3	1.222,80	-0,23	356,3	611,80	0,72
	England and Wales	6.378,52	4.673,00	-0,27	2.012,76	1.256,20	-0,38	123,94	335,00	1,70
2	Cyprus	270,5	587,20	1,17	156,28	399,00	1,55	29,94	82,60	1,76
	Greece	731,06	599,40	-0,18	394,26	287,20	-0,27	50,16	77,80	0,55
	Italy	2470,2	2.523,00	0,02	404,42			71,96	56,50	-0,21
	Malta	1.765,95			169,75	360,50	1,12	58,3	185,50	2,18
	Portugal	1.468,5	1.290,00	-0,12	497,2	437,00	-0,12	67,64	40,25	-0,40
	Slovenia	1.263,44	2.461,60	0,95	572,02	955,60	0,67	43,04	69,00	0,60
	Spain	1.599,8			588,38	891,50	0,52			
3	Bulgaria	1.609,98	907,00	-0,44	784,96	317,40	-0,60	5,42	33,60	5,20
	Czech R.	2.658,42	2.127,40	-0,20	913,96	586,40	-0,36	36,28	30,20	-0,17
	Hungary	2.636,76	1.760,60	-0,33	878,96	426,80	-0,51	13,22	57,80	3,37
	Poland	1.369,52	1.386,40	0,01	858,6	574,40	-0,33	26,4	161,00	5,10
	Romania	520,2	216,60	-0,58	126,16	79,00	-0,37	2,7	10,80	3,00
	Slovakia	1.219,68	1.076,60	-0,12	580,26	391,20	-0,33		30,40	
	Estonia	2.085,44	2.155,20	0,03	1.403,36	37,00	-0,97	11,16	87,20	6,81
	Latvia	939,96	1.084,20	0,15				15,88	50,40	2,17
	Lithuania	1.257,04	1.636,80	0,30		704,80		15,66	44,80	1,86

Table 28 synthesizes the aggregated crime trends for clusters of countries. It has been filled using traffic light logic, where a cell coloured in red means an increasing trend, a cell coloured in green refers to a decreasing trend, and a cell coloured in white denotes a stable trend. European countries are currently affected by an increase in violent crimes and drug offences, along with a decrease in property crimes and homicides. The Northern/Western countries have recorded decreasing trends in homicide and property crimes and a rise in violent crimes (except for bodily injury, which reflect

stable trends) and drug offences. The Southern countries have had decreasing trends in homicide and increases in violent crimes. They have appeared stable in property crimes (theft and burglary). Data collected in Appendix C shows that the trend is not clear; some countries have raised their trends while others have decreased their levels. There are a few countries for which data are missing[30]. Aside from that, some small countries (Cyprus, Malta, and Slovenia) have less weight on crime trends than their larger counterparts, especially if they belong to the same cluster. This is why theft and burglary trends are coloured white for Cluster 2. The Southern countries have held stable trends in drug offences. Finally, the Central/Eastern countries have documented decreasing trends in homicide and property crimes and a rise in violent crimes (except for rape, which shows stable trends) and drug offences.

Table 28 Crime trends of European country clusters, years 1995-99 and 2003-07

Cluster	Countries	Completed homicide	Rape	Bodily injury	Robbery	Theft	Burglary	Drug offence
1 - North/West	Austria, Belgium, Denmark, Finland, France, Germany, Ireland, the Netherlands, Sweden, and England and Wales							
2 - South	Cyprus, Greece, Italy, Malta, Portugal, Slovenia, and Spain							
3 - Central/East	Bulgaria, the Czech Republic, Hungary, Poland, Romania, Slovakia, Estonia, Latvia, and Lithuania							
Europe								

Note: Red colour = increase; green colour = decrease; white colour = stability

[30] Missing countries for completed homicide are: Czech Republic, Romania, Latvia. For assault: Malta, Spain, Slovakia. For theft: Malta, Spain. For burglary: Belgium, Italy, Latvia, Lithuania. For drug offences: Spain, Slovakia.

5.4 RISK FACTOR TRENDS

This section examines the HDI trends over time for the European country clusters (data in Appendix E). From 2000 to 2009, all countries increased their HDI; in particular, the highest variation was found in the Central/Eastern countries (Romania). A few countries that belong to Cluster 3 recorded the lowest HDI values in 2000 as well as in 2009 (Romania and Bulgaria), while the Northern/Western nations (Sweden 0.894 and the Netherlands 0.882) registered the highest values in 2000. In 2009, Germany, Ireland, and the Netherlands had values higher than 0.9. Table 29 is filled using traffic light logic: a cell coloured red means an increasing trend and a cell coloured green refers to a decreasing trend. In this case, the HDI suggests increasing trends in all three country clusters.

Table 29. HDI trends (2000–2009) in European countries

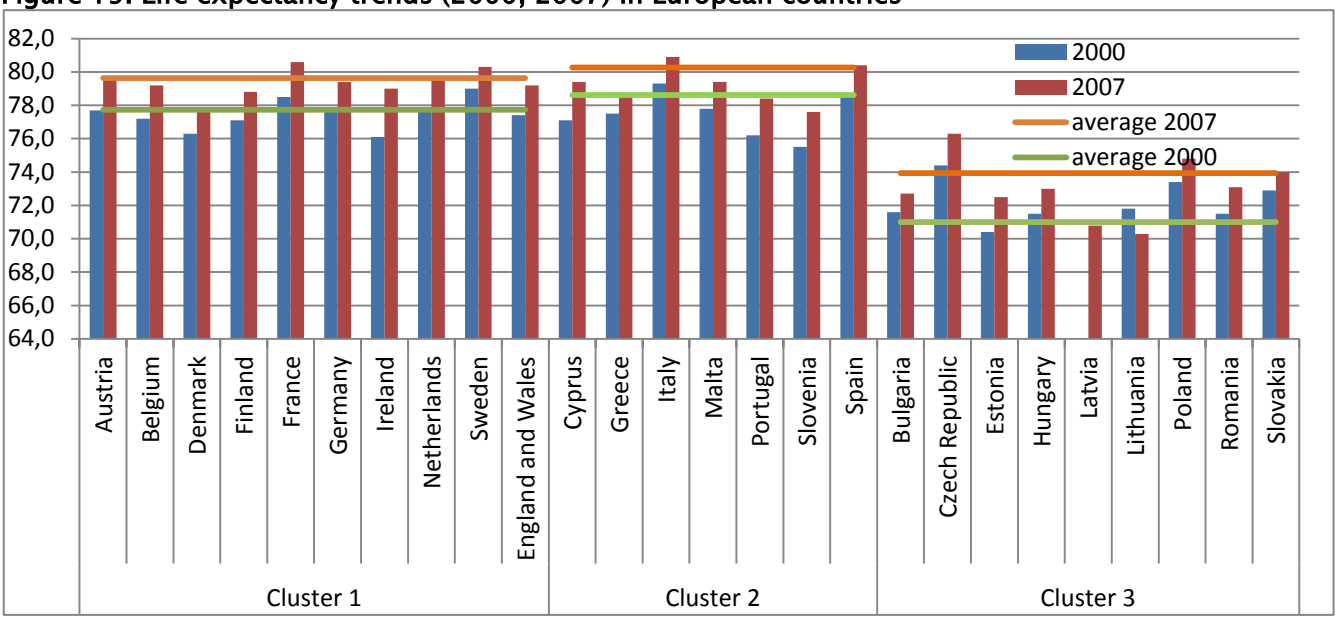
Cluster	Countries	HDI
1- North/West	Austria, Belgium, Denmark, Finland, France, Germany, Ireland, the Netherlands, Sweden, and England and Wales	
2 - South	Cyprus, Greece, Italy, Malta, Portugal, Slovenia, and Spain	
3 - Central/East	Bulgaria, the Czech Republic, Hungary, Poland, Romania, Slovakia, Estonia, Latvia, and Lithuania	

Note: Red colour = increase; green colour = decrease; white colour = stability

In the upcoming pages, Figures 19–21 illustrate life expectancy, school expectancy, and GDP per capita in the years 2000 and 2007 in European countries. These graphics examine trends for the three components of the HDI. The European countries are distributed on the x-axis following the CA results. On the left are countries that belong to Cluster 1, the North/West, in alphabetical order. Then there are the countries that belong to Cluster 2, the South, and on the right are the countries that belong to Cluster 3, the Central/East. Figure 19 and the data in Appendix E reveal that life expectancy has an increasing trend in all three country clusters. Examining the data more thoroughly, it is seen that the highest variation is recorded in Ireland (0.04) for Cluster 1; Cyprus, Slovenia, and Portugal

(0.03) for Cluster 2; and the Czech Republic and Estonia (0.03) for Cluster 3. Lithuania is the only instance where a negative trend was registered from 2000 to 2007 (-0.02).

Figure 19. Life expectancy trends (2000, 2007) in European countries



School expectancy levels recorded for Europe in the years 2000 and 2007 have been organized in Figure 20. Three countries (France, Sweden, and England and Wales) belonging to Cluster 1 display a decreasing trend, while the other countries have higher values in 2007 than those registered in 2000. The highest variations are found in Finland for Group 1, Greece for Group 2, and in Latvia and Romania for Group 3. Average variations vary from 0.02 in the North/West, to 0.07 in the South, and 0.11 in the Central/East (Appendix E).

Figure 20. School expectancy trends (2000, 2007) in European countries

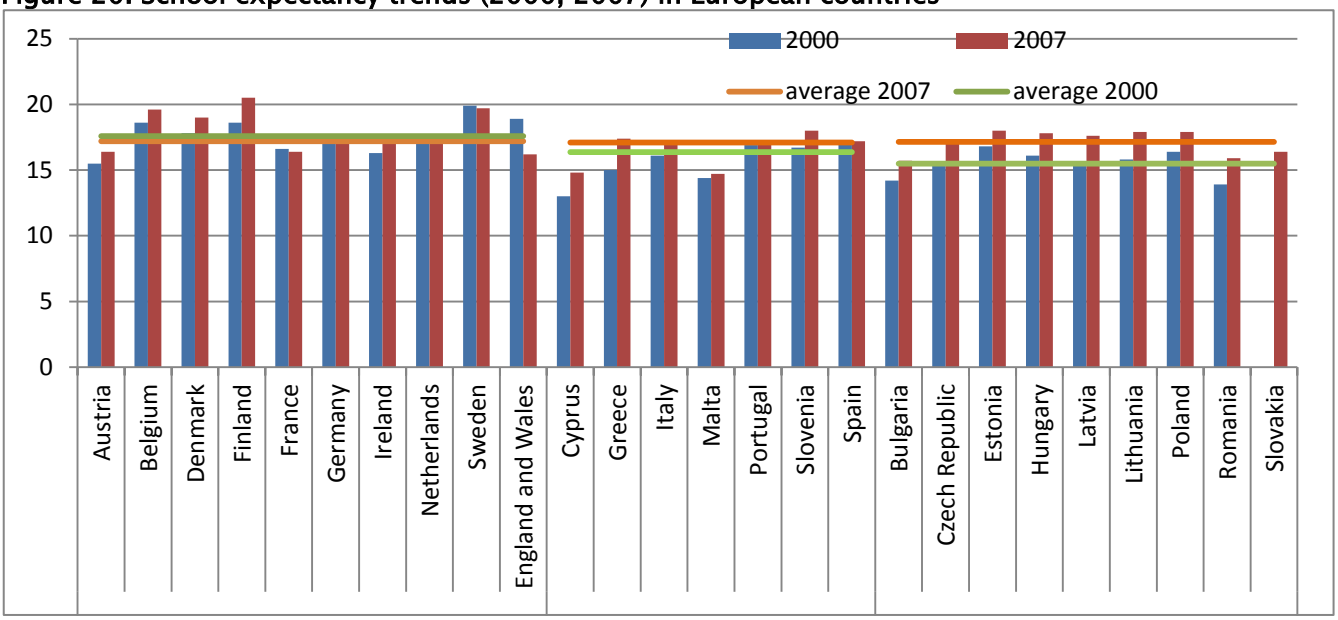
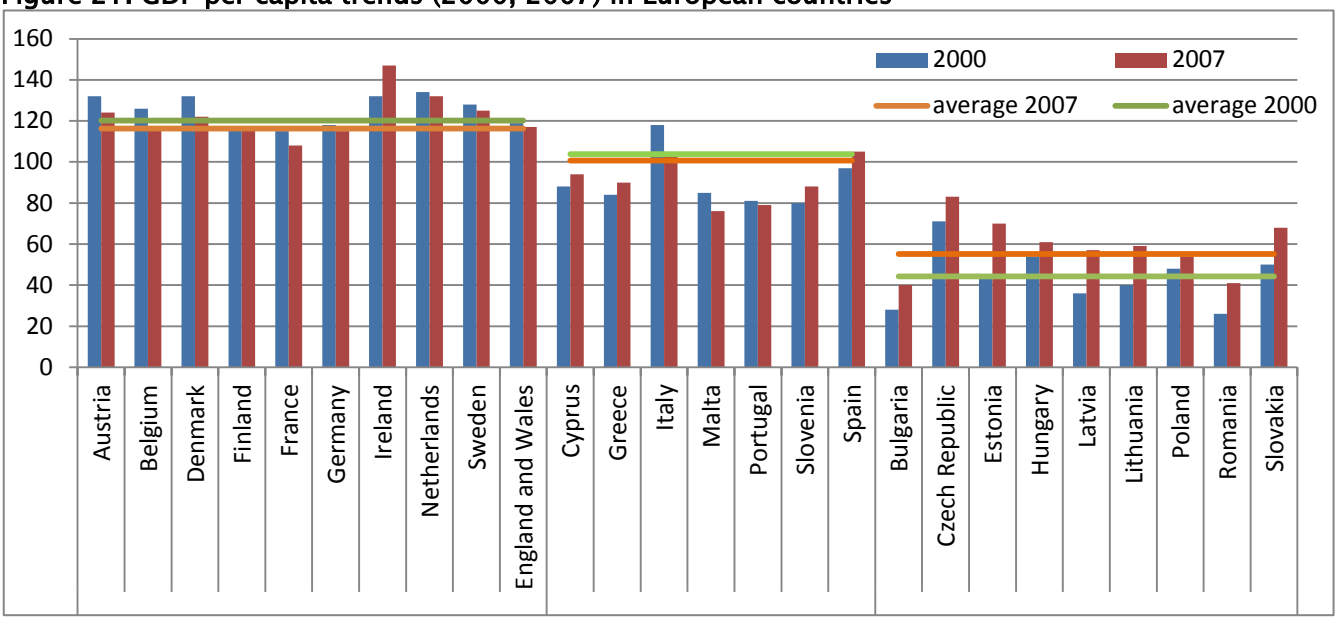


Figure 21 indicates GDP per capita trends in Europe. The North/West countries recorded a small decrease along with some of the Southern countries. Cluster 3 had increasing values overall and particularly high figures in Estonia, Latvia, and Romania (greater than 0.55). The decreasing trend in Cluster 1 and in a few countries in Cluster 2 could have been caused by the very high levels of GDP per capita reached in 2000. Organizing the data in a column with decreasing trends, it is revealed that nine out of the eleven countries that have a GDP higher than 100 in the year 2000 also registered negative variation values (Appendix E).

Figure 21. GDP per capita trends (2000, 2007) in European countries



In an effort to not falsely weight the thesis for the other significant factors, the average values are displayed in Table 30.

Table 30. Comparing social indicator averages in 2000 and 2007 in European country clusters

Social indicator	1 – North/West	2 – South	3 – Central/East	1 – North/West	2 – South	3 – Central/East	1 – North/West	2 – South	3 – Central/East
	2000			2007			Δ		
infant mortality	4,79	5,11	9,92	3,66	3,83	6,88	-0,24	-0,25	-0,31
healthy life years	61,4	62,9	57,06	63,65	63,89	60,27	0,04	0,02	0,05
severely materially deprived people	1.227,2	1.260	2.786,29	1.116,4	1.120,14	2.818,67	-0,09	-0,11	0,01
science and technology	13,25	6,27	6,88	15,22	9,49	11,68	0,15	0,51	0,70
part-time status	20,74	7,63	8,44	24,1	10,09	6,17	0,16	0,32	-0,27

Various observations can be made based on the data collected and analyzed.

1. Infant mortality holds decreasing trends everywhere. In 2000, it registered the following average values: 4.79 in the North/West, 5.11 in the South, and 9.92 in the Central/East, while in 2007 these clusters recorded 3.66, 3.83, and 6.88, respectively. High variations are seen in countries that belong to Cluster 3, which have greatly improved their hygienic measures.
2. Healthy life years have experienced a small increase everywhere. Looking at Appendix D, it is possible to conclude that Denmark, Italy, Poland, and Slovakia are exceptions to this event because they have decreasing trends. (it records a variation that is lower than 5% so it is white coloured in Figure 31).
3. Data on severely materially deprived people is missing for the year 2000, so the gaps were filled with data from the years 2003, 2004, or 2005 as compared to the year 2007. The North/West and South clusters underwent a decreasing trend while the Central/East cluster kept a stable trend.
4. Science and technology graduates rose almost everywhere in Europe; the increase was very significant in Italy, Malta, Portugal (Cluster 2), the Czech Republic, Poland, Romania, and Slovakia (Cluster 3).

5. Part-time employment increased in Clusters 1 and 2, and decreased in Cluster 3.

This section inspected social indicator trends over time in European country clusters (Appendix D). Table 30 exhibited the trends in 2000 and 2007 for the significant social indicators (Section 4.1.2), organized by their clusters in order to summarise the results.

Table 31 addresses social indicator trends using traffic light logic, meaning that a red-coloured cell indicates an increasing trend, a green-coloured cell indicates a decreasing trend, and a white-coloured cell represents stability (less than 0.05, which also equates to 5%). The significant social indicators listed in Section 4.1.2 are all brought into consideration here. The other social indicators from this section are not examined. Each type of crime has been individualized according to its significant social indicators. For 'completed homicide', the paired social indicator was 'intentional homicide'. 'Rape' was matched to 'assault against women', 'assault/bodily injury' was identified with 'assault and threat', 'theft' was linked with 'car theft', and 'burglary' was still equated as 'burglary'. 'Robbery' was excluded due to varied definitions and difficulties in identifying its significant social indicators (see Section 3.5.1).

According to Table 31, most of the countries have similar trends. Dissimilarities only appeared with regard to part-time employment contract trends.

Table 31. Comparing social indicator averages in 2000 and 2007 in European country clusters

Social indicator	1 – North/West	2 – South	3 – Central/East	Europe
infant mortality				
healthy life years				
severely materially deprived people				
science and technology				
part-time status				

Note: Red colour = increase; green colour = decrease; white colour = stability

5.5 DISCUSSION ON CRIME AND SOCIAL INDICATORS TRENDS IN EUROPE

According to the gaps in literature, there are no studies covering the EU27 that both 1) report crime levels in the European Union by distinguishing various types of crimes and 2) explain trends on the basis of social indicator trends over time. On the basis of historical perspective, this section questions whether or not it is possible to evaluate if development and opportunity factors are responsible for the observed changes in criminality. In fact, we will seek to understand the evolution of criminal behaviour and its social aspects over the last 13 years in three European country clusters as well as analyze their trends as a function of different theoretical paradigms, such as the modernization, civilization, and opportunity theories. In this comparison, the crime category 'drug offences' has been excluded because it was not taken into account during the first part of the thesis, so there is no list of social indicators that may be tested for it. In addition, robbery has been excluded because there are no social indicators that are significant enough for it (see Section 4.1.2). On a last note, for theft, the social indicators that are meaningful for car theft have been considered.

1. ***A joint lecture of crime and social indicators trends:*** Table 32 is a combination of the 'type of crime–social indicators' (Tables 13–15), social indicators trends (Table 28), and crime trends (Table 31) in Europe. The trends are similar for crimes and social indicators (except for part-time status trends), so Table 32 has a sole column that represents European trends, but it could be easily tripled to represent the three European country clusters. In addition, there are some symbols that explain the relationships: '+' means 'direct correlation' and '–' means 'inverse correlation'. The colour red represents an increase, green stands for a decrease, and white expresses stability.

Table 32. Relationship signs, crimes, and social indicator trends in Europe from 1995-1999 and 2003-2007

Social indicators	Relationship	Crime
HDI	-	homicide
infant mortality	+	
healthy life years	-	
HDI	+	rape
severely materially deprived people	-	
science and technology	+	
HDI	+	assault
severely materially deprived people	-	
science and technology	+	
HDI	-	theft
infant mortality	+	
part-time worker status	-	burglary

Note: Red colour = increase; green colour = decrease; white colour = stability

Table 32 shows that the:

- Homicide trend decreases when the HDI trend increases (-), the infant mortality trend decreases (+), and the healthy life years trend is stable (-)
- Rape and assault trends increase when the HDI trend decreases (+), the severely materially deprived people trend decreases (+), and the science and technology trend increases (-)
- Theft trend decreases when the HDI trend increases (-) and the infant mortality trend decreases (+)
- Burglary trend decreases when the part-time status trend increases (-)

Significant social indicators identified in Tables 13-15 provide a good explanation for crime trends in Europe. In particular, completed homicides may be explained on the basis of the civilization theory; Table 32 suggests that the human development index has increased across the entirety of Europe and is associated with a decrease in homicide rates. This result is in line with Elias' theory and several other scholarly works. Eisner (2008) stated that homicide rates decreased in Europe after the Second World War, which had caused an increase in victims and deaths caused by homicide. Aebi and Linde

(2012) believed that better conditions in health services decreased homicide rates.

For the other types of crime (excluding homicides), the crime trends show similar patterns for different groups of countries. There was an increase in violent crimes and drug offences but a decrease in property crimes. There is no single theory that can explain all of these crime trend tendencies. Revisiting a topic from earlier in the study, the modernization theory states that a decrease in violent crimes leads to an increase in property crimes (Shelley 1981) while the civilization theory states that it would lead to a decrease in all crime categories (Elias 1997). The issue at hand is that if the aim is to describe a singular crime trend, the civilization or modernization theories could be utilized, but if the aim is a joint explanation, then the civilization and modernization theories will not work together since they come into stark contrast on a foundational basis. Aebi and Linde's (2010) multi-factor model has inspired the idea that the opportunity theory may be a good solution. The process of societal transformation over time is fuelled by progression (HDI) through technological and economic revolutions, changes in free time (e.g. the development of the Internet), and social and demographic changes (part-time worker status)—all of which influence criminal opportunities and causes. These outcomes, in turn, cause variations in crime trends.

3. **Homogenous sets of countries:** The fundamental approach of this work is the comparison of trends between groups of countries as they result from cluster analysis. Clusters have similar features within their units, so this comparison is more suitable than comparing countries individually (Smit et al. 2008). The statistical units are the 26 EU countries. The active variables are the social indicators listed in Table 7 that relate to life expectancy, school expectancy, and GDP per capita. The first country cluster includes Austria, Belgium, Denmark, Finland, France, Germany, Ireland, the Netherlands, Sweden, and England and Wales (the North/West). The second cluster includes Cyprus, Greece, Italy, Malta, Portugal, Slovenia, and Spain (the South). The third cluster includes Bulgaria, the Czech Republic, Hungary, Poland, Romania, Slovakia, Estonia, Latvia, and Lithuania (the Central/East).

CHAPTER 6 – CONCLUSIONS, RESEARCH LIMITATIONS, AND FUTURE INVESTIGATIONS

The research reported here has been an attempt to examine the linkage between crimes and social indicators in Europe and their trends. This final chapter synthesises results, highlights research limitations and proposes some suggestions for future academic research.

The first part of the thesis (Chapter 4) provided a transnational discussion on crime and social indicators in the EU27. That portion tested the correlation levels between a set of social indicators that were selected on the basis of macro theoretical paradigms (the civilization, modernization, and opportunity theories) and seven types of crimes prevalent in European countries. Homicide data was collected from the WHO (HFA-DB), while information on sexual violence against women, assault and threat, robbery, car theft, motorcycle theft, and burglary were collected from the ICVS. It was posited that finding social indicators might help elucidate crime levels. This conglomeration of information has permitted us to test the relationship between social indicators and different types of crimes to assess the validity of theoretical frameworks across the whole of Europe. Having accomplished this task, we sought to identify a set of risk factors for the selected types of crimes. Regression analysis has proven to be an invaluable aid in making it possible to better dissect existent relationships. The main findings from this work can be summarized as follows:

1. ***A larger spatial dimension***: The relationship between the types of crime and social indicators was tested for homicide in 30 European countries (the EU27 + Switzerland, Norway, and Iceland) and in 22 European countries for the ICVS crimes.

2. ***Identify factors that may explain crime levels:*** Tables 13-15 represent a simple and operative framework; they synthesize the correlation results and provide information on the social indicators that have a significant relationship with crime levels in Europe.

3. ***Homicide and the civilization theory:*** Homicide is inversely correlated to the HDI in Europe (for the EU27 + Switzerland, Norway, and Iceland). The rate of homicide decreases when the human development index increases. This result can be explained with the civilization theory (Elias 1997) and

is in alignment with numerous studies that highlighted a negative association between modernization or development and homicide (e.g. Eisner 2012; Eisner and Nivette 2012). There are many reasons why people kill each other and multiple driving forces often interact when they do, but homicide levels and trends indicate that the link between homicide and development is one of the clearest. Higher levels of homicide are associated with low human and economic development. The largest shares of homicides have occurred in countries with low levels of human development, and countries with high levels of income inequality are afflicted by homicide rates almost four times higher than more equitable societies (UNODC 2011).

4. ***Multi-factor explanation:*** The all-encompassing scrutiny of the risk factors that explain seven types of crimes in Europe may be conducted through the utilization of a multi-factor explanation instead of referencing a more traditional theoretical framework. The modernization and civilization theories may not explain all of the crime trends in Europe, but a multi-factor model, following in the footsteps of Aebi and Linde (2012) could be of service.

The second part of this thesis (Chapter 5) examined trends over 26 countries of the EU (Luxembourg is excluded because there is no crime data for the period 2003-2007) for seven types of crimes from 1995-1999 and 2003-2007. For five of them, a comparison of the trends with significant social indicators was completed through the analysis of Tables 13-15. The main findings from this portion of the thesis can be summarized as follows:

5. ***Homogenous sets of countries:*** Taking into account development factors, it was possible to identify homogenous groups of countries through CA. The following clusters were created: the Northern/Western countries (Cluster 1), the Southern countries (Cluster 2), and the Central/Eastern countries (Cluster 3). Cluster 1 includes Austria, Belgium, Denmark, Finland, France, Germany, Ireland, the Netherlands, Sweden, and England and Wales. Cluster 2 includes Cyprus, Greece, Italy, Malta, Portugal, Slovenia, and Spain. Cluster 3 includes Bulgaria, the Czech Republic, Hungary, Poland, Romania, Slovakia, Estonia, Latvia, and Lithuania.

6. ***The utilization of risk factors to explain crime trends:*** Table 32 combined three data sets: 'type of crime-social indicators' (Tables 13-15); social indicator trends (Table 29) and crime trends (Table 31) in Europe. A thorough examination of Table 32 revealed the factor variations that are potentially

predictive of crime trends. The findings conveyed that the homicide trend decreases when the HDI trend increases (–), the infant mortality trend decreases (+), and the healthy life years trend is stable (–). The rape and assault trends increase when the HDI trend decreases (+), the severely materially deprived people trend decreases (+), and the science and technology trend increases (–). The theft trend decreases when the HDI trend increases (–) and the infant mortality trend decreases (+). The burglary trend decreases when the part-time status trend increases (–).

7. ***Crime trends:*** Crime trends show similar patterns for different groups of EU countries; generally, there has been a decrease in homicides, an increase in violent crimes and drug offences, and a decrease in property crimes in Europe.

A joint explanation of crime trends cannot employ both the civilization and modernization theories. Aebi and Linde's (2010) multi-factor model, inspired by the opportunity theory, is a good solution to this problem. Demographic, economic, and social transformations over time may influence criminal opportunities and cause variations in crime trends.

The low rate of homicide could also be explained by the absence of major social catastrophes, the relatively low and stable rates of firearms possession in Western European households (Killias et al. 2001), and the improvements made in the quality of health services with continual developments in medical technology and related medical support services (UNODC 2011).

Aebi (2004a) explained that property crimes decrease through the combination of five factors: the saturation of the black market in Central and Eastern Europe, the positive socio-economic outcomes for Central European countries after the successive enlargements of the European Union, the reinforcement of police measures against transnational crime at the borders of the EU, the improvement of security measures in Western European households, and the massive increase in private security in Western Europe.

In many Central and Eastern European countries, the economic situation has clearly improved between the years 1990 and 2007. This progress was particularly pronounced in the countries that joined the European Union (Cluster 3). Indeed, between 1995 and 2007, the main economic indicators (gross domestic product, industrial production, and employment) grew constantly in the 27 EU nations (Eurostat 2010a). Data from the ICVS corroborates the assertion that concern over security has affected more individuals over time, as the percentage of households with burglar alarms, special

door locks, and other security measures has constantly increased from 1988 to 2007 (Lamon 2002; Van Dijk et al. 2007).

In order to explain the trends observed for violent crimes, we will have to pay particular attention to the changes in youths' lifestyles, as introduced by the development of the Internet. We will also have to study youths' alcohol consumption patterns and the changes in the ethnic composition of the younger European generations. Moreover, the availability of economic resources increases the risk of engaging in drug use for youths involved in property offences.

The combination of these three different trends (a decrease in homicide, increase in violent crimes and drug offences, and a decrease in property crimes) is very difficult to explain. Some authors (Transcrime 2007) have talked about a 'braked violence' ('*violenza frenata*') that is a part of the civilization process; this violence has begun, but it has yet to be concluded. It is known that violence is an element that belongs to all people; it is an instinct that moves man to satisfy his needs. It is also clear that trying to stop violence improves society; in fact, development has moved men to control the most extreme and impulsive parts of their violence. For example, social living permits a cohabitation that is simpler for everyone and supports some common values, like human rights, universality, and a sense of belonging. Aside from these factors, the most evident tendencies for aggression may have disappeared or at least may be decreasing, but broad violence still survives on different levels.

The capacity for self-control and social limits (Elias' chain) helps constructively guide our natural aggression but if there are no tempering elements, then violence may explode. Some hybrid forms of these elements may also cause breaks in violence. Such situations may explain why the current decrease in the worst violent crime, homicide, has not been accompanied by a decrease in other violent crimes like rape or assault. The process of civilization is indeed a 'work in progress'. It is likely that when a new collective conscience on violence is created in the future, it will be improved, meaning that rape and assault will likely follow the decreasing trend that homicide is currently expressing.

This thesis has several limits that have already been mentioned and discussed, but will now be briefly outlined. These limiting factors will also provide the starting points for future research.

1. ***Short temporal period:*** This thesis has a comparative-longitudinal aim. The temporal dimension

covers 13 years, which is not a long period to evaluate variations in social indicator trends. When more crime data becomes available, however, future research could take it into account for a longer temporal period.

2. ***Different crime data sources:*** Crime data collected from the WHO (HFA-DB) and the ICVS has been used to identify significant social indicators. Crime data collected from the ESCCJ has also been used to examine crime trends. It has already been mentioned that the choice of using different data sources was not much of a choice at all. In fact, first, the ESCCJ was not a good data source for evaluated levels of crime, so it was not used to examine significant social indicators in Europe. Second, victimization data did encompass a selection wide enough for a sufficient number of countries, so the ESCCJ had to be taken into account. Statistical analysis conducted on a few data sets was nonsensical because it could not be generalized (Leti 1983). Future research should try to apply the same methodology to any new data that may be obtained from future editions of the ESCCJ.

3. ***Improve prediction model:*** This thesis highlighted significant social indicators and has proposed some categories of crimes (rape, assault, motorcycle theft, and homicide) for a regression model. When more recent data are available, the regression models could be genuinely tested in their ability to predict future trends. At the same time, the proposed models could also be improved. Interesting results could potentially be found by taking into account the social indicators collected from a social survey (trust in an institution, nationality, ethnicity, religious allegiance, etc.). There are no current models for the other categories of crimes (robbery, burglary, and drug offences) and at the moment, it is difficult to build patterns because of the very broad variations in crime definitions, but in the future, efforts will need to move in this direction for more accurate crime predictions to be made.

REFERENCES

Aebi, M.F. (2004a). Crime Trends in Western Europe from 1990 to 2000. *European Journal on Criminal Policy and Research*, 10(2-3), 163-186.

Aebi, M.F. (2004b). Crime trends in Europe from 1990 to 2000. In: K. Aromaa and S. Nevala (Eds.). *Crime and crime control in an integrating Europe: Plenary presentations held at the Third Annual Conference of the European Society of Criminology*, Helsinki 2003 (pp. 39-60). Helsinki: HEUNI. Available online at (last visit 18.7.2013): http://www.heuni.fi/Etusivu/Publications/HEUNIreports/1198085296887.

Aebi, M.F. (2008). Measuring the Influence of Statistical Counting Rules on Cross-National Differences in Recorded Crime. In Aromaa, K., Heiskanen, M., (Eds.). *Crime and Criminal Justice Systems in Europe and North America*. 1995-2004 (pp. 196-214). Helsinki: HEUNI.

Aebi, M.F. (2010). Methodological issues in the comparison of police-recorded crime rates. In Shoham S. G., Knepper P., Kett M. (Eds.). *International handbook of criminology*, 211-227. Boca, Raton, CRC Press.

Aebi, M.F., and Linde, A. (2010). Is There a Crime Drop in Western Europe?. *European Journal on Criminal Policy and Research* 16, 251-277.

Aebi, M.F., and Linde, A. (2011). Conviction Statistics as an Indicator of Crime Trends in Europe from 1990 to 2006. *European Journal on Criminal Policy and Research.*

Aebi, M.F., and Linde, A. (2012a). Crime trends in Western Europe according to official statistics from 1990 to 2007. In Van Dijk J., Tseloni A., Farrell G., The international crime drop – new directions in research, Palgrave Macmillan.

Aebi, M.F., and Linde, A. (2012b). Regional variation in Europe between homicide and other forms of external death and criminal offences. In Liem M.C.A., Pridemore W.A., Handbook on European homicide research – patterns, explanations and country study, Springer, New York.

Aebi, M.F., Aromaa, K., Aubusson de Cavarlay, B., Barclay, G., Gruszczynska, B., von Hofer, H., et al. (2006). *European Sourcebook of Crime and Criminal Justice Statistics – 2006. 3rd edition*. Den Haag: Boom Juridische Uitgevers. Available online at (last visit 18.7.2013): http://www.europeansourcebook.org/esb3_Full.pdf

Aebi, M.F., Aubusson de Cavarlay, B., Barclay, G., Gruszczynska, B., Harrendorf, B., Heiskanen, M., et al. (2010). *European sourcebook of crime and criminal justice statistics – 2010. 4th edition*. Den Haag, Boom Juridische Uitgevers. Available online at (last visit 18.7.2013): http://english.wodc.nl/onderzoeksdatabase/europeansourcebook-4e-editie.aspx?cp=45andcs=6796

Agnew, R., and Cullen, F.T. (2006). *Criminological theory: past to present, Roxbury Publishing Company*. LA CA.

Ahearn, E. (2008). *The Effect of Divorce and Unemployment on Crime in the 25 Most Populated US States*. Available at (last visit 18.7.2013): http://econ651spring2008.wikispaces.com/file/view/Regression+Analisys_update_+03.03.08.doc

Akers, R.L. (1992). A Social Learning Theory of Crime. In Agnew, R., Cullen, F. T. *Criminological theory, past to present*. Roxbury Publishing Company, LA CA.

Akers, R.L. and Sellers, C.S. (2004). *Criminological Theories: Introduction, Evaluation, and Application*, *4th Edition*. Los Angeles, Roxbury Publishing Company.

Akers, R.L. and Sellers, C.S. (2013). *Student Study Guide for Criminological Theories: Introduction, Evaluation, Application*. Sixth Edition. New York Oxford. Oxford University Press. Available at (last visit: 22/10/2013): http://www.oup.com/us/companion.websites/9780199844487/guide1/study_guide.pdf

Altindag, D.T., (2011). *Crime and Unemployment: Evidence from Europe*. In Economic Papers Department of Economics. Louisiana State University.

Aristigueta, M.P., Cooksy, L.J., and Nelson, C.W. (2001). The Role of Social Indicators in Developing a

Managing for Results System. *Public Performance and Management Review*, 24 (3), 254-269.

Arnot, M.L., and Usborne, C. (1999). *Gender and crime in modern Europe*. London, UCL Press

Aureli, E. (2002). *Lezioni di statistica sociale. Fonti, strumenti e metodi*. CISU, Roma.

Aureli, E. (2002). *Lezioni di statistica sociale. Dati e indicatori*. (1-2), CISU, Roma.

Aureli E., and Siciliani, I. (2011). Leggere l'Europa attraverso indicatori armonizzati. *La Rivista delle Politiche Sociali*. (1), P. 307.

Barkan, S.E. (2009). The Value of Quantitative Analysis for a Critical Understanding of Crime and Society. Critical Criminology, 17, 247-259.

Becker, G.S. (1968). Crime and punishment: an economic approach. *Journal of political economy*, 106, 407-443.

Berzano, L., and Prina, F. (1998). *Sociologia della devianza*. Carocci.

Bianchi, M., Buonanno, and P., Pinotti, P. (2008). Do Immigrants Cause Crime?. *Paris School of Economics Working Paper,* 05.

Bisi, S. (2006). *Gli indicatori sociali e l'esperienza internazionale*. Dispensa DCNAPS, Università La Sapienza, Roma. available at (last visited 15.7.2013): http://w3.uniroma1.it/dcnaps/bisi/insegnamenti/indicatori-sociali.pdf

Bolasco, S. (1999). *Analisi multidimensionale dei dati*. Carocci.

Bovekerk, F. (1993). Crime and the multi-ethnic society: A view from Europe. *Crime, law and social change*, 19 (3), 271-280.

Bjerk, D. (2007). Measuring the Relationship Between Youth Criminal Participation and Household Economic Resources. *Journal of quantitative criminology*, 23, 23-39.

Bradley R., Entner Wright, C., and Wesley Younts, (2009). Reconsidering the Relationship between Race

and Crime Positive and Negative Predictors of Crime among African American. *Journal of Research in Crime and Delinquency*, 46 (3), 327-352.

Britt, C. (1997). Reconsidering the Unemployment and Crime Relationship: Variation by Age Group and Historical Period. *Journal of Quantitative Criminology*, 13, 405-428.

Buonnano, P., Drago, F., Galbiati, and R., Zanella, G. (2010). *Crime in Europe and in the US: Dissecting the Reversal of Misfortunes*. Economic Policy Fifty-Second Panel Meeting Hosted by EIEF, 22-23 October 2010. Available at (last visited 18.7.13): http://www.cepr.org/meets/wkcn/9/979/papers/Buonnano_etal.pdf

Burns R., and Burns R. (2009). *Business Research and Statistics using SPSS*. SAGE Publications Ltd

Butcher, K.F., and Piehl, A.M. (1998). Cross-city evidence on the relationship between immigration and crime. *Journal of Policy Analysis and Management*, 17(3), 457-493.

Caceres-Delpiano, J., and Giolitto, E.P. (2010). *The Impact of Unilateral Divorce on Crime, Social Science Research Methods*. Available at (last visited 18.7.13): http://ftp.iza.org/dp3380.pdf

Cantor, D., and Land, K.C. (1985). Unemployment and crime rates in the post-World War II United States: A theoretical and empirical analysis. *American Sociological Review*. 50: 317-332.

Casacchia, O., and Strozza, S. (1995). Il livello di integrazione socio-economica degli immigrati stranieri: un quadro di riferimento. In SIS, *Continuità e discontinuità nei processi demografici*. Convegno 20-21 aprile, Arcavacata di Rende, Rubbettino, 553-560.

Ceobanu, A.M. (2011). Usual suspects? Public views about immigrant' impact on crime in European countries. *International Journal of Comparative Sociology*, 52 (1-2), 114-131.

Cernkovich, S.A., and Giordano, P.C. (1987). Family Relationships and Delinquency. *Criminology*, 25, 401-427.

Chamlin, M.B., and Cochran J.K. (1997). Assessing Messner and Rosenfeld's institutional anomie theory:

a partial test. *Criminology*, 33(3), 411-429.

Chapin, W.D. (1997). Ausländer Raus? The Empirical Relationship between Immigration and Crime in Germany. *Social Science Quarterly*, 78, 543- 557.

Cheong, P.H., and Edwards, R., Goulbourne, H., Solomon, J. (2007). Immigration, social cohesion and social capital: a critical review. *Critical Social Policy,* 27(1), 24-49.

Clarke, R.V. (1997). *Situational Crime Prevention*: Successful Case Studies. Second Edition. Albany, NY: Harrow and Heston.

Clarke, R.V., and Felson, M. (1993). *Routine Activity and Rational Choice: Advances in Criminological Theory*, 5. New Brunswick, NJ: Transaction Books.

Cloward, R., and Ohlin, L. (1960). *Delinquency and opportunity: A theory of delinquent gangs*. Free Press. Glencoe, IL.

Cohen, A.K. (1955). *Delinquent boys*. Free Press, New York.

Cohen, L. E., and Felson, M. (1979). Social change and crime rate trends: a routine activity approach. *American Sociological Review*, 44, 588-608.

Cohen J., Gorr W.L., and Olligschlaeger A.M. (2007). Leading indicators and spatial interactions: A crime forecasting model for proactive police deployment. *Geographical Analysis,* 39, 105−127.

Council of Europe (1999). *European Sourcebook of Crime and Criminal Justice Statistics [1990-1996].* Strasbourg: Council of Europe.

De Candolle, A. (1830/1987). Considérations sur la statistique des délits. *Déviance et Société* 11/4 (1987), 352-355. Published originally in Bibliothèque Universelle, Genève / Paris, 1830, 159-186.

Demeny, P. (2003). Population Policy Dilemmas in Europe at the Dawn of the Twenty-First Century. *Population and development review*, 29(1), 1-28.

Durkheim, E. (1957). *Professional Ethics and Civic Morals*. London: Routledge and Kegan Paul.

Dzemydiene, D., and Rudzkiene V., (2003). Data Analysis Strategy for Revealing Multivariate Structures in Social-Economic Data Warehouses. *Informatica*, 14(4), 471-486.

Ehrlich, I. (1973). Participation in Illegitimate Activities: A Theoretical and Empirical Investigation. *Journal of Political Economy* 81(3), 521-565.

Eisner, M. (2002). Crime, Problem Drinking, and Drug Use: Patterns of Problem Behaviour in Cross-National Perspective. *Annals of the American academy of political and social science*. Special Issue: early Adulthood in cross-national perspective, 580, 201-225.

Eisner, M. (2008). Modernity Strikes Back? A Historical Perspective on the Latest Increase in Interpersonal Violence (1960-1990). *International Journal of Conflict and Violence*. 2 (2), 288 – 316.

Eisner, M. (2011). Killing kings - Patterns of Regicide in Europe. *British Journal of Criminology*, 1,

Eisner, M. (2012). What Causes Large-scale Variation in Homicide Rates? (Working Paper, July 2012) Final revised version to be published in Heinze, Juergen and Kortuem, Henning (eds.) *Aggression in Humans and Primates*. Berlin: de Gruyter.

Eisner, M., and Nivette A., (2012). How to Reduce the Global Homicide Rate to 2 per 100,000 by 2060. In Loeber, Rolf, and Walsh, Brandon C. (eds.) *The Future of Criminology*. New York: Oxford University Press, 219-228.

Elias, N. (1939/1997). *The civilizing process*. Oxford: Blackwell

Engels, F. (1892/1969). *The Condition of the Working Class in England in 1844*. Penguin, Harmondsworth.

Entorf, H., and Spengler, H. (2002). *Crime in Europe – causes and consequences*. Springer, Heidelberg.

Espad (2009). *The 2007 Espad report Substance Use Among Students in 35 European Countries*.

European Commission for the Efficiency of Justice (CEPEJ) (2010) - *Evaluation report of European judicial systems Efficiency and quality of justice*.

European Social Survey (2011). *ESS 2008 Documentation Report. Edition 4*.0. Bergen, European Social Survey Data Archive, Norwegian Social Science Data Services.

European Union Statistics on Income and Living Conditions (2006), available at (last visit 18.7.2013) http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-RA-07-007/EN/KS-RA-07-007-EN.PDF

Eurostat (2010), *Eurostat yearbook*, available at (last visit 18.7.2013): http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-CD-10-220/EN/KS-CD-10-220-EN.PDF

Evans, D.T., Cullen, F.T., Dunaway, R.G., and Burton, V.S. (1995). Religion and crime re-examined: the impact of religion, secular controls and social ecology on adult criminality. *Criminology,* 33 (2), 195 - 217.

Fabbris, L. (2003). *Statistica multivariata analisi esplorativa dei dati*. The Mc Graw – Hill Companies.

Farrington, D.P. (1986). Age and Crime. in M. Tonry and N. Morris, eds., *Crime and Justice :An Annual Review of Research*, vol. 7, 189-250.

Farrington, D.P., (1986). Unemployment, School Leaving, and Crime. *British Journal of Criminology, Delinquency and Deviant Social Behaviour*, 26(4), 335-356.

Farrington, D.P., (1992). Criminal career research in the United Kingdom. *British Journal of Criminology*, 32 (4), 521-536.

Farrington, D.P., Langan P.A., and Tonry M., (2004). *Cross-National Studies in Crime and Justice*. Washington, D.C.. Bureau of Justice Statistics.

Felson, M. (1993). Social indicators for Criminology. *Journal Research in crime and delinquency*, 30 (4), 400-411.

Felson, M., and Poulsen, E. (2003). Simple indicators of crime by time of day. *International Journal of*

Forecasting, 19, 595-601.

Fergusson, D.M., Swain-Campbell N.R., and Horwood L.J. (2002). Deviant peer affiliations, crime and substance use: A fixed effects regression analysis. *Journal of Abnormal Child Psychology*, 30(4), 419-430.

Ferri, E. (1901). Studi sulla criminalità e altri saggi. Fratelli Bocca.

Freedman, J. (2002). *Media violence and its effect on aggression: Assessing the scientific evidence*. Toronto: University of Toronto Press.

Gatti, U., Soellner, R., Schadee H., Verde, A., and Rocca, G. (2013). Effects of Delinquency on Alcohol use Among Juveniles in Europe: Results from the ISRD-2 Study. *European Journal on Criminal Policy and Research*, 19(2), 153-170.

Georgiou, M.N. (2010). Education and Crime: An Empirical Analysis with Panel Data in Europe (1999-2006). *Journal of Property Research*, 27 (1), 87-117.

Glass, G., McGaw, B., and Smith, M.L. (1981). *Meta-Analysis in Social Research*. Beverly Hills: Sage.

Gottfredson, M., and Hirschi, T. (1990). *A general theory of crime*. Stanford University Press, Stanford, CA.

Greenberg, D.F. (2001). Time Series Analysis of Crime Rates. *Journal of Quantitative Criminology*, 17, 291-327.

Greenberg, D.F. (1985). Age, Crime, and Social Explanation. *American Journal of Sociology*, 91(1), 1-21.

Hagan, E.F. (2002). *Research methods in criminal justice and criminology*. Boston, Allin and Bacon.

Harrendorf, S. (2012). Offence Definitions in the European Sourcebook of Crime and Criminal Justice Statistics and Their Influence on Data Quality and Comparability. *European Journal on Criminal Policy and Research*, 8, 23-53.

Heiland, H. and Shelley, L. (1992). Civilization, modernization and the development of crime and control. In H. Heiland, L. Shelly and H. Katoh (Eds.). *Crime and control in comparative perspective*. New York, Walter de Gruyter.

Heusmann, L., and Eron, L. (1986). *Television and the aggressive child: A cross-national comparison*. Hillsdale, NJ: Erlbaum.

Hirschi, T. (1969). *Causes of delinquency*. Berkley, University of California Press.

Hirschi, T., and Gottfredson, M. (1983). *Age and the Explanation of Crime. American* Journal of Sociology, 89, (3), 552-584.

Hirschi, T., and Stark, R. (1969). Hellfire and delinquency. *Social problems* 17, 202-213.

Howard, G.J., Newman, G., and Pridemore, W.A. (2000). Theory, method, and data in comparative criminology. *Criminal Justice,* 4, 139-211.

Idriss, M., Jendly, H., Karn, J., and Mulone, S. (2010). *International report crime prevention and community safety: trends and perspectives*, International Centre for the Prevention of Crime (ICPC). Montreal.

Imrohoroglu, A., Merlo, A., and Rupert, P. (2004). What Accounts for the Decline in Crime?. *International Economic Review*, 3(08): 707-729.

International centre for the prevention of crime, (2010). *Crime prevention and community safety: trends and perspectives*. Montreal, Quebec, Canada.

Jargowsky, P.A. (2004). The ecological fallacy. In K. Kempf-Leonard (Ed.). *The encyclopaedia of social measurement*, 1, 715-722. San Diego, CA, Academic Press.

Junker-Tas, J., Marshall, I. H., and Ribeaud, D. (2003). *Delinquency in an international perspective the international self-reported delinquency study*. Kugler Publication, Den Haag.

Kapuscinski, C.A., Braithwaite, J., and Chapman, B. (1998). Unemployment and Crime: Toward Resolving

the Paradox. *Journal of Quantitative Criminology*, 14 (3).

Karstedt, S. (2000). *Emancipation, crime and problem behaviour of women: A perspective from Germany. Gender Issues*, 18 (3), 21-58.

Killias, M., and Aebi, M.F. (2000). Crime trends in Europe from 1990 to 1996: how Europe illustrates the limits of the American experience. *European Journal on Criminal Policy and Research*, 8: 43-63.

Killias, M., G. Barclay, P. Smit, M.F. Aebi, C. Tavares, B. Aubusson de Cavarlay, J.-M. Jehle, H. von Hofer, B. Gruszczynska, V. Hysi and K. Aromaa, *European Sourcebook of Crime and Criminal Justice Statistics 2003*. The Hague: Home Office, Ecole des Sciences Criminelles, Boom Juridische Uitgevers, WODC, 2003.

Killias, M., Lamon, P., and Aebi, M.F., (2005). Crime and Punishment in Western Countries, 1980-1999. *Crime and Justice*, 33, 213-245.

Killias, M., and Rau, W. (2000). The European Sourcebook of Crime and Criminal Justice Statistics: A New Tool in Assessing Crime and Policy Issues in Comparative and Empirical Perspective *European. Journal on Criminal Policy and Research*, 8 (1), 3-12.

King, R.D., Massoglia, M., and MacMillan, R. (2007). The context of marriage and crime: gender, the propensity to marry and offending in early adulthood. *Criminology*, 45 (1), 33-66.

LaFree, G., Drass, K., and O'Day, P. (1992). Race and crime in post-war America: determinants of African-American and Whites rates, 1957-1988. *Criminology* 30(2), 157-188.

Land, K.C., McCall, P.L., and Cohen, L.E., (1990). Structural Covariates of Homicide Rates: Are There Any Invariances Across Time and Social Space?. *The American Journal of Sociology*, 95(4), 922-963.

Leti, G., (1983), *Statistica Descrittiva*. Il Mulino, Bologna.

Levitt, S.D. (1998). The relationship between crime reporting and police: implications for the use of Uniform Crime Reports. *Journal of Quantitative Criminology*, Vol. 14, 61-81.

Levitt, S.D. (1999). The Exaggerated Role of Changing Age Structure in Explaining Aggregate Crime Changes. *Criminology*, 37, 537–99.

Levitt, S.D. (2004). Understanding Why Crime Fell in the 1990s: Four Factors that Explain the Decline and Six that Do Not. *Journal of Economic Perspectives.* 18(1), 163–190.

Levitt, S.D., and Lochner L. (2001). The Determinants of Juvenile Crime. In Gruber J. (ed), *Risky Behavior among Youths: An Economic Analysis. National Bureau of Economic Research*, University of Chicago Press, 327–374.

Lilly, J. R., and Cullen F. T., Ball R.A. (1995). *Criminological Theory: Context and Consequences*. Second edition. Thousand Oaks, CA: Sage.

Liska, E., and Bellair, P.E. (1995). Violent-Crime Rates and Racial Composition: Convergence Over Time. *American Journal of Sociology*, 101 (3), 578–610.

Lodhi, Q., and Tilly, C. (1973). Urbanization, Crime, and Collective Violence in 19th-Century France. *American Journal of Sociology*, 79 (2), 296–318.

Maguire, M., Morgan, R., and Reiner, R. (2007). *The Oxford Handbook of Criminology*. Oxford University Press.

Mannheim, H. (1965). *Comparative Criminology*. London, Routledge and Kegan Paul.

Marshall, L.H. (ed) (1997). *Minorities, migrants and crime*. Thousand Oaks, CA: Sage

Marshall, I.H. (2002). *A Macro-level Comparative Approach to Criminal Violence*. Toledo, Spain: Paper presented at the Second Annual Conference of the European Society of Criminology.

Matsueda, R.L. (1982). Testing control theory and differential association: a causal modelling approach, *American Sociological Review*, 47, 489–504.

McCall, P.L., and Nieuwbeerta, P. (2007). Structural Covariates of Homicide Rates A European City Cross-National Comparative Analysis. *Homicide Studies*, 11, 167–188.

Memoli, R. (1996). *Strategie d'analisi dei dati nella ricerca sociale e metodologia integrata*. Franco Angeli, Milano.

Messner, S.F., Krohn, M.D., and Liska, A.E. (1989). *Theoretical integration in the study of deviance and crime: Problems and prospects*. Buffalo: State University of New York Press.

Messner S.F., and Rosenfeld, R. (1994). *Crime and the American Dream*. Wadsworth, Belmont, CA.

Messner, S.F., and Rosenfeld, R. (1997). Political restraints of the market and levels of criminal homicide: a cross-national application of institutional-anomie theory. *Social Forces*, 75(4), 1393-1416.

Micheli, G., and Manfredi, P. (1996). Matematica della popolazione. ed. Franco Angeli.

Muftic, L.R. (2009). Macro-micro theoretical integration: an unexplored theoretical frontier*. Journal of Theoretical and Philosophical Criminology*, 1, (2), 33-71.

Nelken, D. (2009). Comparative Criminal Justice Beyond Ethnocentricism and Relativism. *European Journal of criminology*, 6 (4), 291-311.

Noll, H.H. (2002). Towards a European system of social indicators: theoretical framework and system architecture. *Social Indicators Research*, 58/1-3, 547-584.

Noll, H.H. (1980). *Social Indicators and Social Reporting: The International Experience*. Available at: http://www.ccsd.ca/noll2.html

Nuvolati, G. (2002). *Qualità della vita e indicatori sociali*. Dipartimento di Sociologia e Scienza Politica dell'Università della Calabria.

Osgood, D.W. (1998). Interdisciplinary integration: Building Criminology by stealing from our friends. *The Criminologist*, 23(4), 1-10.

Parker, K., and Johns, T. (2002). Urban disadvantage and types of race-specific homicide: assessing the diversity in family structures in the urban context. *Journal of Research in Crime and Delinquency*, 39, 277-303.

Paternoster, R., and Bachman, R. (2001). *Explaining criminals and crime: Essays in contemporary criminological theory.* Los Angeles: Roxbury

Paternoster, R., and Bushway, S.D. (2001). Theoretical and Empirical Work on the Relationship Between Unemployment and Crime. *Journal of Quantitative Criminology*, 17(4), 391-407.

.Pintaldi, F. (2009). *Come si analizzano i dati territoriali*. Franco Angeli editore.

Piquero, R., and Brame, W. (2008). Assessing the Race-Crime and Ethnicity-Crime Relationship in a Sample of Serious Adolescent Delinquents. *Crime and Delinquency*, 54(3), 390-422.

Pratt, T.C., and Cullen, T. (2005). Assessing macro-level predictors and theories of crime: A meta-analysis. In M. Tonry (Ed.), *Crime and Justice*, Volume 32: *A Review of Research* (pp. 373-450). Chicago: University of Chicago Press.

Quetelet, A. (1831/1984). *Research on the Propensity for Crime at Different Ages*. Translated and introduced by Sawyer F. Sylvester. Cincinnati. Anderson.

Quetelet, A. (1869). Phsyque sociale ou essai sur le developpment des facultés. In Barbagli M. (1998). *Reati, vittime, insicurezza dei cittadini*. ISTAT.

Rapporto BES (2013), *Il benessere equo e sostenibile in Italia*, ISTAT-CNEL.

Rizzi, A. (1992). *Inferenza Statistica*. UTET Università. Roma.

Rosenfeld, R. (2009). Crime is the Problem: Homicide, Acquisitive Crime, and Economic Conditions. *Journal of Quantitative Criminology*, 25, 287-306.

Rosenfeld, R., and Messner, S.F. (2009). The crime drop in comparative perspective: the impact of the economy and imprisonment on American and European burglary rates. *The British Journal of Sociology*. 60 (3), 445-71.

Rossow, I. (2001). Alcohol and homicide: a cross-cultural comparison of the relationship in 14 European countries. Addiction, 96(1), 77-92.

Rotolo, T., and Tittle, C. (2006). Population Size, Change, and Crime in U.S. Cities. *Journal of Quantitative Criminology*, 22, 341-367.

Rousseaux, X. (1999). From Case to Crime: Homicide Regulation in Medieval and Modern Europe. In Willoweit, D, ed., *Die Enstehung des o¨ffentlichen Strafrechts: Bestandsaufnahme eines europa¨ischen Forschungsproblems*, 143-75. Ko¨ ln: Bo¨hlau Verlag.

Rushton, J.P., and Whitney, G. (2002). Cross-national variation in violent crime rates: Race, r-K theory, and income. *Population and Environment*, 23, 501-511.

Sampson, R.J., and Groves, W.B. (1989). Community structure and crime: testing social disorganization theory. *The American journal of sociology*, 94(4), 774-802.

Sampson, R.J., and Laub, J.H. (1993). *Crime in the Making*. Harvard University Press, Cambridge, MA.

Sampson, R.J., and Wilson, W.J. (1995). Toward a Theory of Race, Crime, and Urban Inequality. In *Crime and Inequality*. edited by John Hagan and Ruth D. Peterson. Stanford, CA: Stanford University Press.

Sampson, R.J., and Wooldredge, J.D. (1987). Linking the Micro and Macro-level Dimensions of Lifestyle-Routine Activity and Opportunity Models of Predatory Victimization. *Journal of Quantitative Criminology*. 3(4), 371-393.

Savolainen, J. (2000). Inequality, welfare state and homicide: further support for the institutional anomie theory. *Criminology* 38 (4), 1021-1042.

Schwartz, J., and Steffensmeier, D. (2007). The nature of female offending: Patterns and explanation. In R. Zaplin, Ed. *Female offenders: Critical perspectives and effective interventions,* 43-75. Boston: Jones and Bartlett Publishers.

Shaw, C., and McKay, H. (1942). *Juvenile Delinquency and urban areas*. University of Chicago Press, Chicago, IL.

Shelley, L. (1981). *Crime and modernization: The impact of industrialization and modernization on*

crime. Carbondale: Southern Illinois University Press.

Shover, N., Coffey, G.S., and Hobbs, D. (2003). Crime on the line: telemarketing and the changing nature of professional crime. *British Journal of Criminology*, 43, 489–505.

Simha, F., and Landau, I. (1997). Crime Patterns and Their Relation to Subjective Social Stress and Support Indicators: The Role of Gender. Journal of Quantitative Criminology, 13(1), 29–56

Small Arms Survey Issue Brief (2012). Vol. 1, pp. 1–12. Available at (last visited 4/11/2013): http://www.smallarmssurvey.org/fileadmin/docs/G-Issue-briefs/SAS-AVD-IB1-tracking-homicide.pdf

Smith, M.D., Devine, J.A., and Sbeley, J.F. (1992). Crime and unemployment: Effects across age and race categories. *Sociological Perspectives* 35: 551–572.

Smith, D.H., and Inkeles A. (1966). The OM Scale: A Comparative Socio-psychological Measure of Individual Modernity. *Sociometry,* 29, 353–77.

Smit, P., Haen Marshall, I. and van Gammeren, M. (2008). An Empirical Approach to Country Clustering. In: Aromaa, K. and Heiskanen, M. (Eds.), *Crime and Criminal Justice Systems in Europe and North America 1995–2004*. Publication Series No. 55, pp. 169–195. Helsinki: HEUNI.

Smit, P., van Eijk, A., and Decae, R. (2012). Trends in the Reaction on Crime in Criminal Justice Systems in Europe in 1990–2007: A Comparison of Four European Region. *European Journal on Criminal Policy and Research*, 18, 55–82.

Solivetti, L.M. (2004). *Immigrazione, integrazione e crimine in Europa*. Il Mulino, Bologna.

Solivetti, L.M. (2010). *Immigration, social integration and crime – a cross-national approach*. Abingdon: Glasshouse/Routledge.

South, S.J., and Messner, S.F. (1986). Structural Determinants of Intergroup Association: Interracial Marriage and Crime. *American Journal of Sociology*, 91(6), 1409–1430.

South, S.J,, and Messner, S.F. (2000). Crime and demography: Multiple Linkages, Reciprocal Relations, in *Annual review of Sociology*. 26, 83-106.

Steffensmeier, D., (1993). National trends in female arrests, 1960-1990: assessment and recommendations for research. *Journal of Quantitative Criminology*, 9, 413-41.

Steffensmeier, D., and Allan, E.A. (1996). Gender and crime: Toward a Gendered Theory of Female Offending. *Annual Review of Sociology*,. 22, 459-87.

Steffensmeier, D.J., Allan, E.A., Harer M.D., and Streifel, C. (1989). Age and the Distribution of Crime. *American Journal of Sociology*, 94(4), 803-831.

Steffensmeier, D., and Clark, R. (1980). Socio-cultural vs. biological/sexist explanations of sex differences in crime: a survey of American criminology textbooks, 1919-1965. *American Sociology*, 15, 246-55.

Stowell, J., Messner, S.F., McGeever K., and Raffalovich, L.E. (2009). Immigration and the recent crime drop in the U.S.: a pooled, cross-sectional time-series analysis of metropolitan areas. *Criminology*, 47, 889-928.

Strozza, S. (2002). Gli scenari migratori internazionali. In Natale M. (ed), *Economia e popolazione*. Milano, Franco Angeli.

Sutherland, E.H., and Cressey, D.R. (1978). *Criminology*. Tenth Edition. Philadelphia: Lippincott. Sykes.

Tavares, C., and Thomas, G. (2008). *Statistics in focus*. Crime and Criminal Justice, Eurostat.

Tewksbury, R., De Michele, M.T., and Miller, J.M. (2005). Methodological orientations of articles appearing in criminal justice's top journals: Who publishes what and where. *Journal of Criminal Justice Education*, 16, 265-279.

Thornberry, T.P. (1987). Toward an interactional theory of delinquency. *Criminology*, 25(4), 863-892.

Tittle, C.R., and Meier, R.F. (1990). Specifying the SES/Delinquency relationship. *Criminology*, 28, 271-

299.

Tittle, C.R., and Paternoster, R. (1988). Geographic Mobility and Criminal Behaviour. *Journal of research in crime and delinquency*, 25 (3), 301-343.

Tonry, M. (1997). *Ethnicity, crime and immigration: comparative and cross-national perspectives*. Chicago and London, the University of Chicago Press.

Transcrime (2007). *Ottavo Rapporto sulla sicurezza nel Trentino 2006/2007*. Giunta della Provincia Autonoma di Trento. Trento.

United Nations Office on Drugs and Crime UNODC (2011). *Global study on Homicide*, available at (last visited 4.11.2013):http://www.unodc.org/documents/data-and-analysis/statistics/Homicide/Globa_study_on_homicide_2011_web.pdf

Van Dijk, J. (2001). Attitudes of victims and repeat victims toward the policy: results of the international crime victims survey. *Crime Prevention Studies*, 12, 27-52.

Van Dijk, J. (2006). *The ICVS and beyond: developing a comprehensive set of crime indicators*. Tilburg University.

Van Dijk, J., Kesteren, J. van, and Smit, P.R. (2007). *Criminal Victimisation in International Perspective. Keyfindings from the 2004-2005 ICVS and EU ICS*. Den Haag: Boom Juridische Uitgevers

Van Dijk J., Manchin, R., Kesteren, J., Nevala, S., and Hideg, G. (2005). *The Burden of crime in the EU - Research report: a comparative analysis of the European crime and safety survey*. EU ICS.

Verbruggen, J., Blokland, A., and van der Geest, V. (2012). Effects of employment and unemployment on serious offending in a high risk sample of men and women from ages 18 to 32 in the Netherland. *British Journal of Criminology*, 52, 845-869.

Vettori, B. (2010). *Le statistiche sulla criminalità in ambito internazionale europeo e nazionale : fonti e tecniche di analisi con SPSS* . LED, Milano.

Vikat, A., Spedere, Z., Beets, G., Billari, F.C., Buhler C., and Desequelles A. (2007). Generations and Gender Survey (GGS): Towards a better understanding of relationships and processes in the life course. *Demographic Research*, 17 (14), 389-440.

Von Hofer, H. (2000). Crime Statistics as Constructs: The Case of Swedish Rape Statistics. *European Journal on Criminal Policy and Research*, 8(1), 77-89.

Weisæth Monsbakken, C., Hovde Lyngstad, T., and Skardhamar, T. (2013). Crime and the transition to parenthood: The Role of Sex and Relationship Context. *British Journal of Criminology*, 53, 129-148.

Weisburd, D., Bruinsma, G., and Bernasco, W. (2009). Units of analysis in geographic criminology. Historical development, critical issues and open questions. In Weisburd D., Bruinsma, G., Bernasco, W. (ed), *Putting crime in its place: units of analysis in geographic criminology*, 3-31, New York, Springer.

Welch, R. (2009). Testing Social Disorganization Theory On Alcohol Consumption and Homicide Rates in Former Soviet Bloc Countries. In *School of public affairs, 9th Annual Conference of the European Society of Criminology*, *Criminology and crime policy between human rights and effective crime*. Meeting Ljubljana, Slovenia, 9-12 September 2009.

Wellford, C.F. (1989). Towards an integrated theory of criminal behavior. In S.F. Messner, M.D. Krohn, and A.E. Liska (Eds.), *Theoretical integration in the study of deviance and crime: Problems and prospects*, 119-127. Buffalo: State University of New York Press.

Weisner, T.S., and Abbott S., (1975). Women, Modernity, and Stress: Three Contrasting Contexts for Change. *East Africa. Journal of Anthropological Research*, 4, 421-451.

WHO - World Health Organization. (2010). *Health for all database (HfA). Technical notes*. [Geneva: World Health Organization]. Available online (last visit 5.6.2013) at https://euro.sharefile.com/download.aspx?id=sb7422ab51e54f20b

Wolf, F.M. (1986). Meta-Analysis: Quantitative Methods for Research Synthesis. Newbury Park: Sage.

Wolfgang, M.E., and Ferracuti, F. (1967). *The Subculture of Violence: Towards an Integrated Theory in*

Criminology. London: Tavistock.

Zapf, W. (1977). Soziale Indikatoren – eine Zwischenbilanz. In H.-J. Krupp and W. Zapf, *Sozialpolitik und Sozialberichterstattung,* 231–246. Frankfurt A. M. and New York: Campus.

Appendix A

Matrix A – Crime from the ICVS and social indicators in 22 European countries, years 2004-2005

country	year	sexual offenses aginst women	assault and threat	robbery	car theft	motorcycle theft	burglary	HDI	life expectancy (total)	school expectancy	gdp per capita	infant mortality	divorce	healthy years	acquisition citizenship	several material deprivation	science and technology	resource productivity	long termunempl oyment	Single person with dependent children	Two adults, at least one aged 65 years or over	part time	burglar alarm
Austria	2005	2,20	1,80	0,40	0,1	0,1	0,90	0,860	78,7	16,2	128,0	4,5	2,4	60,4	41.645	277,0	8,7	1,23	1,4	3	9,2	21,10	14
Belgium	2005	0,90	3,60	1,20	0,6	0,9	1,80	0,873	78,3	19,1	121,0	3,9	3	58,4	34.754	495,0	11,2	1,61	4,1	3	10,5	22,00	22
Bulgaria	2004	0,20	1,70	0,90	2,5	0	2,50	0,749	72,4	15,3	35,0	11,6	1,9		5.783		8,5	0,18	7,2	1,5	9,3	2,10	3
Denmark	2005	1,90	3,30	0,90	1,6	1,6	2,70	0,885	77,2	18,9	126,0	4,4	2,9	69	14.976	157,0	13,8	1,36	1,2	7	9,3	22,10	9
Estonia	2004	1,10	2,70	1,60	0,8		2,50	0,821	71,7	18,2	57,0	6,4	3,1	53,8	6.543	126,0	8,9	0,39	5,1	7	9,2	7,80	6
Finland	2005	1,40	2,20	0,30	0,5	0,4	0,80	0,875	78,2	19,7	116,0	3,3	2,5	53,1	6.880	194,0	17,9	0,77	2,1	6	10	13,70	9
France	2005	0,40	2,10	0,80	0,7	1,6	1,60	0,869	79,7	16,6	110,0	4,0	2,2	64,3	168.826	3536,0		2,01	3,8	5	11,2	17,20	15
Germany	2005	2,40	2,70	0,40	0,2	0,8	0,90	0,895	78,6	17,4	115,0	4,1	2,6	54,8	127.153		9,0	1,74	5,9	6	12,9	24,00	14
Greece	2005	1,70	2,40	1,40	0,4	1,8	1,80	0,856	78,3	16,9	94,0	4,1	1,1	65,5	1.425	1500,0	8,0	1,05	5,6	1	11,5	5,00	14
Hungary	2005	0,10	1,20	0,90	0,3	0,1	1,70	0,803	72,5	17,5	63,0	6,6	2,4	54,3	5.432		5,1	0,49	2,7	4	9,1	4,10	15
Iceland	2005	3,00	5,90	0,80	1,1	0,5	1,60	0,893	80,3	19,6	107,0	2,8	1,9	62,5		7,0	10,8	:	0,3	6,8	7,5		9
Ireland	2005	3,80	4,90	2,20	1,3	2,5	2,30	0,898	78,3	17,3	51,0	4,8	0,8	64,2	3.784	195,0	23,3	0,8	1,5	3	7		49
Italy	2005	0,70	0,80	0,30	1,1	2,9	2,10	0,861	80,3	16,9	252,0	3,9	0,8	71	19.140	3991,0	10,8	1,72	4,0	1	11,5	12,80	24
Luxembourg	2005	0,60	2,30	0,70	0,6	0	1,70	0,865	78,6	14,1	78,0	3,9	2,3	60,2	841	4,0		2,73	1,0		10	17,40	22
Netherlands	2005	1,90	4,30	0,50	1,1	1,9	1,30	0,890	78,7	17,3	129,0	4,4	1,9	63,5	26.171		7,9	2,82	1,7	4	9,2	46,10	15
Norway	2004	2,50	2,90	0,80	0,8	1,2	1,20	0,938	79,4	18,3	34,0	3,2	2,4	65,3		123,0	9,0	1,47	0,8	7	9	10,80	28
Poland	2004	1,30	3,00	1,30	1,1	0,7	1,40	0,791	74,4	17,1	57,0	6,8	1,5	66,9	1.937		9,4	0,44	10,3	4	6,8	11,20	3
Portugal	2005	0,50	0,90	1,00	1,9	0,1	1,40	0,789	77,6	17,0	87,0	3,8	2,2	52,4	2.855	1032,0	8,9	0,83	3,3	2	10,1	10,20	14
Spain	2005	0,30	1,60	1,30	1,2	1,3	0,80	0,857	79,8	17,1	101,0	3,9	1,2	62,7	38.220	1796,0	12,5	1,05	3,5	1	9,5	12,40	8
Sweden	2005	3,30	3,50	1,10	0,6	1,9	0,70	0,896	79,9	20,0	126,0	3,1	2,2	60,8	28.893	269,0	15,9	1,45	1,4	9	10,2	24,70	16
Switzerland	2005	2,90	2,50	0,80	0,2	3	1,00	0,890	80,7	16,8	138,0	4,2	2,4				14,6	3,44					5
United Kingdom	2005	1,90	5,40	1,30	2,2	6,2	3,30	0,855	78,4	20,3	123,0	5,0	2,8	65,5	148.275		18,1	2,51	1,0	7	11,1		42

Note: 'Year' illustrates when crime are collected; social indicators refer to 2004, except for HDI (2005) and households (data rebuilt 2001-2005)

Appendix B

Matrix B – Completed homicide from HFA-DB (WHO) and social indicators in 30 European countries, year 2004

country	intentional homicide WHO	HDI	life expectancy (total)	school expectancy	gdp per capita	infant mortality	healthy years	divorce	acquisition citizenship	severely materially deprived people	science and technology
Austria	0,74	0,860	78,7	16,2	128	4,5	60,4	2,4	41.645	277	8,7
Belgium	1,71	0,873	78,3	19,1	121	3,9	58,4	3	34.754	495	11,2
Bulgaria	2,61	0,749	72,4	15,3	35	11,6		1,9	5.783		8,5
Croazia	1,74	0,780	74,9	14,6	56	6,1		1,1			5,4
Cyprus	1,39	0,809	78,5	14,4	91	3,5	58,2	2,2	4.534		4,2
Czech	1,15	0,854	75,2	17	78	3,7	60	3,2	5.020		7,4
Denmark	0,64	0,885	77,2	18,9	126	4,4	69	2,9	14.976	157	13,8
Estonia	7,78	0,821	71,7	18,2	57	6,4	53,8	3,1	6.543	126	8,9
Finland	2,55	0,875	78,2	19,7	116	3,3	53,1	2,5	6.880	194	17,9
France	0,71	0,869	79,7	16,6	110	4	64,3	2,2	168.826	3536	
Germany	0,65	0,895	78,6	17,4	115	4,1	54,8	2,6	127.153		9
Greece	0,84	0,856	78,3	16,9	94	4,1	65,5	1,1	1.425	1500	8
Hungary	1,95	0,803	72,5	17,5	63	6,6	54,3	2,4	5.432		5,1
Iceland	1,54	0,893	80,3	19,6	131	2,8	62,5	1,9		7	10,8
Ireland	0,57	0,898	78,3	17,3	143	4,8	64,2	0,8	3.784	195	23,3
Italy	1,11	0,861	80,3	16,9	107	3,9	71	0,8	19.140	3991	10,8
Latvia	9,24	0,784	70,8	17,7	47	9,4	53,2	2,3	17.178		9,4
Lithuania	8,42	0,793	71,6	17,7	51	7,9	54,6	3,2	610		17,5
Luxembourg	0,52	0,865	78,6	14,1	252	3,9	60,2	2,3	841	4	
Malta	1,54	0,825	78,8	15,3	78	5,7	70,4		584		
Netherlands	1,18	0,890	78,7	17,3	129	4,4	63,5	1,9	26.171		7,9
Norway	0,91	0,938	79,4	18,3	165	3,2	65,3	2,4		123	9
Poland	1,47	0,791	74,4	17,1	51	6,8	66,9	1,5	1.937		9,4
Portugal	0,88	0,789	77,6	17	77	3,8	52,4	2,2	2.855	1032	8,9
Romania	2,91	0,748	72,1	15,1	34	16,8		1,6	282		9,8
Slovakia	1,62	0,810	73,7	15,7	57	6,8	56,6	2	4.016		9,2
Slovenia	1,83	0,848	76,5	17,5	87	3,7	60,1	1,1	3.333		9,3
Spain	1,36	0,857	79,8	17,1	101	3,9	62,7	1,2	38.220	1796	12,5
Sweden	1,16	0,896	79,9	20	126	3,1	60,8	2,2	28.893	269	15,9
Switzerland	0,96	0,890	80,7	16,8	138	4,2		2,4			14,6
United Kingdom	0,52	0,855	78,4	20,3	123	5	65,5	2,8	148.275		18,1

Appendix C

Matrix C – Crime data (ESCCJ) in the EU27 countries in 1995-1999 and in 2003-2007 (average years)

Cluster	Country	Completed Homicide		Rape		Assault		Robbery		Theft		Burglary		Drug offenses	
		1995-1999	2003-2007	1995-1999	2003-2007	1995-1999	2003-2007	1995-1999	2003-2007	1995-1999	2003-2007	1995-1999	2003-2007	1995-1999	2003-2007
1	Austria	1,1	0,72	11,24	8,00	391,76	439,00	26,5	59,00	2651,3	3.913,40	1024,32	1.427,80	187,2	296,20
	Belgium	1,62	1,825	16,08	27,00	523,16	641,25	167,06	213,00	3558,62	3.913,50		633,50	408,26	423,25
	Denmark	1,2	1,05	8,18	10,00	164,32	237,50	46,3	38,25	5406,86	4.849,50	2010,76	1.546,00	16,12	322,20
	Finland	3,32	2,76	8,9	11,80	480,26	586,60	41,52	35,80	4236,5	2.988,60	1003,54	542,80	180,62	276,20
	France	2,32	1,82	13,24	16,40	140,44	307,00	142,08	199,60	3753,82	3.263,80	702,08	600,00	151,2	235,20
	Germany	2,02	1,16	8,4	10,20	408,26	599,60	79,62	68,00	4271,64	3.369,20	741,68	499,80	242,28	320,40
	Ireland	1,38	1,52	23,08	9,40	15,52	318,60	142,66	59,80	2167,5	1.735,80	746,72	599,20	128,28	315,60
	Netherlands	1,62	1,2	9,96	9,00	224,82	341,00	98,44	98,00	5334,62	4.452,60	3163,86	2.068,00	48,55	96,00
	Sweden	1,12	1,04	20,5	39,80	632,26	807,60	75,74	97,40	7801,34	6.801,20	1584,3	1.222,80	356,3	611,80
	England and Wales	1,4	1,56	12,94	25,40	573,54	33,80	136,28	179,60	6378,52	4.673,00	2012,76	1.256,20	123,94	335,00
2	Cyprus	1,28	1,72	1,56	4,40	15,56	18,80	3,36	10,80	270,5	587,20	156,28	399,00	29,94	82,60
	Greece	1,45	1,06	2,06	2,00	64,3	69,40	17,78	22,60	731,06	599,40	394,26	287,20	50,16	77,80
	Italy	1,66	1,2	2,6	6,50	44,26	85,25	59,18	118,00	2470,2	2.523,00	404,42		71,96	56,50
	Malta	1,95	0,675	1,9	3,00	156,65		68,45	56,60	1765,95		169,75	360,50	58,3	185,50
	Portugal	3,64	2,05	4,72	3,25	378,82	518,00	139,44	194,75	1468,5	1.290,00	497,2	437,00	67,64	40,25
	Slovenia	1,68	1,06	5,36	3,80	22,52	15,20	26,12	26,00	1263,44	2.461,60	572,02	955,60	43,04	69,00
	Spain	1	1,2	3,575	5,00	41,2		248,74	208,20	1599,8		588,38	891,50		
3	Bulgaria	4,72	2,52	8,26	5,00	11,14	45,20	66,9	48,60	1609,98	907,00	784,96	317,40	5,42	33,60
	Czech	1,75		6,56	6,00	75,28	63,20	42,96	51,75	2658,42	2.127,40	913,96	586,40	36,28	30,20
	Hungary	2,72	1,84	3,74	2,60	103,5	117,40	28,56	30,40	2636,76	1.760,60	878,96	426,80	13,22	57,80
	Poland	2,46	2,08	5,9	6,00	80,26	145,80	66,18	90,80	1369,52	1.386,40	858,6	574,40	26,4	161,00
	Romania		2,18	6,14	4,80	30,66	38,20	16,78	14,40	520,2	216,60	126,16	79,00	2,7	10,80
	Slovakia	2,5	2,06	3,4	3,60	77,06		23,96	29,80	1219,68	1.076,60	580,26	391,20		30,40
	Estonia	13,56	7,98	5,56	9,80	27,68	201,40	251,48	99,60	2085,44	2.155,20	1403,36	37,00	11,16	87,20
	Latvia	6,92		4,78	7,80	19,56	57,33	48,74	96,60	939,96	1.084,20			15,88	50,40
	Lithuania	9,66	9,16	5,06	11,60	27,78	123,60	94,8	136,60	1257,04	1.636,80		704,80	15,66	44,80

Note: Luxembourg is excluded because there are no data in 2003-2007 for the selected crimes.

Appendix D

Matrix D – Levels and variations in social indicators in the EU27 countries, years 2000 and 2007

Cluster	Country	infant mortality			healthy life years			divorce			severely materially deprived people			acquisition citizenship			science and technology			resource productivity			long term unemployment rate			Single person with dependent children			Two adults, at least one aged 65 years			part time			burglar alarms		
		2000	2007	Δ	2004-2005	2007	Δ	2000	2007	Δ	2003-2005	2007	Δ	2000	2007	Δ	2000	2007	Δ	2000	2007	Δ	2000	2007	Δ	2001-2005	2007	Δ	2001-2005	2007	Δ	2000	2007	Δ	2000	2004-2005	Δ
1	Austria	4,8	3,7	-0,23	60,4	61,5	0,02	2,4	2,5	0,04	264	269	0,02	24320	14010	-0,42	7,2	11,1	0,54	1,21	1,28	0,06	1,0	1,2	0,20	3	4,5	0,50	7	9,8	0,40	16,3	22,6	0,39		14	
	Belgium	4,8	3,9	-0,19	58,4	63,9	0,09	2,6	2,8	0,08	460	602	0,31	61980	36063	-0,42	9,7	14	0,44	1,52	1,74	0,14	3,7	3,8	0,03	3	6,1	1,03	12	10,2	-0,15	18,9	22,1	0,17	21	22	0,05
	Denmark	5,3	4	-0,25	69	67,4	-0,02	2,7	2,6	-0,04	107	175	0,64	18811	3648	-0,81	11,7	16,4	0,40	1,43	1,39	-0,03	0,9	0,6	-0,33	7	7	0,00	9	9,8	0,09	21,3	24,1	0,13	7	9	0,29
	Finland	3,8	2,7	-0,29	53,1	58	0,09	2,7	2,5	-0,07	194	185	-0,05	1977	4824	0,62	16	18,8	0,18	0,79	0,84	0,06	2,8	1,6	-0,43	6	5,1	-0,15	10	10,7	0,07	12,3	14,1	0,15	4	9	1,25
	France	4,5	3,8	-0,16	64,3	64,4	0,00	1,9	2,1	0,11	3536	2824	-0,20	150025	132002	-0,12	19,6	20,8	0,06	1,8	1,98	0,10	3,5	3,4	-0,03	5	5,6	0,12	10	9,8	-0,02	16,7	17,4	0,04	13	15	0,15
	Germany	4,4	3,9	-0,11	54,8	58,6	0,07	2,4	2,3	-0,04	3733	3947	0,06	186688	113030	-0,39	8,2	11,4	0,39	1,5	1,81	0,21	4,1	4,9	0,20	6	5,5	-0,08	12,9	13,9	0,08	19,4	26	0,34		14	
	Ireland	6,2	3,3	-0,47	64,2	65,6	0,02	0,7	0,8	0,14	223	195	-0,13	1143	4649	3,07	24,2	18,7	-0,23	0,77	0,78	0,01	1,6	1,4	-0,13	3	9,5	2,17	5	7,2	0,44	16,4	17,7	0,08		49	
	Netherlands	5,1	4,1	-0,20	63,5	64,3	0,01	2,2	2	-0,09	403	279	-0,31	49968	30653	-0,39	5,8	8,9	0,53	2,43	2,86	0,18	0,8	1,4	0,75	4	4,2	0,05	9	9,9	0,10	41,5	46,8	0,13	11	15	0,36
	Sweden	3,4	2,5	-0,26	60,8	66,8	0,10	2,4	2,3	-0,04	269	197	-0,27	43474	33629	-0,23	11,6	13,6	0,17	1,45	1,53	0,06	1,4	0,9	-0,36	9	6,7	-0,26	9	10,8	0,20	19,5	25	0,28	10	16	0,60
	United Kingdom	5,6	4,7	-0,16	65,5	66	0,01	2,6	2,4	-0,08	3083	2491	-0,19	82210	164541	1,00	18,5	18,5	0,00	2,16	2,67	0,24	1,4	1,3	-0,07	7	6,9	-0,01	10	10,6	0,06	25,1	25,2	0,00			
2	Cyprus	5,6	3,7	-0,34	58,2	62,9	0,08	1,7	2,1	0,24	90	103	0,14	296	2780	8,39	3,4	4,2	0,24	0,76	0,72	-0,05	1,2	0,7	-0,42	2	2,7	0,35	9	9,5	0,06	8,4	7,3	-0,13			
	Greece	5,9	3,5	-0,41	65,5	67,4	0,03	1	1,2	0,20	1789	1238	-0,31		3921			8,5		1,04	1,15	0,11	6,2	4,1	-0,34	1	1,6	0,60	12	11,4	-0,05	4,5	5,6	0,24		14	
	Italy	4,3	3,5	-0,19	71	62,5	-0,12	0,7	0,9	0,29	3991	4039	0,01	9555	45485	3,76	5,7	11,4	1,00	1,5	1,87	0,25	6,2	2,9	-0,53	1	2,9	1,90	9	11,6	0,29	8,4	13,6	0,62		24	
	Malta	5,2	6,5	0,25	70,4	71,1	0,01				22	17	-0,23	587	553	-0,06	3,4	7,1	1,09	3,28	3,71	0,13	4,5	2,7	-0,40	2,8	2,8	0,00	7,9	8,6	0,09	6,8	10,9	0,60			
	Portugal	5,5	3,4	-0,38	52,4	57,8	0,10	1,9	2,4	0,26	1032	1015	-0,02	1625			6,3	14,2	1,25	0,78	0,74	-0,05	1,9	4,2	1,21	2	2,7	0,35	8	11,1	0,39	10,9	12,1	0,11	8	14	0,75
	Slovenia	4,9	2,8	-0,43	60,1	62,3	0,04	1,1	1,3	0,18	100	100	0,00	2102	1551	-0,26	8,9	9,8	0,10	0,7	0,68	-0,03	4,1	2,2	-0,46	3	3,2	0,07	8	8,3	0,04	6,5	9,3	0,43			
	Spain	4,4	3,4	-0,23	62,7	63,2	0,01	0,9	2,8	2,11	1796	1329	-0,26	11996	71936	5,00	9,9	11,2	0,13	1,12	1,05	-0,06	4,9	1,7	-0,65	1	1,6	0,60	9	9,6	0,07	7,9	11,8	0,49		8	
3	Bulgaria	13,3	9,2	-0,31		73,9		1,3	2,1	0,62		4426			5966		6,6	8,4	0,27	0,17	0,18	0,06	9,4	4,1	-0,56	1,5	1,5	0,00	9,3	9,2	-0,01		1,7			3	
	Czech Republic	4,1	3,1	-0,24	60	63,3	0,06	2,9	3	0,03	1190	750	-0,37	6436	2371	-0,63	5,5	12	1,18	0,47	0,6	0,28	4,3	2,8	-0,35	5	4,2	-0,16	9,5	9,6	0,01	5,3	5	-0,06			
	Estonia	8,4	5	-0,40	53,8	54,9	0,02	3,1	2,8	-0,10	126	75	-0,40	3425	4242	0,24	7,8	13,3	0,71	0,42	0,35	-0,17	6,2	2,3	-0,63	7	6,3	-0,10	9	9,5	0,06	8,1	8,2	0,01	4	6	0,50
	Hungary	9,2	5,9	-0,36	54,3	57,8	0,06	2,3	2,5	0,09	2272	1971	-0,13	5393	8442	0,57	4,5	6,4	0,42	0,59	0,76	0,29	3,0	3,4	0,13	4	4,4	0,10	8	8,9	0,11	3,5	4,1	0,17		15	
	Latvia	10,4	8,7	-0,16	53,2	54,1	0,02	2,6	3,3	0,27	865	555	-0,36	13482	8322	-0,38	7,4	9,2	0,24	0,25	0,32	0,28	7,9	1,7	-0,78	6	5,5	-0,08	9	8,3	-0,08	11,3	6,4	-0,43			
	Lithuania	8,6	5,9	-0,31	54,6	58,2	0,07	3,1	3,4	0,10	1110	558	-0,50	490	371	-0,24	13,5	18,1	0,34	0,53	0,51	-0,04	8,0	1,2	-0,85	6	5,2	-0,13	8	8,3	0,04	10,2	8,6	-0,16			
	Poland	8,1	6	-0,26	66,9	61,5	-0,08	1,1	1,7	0,55	12752	8415	-0,34	1436	1542	0,07	6,8	13,9	1,04	0,39	0,44	0,13	7,4	4,9	-0,34	4	2,8	-0,30	12	6,5	-0,46	10,5	9,2	-0,12	2	3	0,50
	Romania	18,6	12	-0,35		62,6		1,4	1,7	0,21		7879			31		4,5	11,9	1,64	0,35	0,21	-0,40	3,5	3,2	-0,09	3	1,8	-0,40	8	7,3	-0,09	16,5	9,7	-0,41			
	Slovakia	8,6	6,1	-0,29	56,6	56,1	-0,01	1,7	2,3	0,35	1189	739	-0,38	4526	1478	-0,67	5,3	11,9	1,25	0,56	0,64	0,14	10,3	8,3	-0,19	4	2,4	-0,40	6,3	7,4	0,17	2,1	2,6	0,24			

Note: Luxembourg is excluded because there are no data in 2003-2007 for the selected crimes in Matrix C.

Appendix E

Matrix E – Levels and variations in development factors in EU27 countries, years 2000 and 2007

Cluster	Country	HDI			life expectancy (total)			school expectancy			gdp per capita		
		2000	2009	Δ	2000	2007	Δ	2000	2007	Δ	2000	2007	Δ
1	Austria	0,839	0,879	0,05	77,7	79,6	0,02	15,5	16,4	0,06	132	124	-0,06
	Belgium	0,876	0,883	0,01	77,2	79,2	0,03	18,6	19,6	0,05	126	116	-0,08
	Denmark	0,861	0,891	0,03	76,3	77,7	0,02	17,8	19	0,07	132	122	-0,08
	Finland	0,837	0,877	0,05	77,1	78,8	0,02	18,6	20,5	0,10	117	117	0,00
	France	0,846	0,88	0,04	78,5	80,6	0,03	16,6	16,4	-0,01	115	108	-0,06
	Germany	0,864	0,9	0,04	77,6	79,4	0,02	17,2	17,6	0,02	118	115	-0,03
	Ireland	0,869	0,905	0,04	76,1	79,0	0,04	16,3	17,4	0,07	132	147	0,11
	Netherlands	0,882	0,905	0,03	77,6	79,7	0,03	17,2	17,7	0,03	134	132	-0,01
	Sweden	0,894	0,898	0,00	79,0	80,3	0,02	19,9	19,7	-0,01	128	125	-0,02
	United Kingdom	0,833	0,86	0,03	77,4	79,2	0,02	18,9	16,2	-0,14	119	117	-0,02
2	Cyprus	0,8	0,837	0,05	77,1	79,4	0,03	13	14,8	0,14	88	94	0,07
	Greece	0,802	0,863	0,08	77,5	78,7	0,02	15	17,4	0,16	84	90	0,07
	Italy	0,825	0,87	0,05	79,3	80,9	0,02	16,1	17	0,06	118	104	-0,12
	Malta	0,799	0,827	0,04	77,8	79,4	0,02	14,4	14,7	0,02	85	76	-0,11
	Portugal	0,778	0,805	0,03	76,2	78,4	0,03	16,9	17	0,01	81	79	-0,02
	Slovenia	0,805	0,876	0,09	75,5	77,6	0,03	16,7	18	0,08	80	88	0,10
	Spain	0,839	0,874	0,04	78,7	80,4	0,02	17	17,2	0,01	97	105	0,08
3	Bulgaria	0,715	0,766	0,07	71,6	72,7	0,02	14,2	15,7	0,11	28	40	0,43
	Czech Republic	0,816	0,863	0,06	74,4	76,3	0,03	15,6	17,3	0,11	71	83	0,17
	Estonia	0,776	0,828	0,07	70,4	72,5	0,03	16,8	18	0,07	45	70	0,56
	Hungary	0,775	0,811	0,05	71,5	73,0	0,02	16,1	17,8	0,11	54	61	0,13
	Latvia	0,732	0,798	0,09		70,8		15,5	17,6	0,14	36	57	0,58
	Lithuania	0,749	0,802	0,07	71,8	70,3	-0,02	15,8	17,9	0,13	40	59	0,48
	Poland	0,77	0,807	0,05	73,4	74,8	0,02	16,4	17,9	0,09	48	54	0,13
	Romania	0,704	0,778	0,11	71,5	73,1	0,02	13,9	15,9	0,14	26	41	0,58
	Slovakia	0,779	0,829	0,06	72,9	74,0	0,02		16,4		50	68	0,36

Note: Luxembourg is excluded because there are no data in 2003-2007 for the selected crimes in Matrix C.
HDI data are related to 2000 and 2009 because there are no data in 2007.

Appendix F

ANOVA - motorcycle theft

Modello		Somma dei quadrati	df	Media dei quadrati	F	Sig.
1	Regressione	17,284	8	2,160	7,761	,001[a]
	Residuo	3,619	13	,278		
	Totale	20,902	21			
2	Regressione	17,255	7	2,465	9,461	,000[b]
	Residuo	3,647	14	,261		
	Totale	20,902	21			
3	Regressione	16,857	6	2,809	10,417	,000[c]
	Residuo	4,046	15	,270		
	Totale	20,902	21			
4	Regressione	16,306	5	3,261	11,351	,000[d]
	Residuo	4,597	16	,287		
	Totale	20,902	21			

a. Predittori: (Costante), part-time status, severe material deprivation, long-term unemployment, acquisition of citizenship, science and technology, single person with dependent children, two adults, at least one aged 65 years or over, resource productivity

b. Predittori: (Costante), part-time status, severe material deprivation, long-term unemployment, science and technology, single person with dependent children, two adults, at least one aged 65 years or over, resource productivity

c. Predittori: (Costante), part-time status, severe material deprivation, science and technology, single person with dependent children, two adults, at least one aged 65 years or over, resource productivity

d. Predittori: (Costante), part-time status, severe material deprivation, science and technology, single person with dependent children, resource productivity

e. Variabile dipendente: motorcycle theft

ANOVA - sexual offences against women

Modello		Somma dei quadrati	df	Media dei quadrati	F	Sig.
1	Regressione	17,913	11	1,628	5,274	,007[a]
	Residuo	3,087	10	,309		
	Totale	21,000	21			
2	Regressione	17,913	10	1,791	6,382	,003[b]
	Residuo	3,087	11	,281		
	Totale	21,000	21			
3	Regressione	17,864	9	1,985	7,595	,001[c]
	Residuo	3,136	12	,261		
	Totale	21,000	21			
4	Regressione	17,673	8	2,209	8,632	,000[d]
	Residuo	3,327	13	,256		
	Totale	21,000	21			
5	Regressione	17,293	7	2,470	9,330	,000[e]
	Residuo	3,707	14	,265		
	Totale	21,000	21			
6	Regressione	17,090	6	2,848	10,927	,000[f]
	Residuo	3,910	15	,261		
	Totale	21,000	21			
7	Regressione	16,575	5	3,315	11,986	,000[g]
	Residuo	4,425	16	,277		
	Totale	21,000	21			

a. Predittori: (Costante), single person with dependent children, life expectancy (total), science and technology, acquisition citizenship, healthy years, GDP per capita, divorce, several material deprivation, HDI , school expectancy, infant mortality

b. Predittori: (Costante), single person with dependent children, science and technology, acquisition citizenship, healthy years, GDP per capita, divorce, several material deprivation, HDI, school expectancy, infant mortality

c. Predittori: (Costante), single person with dependent children, science and technology, healthy years, GDP per capita, divorce, several material deprivation, HDI, school expectancy, infant mortality

d. Predittori: (Costante), single person with dependent children, science and technology, healthy years, divorce, severe material deprivation, HDI, school expectancy, infant mortality

e. Predittori: (Costante), single person with dependent children, science and technology, healthy years, divorce, severe material deprivation, HDI, school expectancy

f. Predittori: (Costante), single person with dependent children, science and technology, healthy years, divorce, severe material deprivation, HDI

g. Predittori: (Costante), single person with dependent children, healthy years, divorce, severe material deprivation, HDI

h. Variabile dipendente: sexual offences against women

ANOVA - assault and threat

Modello		Somma dei quadrati	df	Media dei quadrati	F	Sig.
1	Regressione	15,172	11	1,379	2,367	,093[a]
	Residuo	5,828	10	,583		
	Totale	21,000	21			
2	Regressione	15,107	10	1,511	2,820	,052[b]
	Residuo	5,893	11	,536		
	Totale	21,000	21			
3	Regressione	14,963	9	1,663	3,305	,029[c]
	Residuo	6,037	12	,503		
	Totale	21,000	21			
4	Regressione	14,747	8	1,843	3,832	,016[d]
	Residuo	6,253	13	,481		
	Totale	21,000	21			
5	Regressione	14,427	7	2,061	4,390	,009[e]
	Residuo	6,573	14	,469		
	Totale	21,000	21			
6	Regressione	14,316	6	2,386	5,355	,004[f]
	Residuo	6,684	15	,446		
	Totale	21,000	21			
7	Regressione	13,918	5	2,784	6,289	,002[g]
	Residuo	7,082	16	,443		
	Totale	21,000	21			

a. Predittori: (Costante), single person with dependent children, life expectancy (total), science and technology, acquisition citizenship, healthy years, GDP per capita, divorce, severe material deprivation, HDI, school expectancy, infant mortality

b. Predittori: (Costante), single person with dependent children, life expectancy (total), science and technology, acquisition citizenship, healthy years, divorce, severe material deprivation, HDI, school expectancy, infant mortality

c. Predittori: (Costante), life expectancy (total), science and technology, acquisition citizenship, healthy years, divorce, severe material deprivation, HDI, school expectancy, infant mortality

d. Predittori: (Costante), life expectancy (total), acquisition citizenship, healthy years, divorce, severe material deprivation, HDI, school expectancy, infant mortality

e. Predittori: (Costante), life expectancy (total), healthy years, divorce, severe material deprivation, HDI, school expectancy, infant mortality

f. Predittori: (Costante), life expectancy (total), healthy years, severe material deprivation, HDI, school expectancy, infant mortality

g. Predittori: (Costante), life expectancy (total), healthy years, severe material deprivation, school expectancy, infant mortality

h. Variabile dipendente: assault and threat