

**THE IMPACT OF MACROECONOMIC FACTORS ON CRIME
INDEX: UNITED STATES CASE**

ADIOLA SINA

**Thesis submitted for the degree of Master of Science
Banking and Finance**

**EPOKA UNIVERSITY
2018**

APPROVAL PAGE

Student Name & Surname: Adiola Sina
Faculty: Economics and Administrative Sciences
Department: Banking and Finance
Thesis Title The impact of Macroeconomic Factors on Crime Index
Date of Defense: : June, 2018

I certify that this thesis satisfies all the legal requirements as a thesis for the degree of Master of Science (MSC).

Prof. Assoc. Dr. Ugur Ergun

Head of Department

I certify that I have read this study that is fully adequate, in scope and quality, as a thesis for the degree of Professional Master (PM).

Dr. NertilMera

Supervisor

Examination Committee Members

Title / Name & Surname	Affiliation	Signature
1- Assoc. Prof. Dr. EglantinaHysi		
2- Dr. Chrysanthi Balomenou		
3- Dr. Nertil Mera		

THE IMPACT OF MACROECONOMIC FACTORS ON CRIME INDEX: UNITED STATES CASE

ABSTRACT

The main purpose of this study is to examine the economic determinants of the rise in the crime index in the United States. To observe this study, the variables selected are population density, education level, unemployment rate and gross domestic product for residents. Since crime is one of the most problematic societal concerns nowadays, we can say that the economic factors are the ones that have an impact on increasing this variable? To do this study, the ARDL regression and cointegration model were chosen. The reason for choosing this model is to see the correlation between the variables. Data in this model have been collected from 1964 to 2017. The results show that the variables have a long-lasting tire connection. Education has a positive impact on the crime index, while population and GDP densities have a negative impact on the crime index in America. We can say that the state of America should strengthen the laws and undertake new reforms in the fight against crime.

Keywords: *Crime index, education rate, unemployment rate, GDP per capita, population density.*

NDIKIMI I FAKTORËVE MAKROEKONOMIK NË INDEKSIN E KRIMIT: RASTI I SHTETEVE TË BASHKUARA TË AMERIKËS

ABSTRAKT

Qëllimi kryesor që ky studim ka është shqyrtimi i determinantëve ekonomik në lidhje me rritjen e indeksit të krimeve në Shtetet e Bashkuara të Amerikës. Për të vëzhguar këtë studim, variablat e zgjedhura janë densiteti i popullsisë, niveli i arsimit, niveli i papunisë dhe prodhimi i brëndshëm bruto për banorë. Duke qënë se krimi është një nga shqetësimet më problematike të shoqërisë në ditët e sotme, mund të themi që faktorët ekonomik janë ato që ndikojnë më tepër në rritjen e kësaj variable? Për të bërë këtë studim, u zgjodh modeli i regresionit ARDL. Arsyeja e zgjedhjes së këtij modeli është për të parë lidhjen që variablat kanë mes njëra tjetrës. Të dhënat në këtë model janë mbledhur nga viti 1964 deri në vitin 2017. Rezultatet tregojnë se variablat kanë një lidhje afatgjate mes tyre. Sipas studimit të bërë, edukimi ka një ndikim pozitiv tek indeksi i krimit, kurse densiteti i popullsisë dhe PBB kanë një ndikim negative tek indeksi i krimit në Amerikë. Mund të themi se shteti i Amerikës duhet të forcojë ligjet dhe të ndërmarri reforma të reja për luftën ndaj krimit.

Fjalë Kyç: *Indeksi i krimit, niveli i arsimit, niveli i papunisë, prodhimi i brëndshëm bruto për banorë, densiteti i popullsisë*

DECLARATION PAGE

I hereby declare that this Master's Thesis, titled: The impact of Macroeconomic Factors on Crime Index: United States Case, is based on my original work except quotations and citations which have been duly acknowledged. I also declare that this thesis has not been previously or concurrently submitted for the award of any degree, at Epoka University, any other university or institution.

Adiola Sina

June 2018

TABLE OF CONTENTS

APPROVAL PAGE	ii
ABSTRACT	iii
ABSTRAKT	iv
DECLARATION PAGE.....	v
TABLE OF CONTENTS.....	vi
LIST OF TABLES	viii
LIST OF FIGURES	ix
ACKNOWLEDGEMENTS	xi
CHAPTER 1.....	12
INTRODUCTION.....	12
1.1. Study of the problem in United States	12
CHAPTER 2.....	18
LITERATURE REVIEW	18
2.1. Historical Background	18
2.1.1. International Comparison.....	18
2.1.2. Previous Studies	23
CHAPTER 3.....	28
DATA AND METHODOLOGY	28
3.1. DATA.....	28
3.2. METHODOLOGY	29
3.3. ANALYSIS RESULT.....	30
3.3.1. UNIT ROOT TEST	30
3.3.2. ARDL MODEL	30

3.3.3.	ARDL BOUND TEST.....	32
3.3.4.	HETEROSKEDASTICITY TEST: ARCH.....	32
3.3.5.	BREUSCH-GODFREY TEST.....	33
3.3.5.	Normality Test of the Errors.....	33
3.3.6.	ARDL Cointegrating and Long Run Form.....	34
3.3.7.	RAMSEY RESET TEST.....	35
CHAPTER 4.....		36
CONCLUSION.....		36
CHAPTER 5.....		38
SUGGESTIONS.....		38
REFERENCES.....		40

LIST OF TABLES

Table 1: Descriptive Statistics	29
Table 2: Unit Root Test.....	30
Table 3: ARDL MODEL.....	30

LIST OF FIGURES

Figure 1: Homicides and Gun Ownership	19
Figure 2.2: Fire-arm Death Rate Comparison	21

LIST OF APPENDICES

Appendix 1: Heteroscedasticity Test	44
Appendix 2: RAMSEY RESET TEST	45
Appendix 3: ARDL Bound Test	46
Appendix 4: Descriptive Statistics.....	47
Appendix 5: Alkaike Information Criteria	48
Appendix 6: Breusch-Godfrey Serial Correlation LM Test.....	48
Appendix 7: ARDL Cointegration and Long Run Form	48

ACKNOWLEDGEMENTS

I would like to express my appreciation to my supervisor Dr. NertilMera who has helped me finish this thesis successfully. His guidance and knowledge helped me in all the time of research and writing of this thesis.

I would also like to express my appreciation to my thesis committee for their comments and valuations. It was such a nice journey that is ending by the submission of this master thesis.

CHAPTER 1

INTRODUCTION

1.1. Study of the problem in United States

Criminality is one of the major problems that pose social and economic damage to the world. The main damages that a country may face are the economical ones, such as: lowering the real estate value, reducing tourism and also affecting its economic growth. Since crime causes such high social costs, even the smallest crime losses can have a significant impact on the economy. Crime not only creates economic and monetary costs for individuals and society, but also creates insecurity and spreads a sense of anxiety, thereby creating psychological costs. It is imperative for crime reduction policies to understand the social factors, demographic, socio-economic or macroeconomic, that influence crime in a society.

The appropriate actions for significant decrease and efficient prevention of crime rates have become one of the priority cases for different countries, for much as criminal proceedings are presented through different ways, everywhere and at any time. There are no specified reasons why people commit crimes, but every time a person commits a crime it is sure that we can find more than one reason. Actually, there are many negative pushes that can drive a person to be part of criminal activities, due to the specified socio-economic and political conditions that define and characterize each country(Parker, 2001).

Different approaches are made to analyze the crime economy and the relationship between unlawful motives and activities, which seem to be not similar for each country. Actually, more attention has been dedicated to particular types of crime, such as murdering, thefts, robberies etc.

Because of the sophistication of a criminal action, the conclusions are not unanimous, so a theoretical approach can be issued.

The level of criminality, seen by the dynamics-intensity, the types, the magnitude of the acts of violence and the consequence of the grave, the increasing graph of crimes against the person, life and health, the galloping developments of trafficking, especially the narcotics; environments covered with incriminated children who grow up, forming dozens of different theft groups, are therefore facing a civic uncertainty that has never been the case for decades.

The crime in the United States was registered by colonization. The extent of crime has changed over time, with rapid growth since 1963, which peaked in the 1970s and early 1990s. Since those years, crime has dropped dramatically in the United States, The specific definitions of crime reports are considered standard by many US law enforcement agencies. According to the FBI, US-registered offenses include property and violent crime. We can divide property crimes in four groups, such as: theft, car theft, burglary and arson. On the other hand, we can divide violent crimes in four offenses such as: robbery, manslaughter, murder and rape(Tyler, 2012).

In the long run, crime in America has been declined since the colonial era. The assassination rate was computed at more than 30 per 100,000 people in the 1700s, falling below 18 in 1800 and below 10 in 1900. After World War II, the number of crimes started to increase in the United States, ranging from the 1970s to the early 1990s. Violent crime increased nearly fourfold between 1960 and its peak in 1991. On the other hand, real estate increased by more than two times during the same period. But after the 1990s, crime in the United States has dropped dramatically.

Some theories have been suggested to explain this decrease:

1. The number of policeman hired increased considerably compared to the years before.
2. On September 16, 1994, President Bill Clinton underwrote the Violent Crime and Enforcement Act. The campaign spent more than \$ 30 billion in federal funding for a period of time of six years to improve law enforcement by the state and local law enforcement programs, prisons and crime prevention programs. Lawmakers, including the president, have declared him one of the main culprits responsible for the sharp decline in crime in the 1990s, while critics dismissed it as an unparalleled national shield.(Farley, 2016)
3. The number of people arrested in jails increased considerably in the mid-1970s.

4. Since the mid-1980s, the “market crack” developed rapidly before declining a decade later. Different authors have highlighted the correlation between violent crime and the use of different drugs.
5. Demographic changes in an aging population have been mentioned for the general decline in crime rate.
6. Increase of income level.
7. Deeply increase of immigration rate in United States. (Crime in the United States, 2018)

The public perception of crime in the United States is often inconsistent with the data. Opinion polls show that Americans trusted that crime is rising in national ranking, even though the records show that crime is falling dramatically. In 17 Gallup polls conducted since 1993, at least six out of ten Americans reported that the United States had more crimes than the previous year, although the rate of domestic violence and property crime has generally declined during most of this period. (Gramlich, 30 January 2018)

Every hypothesis has its opponents. But the main theory that has prevailed lately is that violence has increased when the justice of the police has been put on a puddle after the deadly shots of unarmed African Americans. The anonymous footage, many of which have been filmed over the past three years, has been broadcast in the media and on the Internet. “Theory believers” say that in cities where police departments treat citizens with disrespect and brutality, residents will eventually cease cooperating with the police, reducing officials' ability to solve crimes. The result, it is argued, is that the most vulnerable people in a given sector will be free to continue to commit crimes with a minimum of fear of arrest.

Most of crime perpetrators were mostly unemployed or wanted just to shoot or kill someone because they had already planned a violent crime? Many jobs were opened during the Industrial Revolution in the United States and many immigrants fought for the job places that they had. During the period when immigrants fought for work around 1900, there were youth groups who created some organized criminal units. The main “job” they had to do was gambling, murdering, organizing gangs etc. According to the Labor Statistics Bureau talking for the periods since 1991 to 2010, the unemployment rate rose from 6.8 to 9.6%. According to the reports of Federal Bureau of Investigation show that between 1991 and 2010, the homicide rate per 100,000 population fell from 9.8 to 4.8 talking in national ranking, suggesting that violence is related to how people think and not unemployed (Haskins, 2015). Many murderers would have killed someone if they worked or not. Unemployment rates and

killings are likely to change in some communities in the center for reasons of ethnicity and poverty. However, if violence is done by young men and women and we can't say that it is created a system where violence or crimes are something that may be just a normal phenomenon; there will always be high levels of criminality in some communities, regardless of the number of jobs are created. United States, as a nation, should examine more deeply the treatment of different crimes such as murdering or violence as a public health problem and spend all the required resources to work on the change on the attitudes about the criminal thinking. Some people may need help to cope with different situations that can avoid violence as their solution. They need a positive incentive to help them avoid and leave away all their negative energy to "escape" of the old habits that lead to acts of violence in minor matters. They can carry everyone, but if we do not change the way we think about violence, then the violence will continue to spread.

The rapport between inequality and crime has also been one of the main topics of sociological theories on crime. Talking generally, these have developed as explanation of the sampling that "with a degree of similarity that is exceptional in the social sciences, the lower and lower classes have higher crime rates comparing to other groups." According to the leading sociological pattern of crime, the theory of "relative deprivation", inequality creates social tensions, as the less affluent expropriated in comparison to wealthier people, and the feeling of deprivation and injustice leads the poor, by all means seeking compensation and satisfaction, including executing crimes against the poor and the rich. It is difficult to make an empirical distinction between sociological and economical interpretations of the observed relationship between inequality and crime. The observation that most crimes are caused by people with lower income for the "lower income group" does not necessarily mean that the economic theory is not valid. Because of the characteristics of the victims rely not only on their family richness, but also on the unequal allocation of services in different areas. In reality, crime may be more dominant in poor communities because the allocation of police services in favor of richer neighborhoods. Likewise, conflicting or consistent evidence of the effects of disparity on different types of crime cannot be used to definitively determine one theory in favor of another.

Crime trends have underlined the particular encumbrance on economies and societies across the nation. Most American countries nowadays come across the challenge of defining a new outlook in the process of fighting against criminality. The main challenge that they have is

based on educational attainments and opportunities. Can educational improvements, especially school attendance rates, be affected? US research proposes that there is a significant correlation between the school time spent and the probability of detention and imprisonment. However, apart from the importance of the question, there has been little discussion about upgrading the quality of education in affecting on the growth of crime rate in United States of America.

A low level of education results in a difficulty finding a job suitable for someone or worse an uneducated person may not have the ability to work. When we talk only about those people who have not taken any education, we can say that the probability that they enter the class of poor people is too high. We can say that it is very difficult to have a high salary without having a proper education or job training. There is certainly a link between education and poverty, whereas there are exclusion and forces that push trends in the reverse direction. Crime is a little more difficult to pin down because there are different forces that affect crime rates, for example we may mention independent of poverty and level of education. Most crimes are committed by the poorest and richest people. The poor often do so to survive, or because they feel empowered to take on the "rich," while the rich often commit crimes because they think they can get away with it. The extremely rich are just manipulating the government to change the law, so what they want to do is legal. Most of the crimes are committed by very poor people or crimes committed by the richest people. The main reason that the poor people's layer becomes a part of the crimes is to survive or to "set justice" and feel the same as the rich people. On the other hand, we can say that the reason a wealthy person can be involved in a crime is to achieve something that crime does not allow. We can mention here the most common crime by the rich, for example: manipulation of governors. We can say that, crime and detention indirectly affect low-income individuals, families and communities, having concerns about barred movement and increasing inequality. In fact, prior work on criminality topic has shown that death rates for all types of crimes are significantly higher for people living in low-income families. During 2008-2009 period, the death rates of all crimes among people with family income below \$16,000 was over three times higher than on those families which income was \$75,000 (Rios, 2016).

This is the dilemma. If the possible factors that influence the crime rate are correctly or sufficiently identified, a more practical solution can be formulated by addressing or mitigating these factors. So what are the possible factors that influence the crime rate in America and

how do these factors influence the crime rate? It is hoped to answer these questions that this study was conducted.

Motivation of the Study:

Do the economic determinants have an impact on the level of crime? Theoretically we can answer this question, no matter whom in his opinion. Not just for America, but for many other countries, there is no exact answer. This is the main reason that pushed me to choose this study. When we talk about United States of America, we always consider a developed and highly powerful state. But seeing the statistics, or just simply listening to the news for this state, America has lagged far behind in the fight against criminality. But who is the main reason behind these high levels of crime?

Research Questions:

- 1- Do the independent variables impact on crime index?
- 2- Do the independent variables have long run relationship with the dependent variable?

Research Objectives:

- × While being one of the main questions in most of the studies, that main objective of this paper is to find the relationship between unemployment rate and crime index.

Limitations of the Study:

I had planned to include as independent variable GINI index on my model, but there was lack of data for this rate.

CHAPTER 2

LITERATURE REVIEW

2.1. Historical Background

2.1.1. International Comparison

The way in which the crime rate of America, in contrast to other countries that have almost the same wealth, evolvement and progress, depends on the type of the crime used in the comparison between them. General statistical and economical comparisons of crime rates are hard to conduct, as the determination and classification of crimes differs from one country to another. As a result, an agency in another country may involve a type of crime in its annual report that an agency in United States has left it out and the contrary.

Nevertheless, some countries, like Canada, have almost the same determinations of what is a violent crime and also what includes a violent crime. We can say that in almost all countries these definitions correspond to the characteristics of the murder. Generally, the crime index in the United States is higher than in other developed countries. Some types of property offenses announced in the US survey are lower than the ones in Germany (in Europe region) and in Canada (America region). On the other hand, according to what writings say the murder rate in the U.S. is higher than the other countries (Mirabile, 2018).

In general, the crime statistics in each country vary and differ from year to year. We cannot say in full conviction which is the state that has done the best job to overcome the acts of crimes. But we can still have a high assurance that America has significant shortcomings in the case of illegal arms possession. On February, the president of United States made a meeting with a group of people (including students and teachers) to talk about a shooting massacre that happened in Florida. His main question was: “Does anyone have any ideas for how to stop it?”

The answers that he got were of all kinds such as: mental illness, maniacs, and gun-free zones. But the ones that got all surprised were the ones such as: the negligence of Federal Bureau of Investigation (FBI), absence of consultants' experts, lack of police officers near the schools or other public areas etc. Different studies have shown that countries with fewer weapons have lower murder rates. Even the United States with fewer weapons has less murders; in a 2002 study, data analysis from 1980 to 1998 pointed out that states with "high" weapon properties had triple the rate of murders compared to countries with few weapons. After 11 years, a study that was made on 2013 found that for every percentage increase in weapons ownership corresponded to 1 percent higher shooting risk Crifasi (2016).

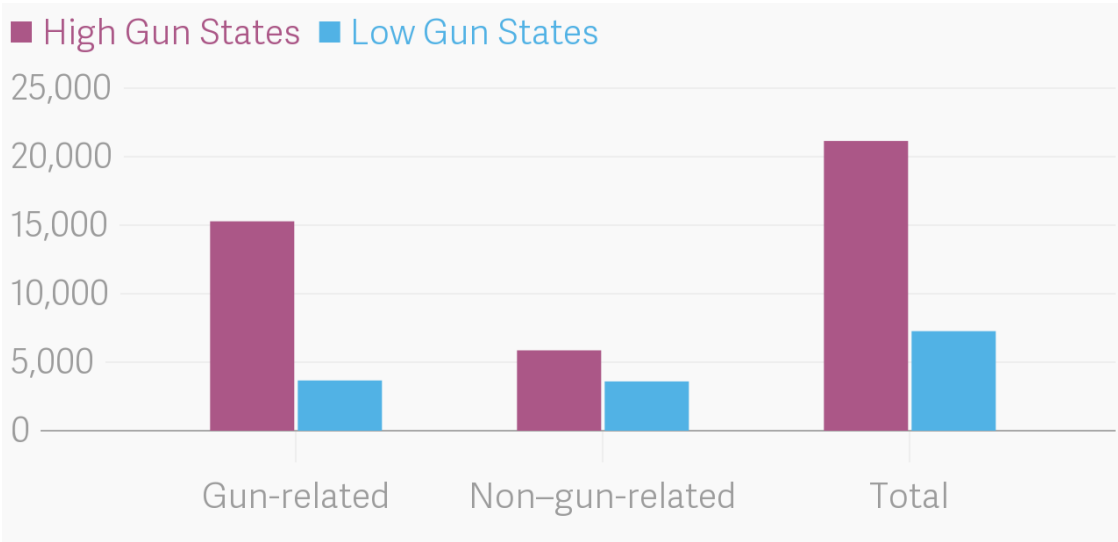


Figure 1: Homicides and Gun Ownership (Source: The ATLAS)

Figure 1 shows the homicide rate by dividing them into two groups. The murders made by people that were a gun owner and murders made by a non-gun owner. The purple column shows the high gun ownership states and the blue column shows the low gun ownership states. As we can see in the figure, states that have a higher gun ownership also have a higher crime rates.

Figure 2 shows the death rates by firearm. It is very clear that America has a very high percentage compared to all other countries in this study. Obviously, mass murders will take place in other countries. Germany, United Kingdom, Russia, Australia, Switzerland have suffered all the massacres in recent years. Unlike United States lawmakers, German and

Swiss lawmakers reacted to the massacres by amending the law to preclude these shootings from occurring again.

- In Germany, some types of firearms were prohibited in 2007 (with the exception of some other kinds of weapons, but certainly requiring permission for using them) in reaction to the massacre that was made in Erfurt in 2002.

In Switzerland, a state with almost the same attitude to weapons ownership such as the United States, the law was changed in 2008 to require more rigorous ammunition conservation as one man murdered 14 people and also wounded 14 other people

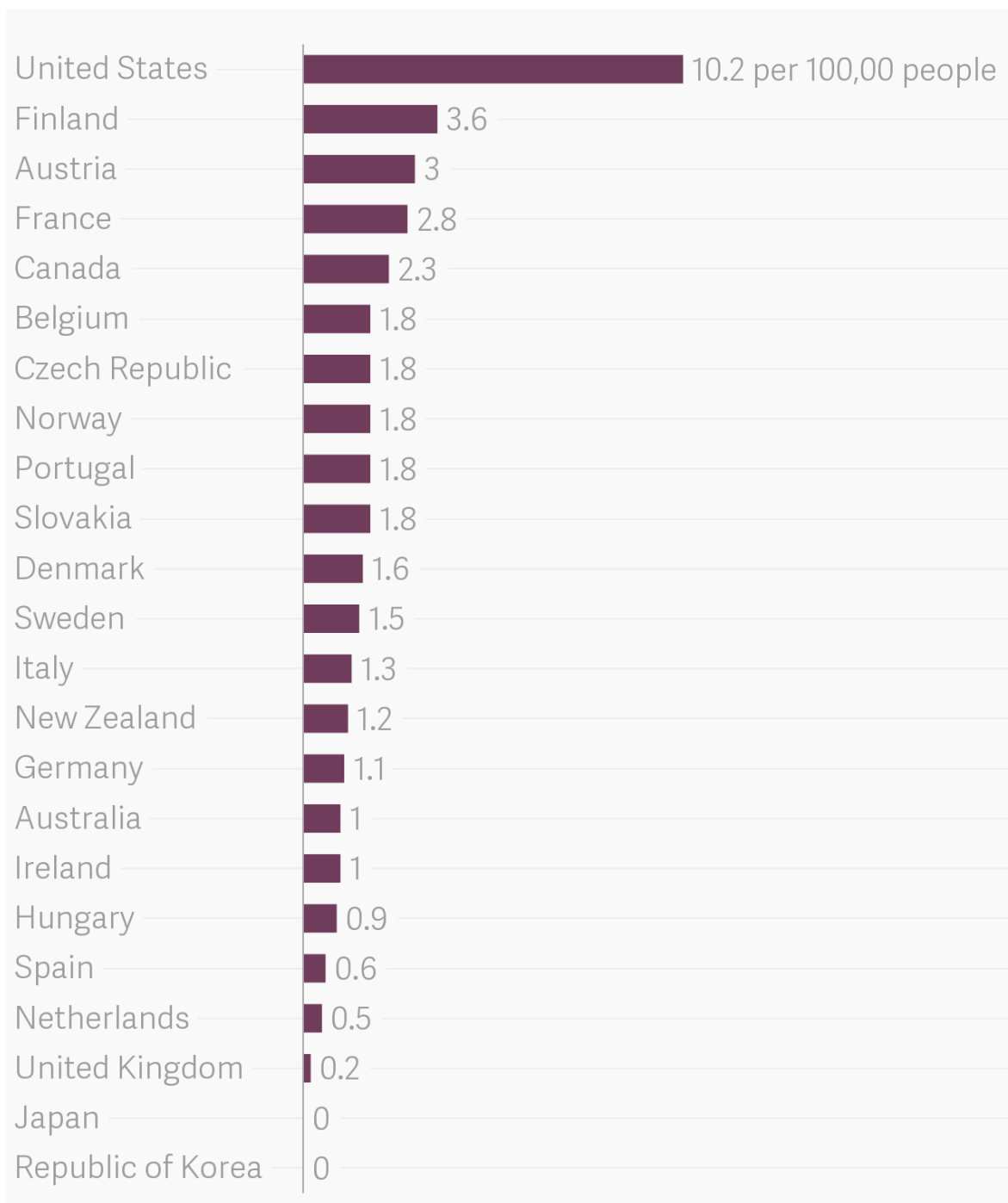


Figure 2.2: Fire-arm Death Rate Comparison. (Source: The ATLAS)

China and Russia are two other countries whose governments are also strengthening the laws on who should own weapons and also determining what kind of weapons.

- China, as a country that already has a tough weapon laws but is facing an increase in possessing weapons, has taken complementary steps, including the prohibition of shotguns, which are very usual in rural areas.

- In Russia, qualifications and licenses are required to buy weapons and among the requests also there are needed medical evidences. To control the unauthorized possession of firearms, the government is negotiating on a law to punish doctors who release non-genuine health reports to people who require arms possession.

The U.S. is distinguished among the countries for the frequency with which its mass attacks and murders occur. But in 2017, after United States testified one of the most fateful shooting in Las Vegas history, the president of United States Donald Trump management made the situation “easier” for people with mental problems to buy weapons. (Merelli, 22 February 2018)

Most Americans Think Gun Violence Is Big National Problem

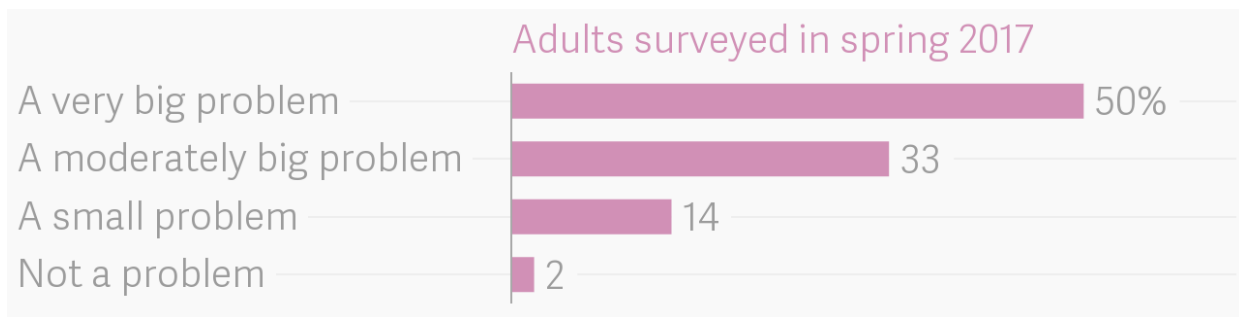


Figure 2.3: Survey (Source: The ATLAS)

In 2017 a survey was made in United States, where adults were asked “Do you think gun violence is a big national problem? The results were:

- A very big problem – 50%
- A moderately big problem – 33%
- A small problem – 14%
- Not a problem – 2%

If we divide the answers into two groups, we may classify the first two answers as “YES” and the second two answers as “NO”. So, 83% of United States adults (the ones who filled the survey) are threatened from the gun violence on their country. The percentage of people, who think that gun violence is one of the main problems that Americans are facing, is very high comparing to other countries. The debate stays the same. Although that America continues to face high levels of unprecedented arms violence comparing with the developed countries, nothing happens - no law is approved by Congress, nothing important has been done to prevent the future terrified stories and scenes.

No other developed country in the world approaches the rate of gunshot violence in America. The United States has almost six times the rate of homicides for weapons such as Canada, more than 7 times Sweden and almost 16 times Germany, according to United Nations data prepared by the Guardian. But state laws sometimes are not sufficient. Since people can pass the state lines just to buy weapons under mitigated rules, the weakest federal standards doesn't make it difficult for someone to simply go to another place or state with cheaper weapons laws to get a gun and send it in to their country. (Lopez, May 2018)

2.1.2. *Previous Studies*

One of first idea that there exists a relationship between crime and macroeconomic determinants is presented from Gary S. Beckers. He provided an economic reason for crimes, such as: "The approach taken here follows the economists' usual analysis of choice and assumes that a person commits an offense if the expected utility to him exceeds the utility he could get by using his time and other resources at other activities(Becker G. S., 1974). One of the main reasons why a person becomes part of a crime is not because their motivation is different from other people but because their costs or profits differ. Beckers has stated that, the income of a person that is involved in crime activities is almost the same as a person which is a crime avoider.

Another study Brenner is based on several criminogenic theory traditions to predict a positive relationship of unemployment - crime, but the fundamental idea of his approach is that the inability of an individual to maintain a certain standard of living as a result of being unemployed will cause a reaction in the form of a criminal offense. To test this proposition, time dependencies of murder rates and prison admissions are investigated in three macroeconomic variables (Brenner, 1976): unemployment rate, the gross national product per capita and the consumer price index. Each of the variables that are chosen is used as an index of macroeconomic activity to which national policies refer, for example fluctuations in employment rates, economic growth and also inflation.

(Hazra, 2017)studied the relationship between crime, per capita GDP, inflation and unemployment in India. The cointegration test claims the cointegration relationships between the variables. The Toda-Yamamoto Granger causality test shows that all macroeconomic variables can significantly influence the level of crime in India and vice versa.

(Lee, 2009) has shown that the relationship between unemployment and crime is usually not clear. More importantly, the relationship between these two variables depends on the rate of concern. This finding suggests that the impact of unemployment on crime varies with different law enforcement agencies and judicial systems that differ in different jurisdictions and cultures. Therefore, it makes sense to include the rate of perception in the empirical analysis of the problem to clarify empirical studies.

Nalica(2010) states that an increase in poverty would increase the crime rate. The same thing applies to the unemployment rate. On the other hand, increasing the number of courts would mean a reduction in the crime rate. However, the model that Nalica(2010) has used reverses the link between the poverty rate and the crime rate, the unemployment rate and the crime rate. That is to say, with each increase in poverty, the crime rate decreases. Any rate of increase in the unemployment rate will decrease the crime rate. Using this model, we were able to establish a linear relationship between crime and factors: population density, poverty rate, number of police officers by province, and number of courts by province. Since this model meets the conditions and assumptions, the model could be a predictable indicator of the crime rate in the Philippines.

(Lederman, 1998) found a result that could prove to be one of the keys to solving the puzzle: there is a delayed effect of educational efforts to alleviate crime, which is the effect of reducing the crime of education does not occur when young people are trained but when grow. Another clue of the puzzle can be obtained by considering the indirect effects of education on inequality. Future research in this area should try to solve the educational puzzle of crime in our empirical findings.

Economists have traditionally concentrated on interpreting the economic behavior of potential criminals and how they are responding to differences and changes in different economic conditions. A basic idea is that a person who intends to hold a certain standard of living during a stage of time that they are unable to find a job so they are classified as unemployed, are more likely to commit a crime. Nevertheless, after the hypothesis that there was a positive correlation between unemployment and crime could not be fully validate, a new “wind” of thought was developed. Lately, sociologists and criminologists have started to examine how unemployment affects the provision of adequate victims. A higher unemployment rate is related to a greater decline in production and consumption; therefore, there are fewer new

goods on the "market" that are being stolen. (Melick, 2003). On the other hand, (Cantor and Land, 1985) point out that there is a encouraged effect between differences in unemployment and the crime rate. Theoretically, it should exist as more people cannot find a job so they are unemployed if they are unfamiliar with dealing with economic discomfort. Even if people are yet unemployed for a longer period of time, they take into account the opportunity cost of selecting unlawful work to be zero because they are not sacrificing legitimate employment potential. For these two people, the "gain" of the crime does not have to be as in the level as for a person who thinks the opportunity cost is positive.

Evidence has been found that tends to confirm earlier conclusions reached by (Lewis, 1996) for New Zealand. Results indicate that the total crime index remains significantly affected by the unemployment rate, once complicating factors are controlled for. Especially, unemployment was found to have a significant relationship to the number of dishonesty crimes committed. This is the category that includes the economic crimes of theft, fraud, car conversion, receiving and burglary that much of the previous literature, including (Lewis, 1996), has focused on.

(Burdett, 2004) analyzed analytically and quantitatively a model of crime, unemployment and inequality, based on the standard model of labor market research, which was expanded to include crime or, alternatively, which was expanded to include research work. The workplace research model is a natural framework for discussing many labor market issues and has interesting implications for the crime economy. While the BLW model has something to say about crime, the big picture becomes theoretically and empirically even more interesting when it comes to workplace research. We believe this should be the benchmark for quantitative analysis and policy discussions in future research.

An intelligent OLS regression, without addressing the problem of inverse causality between income inequality and crime, leads to the conclusion that the highest inequality prevents crime. In other words, the increase in income inequality would be associated with lower crime rates in Mexican communities. An increase in the Gini coefficient of one point between 2006 and 2010 would be associated with a decrease in the killing of drugs per 100,000. This result remains in focus, but differs in all our specifications (Winkler, 2014). However, the main conclusion remains the same: for example, the increase in income inequality is associated with lower crime rates, which, in contrast to our hypothetical effect, is a non-intuitive result.

A number of experimental studies has set the discussion issue how the authorities and the prevention policies can better combat crime. Different variables have been tested, such as the growth of police force (Oliveira, 2003) the money spent for the appropriate equipment (Rupert, 2000), people who have been arrested convicted or sentenced to imprisonment (Kugler, 18 July 2008). The results are still ambiguous, but it seems that the possibility of sentence and conviction are more effective ways for crime prevention than the others. That is because, in most cases, criminal actions are not always connected with arrests, and arrests do not always lead to convictions and imprisonments.

(Han, 2010) found evidences of significant perseverance in both violent and property crime as measured by own-lagged effect. It was also found that law application on variables exert strong negative impact for all the crimes. Socio-economic variables, with the exception of real earnings, were not very significant predictors of crimes. As interpreted this may affect the fact that the contrary effects of factors such as unemployment have on crime may be cancelling each other.

While examining the relationship between economic growth and crime against firms, was found that there is a negative relationship between firm losses due to crime and economic growth (Islam, 2014). It was stated that an increase in real GDP per capita growth by 1 percent is related with a 0.30 percent decrease in the losses due to crime as a percentage of total sales experienced by businesses. This figure is larger for small and medium firms (0.33 percent) than larger firms (0.21 percent). The suggested mechanism for this effect is that economic growth increases opportunities elsewhere and thus increasing the opportunity cost of crime. Moreover, economic growth may outcome in small and medium firms growing faster and increasing performance, thus permitting them to better protect themselves from criminal activity.

(Ojog, 2014) found that there are no significant statistical effects of crime on economic growth in the countries of the European Union. The results of the regression analysis do not support the assumption that overall crime has a statistically negative impact on economic growth, which has been included in Solow's improved growth model adapted to technological advances. The observations suggest that the accumulation of social capital statistically offsets the impact of the crime. Increase in government consumption, this could prevent people from engaging in criminal activity for a variety of reasons, but the most plausible is financial stability. Although the crime is statistically insignificant, it changes some determinants, population growth contributes more to economic growth, while savings contribute less. The

results also do not support the hypothesis that crime has a statistically significant negative impact on economic growth. The findings suggest that while the crime has no statistically significant impact on economic growth, it underlines the importance of savings, although it contributes less to economic growth and the impact on population growth now contributes more. These results are similar to the results of the first hypothesis test. Furthermore, crime emphasizes the importance of political stability and of foreign direct investment, which increase their contribution to economic growth. Since the countries of the European Union have been studied, it seems reasonable to achieve these results. The number of crimes committed is not high enough to have a statistically significant impact on economic growth, but still affects economic growth.

CHAPTER 3

DATA AND METHODOLOGY

3.1. DATA

In order to study the relationship between macroeconomic determinants and crime index, the following variables are chosen: education, GDP per capita, population density and unemployment rate. Years of study are during the period of 1964 until 2017.

- Crime Rate / Index – the crime ratio in an exact area; this rate is expressed per 1000 population per year
- Education rate - Is measured by literacy rate for adults (by weight of 2/3) and by the combination of primary, secondary and tertiary gross enrollment ratio.
- GDP per capita - Is a measure of the economic performance of a country that represents the number of people. It divides the gross domestic product of the country from its total population. This makes it the best measure of a country's standard of living. This shows how “successful” a country feels for each of its citizens.
- Population density - the number of people living per unit area (for example, per square mile)
- The collected statistical data at the paper are taken from different websites. The main sources for the data used are World Bank and JRSA. As known World Bank is one of the websites which has trustful data. On the other hand, JRSA has made easier to find some of the data since it has historical data for United States.

Table below shows the summary of the descriptive statistics of Crime index, Education rate, GDP per capita, Unemployment rate and population density. As we can evaluate, variables (crime index, education rate, and population density) standard deviation are far from the value of mean. This means that they are not normally distributed.

Table 1:
Descriptive Statistics

	CRIME INDEX	EDUCATION RATE	GDP PER CAPITA	UNEMPLOYMENT RATE	POPULATION DENSITY
Mean	70.95	67.45	2.02	6.07	27.30
Median	76.31	67.37	2.02	5.67	26.69
Maximum	100.00	89.60	6.33	9.69	35.32
Minimum	22.75	39.50	-3.62	3.51	20.04
Std. Dev.	21.04	17.40	1.98	1.55	4.66

Economic analysis indicates that there is a long-term relation between the variables considered, dictated by the theory. This means that the properties of the long-term relation are intact. In other words, averages and variances are constant and time is not a factor that affects them. Although, most empirical studies have shown that the durability of tools such as means and variances are not pleased with the analysis of time series variables.

3.2. METHODOLOGY

As we stated the main purpose of the paper is to find the relationship between the independent variables and the dependent one. To find these relationships the model that we will use in this paper is ARDL regression model and cointegration. The main advantage of ARDL model approach lies in the recognition of cointegrating vectors. Cointegration deals with the analysis of long-term relationships between integrated variables and re-parameterization of the link between the variables considered in an ECM.

Below are explained the steps used for econometric model:

- Unit Root Test
- Performing ARDL regression
- ARDL Bound Test
- Heteroskedacity Test
- Breusch-Godfrey Test
- Ramsey RESET Test
- Normality Test of Errors

3.3.ANALYSIS RESULT

3.3.1. UNIT ROOT TEST

First, we should do the Unit Root Test, in order to see whether the variables are stationary or not. The table below shows the unit root test results and the respective probability results for each variable.

Table 2:

Unit Root Test

Variable	Probability
Crime Index	0.0648
Education Rate	0.0000
GDP per capita	0.0000
Population Density	0.0000
Unemployment Rate	0.0092

Crime index probability = 0.0648 > 0.05 (1st Difference)

Education Rate probability = 0.00 < 0.05 (Level)

GDP per capita probability = 0.00 < 0.05 (Level)

Population Density = 0.00 < 0.05 (Level)

Unemployment Rate = 0.0092 < 0.05 (1st Difference)

3.3.2. ARDL MODEL

The Auto Regressive Distributed Lag model was developed by Pesaran et al, and it tries to model the relationship between the variables. In contrast from other regression models, it allows a cointegration of non-stationary variables. Regressors may include residual values (lagged values) of dependent but also current and residual values of the explanatory variables.

Table 3:

ARDL Model

Dependent Variable: LOG(CI)

Method: ARDL

Sample (adjusted): 1964 2016

Included observations: 53 after adjustments
 Model selection method: Akaike info criterion (AIC)
 Number of models evaluated: 2500
 Selected Model: ARDL(4, 0, 2, 2, 4)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LOG(CI(-1))	1.225813	0.142823	8.582734	0.0000
LOG(CI(-2))	-0.588206	0.216326	-2.719075	0.0100
LOG(CI(-3))	0.111138	0.207603	0.535341	0.5957
LOG(CI(-4))	0.179476	0.123800	1.449726	0.1558
LOG(ER)	0.223836	0.108149	2.069693	0.0457
GDPGC	-0.005717	0.001865	-3.065960	0.0041
GDPGC(-1)	-0.009799	0.003775	-2.595820	0.0136
GDPGC(-2)	0.005469	0.003658	1.495162	0.1436
LOG(PDEN)	-0.684990	5.092634	-0.134506	0.8938
LOG(PDEN(-1))	-10.98037	9.071885	-1.210374	0.2340
LOG(PDEN(-2))	11.03505	4.641252	2.377602	0.0229
LOG(UR)	-0.080417	0.055650	-1.445044	0.1571
LOG(UR(-1))	0.131759	0.072491	1.817585	0.0775
LOG(UR(-2))	-0.108067	0.066638	-1.621711	0.1136
LOG(UR(-3))	0.084602	0.045723	1.850306	0.0725
LOG(UR(-4))	-0.059455	0.025960	-2.290284	0.0280
C	1.660616	0.305186	5.441331	0.0000
R-squared	0.996350	Mean dependent var	4.276382	
Adjusted R-squared	0.994728	S.D. dependent var	0.280079	
S.E. of regression	0.020335	Akaike info criterion	-4.698195	
Sum squared resid	0.014887	Schwarz criterion	-4.066215	
Log likelihood	141.5022	Hannan-Quinn criter.	-4.455166	
F-statistic	614.2720	Durbin-Watson stat	1.919700	
Prob(F-statistic)	0.000000			

How to read the main information's of the table:

Dependent Variable: LOG (CI): The dependent variable of our study is Crime Index

Method: ARDL: The chosen regression model is Auto Regressive Distributed Lag model

Sample: 1964 – 2016: The period of the study starts from 1964 until 2016

Selected Model: ARDL (4, 0, 2, 2, 4): The program chooses automatically the perfect model to use for each case. The numbers in brackets shows the number of lags for each independent variable. In our case, 4 lags for crime index, 0 lags for education rate, 2 lags for GDP per capita, 2 lags for population density and 4 lags for unemployment rate.

From the table above the main components that are analyzed are: R-squared, Prob (F-statistics) and Durbin-Watson stat.

R-Square (coefficient of determination) from the table results to be 0.9963. This value implies that all the independent variables (unemployment rate, education rate, population density, gpd per capita and the lags of the dependent variable itself) can be relied on to explain 99.63% of the variations in crime index.

Durbin-Watson statistics is a diagnostic statistic which tests for the presence of auto-serial correlation in the data. If the Durbin-Watson statistic is close to number 2, it denotes the absence of auto serial correlation. So, in our case Durbin-Watson concludes to be 1.919. As being close enough to “2”, we can mark that there is an absence of auto serial correlation in our model.

Prob (F-statistics) = 0.000, since it is smaller than 0.01 % we can conclude that the model overall is strongly significant at 1% significant level.

3.3.3. ARDL BOUND TEST

The ARDL related test is based on the Wald-test (F-statistic). To empirically analyze long-term relationships and short-term dynamic interactions between independent variables (unemployment rate, education rate, population density, GDP per capita) we apply the coefficient of distributed lag (ARDL) cointegration technique. If F-statistic result is greater than the bound critical value, we have to reject the hypothesis, meaning that the variables are cointegrated, and the vice versa.

In the Bound Test Table we can see that the F-statistic is 7.06, and the critical values are 2.45, 2.86, 3.25, and 3.74 (See Appendix3). So, the F-statistic value is greater than the Critical Value Bounds, which falls in the rejection area, meaning that we reject the null hypothesis.

H₀: No long run relationships exist

H_a: Long run relationships exist

As a conclusion, there exists a long run relationship between the variables. In case that F-statistic would be smaller than the critical values then it cannot be rejected the null hypothesis (No long run relationship between the variables).

3.3.4. HETEROSKEDASTICITY TEST: ARCH

The model of conditional autoregressive heteroscedasticity is used for describing the variation of the term of error of time series data. The autoregressive heteroscedasticity model is suitable if the variance of the error in a time series engages in an autoregressive model (AR); when a model of the autoregressive moving average model is supposed for the variance of the error,

the model is GARCH or **generalized autoregressive conditional heteroscedasticity**. ARCH models are usually used in time series financial modeling that show volatility and fluctuations in volatility,

In every model we are interested whether if the independent variables properly represent the dependent variable. As we can see from the Heteroscedasticity table, the Probability value is 0.98, so we cannot reject the null hypothesis (See Appendix 1).

H0: the variance of the error term is constant. (Homoscedastic)

Ha: the variance of the error term is not constant. (Heteroskedastic)

As a result, we can say that the variance of the error term is constant, so is homoscedastic.

3.3.5. BREUSCH-GODFREY TEST

It is used to evaluate the validity of some model hypothesis about the use of regression models in the observed data series. In particular, it checks for the existence of a serial correlation that is not part of the proposed model structure.

The results from Breusch-Godfrey Serial Correlation LM Test, was Prob=0.68, so we cannot reject the null hypothesis. So, as a conclusion there is no serial correlation.(See Appendix 6).

H0: there is no serial correlation

Ha: there is no serial correlation

3.3.5. Normality Test of the Errors

For the model to hold we expect the errors to be normally distributed. The histogram and the respective statistics show that the errors are normally distributed. We expect the Skewness value to be close to 0 and the Kurtosis value to be close to 3 for the errors to be considered as normally distributed. As we can see from the results the Skewness value is -0.221 meaning that the errors are slightly skewed in the left and the Kurtosis value is 2.784. Both values are close to the critical ones and suggest that the errors are normally distributed. (See Appendix 4)

H0: errors are normally distributed

Ha: errors are not normally distributed

Another important statistic is Jarque-Bera which is 0.5344 and the probability value of this statistic is 0.7655 suggesting the rejection of the null hypothesis. So, as a conclusion the errors are normally distributed.

3.3.6. ARDL Cointegrating and Long Run Form

Equation 1

$$\text{Cointeq} = \text{LOG}(\text{CI}) - (3.1184 * \text{LOG}(\text{ER}) - 0.1400 * \text{GDPGC} 8.7813 * \\ * \text{LOG}(\text{PDEN}) - 0.4400 * \text{LOG}(\text{UR}) + 23.1352)$$

According to the long run coefficients table (see Appendix 7) we can evaluate:

- Education rate has a positive impact on crime index. Every unit increase in education rate is predicted to be accompanied by 2.88 units increase in crime index. (c=2.88)
 - GDP per capita has a negative impact on crime index. Every unit increase in GDP per capita is predicted to be accompanied by -0.10 units decrease in crime index (c= -0.10)
 - Population density has a negative impact on crime index. Every unit increase in population density is predicted to be accompanied by -7.61 units decrease in crime index
(c= -7.61)
-
- × The expected error of education rate in the result is 0.89% (From the Std. Error)
 - × The expected error of GDP per capita in the result is 0.032%
 - × The expected error of population density in the result is 1.532%
-
- Education rate is significant (P=0.0025)
 - GDP per capita is significant (P=0.0030)
 - Population Density is significant (P=0.000)

Education rate is a very important factor that affects on crime index. The main fact that comes in our mind is that education rate positively impacts to the crime index leading to an indirect relationship. Higher the education level, lower the crime rate. We can link the education level with the unemployment rate. While a person achieves high qualifications in education, the probability of finding a job in a short time is higher than a person with lower qualifications. So, we can say that high education level results to a lower unemployment rate. But on the other hand we may say that education rate does not necessarily has an influence on crime index. The main example is that even though a person can achieve high qualifications in education, the market does not necessarily enable him a job. But we may also say that the

wages that people get are not high enough so that they can afford to face their family's livelihood.

According to unemployment rate we can definitely say that it negatively affects on the crime index. Unemployment can bring different kind of crimes in a society, such as: robberies or family crimes. In contrast from the other independent variables, unemployment rate has an immense impact on crime rate.

3.3.7. RAMSEY RESET TEST

Ramsey reset test is a broad specification test for the linear regression model. In particular, it verifies whether nonlinear arrangements of adjusted values contribute to the explanation of the response variables. The perception behind the test is that if the nonlinear arrangements of explanatory variables explain the response variables, the model is poorly specified.

H₀: The model does not have structural breaks

H_a: The model does have structural breaks

According to the F-statistic value the null hypothesis cannot be rejected meaning that the model does not have structural breaks and it is well specified. (See Appendix 2)

CHAPTER 4

CONCLUSION

This paper examines the index of crime in United States. In this case, we decided to look at his connection with some of the macroeconomic factors, such as: GDP per capita, education rate, unemployment rate and population density.

The level of criminality, seen by the dynamics-intensity, the types, the magnitude of the acts of violence and the consequence of the grave, the increasing graph of crimes against the person, life and health, the galloping developments of trafficking. The same as other authors such as Hazra (2017), this model claims the relationship between the variables. Also the ARDL test claims the cointegration relationship between the variables and can significantly influence the level of crime in USA. To find the long run relationship of the independent variables with the dependent variable the ARDL Model was used. By the help of ARDL Bound Test the hypothesis was rejected and it was stated that the variables had a long run relationship between them. So, time is not a factor that affects the relationship between crime index and all the independent variables.

Education rate affects positively to crime index. So, we may conclude that if education level increases the crime index will decrease. The higher the education of a person, the higher will be the probability that that person will be involved in a crime. We can link this fact by claiming that by getting a higher education in some specific fields, crime as a sector may become more sophisticated. With a logical connection, it was resulted that population density and GDP per capita affect negatively on crime index. Meaning that if these variables increase, crime index will increase. All the independent variables (unemployment rate, education rate, population density, GDP per capita and the lags of the dependent variable itself) can be relied on to explain 99.63% of the variations in crime index.

As a conclusion this model has satisfied the logical linkage of crime index with unemployment rate, education rate, population density and GDP per capita.

CHAPTER 5

SUGGESTIONS

Crime is also occurring in developed countries, but some standards have been achieved and recognized, although dynamics and intensity have fluctuations and are developing with a rise in time and space, but we still lack accurate police data, which is reflected when we have a look on prosecution statistics. To summarize, some of the directions that should influence the prevention of criminality and the crackdown on acts of greater danger can be summarized as follows:

1. Buying a weapon should be as difficult as buying a vehicle

The decrease of the number of deaths caused by vehicles for the last 50 years in United States is one of the major triumphs of public health interference. Safer cars, tighter law enforcement laws, and a lower number of teenage drivers have helped the decrease of car victims, which have fallen from 34 deaths per billion kilometers traveled in 1970 to 12 deaths per billion kilometers traveled in 2016. But on the other hand we may say that deaths from guns have steadily grown since 2008 and are now almost as deadly as traffic accidents. (Gregory, 2018)

Legislators can take into account to learn from vehicle safety. To begin, they can enforce more strict firearm possession requirements.

"For the most part, it's far easier to be a legal weapon in America than to be a lawful driver" - David Hemenway

A more efficient policy would be: requiring every weapon buyer, having an authorization that involves the recordings of all purchases and leastwise a simple and humble training program.

2. Allowing and making more strict laws that reduce gun violence

Not all laws that are amended for laws are the same. Military cannons used in many mass murders can prevail in the political discussion, but represent less than 4% of the murders. On the other hand, research published in JAMA Internal Medicine found that states that have strong laws about firearms were associated with a lower percentage of firearm murders (Farell, 2017). Researchers are also trying to identify links between legitimate laws - requiring governments to release permits to citizens who meet several requests - and become part of the firearms crime.

Another mass that has attracted the attention of legislator is the orders for extreme risk defense, also known as orders for restricting gun violence. This permits family members or law application to request a court to stop a person at risk for a period of time of buying some kinds of weapons. Police officers can also be allowed to take away their weapons.

REFERENCES

- Becker, A. P. (1969). "Principles of Taxing Land and Buildings for Economic Development." . *University of Wisconsin Press*.
- Becker, G. S. (1974). Crime and Punishment: An economic approach. *NBER*, 10-20.
- Burdett, K. (2004). *An On-The-Job Search Model of Crime, Inequality and Unemployment*. Pennsylvania.
- Calhound, C. A. (2002). *Property Valuation Methods and Data in the United States* .
- Cantor and Land, D. a. (1985). Unemployment and Crime Rates in the Post-World War II United States - A Theoretical and Empirical Analysis. *National Criminal Justice Reference Service (NCJRS)*, 317-332.
- Chui, Z. (2017). Macroeconomic Determinants of Crime in India. *SSRN Electronic Articles*, 13.
- Crifasi, C. (2016). Storage practices of US gun owners in 2016. *AJPH Research*, 6. *Crime in the United States*. (2018, May 16).
- Crosby, N. (1999). Valuation Accuracy, Variation and Bias in the Context of Standards and Expectations . *World Valuing Congress Melbourne*.
- Farrell, C. (2017). Firearm Laws and Firearm Homicides. *JAMA Network*.
- Farley, R. (2016). Bill Clinton and the 1994 Crime Bill. *FactCheck*.
- Gramlich, J. (30 January 2018). *Pew Research Center5 Fact about crime in the U.S.*
- Gregory, S. (2018). 6 Real Ways We Can Reduce Gun Violence. *TIME*.
- Grigg, B., & Hossein, E. (2016). The Boundaries of Australian Property Law.
- Gyourko, J., & Voith, R. (2001). The Price Elasticity of Demand for Residential Land: Estimation and Some Implication for Urban Form.
- Habil, C., Schmid, U., & Hertel, C. (2005). Real Property Law and Procedure in the European Union General Report . *European University Institute*.

- Han, L. (2010). Determinants of Violent and Property Crimes in England and Wales: A Panel Data Analysis. 28.
- Haskins, A. (2015). The effects of unemployment on Crime Rates in the US. 18.
- Hazra, D. (2017). Macroeconomic determinants of crime. *FTP Directory Listings*, 12.
- Hilbers, P. L., Zacho, L., & Lei, Q. (2001). Real Estate Market Developments and Financial Sector Soundness. . *International Monetary Fund*.
- Islam, A. (2014). Economic Growth and Crime against Small and Medium Sized Enterprises in Developing Economies. *World Bank*, 38.
- JEFFERIES, R. (2010). REAL VALUE VALUATION FOR PROPERTY IN THE 21ST CENTURY? - A COMPARISON OF CONVENTIONAL AND REAL VALUE MODELS . *Pacific Rim Property Research Journal*.
- Kinsella, S. (2001). PROPERTY RIGHTS: TANGIBLE AND INTANGIBLE. *Journal of Libertarian Studies*.
- Kugler, P. (18 July 2008). Identifying Efficient Crime-Combating Policies by VAR Models: The Example of Switzerland. *Contemporary Economic Policy*, 525-538.
- Kummerow, M. (2003). Theory for Real Estate Valuation: An Alternative Way to Teach Real Estate Price Estimation Methods. . *Pacific Rim Real Estate Society Conference*.
- LaSalle, J. L. (2013). The Advancement of Real Estate as a Global Asset Class. . *Global Real Estate Markets Global Foresight Series*.
- LAW_Nr_133. (2015). *Law FOR PROPERTY TREATMENT AND COMPLETION OF THE PROPERTY COMPENSATION PROCESS*.
- Lawson, J. W. (2008). THEORY OF REAL ESTATE VALUATION. *School of Economics, Finance and Marketing RMIT Business*.
- Lederman, D. (1998, October). *The World Bank* . Retrieved 1998, from <http://documents.worldbank.org/curated/en/198251468752978462/pdf/multi-page.pdf>
- Lee, K. (2009). Unemployment and Crime. 29.
- Lewis, S. a. (1996). Economic Crime in New Zeland: Causation or coincidence. *Auckland*, 158.
- Lopez, G. (May 2018). America's gun problem. *VOX*.
- McAllister, P., Bowles, G., & Tarbert, H. (1997). Simulating the Effect of Valuation Error on Property Investment Performance Measurement. . *Royal Institute of Chartered Surveyors Cutting Edge conference*.
- Melick, M. D. (2003). The relationship between crime and unemployment. *The Park Place Economist*, 9.

- Merelli, A. (22 February 2018). Dear America, here's how other countries stop mass shootings. *QUARTZ*.
- Mirabile, F. (2018). What's the homicide capital of America? *The Trace*.
- Nalica, A. D. (2010). A regression analysis on the determinants of crime rates across Philippine. 32.
- Ojog, D. (2014). The effect of crime on economic growth. 34.
- Oliveira, A. L. (2003). Violence in the Capital of Brazil: An Analysis Based on the Economic Model of Crime. *Department of Economics University of Brasilia*, 295.
- Pengfei, W. (2011). How to effectively integrate sustainability into property valuation? . *Department of Real Estate and Construction Management*.
- Rahman, M. (2006). ``Development of Valuation Model for Residential Property, integrating Self- declaration``.
- Rios, V. (2016). The impact of crime and violence on economic sector diversity. 27.
- Rupert, P. (2000). On the political economy of income redistribution and crime. *JSTOR*, 26.
- Schultz, J., & Perzanowski, A. (2016). The End of Ownership: Personal Property in the Digital Economy.
- Schumann, C. P. (2006). Improving certainty in valuation using the discounted cash flow method. . *Valuation Strategies*.
- Segal, I., & Whinston, M. D. (2010). Property Rights. *Stanford Education*.
- Sprankling, J. (2000). Understanding Property Law.
- Subbarao, V. (1964). PROPERTY LAW .
- TEGOVA. (2010). *Country-Specific Legislation and Practice* . The EUROPEAN GROUP OF VALUES ASSOCIATIONS .
- The_Law_Library_of_Congress_Global_Legal_Research_Center. (2014). China: Real Property Law.
- TREBILCOCK, M. (2012). PROPERTY RIGHTS AND DEVELOPMENT: THE CONTINGENT CASE FOR FORMALIZATION . *University of Toronto Faculty of Law*.
- Tyler, S. (2012). Kansas incident based reporting system handbook. *Bureau of Investigation*, 132.
- William, J. (2008). THEORY OF REAL ESTATE VALUATION . *Royal Melbourne Institute of Technology*.
- Winkler, H. (2014). Income Inequality and Violent Crime. *The World Bank*, 31.

Żróbek, S., Kucharska-Stasiak, E., Trojanek, M., Adamiczka, J., Budzyński, T., Cellmer, R., et al. (2014). CURRENT PROBLEMS OF VALUATION AND REAL ESTATE MANAGEMENT BY VALUE . *Croatian Information Technology*.

APPENDIX

Appendix 1: Heteroscedasticity Test

Heteroscedasticity Test: ARCH

F-statistic	0.000268	Prob. F(1,50)	0.9870
Obs*R-squared	0.000279	Prob. Chi-Square(1)	0.9867

Dependent Variable: RESID^2

Method: Least Squares

Date: 06/11/18 Time: 15:50

Sample (adjusted): 1965 2016

Included observations: 52 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000285	6.70E-05	4.252369	0.0001
RESID^2(-1)	0.002318	0.141589	0.016374	0.9870

R-squared	0.000005	Mean dependent var	0.000286
Adjusted R-squared	-0.019995	S.D. dependent var	0.000381
S.E. of regression	0.000385	Akaike info criterion	-12.85040
Sum squared resid	7.40E-06	Schwarz criterion	-12.77535
Log likelihood	336.1103	Hannan-Quinn criter.	-12.82162
F-statistic	0.000268	Durbin-Watson stat	1.955114
Prob(F-statistic)	0.987002		

Appendix 2: RAMSEY RESET TEST

Ramsey RESET Test

Equation: UNTITLED

Specification: LOG(CI) LOG(CI(-1)) LOG(CI(-2)) LOG(CI(-3))
LOG(CI(-4))

LOG(ER) GDPGC GDPGC(-1) GDPGC(-2) LOG(PDEN)
LOG(PDEN(

-1)) LOG(PDEN(-2)) LOG(UR) LOG(UR(-1)) LOG(UR(-2))
LOG(UR(-3))

LOG(UR(-4)) C

Omitted Variables: Powers of fitted values from 2 to 3

	Value	df	Probability
F-statistic	1.674589	(2, 34)	0.2025

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.001335	2	0.000667
Restricted SSR	0.014887	36	0.000414
Unrestricted SSR	0.013552	34	0.000399

Appendix 3: ARDL Bound Test

ARDL Bounds Test

Date: 06/11/18 Time: 15:59

Sample: 1964 2016

Included observations: 53

Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
----------------	-------	---

F-statistic	7.068497	4
-------------	----------	---

Critical Value Bounds

Significance	I0 Bound	I1 Bound
--------------	----------	----------

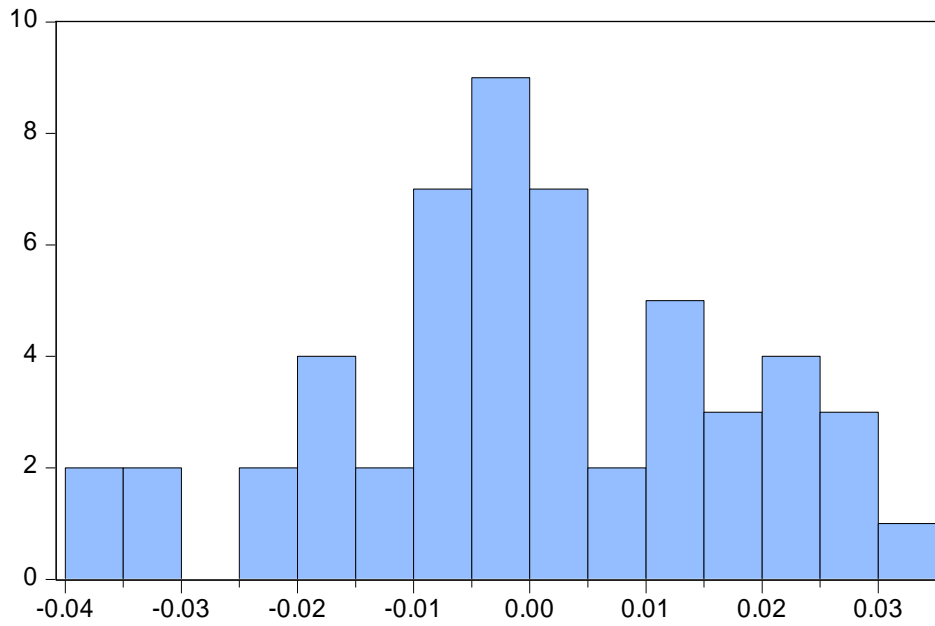
10%	2.45	3.52
-----	------	------

5%	2.86	4.01
----	------	------

2.5%	3.25	4.49
------	------	------

1%	3.74	5.06
----	------	------

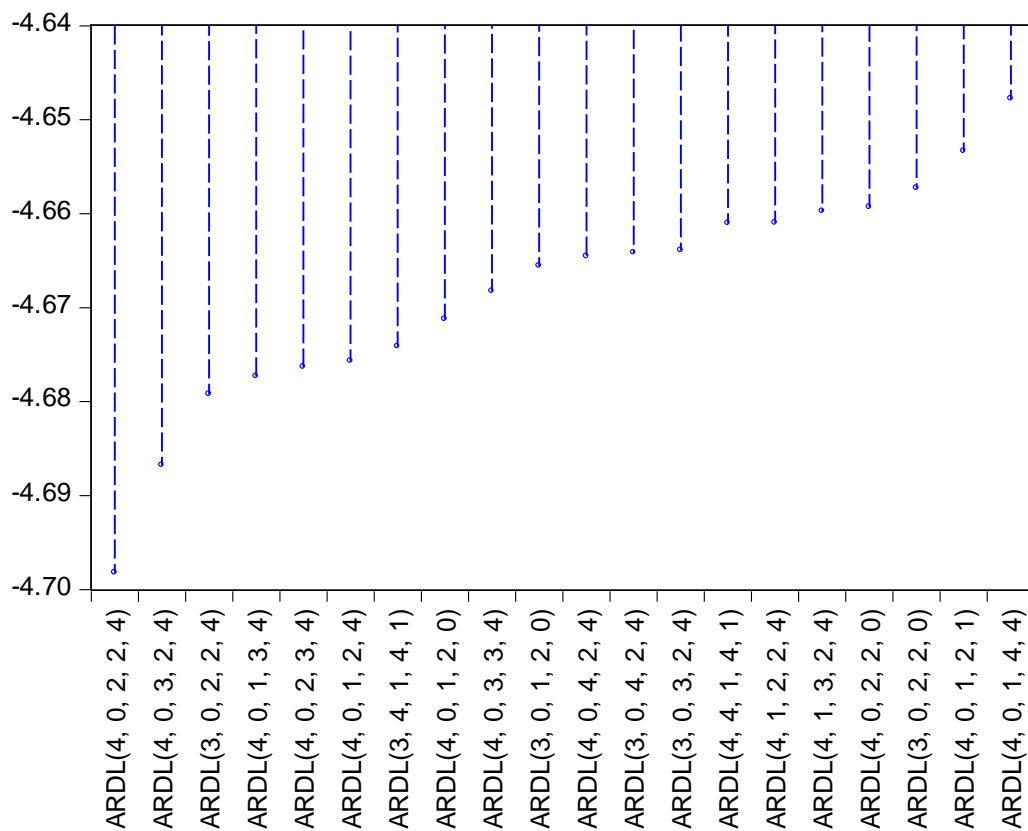
Appendix 4: Descriptive Statistics



Series: Residuals	
Sample 1964 2016	
Observations 53	
Mean	-1.19e-15
Median	-0.000431
Maximum	0.033057
Minimum	-0.037104
Std. Dev.	0.016920
Skewness	-0.221061
Kurtosis	2.784280
Jarque-Bera	0.534434
Probability	0.765507

Appendix 5: Akaike Information Criteria

Akaike Information Criteria (top 20 models)



Appendix 6: Breusch-Godfrey Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.172356	Prob. F(1,35)	0.6806
Obs*R-squared	0.259717	Prob. Chi-Square(1)	0.6103

Appendix 7: ARDL Cointegration and Long Run Form

ARDL Cointegrating And Long Run Form

Dependent Variable: LOG(CI)

Selected Model: ARDL(4, 0, 2, 2, 4)

Date: 06/11/18 Time: 16:02

Sample: 1960 2016

Included observations: 53

Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLOG(CI(-1))	0.297592	0.135407	2.197751	0.0345
DLOG(CI(-2))	-0.290614	0.121107	-2.399653	0.0217
DLOG(CI(-3))	-0.179476	0.123800	-1.449726	0.1558
DLOG(ER)	0.223836	0.108149	2.069693	0.0457
D(GDPGC)	-0.005717	0.001865	-3.065960	0.0041
D(GDPGC(-1))	-0.005469	0.003658	-1.495162	0.1436
DLOG(PDEN)	-0.684990	5.092634	-0.134506	0.8938
DLOG(PDEN(-1))	-11.035050	4.641252	-2.377602	0.0229
DLOG(UR)	-0.080417	0.055650	-1.445044	0.1571
DLOG(UR(-1))	0.108067	0.066638	1.621711	0.1136
DLOG(UR(-2))	-0.084602	0.045723	-1.850306	0.0725
DLOG(UR(-3))	0.059455	0.025960	2.290284	0.0280
CointEq(-1)	-0.071779	0.020153	-3.561637	0.0011
Cointeq = LOG(CI) - (3.1184*LOG(ER) -0.1400*GDPGC -8.7813 *LOG(PDEN) -0.4400*LOG(UR) + 23.1352)				

Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(ER)	2.883693	0.895497	3.220215	0.0025
GDPGC	-0.101851	0.032260	-3.157180	0.0030
LOG(PDEN)	-7.617679	1.532660	-4.970235	0.0000
C	19.061193	2.711102	7.030791	0.0000