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Kyrre Rickertsen

Homicides in the Developing World: Is Capital Punishment an Effective Deterrent, an Empirical Analysis

Shayan Mujtaba

Master of Science in Economics – Development and Global Change
School of Economics and Business

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Abstract

This study uses a panel data on 24 developing countries across four continents Africa, Americas, Asia and Europe on homicide rates for a period of 12 years from 2001-2012. Data for the analysis were taken from different sources such as the World Bank, United Nations Office on Drugs and Crime, Amnesty International, World Inequality Database (WID) and the World Health Organization (WHO). I have used Becker (1968) model based on the Rational Choice Theory (RCT) for selecting my variables that explain the incidence of crime. Becker (1968) suggests that criminals act rationally and base their decision to commit a crime on a cost-benefit analysis. I use the Hausman test to verify which model, fixed or random effects best fits my econometric equation for homicide rates and measure deterrent effects of capital punishment. The results suggest that homicide rates tend to increase with increased economic activity while human development index (HDI) plays a highly significant role on the impact of homicide. Higher the human development index score, the lesser the degree of homicide. Higher economic growth shows two distinct results; Higher real GDP growth leads a reduction in homicide rates while the increase in GDP per capita (US\$) leads to an increase in homicides.

The Hausman test suggests a random effects model is better suited for my analysis rather than a fixed effects model as it also considers, the time invariant variables. Lastly, as normal intuition might suggest, capital punishment does have a deterrent effect on homicides; meaning it reduces the homicide rates and enforces the offender not to commit murder. But it proves to be statistically insignificant, suggesting it is an inadequate measure in reducing homicide rates and a better alternative policy is required.

Keywords: Crime, Deterrence, Homicide, Human Development, Capital Punishment

1. Introduction

Crime is studied in order to understand why and how a crime occurs so it could be prevented (Justice, 2011). It can be broken down into several categories such as ‘violent crime’, ‘property/theft crime’, ‘white collar crime’ and ‘organized crime’. The nature of various crimes depends on many factors such as race, religion, region, culture, resources etc. The most common factors involved in violent crime especially homicides are income inequality, economic activity and human development that involves health care and education (UNODC, 2011).

Because, crime is an economic activity, albeit an illegal one, it has multiple implications on society. For instance, societies are divided into different communities or call them neighborhoods for ease of understanding. Each neighborhood has a different social status such as class (if the neighborhood has wealthy, poor or a mix of both people), ease of access to health care, education system, recreational areas and the list can go on and on. Each community works and establishes a social connection with its inhabitants to live freely (under some regulations of course) so it could flourish. So, when someone in the neighborhood commits a crime, they are subsequently going against the rules and regulations of their community which upsets the balance of society. Aggregating these crime results would give us the national crime rate

Homicide is the most widely reported crime in law enforcement and criminal justice statistics worldwide (Malby, 2010, p. 10). One of the reasons why it is the most commonly and widely used statistic to report crime is due to the serious nature of the offense, hence it is recorded more effectively and efficiently than other criminal activities (Malby, 2010, p. 7).

According to the definition by the United Nations Office on Drugs and Crime (UNODC), “Intentional homicide is defined as unlawful death purposefully inflicted on a person by another person” (UNODC, 2004). The world homicide rate in 2004 was 7.6 per 100,000 population (Malby, 2010, p. 8). While there have been several studies done on violent crimes, homicide and capital punishment Britto and Noga-Styron (2014); Chalfin et al. (2013); Dezhbakhsh et al. (2003); Durlauf et al. (2013); Fajnzylber et al. (2002); Lamperti et al. (1994); (Rosenfeld, 2009; Unnever & Cullen, 2010), they mainly use data from developed countries or a sample consisting of mainly developed and a few developing countries. Fajnzylber et al. (2002) analysis on violent crime does include developing countries but their focus is not evaluating the impact capital punishment has on violent crime; they assess what are the causes that lead to violent crime (so no correlation is established between crime and deterrence).

Also, most of the studies on crime include not only homicide but other types of crimes such as assault, robberies, drug related crimes, car theft etc. I have not found any studies yet that have been exclusively done on homicide in the developing world. The most comprehensive study is a report published by the United Nation’s Office on Drugs and Crime (UNODC) that includes the global study on homicides. Of the 193 countries studied, sources for homicide data for 70 of them was not sufficiently available and they were based on estimates produced by the World Health Organization (WHO) (UNODC, 2013, p. 99). However, (UNODC, 2013) only provided a range of statistics and social indicators on various regions about different types of homicides such as more than half of all the global homicide victims are under 30 years old (UNODC, 2013, p. 5).

Also, UNODC (2013) does not provide any economic model or econometric analysis of their findings or any reasonings as to why homicides occur, it merely reports homicides

all over the world and its key indicators. So, there is no study done with empirical analysis for developing countries where homicide rates were studied with respect to economic activity, human development and capital punishment on estimating the impact of deterrence.

One reason for that is the poor availability of data in the developing countries. There is no study I could find where homicide rates and its effect on the economy were studied over a long period of time in Africa due to lack of missing observations, not just on homicide but, other important socio-economic indicators in most African countries too. There is very little country specific literature to be found on homicide not only because it is difficult to find data on homicide, but the issue has just not been given enough attention. According to Natarajan (2016, p. 1), it is argued that crime rates are higher in developing countries, however, the reason why this issue has received very little to no attention from criminologists and crime scientists is due to the fact that most of them live in developed countries. This is one fact that simply cannot be ignored. Henceforth, I started my research on crime and specifically homicide in developing countries.

In recent times, the relationship between economic conditions and crime has consistently been linked with shifts in business cycles and economic activity (Rosenfeld, 2009, p. 287). Earlier researches on crime showed inconsistent results of crime rates during economic development or declines and a major reason for that was, previous researchers mainly focused on unemployment rate as the economic indicator to study changes in crime (Rosenfeld, 2009, p. 287).

Numerous studies Arvanites and Defina (2006); Gould et al. (2002); Grogger (1998); Rosenfeld (2009); Rosenfeld and Fornango (2007) have shown a conclusive association between “crime rates and wages, GDP and collective perceptions of economic conditions”. By employing the Hausman test, a fixed effects vs random effects model is estimated based on Becker (1968) Rational Choice Theory (RCT).

Of the 24 developing countries included in my thesis, three are from Africa (Ghana, Morocco and South Africa) and seven each from the Americas, Asia and the European region. The measurement of development as stated by former Secretary General Kofi Annan of the UN defined a country that is developed as “one that allows all its citizens to enjoy a free and healthy life in a safe environment” (Annan, 2000). So, the countries in my analysis have a low to medium human development score, lie in low to medium income group classification and have a low to medium GINI index score.

My motivation for researching on crime was driven by the notion of human psychology, justice and upholding civic and moral values. I want to explore, what makes people to commit crime? What are the factors that drive them to break the law and cause harm to society in developing countries? Secondly, I need to determine the correlation between human development and punishment on crime, to see if it has any deterrent effect on crime. The objective of my thesis is to find out the significance between homicide, education, economic activity and the influence of capital punishment as deterrence on crime rate with the help of empirical analysis of the 24 developing countries in my dataset. In my research, I will primarily be looking at homicide rates, and the major indicators assessing for homicide rates are, income inequality (measured by the GINI index and HDI), economic activity (measured by GDP growth and GDP per capita in constant US\$), deterrence (capital punishment and domestic violence), demographics measured by age distribution, unemployment rate, religion and rate of urbanization.

I have chosen homicide rates as an indicator that signifies crime rate. There are multiple reasons as to why I choose homicide to be my indicator for assessing crime. First, homicides are known to the police authorities simply because it is not easy to hide dead bodies. Second, the definition of homicide is quite similar from one country to another (Ouimet, 2012, p.

244). Also, homicide rates are a reliable indicator of the general level of violence in any given country because homicide is more often than not a result of a lesser crime such as robbery, rape, property crime etc. (Ouimet, 2012, p. 244). Lastly, homicide is the most heinous of all crimes as it is irreversible, and we would all be better off without it. Taking someone's life for personal gain, is simply, the most inhumane act in the world in my opinion.

Hopefully, my research will contribute and give attention to something as atrocious as homicide, why it occurs (linked with theoretical background) and how can we prevent it (determine its correlation with punishment), especially in the developing world which has to a large extent been ignored up until now.

2. Theoretical Perspectives

In this section, I will be discussing some of the theories in economics and criminology and link them to my econometric random effects model.

2.1 Rational Choice Theory

The roots of rational choice theory (RCT) date back to the classical school of criminology developed by Cesare Beccaria the 18th century Italian philosopher and Jeremy Bentham an English philosopher in the 19th century (Moran, 1996). Over the course of time however, the theory has been developed significantly and has involved efforts to uncover some conditions under which sanctions may be effective in deterring criminal behavior (Braithwaite, 1989, p. 69). According to Zimring et al. (1973, p. 192), a British government social survey on consequences of arrest was conducted amongst the youth. Ten percent responded that the most important consequence of committing a crime was, the punishment they might get when caught,

whereas fifty-five percent responded what their family, or girlfriend (close relations) would think about it if they committed a crime. Other twelve percent ranked public shame of having to appear in court was a very serious consequence of arrest. Judging by this study, it appears rationality and critical thinking plays an important role in decision making of human beings. A commonly used assumption in economic models about human behavior and decision-making is rationality in finding out optimal values of maximizing utility with respect to budget constraints whether the person in view is a consumer or producer (Day, 1971).

RCT suggests that people would generally act in their self-interest and make decisions determining the costs, benefits means and ends before committing a crime after considering all the possible risks including risk and rewards (Cornish & Clarke, 1987). The model derived by Becker in his essay: "Crime and punishment: An economic approach" develops an optimal policy to reduce criminal activities and illegal behavior (Becker, 1968). The obedience to law is not taken for granted and resources are spent in order to reduce and prevent offenses (Becker, 1968, p. 169). It measures the social loss from the offenses, and the expenditure, minus the cost incurred due to the punishment handed to the offender, to minimize the loss (Becker, 1968, p. 170). The cost of catching and punishing the offender, and the responses of offenders to change in enforcement is determined to be the optimal amount of law enforcement (Becker, 1968, p. 170).

Becker's model is based on a constrained optimization problem where offenses/crime is treated as the dependent variable and the costs incurred (imprisonment, fines, legal work vs illegal work, probability of being caught) as the independent variables. The key variables in Becker (1968) empirical study are crime rate, punishments meted out and the cost incurred for those punishment.

2.2 Deterrence Theory

Deterrence is a utilitarian approach exercised by nearly every society in the world and is specifically designed to change and alter unwanted human behavior rather than to simply have retribution. So, deterrence differs from RCT in a way that affects an individual to reform their behavior and refrain them from criminal activities. These could be achieved by strict policing, stiff punishments (whether it makes a society better off or worse in terms of freedom is up for debate).

Deterrence theory in relation to criminal behavior is more of a utilitarian approach where the idea that an individual would face dire consequences, if a person chooses to engage in illegitimate activities is caught and the aftermath could lead to either jail time, or even execution in extreme situations, depending on the severity of crime. So, it is consequential in nature with two outcomes; either it brings joy or sadness to an action performed by an individual to maximize their utility (Duignan & West, 2020). So, in practice, deterrence theory has been around longer than rational choice theory. According to Hobbes there are main components of the deterrence theory; severity, certainty and celerity (swiftness).

Sentencing and jail time tends to incorporate various goals, which include incapacitation, punishment, deterrence and rehabilitation (Wright, 2010, p. 1). While deterrence theory does relate to RCT on many levels, it is regarded as a theory in criminology and deals with a utilitarian philosophy to crime (Akers, 1990, p. 654). However, RCT did not enter criminology as a theory to measure and deter crime until very late and it was first introduced through an economic analysis of crime (Akers, 1990, pp. 654-655; Crouch, 1979). Criminologists working on deterrence much later on, began relying on economic models of rationality to expand the doctrine of deterrence theory (Akers, 1990).

Deterrence theory has two main objectives. The first objective is to prevent individual offenders and deter them from committing crime through punishment and the second objective is to make sure that the public is aware of the law on regarding what is considered legal and what is considered illegal in a society (Wright, 2010).

2.3 Self-Control Theory

The general theory of crime also known as self-control theory of crime was first proposed by two criminologists (Gottfredson & Hirschi, 1990). It suggests that individuals who have had a bad upbringing or an ineffective and neglectful childhood prior to the age of 10 have a stronger tendency to commit criminal acts than those with an effective parenting (Muraven et al., 2006).

So, this theory divides people into two groups, people with low self-control and people with high self-control. It asserts that people with low self-control will be more prone to committing crimes regardless of the circumstances they find themselves in while people with high self-control will be less likely to engage in criminal activities (Gottfredson & Hirschi, 1990, p. 89). I came across an interesting study in Neuroscience and behavioral review Willems et al. (2019) about genes contributing significantly to differences in self-control with the overall heritability of 60%.

This is quite a shocking and distressing revelation to me personally as it stresses the fact that genetics play a huge role in shaping people's personal traits, especially self-control. Seems unfair to those children born to parents with a criminal history, or just bad human behavior in general. I am no behavioral or neuroscience expert, but perhaps more research is needed in the future to explain the significance of the genetic makeup with self-control. As I believe, everyone

deserves a chance to have a good life and contribute to society, including criminals who might have done wrong at some point in their life. That is why I am studying the deterrent effects of punishment on an individual as well as part of my thesis.

Low self-control behavior in this case can only be countered by circumstances that do not require crime to be committed (Akers, 1991, p. 202). So, a major factor self-control theory is that a person, when given the opportunity will commit crime if he suffers from low self-control (Grasmick et al., 1993). According to the study conducted by (Higgins et al., 2006) which was based on their model for self-control theory for a qualitative analysis on digital piracy, the key set of variables included were intentions to commit crime, low self-control, differential association and definitions. Intentions to commit crime was defined as the dependent variable measured by a response on a Likert scale. Low self-control measured by a scale based on (Grasmick et al., 1993). Differential association included a set of friends that knew each other for a long time involved in digital piracy and the final variable definition was based on student's attitude towards software piracy (Higgins et al., 2006, pp. 10-12).

A major weakness of the self-control theory is that it does not define self-control and the tendency toward criminal behavior separately (Akers, 1991, p. 203). Akers (1991, p. 204) writes that Gottfredson and Hirschi use low self-control and high self-control as just labels for different propensities to commit crime. Since we cannot know if a person has low self-control (high propensity to commit crime) unless, they actually committed a crime (Akers, 1991, p. 204). There needs to be a separate indicator or variable measuring self-control and a separate indicator measuring the propensity of crime (Akers, 1991, p. 204).

3. Literature Review

In this section of my thesis, I will discuss some of the literature and shed light on the issue of homicides, violent crimes and the policies that deter them.

3.1 A Rational Perspective to Crime and Punishment: Economic Approach

The framework of crime in economics is based on criminal behavior and rationality where benefit of violating the law is compared to the cost of (in terms of probability and severity of punishment) (Garoupa, 2014, p. 1280). What amount of resources and the severity of punishment must be used to enforce different kinds of legislation? (Becker, 1968, p. 170). The reason why societies and governments outlaw an activity and label it as a crime is due to the fact it brings harm to the general population (Becker, 1968, p. 172). Theories regarding number of crimes committed vary greatly from biological inheritance to family upbringing, but they all agree if, if other factors held constant, an increase in a person's probability of getting caught and being punished if convicted would decrease, the number of crimes they commit (Becker, 1968, p. 176). Criminals therefore, become criminals not because of any psychological mishap, but because they are rational in thinking in terms of their benefits and costs when comparing legal and illegal activities (Becker, 1968, p. 176).

For example, an increase in disposable income in legal activities due to education would reduce a person's chances to commit crime, and thus would reduce the number of over-all offenses (Becker, 1968, p. 177). Similarly, a shift in the form of the punishment from a fine to imprisonment would reduce number of offenses committed (Becker, 1968, pp. 177-178). Deterrence theory concurs on this point. Now, in order to achieve the optimality condition in a society Becker (1968) states costs of apprehending the criminal must equal to the marginal their

value of the harm done (Buchanan, 1978, p. 93). In easier words, the severity of punishment must fit the degree of crime committed and the degree of crime is calculated based on the cost of harm done. If the cost of punishment to the offender equals the cost of damage done, then optimality is achieved (Becker, 1968, p. 207). This does not mean however that Becker did not want to eliminate crime, it's just a fact that crime is a never-ending vicious cycle which will continue to exist (Walters, 2016).

3.2 Relation between Education and Crime

Can education play a significant role in identifying systematic effects on the incentive to not commit crime or vice-versa? Education is defined here as the schooling, legitimate training and other indicators of human capital which are considered as efficiency parameters for both legal and illegal markets (Ehrlich, 1975b, p. 319).

According to Ehrlich (1975b, p. 319), "If the main effect of education on occupational choices were through its role in directing the individual's motivation and propensities toward socially acceptable goals, one might expect to find a negative correlation across persons between education and all criminal activities". It may or may not be enough to conclude that education has a positive effect on an individual's choice to not commit a crime. In fact, education might increase criminal's capacity at self-protection against apprehension and punishment for crime, as well as various legitimate occupational hazards (Ehrlich, 1975b, p. 319).

The economic approach to criminality emphasizes the roles market opportunities play in determining entering of an individual into legal or illegal activities. Education does not have uniform effect on legitimate and illegitimate opportunities, but rather has an effect "which varies according to the complementarity of schooling and legitimate training with inputs

employed in producing legitimate and illegitimate returns” Ehrlich (1975b, p. 334) a conclusion similar to my next case study of violent crime Fajnzylber et al. (2002, p. 1328) that education has an ambiguous net effect. However, it could be argued that if legal activities are highly skill intensive than illegal activities, therefore requiring high education, then it will have a positive effect on individuals leading to committing less crime (Fajnzylber et al., 2002, p. 1328).

3.3 Factors Associated with Violent Crime

Homicide rates vary vastly across the different regions of the world. The Americas region are the world leaders in intentional homicide rates which is 40% higher than the average rate for rest of the world (Loureiro & Silva, 2012, p. 287). More than 400,000 people die from homicide each year (Max Roser, 2020). Even though, less than 1% of global deaths are caused by homicide, in some countries its almost close to 10% (Max Roser, 2020). They are generally much lower in the developed countries, which suggests differences in development indicators might explain the differences in homicide rates (Cole & Gramajo, 2009, p. 752).

According to the study of panel data for intentional homicides and robberies from 1970-1994 by Fajnzylber et al. (2002, p. 1323) “increase in income inequality raises crime rates, crime tends to be counter-cyclical and criminal inertia is significant”. Fajnzylber et al. (2002, p. 1325) basic analysis includes economic variables that affect the incidence of crime. It follows Becker’s model of RCT and emphasizes demographic and sociological aspects on the incidence of crime. Fajnzylber et al. (2002) econometric model includes lagged crime rate as they are using the dynamic panel data technique called GMM estimator (value of the dependent variable crime based on current and past values of the explanatory variables), output growth rate, average income of the population, income inequality and the average educational attainment of the adult

population. The methodology applied for their theoretical model uses national crime rates (includes homicide rates and robberies) as their dependent variable. This model has extensions along four dimensions, and they are as follows:

- 1) The deterrence factor is estimated by the presence of police in the country and the existence of capital punishment.
- 2) Production of drugs in the country and the rate of drug possession.
- 3) Demographic issues such as extent of urbanization and the age composition of the population influencing violent crime.
- 4) Cultural issues by geographic region and religion dummies.

So, when these variables are incorporated in Fajnzylber et al. (2002, p. 1330) model, the equation is:

$$\begin{aligned} Crime\ Rate_{i,t} = & \beta_0 + \beta_1 Crime\ Rate_{i,t-1} + \beta_2 EA_{i,t} + \beta_3 INEQ_{i,t} + \beta_4 EDUC_{i,t} + \beta_5 JUST_{i,t} \\ & + \beta_6 DRUGS_{i,t} + \beta_7 OTHER_{i,t} + \eta_i + \varepsilon_{i,t} \end{aligned}$$

Fajnzylber et al. (2002, p. 1332) uses two variables as proxy for the probability of being caught and the punishment meted out. The last two parts of their model consists of drugs and demographics. For drugs, two variables are used to measure illegal drug activity in a country. The data is obtained from the U.N.'s World Crime Surveys. The first variable is number of drug possession offenses per 100,000 inhabitants and is considered exogenous in the analysis. Second variable is a dummy variable that "takes the value of one when a country is listed as a significant producer of any illegal drug in any of the issues of the U.S. Department of State's International Narcotics Control Strategy Report, which has been published on an annual basis since 1986. This variable does not vary over time either and we treat it as exogenous in the corresponding regressions" (Fajnzylber et al., 2002, p. 1332).

Fajnzylber et al. (2002, p. 1331) include the lagged crime rate, average income of the population, GDP growth rate, income distribution levels and education of the adult population. All the explanatory variables are treated as endogenous in their analysis. Measures for the Economic activity variable *EA* are average income was based on (GNP per capita) and the degree of income inequality *INEQ* measured by the Gini Index, while the education variable *EDUC* is a “measure of the stock of human capital in a given country and is given by the average years of schooling of the population over 15 years of age” (Fajnzylber et al., 2002, p. 1332). Variable *JUST* represents the strength of police and justice system, *DRUGS* represent the illegal profit made by selling drugs and η_i is the unobserved variables that vary little over time and are the unobserved country specific effect while $\varepsilon_{i,t}$ is the error term. The most important systematic errors involved in the measurement of crime rates in their regression model are the unobserved country specific effects.

Demographic factors are measured through rate of urbanization, total population of males belonging to the age group 15-29 and religion dummies (Fajnzylber et al., 2002, p. 1333). Their estimation relies on panel data of 5-year averages for both dependent variables and independent variables. A sample of 45 countries both developed and developing countries was chosen between 1970-1994 from the United Nations World Crime Surveys and the regressions done according to the quality and availability of data of at least three consecutive observations (Fajnzylber et al., 2002, p. 1331).

One challenging issue in the study of cross-country studies and analysis is it is difficult to determine and compare crime rates across nations as the issues of mismeasurements related to aggregate variables are severe to most types of crime data (Fajnzylber et al., 2002, p. 1326). Under reporting, low quality police and judicial systems and poorly educated population

adds more difficulty in determining and measuring the crime rates across countries accurately (Fajnzylber et al., 2002, p. 1326). Soares (1999) finds the extent of underreporting is negatively correlated with the level of development (Fajnzylber et al., 2002, p. 1326). So in order to reduce errors and biasness in the results, Fajnzylber et al. (2002) chose crimes that are least likely to be affected by underreporting, namely intentional homicides and robberies. Data on intentional homicides are extremely difficult to be underreported as it is not easy to hide a dead body (Fajnzylber et al., 2002).

Fajnzylber et al. (2002, p. 1349) research on what causes violent crime concludes that both economic growth and income inequality are robust determinants of violent crime rates and that crime is self-perpetuating in nature, meaning it's a never-ending cycle. The chosen economic variables worked well for homicide rates and proved significant in explaining measures of crime deterrence, drug activities and other demographic characteristics.

3.4 Homicide, Capital Punishment & Deterrence

In recent times, debate over capital punishment has involved numerous significant arguments illustrating from moral principles and social welfare perspectives (Dezhbakhsh et al., 2003, p. 348). The issue with morally based arguments is, they are at most speculative and are backed up by either philosophy, religious beliefs or cultural norms and values with no real scientific research and empirical evidence to back them up (Dezhbakhsh et al., 2003, p. 348). Here I will shed some light on studies that have engaged in an empirical way by gathering data and what their conclusions about death penalty are on deterrence. The literature on homicide and capital punishment Chalfin et al. (2013); Dezhbakhsh et al. (2003); Durlauf et al. (2013);

Lamperti et al. (1994); Schönteich (2002) to name a few are themselves, divided on the opinion on whether capital punishment is the best form of deterrence against murders and, it is no easy task to conclude simply by siding with one side favoring death penalty or the other against it. So, it is by no means a straightforward answer, as at times research does support that deterrence works in some cases (especially when executions are publicized) Bailey (1990), in some cases it doesn't. For instance Chalfin et al. (2013, p. 41) points out that, current studies on homicides and capital punishment stating the deterrent effect of capital punishment to be inconclusive as no single literature makes a strong connection linking their empirical evidence with capital punishment's impacts on crime committed.

A fundamental rule in deterring crime via capital punishment is that it must be effective in preventing crime and the application of law must be known to all the citizens of the state (Bailey, 1990, p. 628). Supporters of the deterrence theory Andenaes (1974); Gibbs (1975) argue that punishment serves as an important tool for educative, moral and ethical purposes. So, if we are to accept capital punishment as a deterrent against murder and homicide, it should result in lower homicide rates overall (Bailey, 1990, p. 628). Again, several investigations on the subject Britto and Noga-Styron (2014); Dezhbakhsh et al. (2003); Phillips (1980); Rodgers (2012); Schönteich (2002); Unnever and Cullen (2010) have been done.

According to Phillips (1980, p. 139) "homicide rates decrease by 35.7% immediately following a publicized execution". However, Phillips (1980) does state that the effect is only lived short-term and there are two main reasons behind it. Firstly, some psychological experiments show that people are discouraged from exhibiting violent behavior when they find out someone else has been punished (Bandura, 1973; Bandura & Walters, 1977). Secondly, there is anecdotal evidence (evidence that is collected casually or informally relying on personal

testimony) which states that criminals may be deterred by the threat of capital punishment (Britain, 1953).

Regarding the magnitude the deterrent effect of capital punishment on murder, Dezhbakhsh et al. (2003, p. 368) is significant. But how many potential future victims could be saved if executions were to take place? According to Dezhbakhsh et al. (2003, p. 369) per every execution nearly 18 fewer murders occur (in USA as this study includes counties only in the US). Schönteich (2002, p. 91) study of South Africa however states, there is no evidence that death penalty acts as an effective deterrence against homicide and suggests institutions such as the judicial system and governance play a stronger role in undermining and controlling crime.

Unnever and Cullen (2010, p. 831) study claims regarding capital punishment which states that people expressed support for capital punishment when they were found to be racially and ethnically intolerant. Unnever and Cullen (2010) suggest that supporters of capital punishment in countries with conflicted racial and ethnic relations might be universal. Britto and Noga-Styron (2014, p. 81) make another interesting claim that media plays a limited, but statistically significant role in influencing support for capital punishment. Britto and Noga-Styron (2014, p. 81) study includes variables such as age, ethnicity, gender, economic insecurity, and justice indicating a strong connection between media consumption and capital punishment, both being dependent on the media outlet (news, crime dramas, police-reality programs etc.) and the operationalization of capital punishment. But, Britto and Noga-Styron (2014, p. 95) do state the obvious conclusion about capital punishment being a complex study policy and varies “depending on how the media consumption and support for capital punishment are measured” (Paternoster et al., 2008).

Historically, religious and civil authorities have used death penalty for several different reasons. Opposition to capital punishment in Europe surfaced in the 1700's when philosophers such as Bentham and Beccaria called for abolition of the death penalty (Dezhbakhsh et al., 2003, p. 347). Welfare based arguments tend to build on empirical evidence gathered through scientific research. Ehrlich (1975a, p. 45; 1977) states there exists a systematic relationship between employment, earning opportunities and murder rates. Criminals respond to incentives derived from the behavioral implications of murder and defense against murder. Homicide rates may also be reduced through an increase in employment and earning opportunities (Ehrlich, 1975a).

Black and Orsagh (1978, p. 626) find mix results in their research as they are unable to discover a consistent relationship between sanctions and homicide. The statistical analysis do not reflect behavioral information when a person chooses not to commit murder when the severity of the punishment is too high (Black & Orsagh, 1978, p. 626). Dezhbakhsh et al. (2003, p. 355) makes another point regarding non deterrable murders and points out a flaw in the economic models of calculating murder rates. Non deterrable murders according to Glaser (1977) are interpersonal disputes and crimes of passion which leads (Dezhbakhsh et al., 2003, p. 355) to argue they are not accounted for in the economic model and should be subtracted from intentional homicides. Since there is no detailed classifications on the murdered victims, it would require a detailed examination of each and every single reported murder, which is by no means an easy task and possibly impossible to go over such lengths (Dezhbakhsh et al., 2003, p. 355).

4. Data and Methodology

In this section, I will list all the sources used for my panel data analysis on homicide rates and capital punishment, as well as explain the econometric method and estimation technique used for my model.

4.1 Data Sources

After carefully going through data available on the web, I was only able to choose 3 countries from the African region as no other country had enough data available for a consistent period of time. In fact, data after 2012 was difficult to find for the rest of the nations as well and there were just too many gaps to be filled. So, I decided to keep my base year as 2001 and final year to be 2012.

From the Americas region, a lot of countries had exceptionally high murder counts and murder rates. But again, data on every country for each variable and each year was not possible to find, henceforth I had to restrict it to 7 countries only. Interestingly, Brazil, Colombia, Jamaica, Mexico and Venezuela were amongst countries that had a High Human Development index score (UNDP, 2019) , but still had very high murder rates. This makes it interesting to study as to why murder rates are high in the Americas region even though most of the countries had high development scores (HDI scores).

Finally, from the European region, I also selected 7 countries which are not part of the European Union and the Schengen Agreement. Amongst the 7 countries, Russia and Ukraine had the highest murder rates and the rest had countries had less than 5% murder rate per 100,000 people. There are more than just 7 countries included in the European region that are not part of

the EU and considered developed, but however due to time constraints and availability of data, I had to restrict where data was easily available for all of them. Also, there is a stark contrast between homicide rates in the countries chosen from European region and the Americas region. As most of countries in these regions have a medium to high development index (HDI) but, they have very different homicide rates.

Of the 24 countries chosen, only 10 (Bangladesh, Belarus, China, Ghana, India, Jamaica, Morocco, Pakistan, Russia and Vietnam) still practice capital punishment and it is still a part of their constitution. Albania and the Philippines abolished their capital punishment laws in 2007 and 2006 respectively (International, 2018). Initially I wanted to include a lot more countries in my dataset than I have currently now, especially a lot more from the African region, but it was simply not possible to find uniform data without any gaps and missing values.

I collected data from multiple sources such as the World Bank, International Monetary Fund (IMF), World Health Organization (WHO), World Inequality Database (WID) for social and economic indicators, and Amnesty International for data on capital punishment (please, refer to the appendix for details on the sources) . I have two reasons for choosing multiple sources; 1) Data on all the countries for all variables and years are not available at just one source. 2) The data is more reliable and robust when collecting from multiple renowned sources. So, I have a panel dataset on 24 countries from 4 different regions (Africa, Americas, Asia and Europe) from 2001-2012. The use of panel datasets in research allows to overcome the unobservable country specific heterogenous affects in cross-sectional studies. If heterogeneity is neglected in the model, it could lead to biased estimates ultimately leading to weak analysis and conclusions.

For my explanatory variables I have selected annual GDP growth in % (*dGDP*), GDP per Capita (*GDP*) in constant 2010 US\$, Human development index (*HDI*) score where 0

means very low human development and 1 means very high human development, GINI Index (*GINI*) which is used as measuring income inequality where 0 expresses perfect equality and 100 expresses very high inequality, urbanization rate % (*dUP*), population of males % between the age 15-29 (*PM₁ PM₂ PM₃*), total unemployment rate % (*UEM*) and capital punishment (*Dpenalty*) which also takes a value of 0 and 1 (0 indicating no capital punishment law exists).

For religion, I have created four dummy variables, one for each religion that includes Atheism (although officially atheism is not really a religion but still a set of belief not to believe in God, hence included in the religion dummy variable) Christianity, Hinduism and Islam. I have consulted the (Agency, 2020) to find out the dominant religions of each of the country for my research. The religion of each country is determined by the dominance of a particular religion and the majority of population adhering to a set of beliefs, regardless of the status of the State's declaration as a secular state. For example, Albania has a Muslim population of about 56.7% but the sovereign State of Albania declares itself as a secular state according to its constitution¹, hence Islam is the dominant religion of Albania (but it is not an Islamic State).

The variable description in Table 4 on the next page shows the basic descriptive statistics of these key variables:

¹ <https://web.archive.org/web/20100307100131/http://www.km.gov.al/skedaret/1231927768-Constitution%20of%20the%20Republic%20of%20Albania.pdf> Access date: 01-05-2020

Table 4. Descriptive statistics

Variable Name	Mean	Standard Deviation	Min	Max	Description
Dpenalty	0.48	0.50	0	1	Dummy variable: 1 if death penalty, and 0 otherwise
DV	0.24	0.43	0	1	Dummy variable for legislation on domestic violence
dGDP	4.98	4.45	-14.75	34.47	Real Annual GDP growth rate (%)
GDPlog	7.97	0.89	6.14	9.61	Real GDP per capita expressed in terms of US\$ (PPP)
GINI	41.96	10.68	24.6	64.8	GINI index score 0-100
HDI	0.65	0.09	0.45	0.80	Human development index from 0-1
CPI	8.91	9.62	-0.73	95.01	Consumer price index (%)
HRlog	2.06	1.30	-0.22	4.44	Homicide rate per 100,000 inhabitants
UEM	8.05	6.04	0.40	33.7	Total unemployment rate %
dUP	1.86	1.37	-1.20	5.71	Total urbanization rate %
Atheism	0.83	0.28	0	1	Dummy variable 1 if Atheism and 0 otherwise
Christianity	0.63	0.48	0	1	Dummy variable 1 if Christianity and 0 otherwise
Hinduism	0.83	0.28	0	1	Dummy variable 1 if Hinduism and 0 otherwise
Islam	0.21	0.41	0	1	Dummy variable 1 if Islam and 0 otherwise
Africa	0.13	0.33	0	1	Dummy variable Africa
Americas	0.29	0.46	0	1	Dummy variable Americas
Asia	0.29	0.46	0	1	Dummy variable Asia
Europe	0.29	0.46	0	1	Dummy variable Europe

4.2 Econometric Model

In this section, I will specify my econometric model. The explanatory variables in my model include income inequality, economic activity, age distribution, and the urbanization rate. According to the UNODC (2013, p. 5) Most crime occurs in the urban areas. Deterrence is another factor that is included in this model to study if capital punishment indeed has any impact on homicide rate as there is a lot of literature that has discussed its effectiveness in detail. The deterrence factor is estimated by including the existence of capital punishment and legislation on domestic violence (data on police personnel was not available for all the countries). Demographic factors such as age distribution, total rate of unemployment, religion and urbanization are used to find the impact on incidence of crime.

My explanatory variables used in the analysis are factors that include economic activity measured by Real GDP growth in %, GDP per capita in US\$ and Consumer Price Index in %, Human development and income inequality measured by HDI and Gini Index, demographic factors measured by population % of males age between 15-29, unemployment rate and the dummy variable for region and religion, and lastly the deterrence factors measured by the existence of capital punishment and legislation on domestic violence. My dependent variable is the homicide rate per 100,000 people.

Based on Fajnzylber et al. (2002) econometric model and the extension to Becker (1968) rational choice model, people commit crime in order to increase their earnings when presented with an opportunity and the costs are given by the punishment received to apprehended criminals. So, a cost-benefit analysis is done that results in deciding for a criminal whether to commit a crime or not. So, the equation for my model is:

$$HR_{i,t} = \beta_0 + \beta_1 Dpenalty_{i,t} + \beta_2 dGDP_{i,t} + \beta_3 GDP_{i,t} + \beta_4 GINI_{i,t} + \beta_5 HDI_{i,t} + \beta_6 CPI_{i,t} + \beta_7 DV_{i,t} + \beta_8 PM_{1i,t} + \beta_9 PM_{2i,t} + \beta_{10} PM_{3i,t} + \beta_{11} dUP_{i,t} + \beta_{12} UEM_{i,t} + \alpha_i + \mu_{it}$$

4.3 Methodology

Using the Hausman test, I will compare a fixed vs a random effects model for consistency, as such model assists in controlling for omitted variable bias (OVB) due to unobserved heterogeneity (Wooldridge, 2010). Since I am using a panel data, unobserved heterogeneity must be accounted for. What is unobserved heterogeneity? To put it in simple terms, heterogeneity refers to differences across units being studied, in my case countries. Since I have a sample of 24 different developing countries across 4 different continents, no one country is exactly the same. There could be similarities between them, but they are unique entities, and things that set them apart could be the culture, language, variety of food, land size, weather and so on. So, when studying for a larger sample size and be able to draw inferences that could fit a model generally, unobserved heterogeneities are to be accounted for otherwise the results could lead to biasness. These unobserved specific effects could be eliminated by using a fixed effect model.

How does a fixed effect model eliminate the problem of unobserved heterogeneity? Consider an example of the relationship between crime and poverty. We wish to study the effect of poverty on a person's decision to commit a crime, we can come up with a general equation for that model:

$$Y_{it} = \beta_1 + \beta_2 X_{it} + \alpha_i + \mu_{it}$$

where Y denotes crime and X denotes poverty. The subscript i denotes the individual and t the time period. Then α_i is the unobserved individual specific effect, i.e. something related to the

individual which is not accounted for in the model but is time invariant (could be a person's education, gender, ethnicity, religion etc.) and μ_{it} is the error term of our model. Now, in order to get rid of the unobserved effect, we will take the average value of crime for a given individual across time period t . That gives us the mean value of our dependent variable crime and independent variable poverty. Since α_i is time invariant, it remains as α_i . In order to get rid of the unobserved effect, we subtract averaged values from the original equation, which eliminates α the unobserved effects. One assumption about the fixed effect model is that individual specific effects are correlated with the regressors in our model (Wooldridge, 2010). If the error term is not correlated with the independent variables, we use the random effect model (Wooldridge, 2010).

Moving forward with my analysis of the 24 countries for homicide rates for a period of 12 years (2001-2012). As mentioned previously, deterrence is estimated by the dummy variable *Dpenalty* (capital punishment).

5. Results

My dependent variable HRlog is measured in log so that each estimated coefficient is interpreted as a relative change in homicide rate that is caused by a unit change in that corresponding explanatory variable. In order to see what estimation technique best fits my analysis, I run the Hausman test to examine the consistency of the fixed and random effects estimators (Greene, 2012, pp. 234-237) (please see the appendix for the STATA command). The P-value of the Hausman test is 0.2708 which suggests that the null hypothesis cannot be rejected, and a random effects model is more suitable for my analysis. Table 5 on the next page shows the following results:

Table 5 Random Effects Regression

Random-effects GLS regression	No. of Observations	No. of Countries	R-squared Overall
	288	24	0.342
Dependent variable	Coefficient	z-value	P > z-value
HRlog			
GDPl _{og}	-0.034	-0.02	0.983
dGDP	-0.006	-0.19	0.846
GINI	0.007	1.02	0.309
HDI	-2.591	-2.17	0.030
CPI	0.004	2.42	0.015
PM ₁	0.157	5.34	0.000
PM ₂	-0.128	-3.04	0.002
PM ₃	0.058	1.28	0.202
UEM	-0.004	-0.48	0.632
dUP	-0.025	-0.54	0.586
Dpenalty	-0.074	-1.22	0.222
DV	0.169	4.48	0.000
Atheism	-0.721	-0.92	0.360
Christianity	0.838	1.43	0.152
Hinduism	-0.281	-0.36	0.720
Islam	(Omitted due to collinearity)	NA	NA
Africa	-0.896	-1.44	0.149
Americas	1.335	2.65	0.008
Asia	-0.248	-0.39	0.695
Europe	(Omitted due to collinearity)	NA	NA
Constant	1.995	1.77	0.077

In the random effects model, it is assumed that the error term and the individual specific effects are not correlated (Wooldridge, 2010) (also please see the appendix for the command used in STATA). The R^2 describes 34.2% of variation in my dependent variable is explained by the regressors in my model. We can see from table 5, the total number of observations are 288, total number of countries included in the analysis are 24. Each country has a maximum of 12 observations as I have a balanced panel data from year 2001-2012 for 12 years. Table 5 shows the variable *HDI* for Human Development Index which measures the overall life

expectancy, education attainment and per capita income has a negative sign, and the magnitude of its coefficient is really high at 259.1%. It shows that higher human development index score leads to a reduction in homicides and violent crimes. Also, it is highly statistically significant in reducing crime rates.

The variable *CPI* that measures the inflation rate or the consumer price index % of real GDP is also statistically significant, but the magnitude of its coefficient is quite small at 0.4%. It means that an upward shift in the prices will increase the homicide rates by 0.4% and this could be true in the cases of countries with very high inflation rates. Venezuela is a country that has suffered in the past from hyperinflation and consumer price index could very well play a part in increasing the rate of homicides in the country combined with income inequality as well.

The third variable which is statistically significant, is from the demographic's category; PM_1 and PM_2 which measure the population % of males age between 15-24. While PM_1 is highly statistically significant and the magnitude of its coefficient is really high at 15.7% which indicates that males aged between 15-19 are more prone to commit violent crimes and involved in homicides while PM_2 has a negative coefficient -12.8%, which indicates that homicide rates tend to decrease in more mature adults age 20-24.

Lastly, the final variable that proves to be highly statistically significant is *DV* which denotes the existence of legislation on domestic violence. This variable shows that where the legislation on domestic violence exists, homicide rates increase with 16.9% which comes as a bit of a surprise. One would think where the state guarantees the rights and safety of household personnel, homicide rate should decrease. However, my results show the opposite. This could be due to the fact that such a legislation exists only on paper, or in a country's constitution but is rarely practiced, hence the positive relationship between homicide and domestic violence. Corrupt

nations with a weak judicial and policing system might suffer from this problem and this could be true in the case of most developing countries that spend less resources on human development and law enforcement. However, it does imply a further need to research and study before I could make a robust conclusion on this matter.

Also, we can see that the variable *Dpenalty* which denotes capital punishment has a negative sign, meaning is negatively correlated with homicides. This gives capital punishment a deterrent effect on homicide and according to table 5, it reduces homicide rate by 7.4%. However, the p-value of the z-statistic is larger than 5%, which means that statistically it is insignificant and a better and alternative policy would be required to effectively reduce homicide and violent crime rate. According to Schönteich (2002), it is the strong judicial system that provides a greater deterrent likelihood along with credibility of the government to be fair and transparent in their dealings of criminal matters.

Other economic variables such as real GDP growth *dGDP*, GDP per capita (US\$) *GDPlog*, and the GINI index *GINI* appear to be insignificant statistically but, GINI index does indicate that higher the income inequality, the higher the murder rate as one would expect. Whereas GDP per capita (US\$) and GDP growth both have a negative sign which leads us to believe that a higher economic activity would lead to higher homicide rate. And this is especially true if the economy faces higher rates of income inequality, hence the reason why *CPI* showed significance. Another interesting thing we could see from table 5 are the religion dummy coefficients. We can see that Hinduism and Atheism have a negative sign, which means that states with Hinduism and Atheism tend to have a decline in homicides whereas if we see the coefficient of Christianity, it has a positive sign. This does not come to me as a surprise though, because it has been stated previously in my thesis, the Americas region has the highest homicide rates in the

world (Loureiro & Silva, 2012, p. 287). However, my intention is not to tarnish or belittle one religion over the other. I am simply quoting results from my data. I would suggest further research be done on the topic of religion and homicide before I could make a valid conclusion on them.

6. Conclusion

From the analysis based on my results, it could be said that capital punishment is not an effective means of deterrence against homicides or other forms of violent crimes. Although, it does deter criminals from committing violent crimes as can be seen with the negative correlation between homicide rate and capital punishment, but it is simply, just not an effective policy measure against it. A lot of the homicides when investigated could be broken down into several sub-categories such as hate crime due to ethnicity, crimes of passion, gang violence, family feuds etc. which ultimately does lead to murder.

The government needs to invest a lot more into effective policing methods, such as adding more surveillance, coming up with a more credible and transparent judicial system especially, when ethnicity and religion is involved. Making education more feasible and accessible within the reach of a larger population, rehabilitation for past criminals so they could be given an opportunity when they enter the legal market for work instead of being stigmatized (Fajnzylber et al., 2002, p. 1328). According to Schönteich (2002, p. 91), effective deterrence is based on three C's; Credibility, capability and communication. For the judicial system to be effective in deterring criminals, it must be capable of identifying, arresting, prosecuting, convicting and punishing most of the serious offenders. This could only be achieved if the justice system which consists of both, the police personnel and judges/prosecuting attorneys have enough resources. Meaning, the more

capital is invested strengthening the justice system, the more effective it will be able to deal with criminals in deterring crime.

Secondly, this justice system must be transparent and credible when prosecuting, convicting and punishing offenders. They must be free of any political or private influence for their judgements to remain valid and credible. Finally, the first two C's must be communicated to all citizens of the state, whether criminal or otherwise. It must become a common knowledge for people living in their communities to understand, that the criminal justice system is swift and capable of arresting any nasty offenders, law breakers and troublemakers with severe penalties and fines. Another reason why capital punishment is not an effective measure against violent crime is, the fact it takes serious amount of time and resources to investigate and sentence a death warrant for the criminal.

According to Gershowitz (2010, p. 358), inadequate criminal lawyers must be handle capital murder cases simply because they are lawyers. Even having highly competent lawyers is not enough and specialization is needed. The capital punishment system staff should not only be defense attorneys and judges, but they must devote all their attention exclusively to capital cases only (Gershowitz, 2010, p. 358). One final fact on capital punishment is, if the sentence carried out was to an innocent person, the decision is irreversible since life cannot be granted once a person once they die.

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Appendix

I have used multiple sources for gathering data on my variables as mentioned in my thesis. Here I will list the source for all my variables:

Variable	Description	Source
HRlog	Purposely taking a life of another human per 100,000 inhabitants	World Bank Data. Except for Ukraine, Russia and Vietnam for the year 2008, 2009 and 2012 URL: World Bank https://databank.worldbank.org/home.aspx . UNODC and WHO for missing years on Russia Vietnam and Ukraine URL: UNODC https://dataunodc.un.org/content/data/homicide/homicide-rate . WHO URL: https://apps.who.int/gho/data/view.main.VIOLENCEHOMICIDEv
Dpenalty	Existence of Capital punishment in a state as a deterrent policy	https://www.amnesty.org/download/Documents/ACT5066652017ENGLISH.pdf
CPI	Consumer Price Index	World Bank for all countries except for Venezuela. IMF for data on Venezuela URL: https://www.imf.org/external/datamapper/PCPIPCH@WEO/OEMDC/
HDI	Human Development index for life expectancy, education and per capita income	UNDP URL: http://hdr.undp.org/en/indicators/137506
GINI	Income Inequality	World Bank for Russia, Brazil, Colombia, El Salvador, Honduras, Belarus, Moldova and Mexico. For the rest of the countries (WID) URL: https://wid.world/country/
PM1,PM2 PM3	Demographic indicators for population age distribution between 15-29	World Bank
dUP	Urbanization Rate	World Bank
DV	Legislation on domestic Violence	World Bank
dGDP	Growth in Real GDP%	World Bank
GDP	GDP per capita in US\$	World Bank
UEM	Unemployment Rate %	World Bank

Stata commands for my Panel Data Model

```
///Running Fixed Effect Regression vs Random Effect Regression on Panel Data and Hausman  
test on my model///
```

Fixed effects

```
xtreg HRlog GDPlog dGDP GINI HDI CPI PM1 PM2 PM3 UEM dUP Dpenalty DV Atheism  
Christianity Hinduism Islam Africa Americas Asia Europe, fe  
  
estimates store fe
```

Random effects

```
xtreg HRlog GDPlog dGDP GINI HDI CPI PM1 PM2 PM3 UEM dUP Dpenalty DV Atheism  
Christianity Hinduism Islam Africa Americas Asia Europe, re  
  
estimates store re
```

Hausman test (table on the next page)

```
hausman fe re, sigmamore
```

Hausman Test Results

Coefficients				
Variables	(b)	(B)	(b-B)	Std.Error
GDPllog	-.1069034	-.0034175	-.1034859	.0609856
dGDP	-.0004464	-.0006458	.0001993	.0002151
GINI	.0033888	.007017	-.0036282	.0017224
HDI	-2.313548	-2.590833	.2772854	.2346479
CPI	.003667	.0037609	-.000094	.0001024
PM1	.1455037	.1567415	-.0112378	.0048574
PM2	-.1175369	-.1278612	.0103243	.0112591
PM3	.0436734	.0576826	-.0140091	.0083935
UEM	-.0071754	-.0038532	-.0033222	.0016328
dUP	-.0143183	-.024548	.0102297	.0074764
Dpenalty	-.0741542	-.0739945	-.0001597	.0080238
DV	.169816	.1694134	.0004026	.002846

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg
Test: Ho: difference in coefficients not systematic
$\chi^2(11) = (b-B)'[(V_b - V_B)^{-1}](b-B)$
= 13.35
Prob>chi2 = 0.2708



Norges miljø- og biovitenskapelige universitet
Noregs miljø- og biovitenskapelige universitet
Norwegian University of Life Sciences

Postboks 5003
NO-1432 Ås
Norway