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# Does a State's Gun Control Legislation Significantly Influence the Number of Violent Crimes?

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*Abstract*

Gun control legislation varies significantly between State's and results from previous studies show great variation on the effectiveness of gun control. This paper attempts to empirically evaluate the relationship that gun control legislation has on violent crime rates throughout the United States. Upon reviewing literature, this study controls for several different economic factors in order to examine the various incentives criminals face when committing a crime. From a theoretical perspective gun control is simply enacted in order to curtail the access to firearms, but with vigorous illegal firearm markets and criminal use of firearms, evaluating the true effect of gun control is proven to be difficult. This empirical study shows inefficient evidence that gun control truly reduces violent crime overall but finds significance in several socioeconomic factors that can efficiently reduce violent crimes. With implications for future studies, this study suggests that for legislators, more focus of efforts should be to reevaluate current existing laws and uniformly implement them across the nation. These findings propose that violent crime rates across the nation have a variety of causes, but with the appropriate attention from both Federal and State legislators, innovative gun control laws can evolve to mitigate the ease of access of firearms across all different markets.

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## Section 1, Introduction

By simply enacting more gun control laws can the United States see a decrease in the amount of crime that is observed in a given year? Over the past decade there has been a drastic increase in the amount of gun related crimes in the United States. According to Everytown Research, the United States has nearly 3 times as many gun related homicides than that of the next 20 developed nations in the world including Canada, the United Kingdom and France. That being said the United States has also seen a steady escalation in the number of mass shootings over the years topping off at 317 mass shootings in 2017 alone. Although in the United States these numbers are speculative as local governments and municipalities report their crime rates on a voluntary basis these numbers are still very large. Numerous agencies and nonprofit organizations such as the Brady Campaign, Gifford's Law Center to Prevent Gun Violence, and the United States Department of Justice in partnership with the FBI, have several campaigns and resources allocated on curbing the accessibility to firearms. These initiatives are measures taken in order to curtail the number of gun related incidents throughout the United States. With the increase in gun violence, it is safe to implicate that the necessary restrictions put in place today by both Federal and State level regulations seem to have no effect in minimizing the amount of crime, homicides and violence that occurs with access to firearms. Gun control policy and gun intervention programs seem to only partially solve the issues of perhaps getting illegal guns off the street however these programs evade the overall goal of diminishing gun violence all together.

30 to 40% of all new guns purchased and transferred come from the secondary market and are responsible for supplying guns used for criminal activity (Sheley &Wright, 1995). This secondary market that Sheley and Wright (1995) discuss is what Moorhouse and Wanner (2006) refer to as the illegal black-market sales of firearms in which having such a robust illegal market makes it difficult for Federal agencies to curtail the access to firearms. With new legislation only influencing the primary market for gun sales, economists like Kwon et.al (1997) and Moorhouse and Wanner (2006) find it difficult to find evidence supporting the idea that gun control directly influences gun violence and overall crime rates. What both studies find is that economic factors like unemployment, poverty and race all greatly influence crime. But crime is a multifaceted problem in which legislators must take into consideration the effect that firearms have on the

general public. With Everytown Research estimating that nearly two-thirds of all firearm deaths are suicides, it is evident that by reducing the access to firearms can simply save lives.

The purpose of this study is to explore the relationship that gun control laws have on violent crime rates throughout the years of 2000 to 2015 in the United States. This study begins by establishing the fact that States have very different gun legislation and seeing as how it is difficult to compare across States this study will utilize the Gifford's Law Center ranking tool in order to see how each State stacks up against one another on a six-category criterion based on their gun legislations. From there this study aggregates violent and non-violent crime rates from the FBI Uniform Crime Reporting along with multiple economic variables taken from various studies specifically from Moorhouse and Wanner (2006), Kwon et.al (1997), and Kwon and Baack (2005). Ultimately, a multivariate statistical technique will be used to establish the relationship between a set of determinants, including a State's gun law rank and its effects on the level of violent crime and on-violent crime a State observes.

This study simply builds on previous works by combining papers like Kelly (2000), Fallahi et.al (2012) and Moorhouse and Wanner (2006), with multiple economic variables but with an acute focus on gun control laws and crime. The contributions of this work are to see the true relationship and policy implications of whether mitigating the access to firearms should be implemented uniformly across the nation. This study observes a different criterion for a State's gun law and ranks it against one State to another while other studies simply scored a State on a different scale. Other studies either look at crime holistically or simply at firearm deaths but for this study crimes are viewed in two separate categories; violent crime including homicides which systematically involve a weapon and nonviolent crimes viewed as petty crimes that are smaller in scale but occur often. In addition, this study also examines Federal law as the benchmark for all States and how such Federal law is implemented differently across the nation. To observe this Federal benchmark effectiveness this study collects the rate of firearm background checks submitted by each State to the National Instant Criminal Background Check System. The assumption for this variable is of great importance in order to implicate whether or not running criminal background checks on any and all firearm transactions can be sufficient enough to reduce the number of firearms that are used in crime.

From the multivariate regression analysis, this study does not find significance for the relationship between a State's gun control laws and violent/non-violent crime rates. Although

this study achieves expected signs for all variables, the level of significance is limited to only the economic variables used in the study. The results observe a positive relationship between gun law ranks and violent crime while also showing that by increasing the number of firearm background checks submitted, a State could reduce their violent crime rates. Although both of these relationships don't show significance we can allude to the explanation given by Moorhouse and Wanner (2006) who extend the idea that gun legislation simply doesn't deter the behaviors of criminal and how we must question whether or not gun control laws are truly effective. Seeing as how crime is a multifaceted problem for legislators, gun control cannot naturally reduce the number of incidents but instead legislators must focus on the economic incentives criminals face in order to truly reduce crime rates. As for firearm accesses, it would be nearly impossible for legislators to regulator private transfers of firearms as they are long lived assets that are passed down in families and transferred regularly between owners. Hence, private transactions involving guns are out of the jurisdiction of the Federal government making firearm markets practically impossible to regulate.

The remainder of the paper is structured as follows: Section 2 will discuss the relevant literature in three separate sub sections. Section 3 details the data used in this study as well as the econometric model utilized. Section 4 discusses the results of the statistical analysis and policy implications. Section 5 provides some concluding remarks.

## *Section 2, Literature Review*

This study initially begins looking at early papers written prior to the early 2000's targeting gun laws in the United States and how they have been proven to be ineffective in means of reducing violence. There is a body of research that specifically studies how firearms actually help to decrease gun fatalities. One to note is James D. Wright (1988) who States that "with some 20,000 firearms regulations now on the books, why the clamor continues for even more laws." What he States is that with all these laws and the continuous debates for more gun control laws, this insinuates that none of these laws already established thus far have made a significant impact in reducing the number of crimes occurring. That being said Wright (1988) also goes on to say that with gun laws and outlawing firearms, the US government will only go on to make guns a bigger item on the black market increasing the demand for it. Building on this body of literature are, Gary Kleck and Karen McElrath (1991), who discuss this issue of guns

being used as a mean of protection in certain situations. They explain how the presence of a firearm in a threatening situation can be used as a means of preventing attack or significantly reduce the possibility of an attack as individuals can use this firearm as a mean for protection. In this case Kleck and McElrath (1991) focus on crimes where both victims and criminals were strangers and the crimes were unmotivated without regards to personal situations. Therefore, in their opinion their dataset contained no bias, resulting in findings that show how guns are in favors of victims to protect themselves in threatening situations. Both Kleck and McElrath (1991) miss crucial data by really narrowing their dataset to only crimes between strangers that are supposedly committed without any personal motivations between the two counterparts. This underestimates the crime rates drastically and simply overlook how the exclusion of guns all together can easily unmotivate individuals to commit crimes. In response to Wright (1988), his insinuations completely disregard how certain economic factors such as spending on police and gun control programs also help to mitigate black market sales. Which along with the eradication of publicly available firearms can help significantly to reduce the inherent number of violent crimes that involve firearms.

Focusing on the former arguments of gun control from the late 1900's helps to formulate this research around more recent data and events that help shape the implications of gun control and laws in the future. It is no secret that early 2000's and hence forth have seen a drastic increase in the number of violent crimes committed as well as firearm related crimes in the United States. Since 2012 to 2017, the United States has seen at least "1,518 acts of gun violence in which at least four people were wounded or killed," according to the Gun Violence Archive, where they define a mass shooting as; "where at least 4 people are wounded or killed by a firearm." This inherent increase although not the main focus of the study but a crucial aspect of its implications brings me to the body of research which indulges in finding economic and policy factors that inhibit or incite violent crime rates across the world.

## 2.1 Poverty and Inequality Rates

According to the early studies done by Zimring (2008), he suggested that within the past twenty years, violent crime was on a decline at an unprecedented rate. However, the rate at which violent crime was decreasing began to stagger over the years. Researches have become uncertain whether certain geographic locations experience decreasing violent crime rates while

others experience increasing or simply stagnant violent crime rates. Economists like Kelly (2000), explored varying literature to describe how different theories of crime can explain violent crime rates in certain locations. Kelly (2000) outlines the following theories; Becker's (1968) economic theory of crime, Merton's (1938) strain theory and McKay (1942) social disorganization theory in which all argue different ideologies of how violent crime rates are affected by socioeconomic factors. Kelly (2000) combines these theories to indicate that inequality is a major determinant in increasing violent crime rates. Becker's (1968) economic theory of crime illustrates how areas with high inequality inadvertently place poorer individuals with "low returns from market activity," near high income individuals with good that are worth stealing. This theory alludes to the fact that poorer individuals in high inequality areas experience an increase in returns when allocating time to criminal activity, thus linking high inequality areas to higher crime rates. Merton's (1938) strain theory is comparable to Becker's (1968) in which it clarifies that when individuals are faced with success of others, unsuccessful individuals feel dissatisfied with themselves. This dissatisfaction can be amplified in areas of inequality which undoubtedly increases the strain some people feel thus enticing some to commit a crime. And last but not least, McKay's (1942) theory of social disorganization argues how weak social control increase the amount of crime that occurs. McKay (1942) defines a communities social control with its ability to regulate its members but certain factors such as, "poverty, racial heterogeneity, residential mobility, and family instability," further weaken a societies ability to control its members. In McKay's (1942) theory, inequality is associated with poverty as they can go hand in hand. Although all three of these theories are fairly old dating back to simpler times, the concept of these theories can still be applied today.

What Kelly (2000) studies in her research is how all of these varying theories combined explain the phenomenon that our societal hierarchy is what drives and induces higher rates of crime in areas that are highly plagued by extreme poverty and inequality rates. Kelly (2000) finds strong positive correlation between inequality and crime rates and States that crimes are committed by the most "disadvantaged members of society." Fajnzylber, Lederman and Loayza (2002), also look at inequality, poverty and violent crime rates on a more macro level comparing it across countries instead of counties like Kelly (2000) and find similar results. Fajnzylber, Lederman and Loayza (2002), build off of Kelly (2000) and find that "income inequality, measured by the Gini index, has a significant and positive effect on the incidence of crime,"

which is in line with Kelly's (2000) findings. Fajnzylber, Lederman and Loayza (2002) looking at 39 different countries find that as a countries economic condition improves it experiences lower rates of crime which they attest to the economic growth increasing the income distribution and reducing the level of poverty a country experiences. In particular what Fajnzylber, Lederman and Loayza (2002) focus on is the incidence of crime, although they find significance in the economic variables influencing crime rates, the incidence of crime is to determine whether or not individual intentions for crime are related to an individual's socioeconomic level and whether there are ways to deter individuals from committing a crime, whether intentional or not. In Kelly's findings, her study is limited to only a single year's worth of data across counties and includes rates of poverty which has a population bias. Kelly's insinuates that poverty-stricken people living near high-income earners are using time to plan and commit crimes. However, most people that are in poverty have a population primarily made up of women, children and elderly individuals who live below the poverty line and historically are not the ones who commit crime.

Fajnzylber, Lederman and Loayza (2002), paper shortcomings are clearly listed in which it is nearly impossible to distinguish the incidence of crime, whether a crime committed is intentional or unintentional. One type of incidence of crime explored by Kwon, Scott, Safranski and Bae (1997), are crimes committed out of passion. Kwon et.al (1997) criticizes this idea of incidence of crime and cites that laws that inhibit individuals from purchasing a firearm immediately, such as a waiting period or background checks, helps to deter an irrational perpetrator from acquiring a firearm for violent actions and engenders a "cooling off" period. By reducing this type of incidence of crime, Kwon et.al (1997) argues that under normal circumstances, these irrational perpetrators looking to commit a crime of passion are unwilling to pay a price for the crime however still claims that in the heat of a moment any perpetrator looking to commit a crime faces a near perfect inelastic demand in which nothing will deter them from committing a crime, even if that inelastic demand is only momentarily. Although Kwon et.al (1997) helps to explain Fajnzylber, Lederman and Loayza (2002) incidence of crime as they describe ways to deter crimes of passion the biggest shortcomings for both of these papers are the ways to distinguish the incidence of crime. These incidences of crimes face a scarcity in data simply because they go unreported. Thus, as Fajnzylber, Lederman and Loayza (2002) use a proxy of intentional homicide and robbery rates to determine the incidence of violent crime, but

as they compare across countries', certain nations face severe data problems as crimes are underreported in nations with unreliable police and justice systems. These papers also crucially overlook variables of resources and key variables of policing, education and even labor availability to which affect an individual's level of income thus primarily affecting the inequality rate in a given region. These economic indicators along with local municipalities stimulus, primarily police spending, drastically influence the amount of crime a given geographic region observes. Therefore, this study will focus on economic factors that affect communities and States uniformly across the United States.

Friedson and Sharkey (2015) take a more present approach to see the long-term effects on neighborhoods that had violent crime rates and their disadvantages over the years (inequality measures). Friedson and Sharkey (2015) describe that spatially, violent crimes tend to occur in the same geographical location on average. Their study focuses on 6 different cities in the US, focusing on neighborhoods with the highest violent crime rates and their effects on the remainder of the city's and neighborhoods surrounding it. Friedson and Sharkey (2015) conclude that "the burden of violence was not spread evenly across each city, but rather was concentrated within a small segment of neighborhoods," and that their "decline of violent crime in these six cities served to ameliorate, but not to eliminate, socioeconomic and racial/ethnic disparities in community violence." In other words, their decline in crime rates were subjective and still remained fairly high and that the spatial distribution of the decline doesn't significantly impact that of the surrounding neighborhoods. The main setback of this study is the constraint on data availability for city level crime rates which are voluntarily disclosed to the public. In addition, the paper doesn't seem to explore any reasons as to why these crime rates were declining or what were the significant factors or variables attesting to the crime rate decline over the years. Thus, the plan for this study is to showcase State level data in which it explores how the ease of access to guns have in fact seen a national increase in violent crime rates instead of isolated cases of crime rate decline. These papers in combination have a great indication on how certain policies can implicate drastic changes in the way our society runs. From sociological theories of crime to the economic indicators that affect individuals, we see a pattern of where violent crimes are so heavily located and how to influence change in order to decrease these rates in the future.

## 2.2 Minimum Wage, Unemployment and Income

Unemployment, wages and income are all crucial indicators of a regions' stability. Many studies have been conducted since the early 1990's focusing on the relative influence of unemployment and minimum wage on crime rates in the UK and United States. These papers provide great foundational research on the expected influence these factors have on crime rates. Fallahi, Pourtaghi, and Rodríguez (2012), studied the respective effects of unemployment and unemployment volatility on crime rates over a period of 28 years. One compelling Statement that Fallahi, Pourtaghi, and Rodríguez (2012) elucidate is how the "business cycle affects the economic activity, unemployment, consumption patterns, and a variety of other economic and social variables," that impact an individual's potential to commit a crime. In other words, the authors allude to the fact that crime rates in the UK can be very cyclical thus making it even harder to study the explicit variables that affect crime rates. It's interesting the ideology that Fallahi, Pourtaghi, and Rodríguez illustrate, indicating how crime rates have been falling and rising over the short run demonstrating the cycle, however over the long run crime has increased. Their study focuses on how unemployment rates and volatility effect crime and find that in the short run there is no significant effect but in the long run "the unemployment rate has a negative effect on crime," (Fallahi, Pourtaghi, and Rodríguez, 2012). Fallahi, Pourtaghi, and Rodríguez (2012) go on to indicate that there is some benefit in creating a stable labor market in which, "the benefits…would be two-fold. First, it will provide an environment that makes economic planning much easier and second, it helps to control, at least some types of crime." What can be questioned here is how to define the parameters of the long run in this situation as crime is continuous, whether the long run is two or ten years, the limit is indiscernible. The crime rate cyclical patterns are helpful to indicate in this study how certain economic variables like unemployment and minimum wages, are an indication of the overall economies performance and can be used to bridge the opportunity that individuals have in order to commit a crime.

This idea is further embodied by the study done by, Gao, Liu, and Kouassi (2017), who look at the effects of how an individual facing unemployment has the excess time to either commit a crime or "slows down the circulation of people" in which individuals stay home to guard their properties due to a lack of income. With data from 23 different counties in the State of Indiana, the study sets out to look at the different magnitudes of the opposite effects and find "that unemployment has a negative contemporaneous effect on the violent crime rate," in which

"during unemployment people are less likely to be outside but more like to stay within their properties," (Gao et.al., 2017). What is interesting here is that Gao et.al., claim to have supported the criminal opportunity effect theory which suggests that offenders make rational choices and choose targets wisely. This study isn't successful in showcasing the true effects of each individual outcome from people being unemployed. One major shortcoming of this study is the data used thus providing some bias results in which the data is limited to only 7 years of data from only a small number of counties.  In an effort to see more long-term results and from a macro level, the study will need to examine a wider array of States and over a longer period of time. When describing people being unemployed, due to having a lack of income it is more common for individuals to seek other means of gaining income which can make people resort to crime as an only option. One factor unattended in this study is whether or not people are given any unemployment assistance which will deter them from committing any heinous crimes.

When also looking at unemployment rates there are several factors in the economy that affect the level of unemployment a region experiences. A major variable influencing unemployment are minimum wages and the labor force of low skilled workers. Wage incentives are crucial in discerning whether or not individuals have a monetary gain in committing a violent crime or whether the return from working is larger. Burglary and assaults are most commonly linked to some financial possessions being taken away in which offenders carefully look for some type of financial gain. Hansen & Machin (2002) look at this effect closely in their study whether the UK's national minimum wage that was introduced in April of 1999, influenced the spatial crime patterns across 43 police force areas in the England and Wales region. It is crucial to understand that when certain minimum wages are set this inadvertently affects unemployment because many employers are unable to afford higher wages, thus displacing workers, while at the same time promoting lower skilled workers to join the labor market. Hansen & Machin (2002) find mix results that in some cases violent crime rates and unemployment is positive and significant but in other estimates they find a "statistically significant negative relationship," between crime and minimum wage. They show a relative crime reduction in areas that initially had higher levels of wage workers. In other words, as the minimum wage increased on average areas that relied on low wage workers experienced a reduction in crime rates, but this wasn't always the case. These results indicate profoundly that the overall relationship between crime and unemployment is a tough one to differentiate and seeing as how integrated minimum wages

are influencing unemployment it's even more difficult to determine the magnitude in which setting minimum wages actually displaces workers and/or if this incentivizes individuals to resort to crime.

Machin and Meghir (2004), examine the theory similar to Hansen & Machin (2002) in which they observe the economic incentives in England and Wales for a period right up to 1996 prior to the national minimum wage being set. Machin and Meghir (2004), aggregate how the falling wages for low skilled workers from 1975 to 1996 increase the amount of crime that occurs. Their findings show that crime rates should be higher with the following circumstances; "where wages at the bottom end of the wage distribution are lower, reflecting poorer labor market opportunities, where the probability of being caught is lower, where crime rates are already higher, and where the potential returns to crime are high," (Machin and Meghir, 2004). When analyzing their results Machin and Meghir (2004) calculate that by holding wages at their 1975 levels in 1996, they can observe crimes rates that are 28 percent higher than its 1996 figure. If it wasn't for the fact that their "wage distribution grew by about 23 percent over this period in real terms," than the crime rates would have been significantly higher (Machin and Meghir, 2004). This illustrates how minimum wages do have a significant impact on the choices made by lower skilled workers in order to decide whether or not it is profitable to commit a crime for financial gain or to simply work. These choices although arbitrary make this study really difficult to quantify. One factor that even Machin and Meghir mention as one of the biggest setbacks of any modern crime rate study is finding the opportunity cost of committing a crime. In this study it is simply measuring the potential returns of a crime which is crucial to be included as an independent variable, Machin and Meghir (2004) attempt to quantify this by using British Crime Surveys from the years of 1984, 1988, 1992, 1994, and 1996, however these surveys are done by victims of crimes in order evaluate the value of their stolen property and is inconclusive data with man biases. In addition, both papers aggregate all types of crime, not specific to one type, thus possibly overestimating their results. In an ideal setting if it is possible to measure and quantify each individual's crime opportunity cost than with relative certainty this study would be able to estimate the actual magnitude to which government's and local municipalities can deter people from crime.

## 2.3 Gun Control Policies and Legislation

The accessibility to firearms in the United States is a hotly debated topic within both Federal and State level politics and societies. The US Constitution stipulates that, "A well-regulated Militia, being necessary to the security of a free State, the right of the people to keep and bear Arms, shall not be infringed." This Second Amendment, mandated by the Federal government, incites that its citizens are legally allowed to buy, sell and own firearms. For government officials, gun control has been a persistent issue amongst political discourse. Paul Helmke (2013) discusses that in the wake of the Newton, Connecticut school shooting back in 2012, there have been more efforts from public officials, the media and even the public to curtail the access to guns. However, Helmke (2013) also States that although many States have adopted stricter gun policies, but the Federal government, lacks the initiative to take action against gun and firearm access. Throughout the mid 20th century, there were several Federal restrictions put in place in, such as the National Firearms Act (NFA) of 1934 to tax any and all sales, productions, and transfers of firearms and requiring that all firearms be registered. Many Federal laws prior to it, eliminated the access to machine guns and full automatic weapons to the general public as well. As Helmke (2013) describes, Federal laws restricting access to firearms have serious flaws and loopholes. Many previous laws have undergone referendums such as the NFA of 1934 which after being altered led to the Gun Control Act (GCA) of 1968 to create a Federal database with a list of "prohibited purchasers" in the US (Helmke, 2013). Although initially successful, the issues of acquiring this data of individuals prohibited in possessing a firearm and distributing this list all across the nation has proven to be very difficult. Since this data is meant to be submitted by States on a regular basis, Helmke (2013) States that the Federal background check database is "woefully incomplete," as States fail to submit and populate these lists hence creating loopholes with insufficient means of information transfer. With this, many individuals have found it easy to circumvent these Federal restrictions and seamlessly acquire guns. Helmke (2013) uncovers a central issue when it comes to gun violence and firearm access which is that although there are many Federal stipulations for gun control, State and local gun laws are drastically different compared to each other. This alludes to the fact that porous borders between States create the easy movement of firearms across State lines. The blame of having easy access to guns stems from both Federal and State level attention to this issue where it is difficult to differentiate the level of restriction each State puts on its firearm and gun access.

In 1996, the United States Congress expanded the Gun Control Act, to prohibit individuals convicted of a domestic violence misdemeanor from possessing or purchasing a firearm (Raissian, 2016). Domestic violence rates in the United States have been consistently high, according to Raissian (2016), between the years of 1980 and 2008, the United States on average observed nearly 1.620 domestic homicides annually and within that nearly 55% of those homicides were conducted using a firearm. Raissian's (2016) study looked to detect whether or not the GCA expansion in 1996 actually aided in reducing this one type of crime; domestic homicides. She observes the idea that although the Federal law went into effect in 1996, States across the nation implemented the law in varying years from 1996 to 2006. The GCA expansion was also scrutinized for its interpretation, under the Brady Act of 1993, new firearm purchases required licensed gun dealers to run background checks on all potential buyers and enacted a 5-day waiting period. Heeding this new bill, Raissian (2016), finds that the GCA expansion in fact lowered domestic gun homicide rates by 17% among female intimate partners and 31% amongst male domestic child victims. According to Raissian's (2016) calculations, between the years of 1998 to 2009, approximately 188,000 requests for firearm purchases were denied due to background checks administered because the potential purchaser had a qualifying domestic violence misdemeanor. This inadvertently affirms the goals of both the Brady Act and GCA expansion in which a significant decrease in one type of crime which was the intention of the bill. However, several limitations to this study could be the data acquired for domestic homicides, which is submitted on a voluntary basis by each law enforcement agency, thus indicating an underrepresentation of the actual number of domestic homicides. In addition, according to Cook and Ludwig (2006), the Brady Act of 1993 did nothing to regulate the secondary market sales of firearms, in which buyers and sellers are primarily unlicensed and illegally transfer firearms. 30 to 40% of all new guns come from this secondary market and are responsible for supplying guns used for criminal activity (Sheley &Wright, 1995). Hence why we must question that although Raissian (2016), finds significance in the reduction of domestic homicides after the expansion of the GCA, there is simply no way to measure the spillover effect of illegally acquired guns.

Cook and Ludwig (2001), in the early 2000's alludes to this theory of the willingness to pay by the general public to fund the reduction of gun related violence. In 1998 the National Opinion Research Center at the University of Chicago conducted a survey of 1,204 American

adults called the National Gun Policy Survey (NGPS). In this survey, interviewers asked individuals of a household their sentiment towards the government and various gun related policies. During the survey, each individual was asked whether or not they were willing to pay for an increase in their annual taxes by either, $50/$100/$200 increments if the funds were used towards a program to reduce gun violence and reduce gun related injuries by nearly 30% (Cook and Ludwig, 2001). Based off of this contingent-valuation survey data, Cook and Ludwig (2001) estimated that the American public is willing to pay roughly $24.5 billion in taxes to reduce gun violence by 30%. This equated to approximately $1.2 million per gun injury and an additional $240 per year in taxes for every American household. As Stated by Anderson (1999), the average American household currently spends around $1,800 in taxes on the criminal justice system and private protection. The findings of Cook and Ludwig (2001) fall in line with that of Anderson (1999), in which it isn't crazy to imagine such a small increase in annual taxes to reduce such a devastating loss. Nonetheless, the survey data used in their study is speculative. For survey respondents, there is a "moral satisfaction" in answering questions in favor of a beneficial public good. This contingent valuation survey is subject to the embedding effect, in which the survey respondent's willingness to pay isn't dependent on the public good, in this case gun injuries, to which placing a value on an individual gun injury will be difficult and respondents can seamlessly answer in favor of a desire to "purchase moral satisfaction," (Cook and Ludwig, 2001). This unfortunately can severely overestimate the actual willingness to pay by any individual as there is a desire to answer positively which may drive some respondents answer to be higher than what they would actually be able to afford or willing to pay.

After reviewing the works of Raissian (2016) and Cook and Ludwig (2001) following the effect of certain gun control laws and public sentiment towards gun violence, the remaining literature is focal on State gun control laws and their effectiveness. In a simple multivariate model, Kwon, Scott, Safranski, and Bae (1997), look at both gun control laws adopted by States and several socioeconomic factors to see whether or not these variables reduced the number of firearm deaths observed in a given State. Kwon et.al (1997), create an index to rate State gun control law by dividing the States into two groups and creating a dummy variable; where 0 represented States with no gun restrictions and 1 represented States with some type of; licensing requirements, waiting periods, and background checks for the year of 1990. According to their model, States with gun control laws observed nearly 3 fewer deaths per 100,000 people than

States without any such laws but their results weren't significant. In fact, Kwon et.al (1997) find their socioeconomic variables, in particular poverty and race, were in fact significant in increasing the number of firearm death's any State observed, especially for States with no gun control laws. Although Kwon et.al (1997), don't find significance for the relationship between gun control laws and firearm deaths this can be attested to the bias index created for their study. The index utilized to measure a State's gun control laws is simplistic, in which the States are separated with no laws or some and given a rating of 1 or 0. If a given State only executes licensing requirements and not background checks or waiting periods, then this State would still be given a rating of 1 thus aggregating States into one index irrespective to the level of gun control the State actually administers. Hence this index used for the study is biased positively. Nevertheless, building off of this study, Kwon and Baack (2005) go on to account for this faulty index and use a similar multivariate model to that of Kwon et.al (1997), to examine a holistic effectiveness of gun control laws in the United States.

State to State gun control legislation varies significantly as shown thus far. Kwon and Baack (2005) take the model from Kwon et.al (1997) and improve upon the measures that they wish to observe. Keeping the same dependent variable of firearm death rates, Kwon and Baack (2005), change the State index into a State ranking which they acquired from the Open Society Institute. The Open Society Institute in 2000 ranked each State according to the extent of its gun control legislation which they aggregated from several different Federal agencies and national organizations. The States were ranked on six different categories; "registration of firearms, safety training, regulation of firearm sales, safe storage and accessibility, owner licensing, and litigation and preemption," (Kwon and Baack, 2005). States were scored from 0 to 100, where a score of 100 meant the State observed stringent gun laws. With this model, Kwon and Baack (2005) find that with stringent gun laws States observe on average almost 3.5 fewer firearm deaths and find significance at the 1% level. These findings are similar to that of Kwon et.al (1997) but are more comprehensive as the State rankings used was far more extensive than the previous index and include variables of law enforcement employees, crime rates and population density. Furthermore, one interesting discovery from Kwon and Baack's (1997) study indicates that States with more stringent gun laws experience higher rates of violent crime overall than States with lax laws. This although peculiar at first is hard to distinguish as Kwon and Baack (2005) don't dwell into this much further or examine it separately. One big shortcoming of this paper

and of Kwon et.al (1997), is the use of their dependent variable. Although both papers look at firearm death rates in each State, this number is including deaths by suicide, unintentional deaths, and those of unknown intent. According to Everytown Research 62% of all firearm deaths in the US are suicides. This variable is the closest variable to any that can serve as a proxy for gun related violence but doesn't include gun related injuries as well and leaves out gun related crimes. To account for this shortcoming, Moorhouse and Wanner (2006), explore the question whether gun control reduces crime or does crime increase gun control?

Moorhouse and Wanner (2006) on one view claim that fewer guns means less crime where the less access to firearms the reduction in the number of crimes committed. On the other hand, they explore the idea that higher crimes rate incites for politicians and the public to advocate for the passing of more gun laws. These two models explored by Moorhouse and Wanner (2006) follow a similar model to Kwon and Baack (2005), in which they use similar socio-economic variables and the same gun control index aggregated and scored by the Open Society Institute in 2000 but go further to include a spill in effect variable. The Open Society Institute argues that "very strict gun laws in one State can be undermined by permissive laws in neighboring States." In other words, these States with strict gun laws can face a spill in effect in which any neighboring State that has lax gun laws, can easily transfer firearms from the lax State to the strict gun law State. Moorhouse and Wanner (2006) attempt to capture this spill in effect by taking the ranking provided by Open Society Institute and observing whether each States score is lower/higher than its neighboring State.

Unfortunately for Moorhouse and Wanner (2006) who run 10 regressions for each of the years 1999 and 2001 for 10 categories of crime, find no significance in any regression for the gun law scores and for their spill in effect variables. Although they do see expected signs in 4 out of the 10 regressions in each year, Moorhouse and Wanner (2006) conclude that along with many other studies, they find no evidence that supports the claim that gun control reduces crime. The reason for such results could simply be mitigated by adding more years to the data set instead of looking at only 2 years. With such a small set of years and an abundance of variables, Moorhouse and Wanner (2006) are unable to see the trends of gun laws and crime over a long period of time. Since one can assume that laws take time to go into effect as seen by Raissian (2016) who presents several States that implemented the GCA expansion years after it was

enacted by Congress in 1996, we can allude this to Moorhouse and Wanner (2006) who must embody a longer period of data in order to see the effect over time.

Due to their insignificant results, Moorhouse and Wanner (2006) explain that gun control simply does not influence the behavior of criminals in their efforts to obtain and use firearms as it does for law abiding citizens. They insinuate that criminals who regularly violate the law will continue to do so by purchasing firearms on the black market or by stealing them. In addition, Moorhouse and Wanner (2016) also claim that gun control legislations seem to only influence the process of purchasing a firearm from a licensed dealer, but once a firearm is purchased it is considered a "long-lived capital asset," in which it can be transferred and sold to many different parties. With these explanations in mind, this study will attempt to see whether or not State level gun legislation can naturally affect rates.

## *Section 3, Data and Variables*

While looking at previous literature there is a commonality amongst the models tested by authors including variables such as unemployment, minimum wage, poverty rates and more, all based off of economic or socioeconomic factors that subsequently have an effect on crime rates. This study will focus on finding an astute relationship defining what drives violent crime rates in America for the past 16 years from 2000 to 2015 for all 50 States. Variables that have been gathered for this study have come from a multitude of sources, however certain data in United States for some variables is either inexistent as in not accumulated or under/over estimates of actual data. Of importance in this study is trying to explain if access to firearms in certain States can consequently lead to higher rates of crime. Unfortunately, in the case of the United States under the Firearm Owners' Protection Act of 1986, "it is illegal for the national government or any State in the country to keep any sort of database or registry that ties firearms directly to their owner." This creates a gap in the study simply because it is impossible to tell how many guns are registered in the United States and whether or not these guns are bought legally. Legality causes a great issue in this case since gun reform in the United States is a widely debated topic. Seeing as how data is scarce the following variables were chosen carefully to accurately see the effect of gun control and economic incentives on violent crime rates.

## *3.1 Dependent Variables*

Violent Crime Rate (*VCR*):

This variable along with non-violent crime rates is aggregated from the FBI's Uniform Crime Reporting agency in which the FBI program collects statistics on the number of offenses known to law enforcement. These statistics are submitted on a semi voluntary basis by local and State law enforcements in order to track offences on a national level. Similar to the study done by Moorhouse and Wanner (2006), who look at whether gun control increases crime or crime increases the need for more gun legislation, this study is meant to look at the former theory. Violent crime rates include crimes of murder; legacy rape. revised rape, robbery, and aggravated assault. Ideally for this study, data on gun related crime and violence rates in the United States would help to find an accurate relationship of firearm access and gun related crimes and deaths implications, but for the sake of availability, violent crime rates will act as a proxy in this study. Simply because violent crimes on average tend to include the use of a weapon and more so the use of firearms in certain crimes.

Non-Violent Crime Rate (*NVCR*):

As mentioned in the literature by Moorhouse and Wanner (2006), Machin and Meghir (2004), Fallahi et.al (2012) and Gao et.al (2017), all of these papers use some type of variation of crime rates. All three of these papers focus on an aggregate of crime rates, not specifically one type whether it be violent or non-violent. Since this study will use violent crime rates as a way to proxy for gun violence, it is necessary to also include non-violent crime rates as a way to see the general effects on crime as these are the crimes that are committed at a higher rate. Non-violent crimes include crimes of; burglary, larceny theft and motor vehicle theft. Not synonymous to gun usage however as a way to see the overall effects of gun control legislation we are interested in seeing if the legislations have a spillover effect onto non-violent crime rates. As measured by Moorhouse and Wanner (2006), they only see a negative relationship between gun control laws and crime for 4 out of the 10 types of crimes that they observed all of which were violent crimes. Thus, building off of their model this study will include non-violent crime rates for secondary model to observe the effects of gun legislation on the remaining types of crime aggregated by the FBI UCR program.

## 3.2 Independent Variables

Poverty Rates (*POV*) and Unemployment Rates (*UNR*):

Similar to Kelly (2000), this study will explore the effects of poverty rates in the United States. As Kelly (2000) mentions the economic theory of crime, in which poorer individuals are places near high income individuals, it creates a strain and incentive to poverty-stricken individuals to commit a crime for the possible returns that they can gain. This study will include poverty rates because it can also be linked to unemployment rates in which Gao, Liu, and Kouassi (2017) explain how individuals who are unemployed have the incentive to also stay home and protect their belongings and properties. This study will make the assumption that individuals who are in poverty can more or less be the ones who are unemployed as well thus exploring the relationship of whether the returns to commit a crime while being in poverty and unemployed can outweigh the returns to simply stay home to protect properties and look for work. The magnitude of these two variables will define whether or not lower-class Americans are placed in unfavorable situations that incite a reason to commit crimes.

Minimum Wage (*MINW*):

Aggregated from the Department of Labor, minimum wage is a great indicator of economic performance for lower skilled workers. As Hansen & Machin (2002) examined in their study, the UK implemented in 1999 a national minimum wage, which in their study had varying results on crime rates but ultimately affirm that minimum wage leads to a decrease in a wage incentive to commit a crime. Similar to the UK, the US also has a Federal minimum wage since 1938, which mandates a wage floor for all employers in the country and has steadily increased over the years to roughly $7.25 in 2017. Every State must adhere to these Federal wages; however, each State has its own authority over the minimum wages under its jurisdiction, thus some States such as California, which in 2015 raised their minimum wage to $9 and by 2018 raised it to $11. Such States similar to California take a very bold approach to helping the lower skilled labor force survive in today's economy by making extra wages to increase the quality of living. Contrarily, as Gao, Liu, and Kouassi (2017) implicate, the effects of raising minimum wage directly affect labor markets, as it can displace many workers from employers who simply can't afford to pay the higher wages. Once this effect takes place and a handful of individuals are displaced, this can sway individuals one of two ways in which it can incentive some to commit crimes for short term financial gains or may entice individuals to sway away from crime and

look for more honest work in the labor market as wages increase, making them active participants in the labor market.

<div align="center">Median Household Income (<em>INC</em>):</div>

Similar to the aforementioned economic variables, each State has a different level of dispersion of income, within its State limits. Across the United States annual incomes vary drastically while some States have higher rates of poverty and inequality others experience higher wages and lower rates of unemployment. As mentioned by Merton's (1938) strain theory, by placing high income "successful" individuals near low income individuals it creates a socioeconomic divide, in which low income individuals feel incentivized to satisfy themselves. Hence in order to aggregate all these factors together we look at median household incomes to compare whether income creates a socioeconomic incentive to commit a crime by simply enhancing the income inequality levels.

<div align="center">Education (<em>EDU):</em></div>

Moorhouse and Wanner (2006) in their study include rates of high school dropout rates. What they assume this variable signifies is the proxy for low skilled workers that enter the labor market. Moorhouse and Wanner (2006), expected to see a positive relationship in which as the dropout rates increase, we would see an increase in the number of crime observed. Similar to that, this study is using the post-secondary education graduation rates as the educational attainment variable. Across the nation, educational programs are enacted by local municipalities, State officials and Federal governments in order to ensure that every American has access to an education. Education carries weight in discussions for country progression and growth similar to its effect on crime rates as well, where impoverished neighborhoods that have high rates of crime tend to have lower rates of education. For this study, postsecondary school graduation rates are obtained in each year for every State. Higher education is important as it is shown to lead to great opportunities and progression for anyone acquiring a degree ergo allowing for lower rates of unemployment and poverty.

<div align="center">Political (<em>POL</em>):</div>

In the United States, political fervor greatly influences our nations policy. Usually a State's public discourse is enacted by their elected officials. As Moorhouse and Wanner (2006) mention as one of their models, they hypothesized that as crime increases than the amount of gun control legislation should increase simultaneously. In other words, this enacts both political

parties to debate whether or not more gun control legislation is needed. For the sake of this study, it is necessary to include a political variable similar to Moorhouse and Wanner (2006), in which the relationship of whether political parties have an effect on the number of gun legislation passed in a given State will be explored. Historically, certain States that have Republican officials as front runners for increasing firearm access while certain Democratic officials against the access to firearms. This creates a great divide in the nation, especially recently where officials fight over the right to bear arms and since these elected officials are the ones who have final say in bearing arms makes them a crucial aspect of the issues at hand. We've aggregated here stance each State took in the past four elections between the years of 2000-2015 in order to dictate whether it is a Republican or Democratic State.

<div align="center">Police Spending per Capita (<em>PSP</em>):</div>

Kwon and Baack (2005) indicate that the number of police in a State is assumed to lower crime due to the large presence of law enforcement that will deter individuals from committing a crime. Every State has a budget that is utilized for financial and social programs which includes paying for civil workers such as policemen. Policing in the United States is a great indicator of safety within a region. In this case, police spending is crucial for gun control, since many States spend heavily on such forces which enable programs for gun safety and protection. This data is acquired from the protection spending budget of each State for every year which also includes spending on Firefighters and EMS thus this variable is a bit of an overestimate but includes police spending as a big margin which can act as a proxy. It is then divided by the State population in that given year to account for protection spending per individual in that State.

<div align="center">Gun Laws Rank <em>(RANK):</em></div>

Although Federal law requires all sales of firearms to have some sort of background check on the individual trying to purchase a firearm, each individual State sets its own regulations, on the type of firearms, criminality checks as well as carrying laws for its State residents. This inevitably makes it easier in some States to acquire firearms from both public and private dealers. Kwon and Baack (2005), who use a holistic measure of gun law rankings provided by the Open Society Institute in 2000, in which they utilize six different measures to determine a State's gun law ranks. This study aggregated the rankings from, The Gifford's Law Center where each year they rank the States according to one another from 1 to 50 in relation to its access to firearms, 50 being the easiest State to acquire firearms hence having really loose gun

control laws. Similarly, the Gifford's Law Center applies the following six categories, that can be influenced policy changes, to rank a State; background checks, child access prevention, concealed carry permitting, domestic violence, extreme risk protection order and military style weapons. This helps us to see how such lax firearm laws play into affecting the amount of crime a State observes.

<div align="center">Gun Background Checks (<em>CHECK</em>):</div>

Under the Firearm Owners' Protection Act of 1986 (FOPA), it is illegal for the United States government or any State to create any database or registry linking firearms to their owners. This makes it difficult for the Federal government especially the Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF) to track and monitor firearm sales and distribution. The law instead mandates that firearm dealers, must keep records of firearm sales indefinitely for legal and criminal purposes. Luckily, under the Brady Handgun Violence Prevention Act of 1993, the United States Congress mandated Federal background checks on firearm purchasers in the United States. This Federal enactment of mandatory background checks enables for the simplest barrier for acquiring a legal firearm, which in this study is viewed as a way to prevent a firearm from ending up in the wrong hands. This data was acquired from the National Instant Criminal Background Check System for the total numbers of background checks submitted by each State for firearm sales. By aggregating background checks we are able to see whether or not background checks are effective by indirectly targeting the issue of firearm sales to the wrong hands.

## 3.3 Empirical Model:

The following empirical model was used to explore the impact of gun laws and other economic factors on violent crime rates throughout the 50 States

Model 1:

$$VCR_{it} = \beta_0 + \beta_1\, POV_{it} + \beta_2\, UNR_{it} + \beta_3\, MINW_{it} + \beta_4\, INC_{it} + \beta_5\, EDU_{it} + \beta_6\, POL_{it}$$
$$+ \beta_7\, PSP_{it} + \beta_8\, RANK_{it} + \beta_9\, CHECK_{it} + \varepsilon_{it}$$

Model 2:

$$NVCR_{it} = \beta_0 + \beta_1\, POV_{it} + \beta_2\, UNR_{it} + \beta_3\, MINW_{it} + \beta_4\, INC_{it} + \beta_5\, EDU_{it} + \beta_6\, POL_{it}$$
$$+ \beta_7\, PSP_{it} + \beta_8\, RANK_{it} + \beta_9\, CHECK_{it} + \varepsilon_{it}$$

where *i* is the State indicator and *t* is the time indicator between the years of 2000 to 2015. In Model 1, as mentioned before, violent crime rates are the dependent variable which is measured as the number of violent crimes that occur per 100,000 residents in the State, including crimes of murder; legacy rape. revised rape, robbery, and aggravated assault. Although Model 1 is of main interest for this study, as violent crime rates are utilized for the nearest variable to equate gun violence rates, also evaluated is the relationship on non-violent crime rates. Non-violent crime rates include crimes of; burglary, larceny theft and motor vehicle theft. Based off of the literature explored for this study, this study assumes some hypothesis for the potential effects of each independent variable on violent/ non-violent crime rates. As both poverty and unemployment rates increase, this study believes to see a negative relationship. As Fallahi et.al (2012) and Gao et.al (2017) find in their studies, that as these rates increase, individuals who are below the poverty line and are unemployed will likely face financial incentives to commit a crime however these incentives don't outweigh the incentive to stay home, protect their properties and seek employment. This theory embodied specifically by Gao et.al (2017) who find negative statistical significance in the relationship between unemployment and crime, can be expanded to poverty in this study as they are seen to be complements with one another.

Machin and Meghir (2004) stipulate in their study, that when the United Kingdom grew the wage distribution, they viewed significantly lower rates of crime as the wages grew. What their study along with Fallahi et.al (2012) and Gao et.al (2017) allude to is the fact that there exists a wage incentive for lower skilled workers. As lower skilled workers can be defined as being the disadvantaged members of society, earning lower rates of wages than that of others, these individuals are more inclined to commit a crime for a financial gain (Kelly, 2000). Hence, when wages are systematically growing for every member of society, this will increase the wage incentive for individuals to look for work and stabilizes lower skilled workers to be active participants in the labor market rather than actively seeking out financial gains from crime. Ultimately, we expect to see for minimum wage a negative relationship with crime. This would show that as State's minimum wage level increases, then it would provide lower skilled workers with an incentive to look for honest work than to actively commit a crime.

As Fallahi et.al (2012), mention in their study, creating a stabilized labor market can have various positive externalities on curbing crime rates. It helps to foster an environment of economic planning for certain individuals and helps to deter some types of crime. By providing

individuals with a stable stream of work and income can help to mitigate crime rates. Therefore, this analysis views a stable labor market as a contributing factor to having stable wages and income. With Fallahi, Pourtaghi, and Rodríguez's (2012), stable labor market theory in mind, this study plans to see a negative impact on violent crime rates as a State's median household income increases. The median household income in a given State is approximately the average income an individual earns and as this increases the expectation is supposed to lessen economic incentives to commit a crime and reduce the number of crimes that occur.

Education as mentioned previously can positively impact an individual's economic situation and increase their well-being. By looking at rates of graduation, this study is able to show how much of the State's population each year actually finishes school and the assumption is that as individuals graduate and acquire degrees they get better paying jobs and have less of a need to commit a crime. This variable is broadened from Moorhouse and Wanner (2006) who use high school dropout rates as a proxy for low skilled workers, but in this study, graduation rates are utilized to show how by improving educational programs across the nation can actually help to benefit the public by reducing of crime overall.

Political indicators of State representation seem to have significant impacts on crime rates. On average the National Rifle Association donates about 80 thousand dollars to the Republican Party in a given year, but this is aside from its individual donations to senate and congress members. Since such donations are made to support the mission of the NRA, the assumption is that by being in a Republican State, you will experience higher rates of crimes, as these States tend to be front runners for less gun control legislation. To denote the State's political affiliation a dummy variable, from the three previous elections electoral map is aggregated, with 0 representing Democratic States and 1 being Republican States.

Now the next three variables are in relation to gun control legislation and protection spending by each State. As States increase the overall spending on police, in this case their protection budgets, one can assume the effects on crime to be double faceted. On one end of the spectrum one can infer that as protection and policing increases in a given State, then crime should decrease. As the consequences and chances of getting caught and imprisoned are higher with greater police spending the hypothesis of the effect is expected to be negative. However, the adverse effect could be as protection budgets grow, then States are experiencing higher rates of crime and in order to get the crime under control a given State would require larger police forces

which require heavy amounts of funding to grow the protection force. Hence it can also be seen as a positive relationship that States spend more money on policing as crime rates are high as a way to curtail the crime. For ranking, according to Gifford's Law Center, the higher the rank the easier access to firearms within that State. This is the most crucial relationship we wish to answer in this study, whether stringent gun laws actually reduce the number of violent crimes that occur within a State as Stated by Kwon and Baack (2005). Lastly, we have firearm background checks, which are submitted instantly when a new buyer wishes to purchase a firearm. Since this is stipulated by Federal law, not all dealers abide by these rules, but with this variable we hope to see a negative relationship in which as the amount of background checks increases, we would like to see violent crime rates to decrease. What this would tell us is that in fact the simplest barrier to firearms is actually effective in minimizing the amount of violent crimes that occur that include firearms in which criminals aren't legally obtaining a firearm.

## *3.4 Robustness Checks*

In order to check for multicollinearity, we review the preliminary Variance inflation factors (VIFs) for all of the variables individually acquired which are shown in Table 1.

In order to account for the relationship between police spending and population we acquire the per capita spending for police by dividing gross police spending numbers by the population variables obtaining the police spending per capita variable (*PSP*). Seeing as how this is still a total number per individual we also take the log of the variable *PSP* in order to better observe the relationship of police spending on violent crime rates. In addition to police spending we also take the partial log of median house hold incomes (*INC*) since this is a gross figure and the partial log of gun background checks (*CHECK*) as well as it is easier to see the impact of these two variables on violent crime rates as a partial log function. Thus, as shown in Table 2, we acquire a new set of VIF's after logging income, police spending per capita and firearm background checks we see VIF's below 5.

Lastly, since we have a panel data set with our time indicator from 2000 to 2015 and cross-sectional aspect by looking across the 50 States we conduct the Hausman test. However, upon running the fixed effects regression we the variable *RANK* omitted. This variable which is assigned by the Gifford's law Center ranking the States gun law's, is the same for each State from 2000 to 2015. We decide to keep this *RANK* variable non-changing as data isn't available

on the ranking of the States prior to 2015, so the 2015 ranking is utilized for the entire period study for each State. This being said, we are forced to run a random effects regression for all the models.

## *Section 4, Basic Results*

Model 1:

$$VCR_{it} = \beta_0 + \beta_1 \, POV_{it} + \beta_2 \, UNR_{it} + \beta_3 \, MINW_{it} + \beta_4 \ln(INC_{it}) + \beta_5 \, EDU_{it} + \beta_6 \, POL_{it}$$
$$+ \, \beta_7 \ln(PSP_{it}) + \beta_8 \, RANK_{it} + \beta_9 \ln(CHECK_{it}) + \varepsilon_{it}$$

Model 2:

$$NVCR_{it} = \beta_0 + \beta_1 \, POV_{it} + \beta_2 \, UNR_{it} + \beta_3 \, MINW_{it} + \beta_4 \ln(INC_{it}) + \beta_5 \, EDU_{it} + \beta_6 \, POL_{it}$$
$$+ \, \beta_7 \ln(PSP_{it}) + \beta_8 \, RANK_{it} + \beta_9 \ln(CHECK_{it}) + \varepsilon_{it}$$

Above is the revised version of the empirical model Stated earlier with the partial logs of *INC, PSP,* and *CHECK.* Table 3 shows some basic descriptive statistics for all of the variables in the econometric model above. Table 4 shows the results of the multivariate linear regression for Model 1 and Model 2. Overall for Model 1 we receive significance in 6 out of the 9 variables that we observe However experience unexpected signs in two of these variables, poverty and unemployment as well as don't receive significance in our gun legislation rank and background check variables, two variables of main focus for this study. Originally when running the random effects regression for Model 1 we observed a negative relationship of -.244 between *RANK* and *VCR* which was an unexpected sign. As we previously hypothesized, by having a State with less stringent gun laws this State in particular would experience a higher rate of violent crime, in which we expect to see the sign of the coefficient to be positive. In order to see the true results, the variable *RANK* was squared in order to see if the actual relationship between *RANK* and *VCR* was changing direction at some point. Therefore, after squaring the variable *RANK,* we observe that as a State's *RANK* increases, with violent crime rate increasing at a decreasing rate and then begins to drop. This falls in line with Kwon and Baack (2005) who find that for States that have more extensive gun laws these States experience fewer gun related deaths. This study's results are also relatable to Moorhouse and Wanner (2006), who find no significance in their gun control index variable in relation to crime but find a positive relationship in 7 out of the 10 regressions. In this study, it is shown that States with lenient gun laws face 2.95 more violent crimes per

100,000 people and although $RANK^2$ shows negative affect on crime rates the coefficient is significantly smaller at -.062. In addition, since this doesn't show a statistically significant result we can attest this to the fact that violent crime rates are acting as a proxy in this study which doesn't precisely relate to crimes involving firearms, therefore not showing statistically significant results.

In Model 2 with non-violent crime rates as the dependent variable we see a similar result but with an even bigger coefficient. Again, the results aren't statistically significant, we observe a quadratic relationship between gun law ranks (*RANK*) and *NVCR*. Initially as a States *RANK* increases by one unit they witness a 24.15 unit increase in the number of non-violent crimes per 100,000 people but as their *RANKs* get higher, they observe a -.428 decrease in non-violent crimes. Overall States attract higher rates of crime, when their gun laws are more lenient, meaning these States have more accessibility to firearms and observe higher rates of crime but once again these increases are at a decreasing rate.

The background check variable *(CHECK),* is also of great importance in this study as we see a one percent increase in the number of background checks decreases the number of violent crimes by 7.8 units. Although not statistically significant, shows an important relationship, that by mitigating the access to firearms at the simplest level by running background checks on those acquiring a firearm can substantially lower the number of violent crimes committed. Similarly, in Model 2 we see that firearm background checks largely decrease the number of non-violent crimes, in which a one percent increase in the number of firearm background check reduces the nonviolent crime rates by 64.39 units. Here once again we see that background checks can essentially reduce the number of crimes overall as States take the necessary steps to maintain fundamental background checks on all firearm purchases.

In the case for Model 1, three out of the four economic variables, poverty rates (*POV*), unemployment rates (*UNR*) and minimum wage (*MINW*), all observe statistically significant results at the 1% level. As poverty rates and unemployment increases by one-unit, violent crime rates decrease by -5.42 and -4.56 units, respectively. As mentioned earlier by Gao et.al (2017), their theory of having two options when being unemployed; whether to stay home and protect your belongings or go out and commit crimes, this study's findings observe results for the former. This theory proposed by Gao et.al (2017), explains that when individuals are included in the unemployment rate, these individuals are still actively looking for work and are a part of the

workforce. Therefore, these individuals who face poverty and unemployment face greater returns to stay home and look for jobs than to actively plan and commit a crime. We can further explain these two variables when we look at minimum wage, in which as minimum wage increases, violent crime rates decrease at a rate of 15.48. By far the biggest coefficient and driver to decrease violent crime rates amongst the three in which we can compare to Machin and Meghir (2004) in which they observe the wage incentive. Similar to their findings in which they found lowering wages for low skilled workers increased crime rates we find evidence supporting their study in which by increasing minimum wage, which is primarily for low skilled workers, the United States on average can observe lower rates of violent crime, thus indicating that a financial incentive can be a significant factor when contemplating the returns to commit a crime.

Other variables that we observe significance are *EDU* and *POL* at the 5% level and *ln(PSP),* at the 1% level. For education (*EDU*) we see that as post-secondary graduation rates increase a State experiences .744 reduction in the rate of violent crime and a 1.96 reduction in nonviolent crime however for nonviolent crime, the results weren't significant. Moorhouse and Wanner (2006), who include a high school dropout rate in their model find a positive significant relationship which is in line with this study as the results stipulate that by having more individuals stay in school and actually completing their education it can help to reduce the level of crime a State observes. Moorhouse and Wanner (2006) also hypothesized that by having more Democrats in the State delegation, that State would observe a higher rate of gun control legislation being passed in which they find positive and significant results to support this theory. This study takes this hypothesis a step further to observe whether or not these Democratic States that observe higher rates of gun legislation being passed actually see a reduction in the amount of crime. The results show a negative significant relationship that by having a State that votes Republican, these States observe a 17.42 reduction in the rate of violent crime. Indicating that although Democratic States that notoriously have more gun legislation alluded to by Moorhouse and Wanner (2006), don't actually encounter lower rates of violent crime. Lastly, we observe police spending per capita *ln(PSP),* where the results show that as a State allocate more of their budget to protection measures than this State will experience an 81.98 increase in the rate of violent crime. This is contrary to Kwon and Baack (2005) who examine that by increasing the size of your police force, a State will observe lower rates of firearm deaths. But in this study, we inspect whether spending more of protection measures can actually help to reduce crime

however since the results show the opposite we can assume it is because as these States observe higher rates of crime, than it is within their best interests to allocate more resources to fund better policing measures.

## *4.1 Policy Implications/ Further Research:*

With the odds of being shot in America being 1 in 315, according to the US Center for Disease Control, the US has faced struggles in curtailing incidents involving firearms for decades. The findings of this study are ineffective in showing that gun control laws truly reduce crime overall. With that being said, it is evident that for legislators the issue of gun control is multifaceted in which along with gun control, socioeconomic issues must be considered when it comes to reducing violent crime. As Stated by Moorhouse and Wanner (2006) and Kwon et.al (1997) who neither find significance in gun control reducing firearm deaths and crime, indicate that if in conjunction with other socioeconomic laws, legislators can significantly reduce the number of firearm incidents. As we can see from the results, minimum wage, education and income can significantly reduce violent crime rates. With this we can see how certain financial and economic incentives can outweigh the returns of crime. However, legislators must first reevaluate current existing laws and look specifically at the implementation by each State. Federal law, as shown by Raissian (2016), can be implemented by each State at varying times, thus implying that laws experience some type of lag effect as they can be interpreted differently at the State level. Therefore, to see the true effects of varying laws they must all be considered individually and defined uniformly. State level laws are also of great concern as each individual State can implicate different laws under its jurisdiction, thus making it difficult to study such differences across all 50 States.

On that account, we look to see how current existing laws may truly be ineffective as shown by the insignificance in the data and the quadratic relationship between gun law ranks and violent crime rates. As shown in Table 4, gun laws reduce violent crime at a decreasing rate and eventually begins to fall. This relationship tells us that gun control alone can't significantly influence crime rates. Moorhouse and Wanner (2006), State one of the reasons these laws may be ineffective is simply due to the will of a perpetrator who will violate several laws such as acquiring s firearm in order to commit a crime. In addition, they State that since firearms are long lived assets, laws simply effect only public sales of firearms involving a licensed dealer.

They have no jurisdiction in effecting private sales and transfers as mentioned earlier thus indicating that legislators and Federal agencies must begin to monitor such markets as closely as possible.

Although this study find results in line with most of the literature, the biggest limitation to this study is the availability on the necessary data points. The role of the ATF is to appropriately manage the sale and distributions of firearms, but with growing gangs, violence and black-market sales, it is impossible to aggregate the amount of public and private deals that contain firearms, thus restricting this study significantly. We can assume that with the correct data, we can make appropriate policy implications that with stricter gun laws and stringent access to firearms, the United States can observe a significantly lower rate of crime. Further research must be done on the significance of the firearms black market in order to truly understand the ease of access. Only then will it be possible to measure the effectiveness of gun control laws as we can already view the limitations of such laws only partially impacting the problem. In addition, further research needs to focus on how such black markets can also increase the chances of spillover effects. Since States vary drastically in relation to their gun control laws, a simple metric can underestimate such effects while also not taking into consideration of the spillover effect. By pinpointing certain measures for such spillovers, studies can learn the true ease of access citizens and criminals have to firearms in order to show how such lax laws in certain States can affect crime rates overall across several States and not only in one. This will help add depth to gun control studies as studies already conducted including this one show inconclusive evidence to support that gun control truly reduces crime.

## *Section 5, Conclusion:*

Using State-level data from the years 2000-2015, this study examined the relationship between gun control legislation and violent crime rates controlling for several socioeconomic factors. Conclusively, this study can implicate that gun control laws and crime are no simple matter. When it comes to explaining violent crime rates across the nation, there are several factors influencing these incidents as shown through the varying literatures and results of this study. No one variable can explain the impact and reasoning behind all the crime that occurs. That being stated, this study uses various factors, from financial incentives to socioeconomic status to estimate the relationship of gun legislation on violent crime rates. Even though this

study does not find significance between the variables of most interest, it can suggest that for legislators the problem is not simply to reduce firearm accesses but to also efficiently implement successful educational and economic growth programs. As shown through this study, law enforcement as well as legislators must look at existing laws and amend them in order to uniformly implement laws across the nation. Only then can legislation move forward to also find ways to monitor and curtail the illegal market of firearms. With growing rates of firearm deaths and violent crimes, any effort must be taken to reduce such incidents by both Federal and State governments. As Stated by Cook and Ludwig (2001), the American public is always willing to pay for more security. With the odds of being involved in a deadly firearm interaction increasing on a daily basis this inclination for more security is even more crucial.

Further research can be developed to understand the levels of firearm spillovers across State lines and dwell deeper into a metric measuring the ease of access to firearms in each State. While traditional measures of laws aren't inconclusive, studies in this field have found it difficult to accurately score and rank State level legislation as they differ frequently and are open to interpretation. Indeed, this study finds significance in ways to reduce violent crime rates across the nation, but further research must be provided to understand the role of firearms in crime. As firearm sales still remain at a high and public discourse in these arenas are rampant change in future legislation is sure to come, but to what extent do these laws effect violent crime and firearm incidents is still up for debate.

For the Federal government, infringing upon a citizen's rights is at the heart of all gun control debates and to such a degree lawmaker must heed such civil liberties when deciding on how to move forward with gun control. As this study shows, resources and efforts can be pointed in the direction to educate the younger generations and carry out programs to promote economic growth in order to incentivize individuals away from committing a crime. The core of gun violence and crime is deeply rooted amongst other factors and as the literatures shows, this problem has been around for decades. This indicates that existing laws are insufficient in achieving the roles they were intended to do, which is to keep the public safe.

Table 1: VIF's

| Variables | VIF |
|---|---|
| POP (Population) | 10.97 |
| POS (Police Spending Gross) | 9.78 |
| POV | 3.20 |
| INC | 2.88 |
| MINW | 2.65 |
| RANK | 2.54 |
| POL | 2.25 |
| CHECK | 1.74 |
| UNR | 1.71 |
| EDU | 1.49 |

Table 2: Fixed VIF's

| Variables | VIF |
|---|---|
| ln (INC) | 3.27 |
| POV | 2.87 |
| MINW | 2.81 |
| RANK | 2.74 |
| POL | 2.31 |
| ln (CHECK) | 1.84 |
| UNR | 1.71 |
| ln (PSP) | 1.50 |
| EDU | 1.50 |

Table 3: Descriptive Statistic

| Variable | Obs. | Mean | Standard Deviation | Minimum | Maximum |
|---|---|---|---|---|---|
| *VCR* | *816* | 409.26 | 215.08 | 78.2 | 1,637.9 |
| *NVCR* | 765 | 3,194.15 | 837.68 | 1,524.4 | 6,409 |
| *POV* | 816 | 13.35 | 3.35 | 5.6 | 23.9 |
| *INC* | 816 | 48,509.65 | 8,971.20 | 30,187 | 75,784 |
| *MINW* | 816 | 6.37 | 1.28 | 1.6 | 10.5 |
| *UNR* | 816 | 5.88 | 2.01 | 2.3 | 13.7 |
| *EDU* | 816 | 53.76 | 9.55 | 19.37 | 78.22 |
| *RANK* | 800 | 25.36 | 14.35 | 1 | 50 |
| *POL* | 816 | .54 | .49 | 0 | 1 |
| *CHECK* | 816 | 262,360 | 331,214.10 | 7 | 3,218,371 |
| *PSP* | 816 | 204.61 | 85.34 | 0 | 673.67 |

Table 4: Results

|  | Model 1 | Model 2 |
|---|---|---|
|  | VCR | NVCR |
| Dependent Variable | | |
| POV | -5.42*** | -72.47*** |
|  | (1.88) | (10.66) |
| UNR | -4.56*** | -2.50 |
|  | (1.35) | (8.06) |
| MINW | -15.48*** | -81.78*** |
|  | (3.07) | (18.62) |
| ln (INC) | -41.82 | -1732.70*** |
|  | (36.38) | (212.86) |
| EDU | -.744** | -1.69 |
|  | (.353) | (2.06) |
| POL | -17.42** | 6.41 |
|  | (8.54) | (49.14) |
| ln (PSP) | 81.98*** | 158.21 |
|  | (17.68) | (101.61) |
| RANK | 2.95 | 24.15 |
|  | (5.38) | (24.33) |
| RANK$^2$ | -.062 | -.428 |
|  | (.101) | (.456) |
| ln (CHECK) | -7.80 | -64.39 |
|  | (7.47) | (43.29) |
| Cons | 606.39* | 21898.96*** |
|  | (354.23) | (2059.32) |
| N | 800 | 750 |
| R$^2$ Within | 30.87% | 65.18% |

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