

HEALTH INSURANCE TO DIE FOR:  
THE IMPACT OF THE ACA'S MEDICAID EXPANSION ON CRIMINAL HOMICIDE RATES

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By

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ABSTRACT

While a significant body of research details the effects of Medicaid Expansion under the Patient Protection and Affordable Care Act of 2009 (ACA) on patient outcomes and economic impacts, few studies investigate the fringe effects of this expansion on crime and violence—including the effects on rates of criminal homicide. Using criminal homicide data for the years 2012 to 2016 from the Murder Accountability Project, a non-profit organization that has sued for criminal homicide records from all law enforcement jurisdictions across the US, I estimate the effect of the Medicaid expansion under the ACA on the rate of criminal homicide observed in states that did and did not pursue program expansion. Using a fixed effects model, I find that on average the Medicaid expansion under the ACA led to between a three and four person per million decline in the rate of criminal homicide in states that did expand their Medicaid program as compared to states that did not pursue expansion. This overall reduction is not shared across all races; in fact, black victims saw a relatively minor increase in criminal homicide rates in expansion states. This points to the necessity for innovative policy solutions and program implementation that address the cultural differences in the way in which populations access healthcare to ensure that all populations benefit from health insurance expansion.

## Acknowledgements

The research and writing of this thesis  
is dedicated to the lives that are lost in violence.

It is my hope that in some small way, this contributes to a growing body of research that supports decision-making aimed at lifting Americans out of poverty and ensuring all communities have the opportunity to chase their dreams.

Many thanks,  
Elle K. Loveseth, B.A.

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## **I. Introduction**

In this paper, I will study the relationship between access to health care and rates of criminal homicide by comparing states that expanded their Medicaid program under the Patient Protection and Affordable Care Act (ACA) to states that chose not to expand their Medicaid program. As increased access to mental health services, addiction services, and health care in general has been linked to greater overall well-being, it is probable that access to care is also linked to lower rates of violence (Roy, Riley, Herrin, Spatz, Arora, Kell, et al., 2018). The Medicaid expansion has been linked to falling crime rates and criminal homicide<sup>1</sup> in expansion states, yet these studies have relied on the Federal Bureau of Investigation's crime projections rather than a complete dataset of criminal homicide data (We, 2018). While many states have experienced falling trends in criminal homicide rates over the past ten years, others have experienced relatively stable rates of criminal homicide from year to year. Interestingly, some states with progressively declining murder rates have experienced sharp upticks in murder rates between 2016 and 2017. These sharp increases are apparent in states such as California and Illinois, which have also experienced increasing numbers of mass killings since 2013. Policy solutions to criminal homicide and to mass killings will likely differ, as will the effects of access to care on each type of violence. This paper will focus on overall criminal homicide trends, as comprehensive data is not yet available for the year 2017.

My hypothesis is that criminal homicide rates will fall more sharply in states that pursued the Medicaid expansion under the ACA as compared to states that did not pursue expansion. To test this hypothesis, I will use data gathered from a variety of governmental and non-governmental sources. As not all law enforcement entities are required to report their crime rate data, the FBI instead compiles a dataset of criminal activity in the US that relies on projections to fill in missing or

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<sup>1</sup> Criminal homicide encompasses manslaughter, first-degree murder, or criminally negligent manslaughter. This measure does not include murder in self-defense, accidental manslaughter, or suicide.

unreported data. Rather than use the FBI projections, I instead use a dataset of criminal homicide activity obtained from the Murder Accountability Project, which sued each law enforcement entity that does not report data to the FBI under the Freedom of Information Act.<sup>2</sup> This dataset is the most complete picture of homicide data in the US, and is likely to yield a more accurate results than the estimated FBI dataset. I have compiled demographic data from the US Census Bureau to use as controls within the model and have estimated gun ownership at the state-level using a combination metric of hunting licenses from the US Fish & Wildlife Service's Wildlife & Sport Fish Restoration Program and suicide by firearm data from the Center for Disease Control's (CDC) Injury Prevention and Control data. Data detailing each state's Medicaid expansion status have been consolidated from the Kaiser Family Foundation's Medicaid Expansion Status tracker.

I utilize a fixed effects model to analyze data from a period of 2012 to 2016, as data from 2017 are not yet fully available for all model controls. The unit of analysis for my model is the county-level, although some demographic controls are only available at the state level; the Medicaid expansion, is my main variable of interest and adopted at the state level. I perform sensitivity testing to ensure that my model shows improvements over a pooled OLS model and the demographic variables are suitable controls for the model.

Using this framework, I find that states who expanded their Medicaid programs under the ACA demonstrate a small decline in the rate of criminal homicide as compared to states who did not expand their Medicaid programs. While the effect is small, the majority of the effect is attributed to a decline in deaths of white males; in fact, there is a small increase in criminal homicide rates associated with the Medicaid expansion for black victims. This indicates the need for additional study into the impact and effectiveness of the expansion to ensure that all demographics benefit from the expansion. It is possible that while the Medicaid expansion under the ACA provided health

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<sup>2</sup> The Freedom of Information Act requires the US government to release full or partial government records and documentation upon request.

insurance coverage to low-income individuals, access to care is still impeded due to an increased demand in services and a supply that cannot scale quickly enough to meet this need.

In the next section, I provide background of the development of the health insurance sector in the US and a summary of the relevant literature surrounding the impact of the Medicaid program on the economy, health outcomes, poverty, and violence. By the end of the section, readers should be well-versed in the intersection of health and economic outcomes. Section III begins with my theoretical framework and moves into a discussion on factors that explain in more detail the relationship between poverty, crime, violence, and health insurance. Section IV describes the data that have been used in my analysis, as well as the potential limitations that use of each dataset poses. In Section V, I present my empirical model, my analytical approach, and the potential limitations posed by my model and methodology. Section VI describes my empirical results, how the results change over different model iterations, and how the trends in states that expanded their Medicaid program differ from overall trends during the studied time period. In Section VII, I conclude my paper with a discussion of the implications of my findings, expanding in particular on the impact of these findings on current public policy issues in health equity.

## **II. Background and Literature Review**

In this section, I discuss the socio-political history of the development of the health insurance market in the US, the coverage gaps that resulted from this series of decisions, and the ways in which the ACA sought to close the coverage gaps and provide affordable care to all Americans. I then provide an analysis of the impact of the ACA on the insurance market, including its successes, its limitations in expanding coverage through Medicaid, and the effects of legal challenges to the Medicaid expansion portion of the landmark health bill. Finally, I provide a summary of the growing body of literature that investigates the impact of the Medicaid program and its expansion under the ACA on state economies, communities, and individuals.<sup>3</sup>

### **1. The History of the US Insurance Market**

The United States is one of the only industrialized nations that lacks some form of universal health insurance, though it is more for the lack of political will than a true lack of need. While the US grappled with weak institutions and a fragmented federal system that made it difficult to form a national compulsory health care system, other countries with stronger federal systems saw success in enacting national health insurance programs. The health insurance market as it stands today was developed by a series of deliberate choices made by the US government under influence from the medical community. While strong federal systems were successful in instituting early forms of compulsory health insurance—such as Germany and England—the US faltered due to weak political institutions, deliberate actions by the health care industry, and a structure of federalism that relied to a large part on state decision in health care. By failing to seize the opportunity to institute universal coverage in the early 1900's, these deliberate choices placed the US instead on a

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<sup>3</sup> The background information in this section is attributed to Hacker, 2002, unless otherwise noted.

path that segmented the health insurance market and allowed for the exclusion of certain populations from the market entirely.

The health insurance system began developing in the early 1900's, when there was a demand for injury and disability insurance to protect against wage loss and income shocks associated with adverse health events. While the US demonstrated interest in compulsory health insurance at the time—as evidenced by its inclusion as a key component of President Theodore Roosevelt's 1912 presidential campaign—the reliance on states' actions eventually stymied movement on the issue. State legislators balked at the responsibility of creating a state-run health insurance scheme, and the compulsory health insurance movement crumbled under the onslaught of opposition from the American Medical Association (AMA). This failure opened an opportunity for the market and providers to shape the nature of health insurance and health care delivery in the US. As the market developed without regulatory action, hospitals began marketing pre-paid health care plans to employers in the early 1920's; this provided the framework for the employer-sponsored insurance (ESI) market, where employers could compete by offering benefits to their employees in the form of employer-sponsored hospitalization insurance plans.

As both the supply and demand for medical services were rising, questions around access to care began to infiltrate the national policy agenda. Although health insurance arose as a topic of discussion during the design of welfare programs under the Social Security Act of 1935, the public will and public interest in health insurance was insufficient for it to become a focus of the bill.

Instead, the welfare program centered around unemployment insurance—missing what would be the first in a long line of critical policy windows for the adoption of a universal health care system.

In the following years, the health insurance market developed in response to changing market demands. When the federal government froze wages during World War II, companies searched for innovative strategies to attract talent in a constricted labor market. By offering health insurance as

a fringe benefit to employees, employers found a novel mechanism to increase worker compensation without raising wages. Combined with a 1943 Internal Revenue Service (IRS) ruling that provided a tax exemption for employer-sponsored health insurance, the market for ESI boomed. The development of the ESI market would define the future growth of the health insurance market in the US, becoming increasingly path dependent as the ESI market fought back against government interference.

This pressure came to a head in 1945, as President Harry S. Truman faced fierce opposition against his newly proposed—and publicly popular—public health insurance plan. With opposition mounting from the Chamber of Commerce, AMA, and the American Hospital Association (AHA), the proposal crumbled. Meanwhile, the ESI market flourished, attracting the support of labor unions and the public sector, in addition to gaining further traction within the private sector. ESI had survived the political onslaught and became further entrenched as the largest player within the market.

The effects of ESI's solidification as the major health care market would span generations, but the most pressing concern—a concern that continues today—was that ESI by design could not provide universal coverage; as insurance was tied to mostly white-collar employment, the poor, sick, and elderly could not afford care. During the 1960's this concern again sparked interest in public insurance, but this movement was not aimed at reforming the system to provide universal coverage or de-couple insurance from employment; instead, coverage would be targeted at certain “deserving groups” that had been left out of the ESI market. The 1960 Kerr-Mills Act set provisions to provide states with federal matching funds for health assistance programs, and an amendment to the Social Security Act created the Medicare and Medicaid programs in 1965. Combined, these bills provided the structure and federal funding mechanisms to create public health coverage via Medicare and Medicaid for the elderly and the poor or disabled, respectively.

While the Medicare and Medicaid programs provided meaningful coverage for select groups that were left out of the ESI market, health insurance was still out of reach for the unemployed and for the working poor. During the 1970's, Senator Ted Kennedy took advantage of another public movement for universal coverage by proposing a single-payer system that would separate health insurance from employment and establish the government as the sole insurer in the market. President Nixon countered with an alternate proposal, one that preserved the current piecemeal system and instead expanded public insurance coverage to those who were excluded from the current system. Before a consensus could be reached for reform, the public agenda shifted in the wake of the Watergate scandal—and the health insurance debate fell dormant once again.

After a silence of roughly 20 years, an ambitious plan to provide a universal coverage coalesced under the Clinton administration in the early 1990's. Health insurance reform was high on the President's agenda, and a Democratic Congress seemed to support the movement for reform—although they disagreed on the contents and context of the reform. While President Clinton's plan preserved the current blend of public and private insurance offerings in the US system, it provided government sponsored vouchers to purchase insurance within the current system. Although the plan aimed to provide universal coverage, it did not necessarily satisfy the entire Democratic party; in particular, proponents of a single-payer system did not feel that the proposal went far enough. While the timing seemed rosy at first, the Democratic Party lost its Congressional majority by the time the plan reached Congress; with their majority went another chance to reform the fragmented health insurance system.

The next opportunity for reform would come under the presidency of President Barack Obama. While health insurance was not a primary focus of President Obama's initial campaign platform, feedback from constituents during his presidential campaign sparked his interest in the subject. The ACA would enact market reforms to strengthen consumer protections, create a strong individual market with subsidized plans, expand public coverage to the working and child-less

poor, and provide a public option for insurance coverage.<sup>4</sup> While the ACA modeled its reform efforts on a Republican solution to universal health coverage first enacted in Massachusetts, support for the bill was split on party lines—not one Republican in Congress voted for the bill (Congress.gov, 2019). Ultimately, the public option was removed from the bill as a compromise to win moderate Democrat votes, securing the passage of the ACA in 2009. Although many attempts have been made by Republicans to repeal and/or replace the ACA, its insurance market reforms have largely remained untouched since its passage.

## **2. Access Issues and the ACA's Solution**

In 2008, 44.2 million (17.1%) adults in the US under the age of 65 lacked health insurance (Kaiser Family Foundation, 2018).<sup>5</sup> By tying health benefits to employment, the US' insurance system had largely left out single adults and the working poor. Even some Americans with full-time work lacked health insurance, as employers were not required to provide insurance to their workers. Without access to employer health insurance, two options were left: public programs (such as Medicaid), or the individual insurance market. As Medicaid and public insurance programs were need-based, many Americans found themselves with incomes too high to qualify, yet were still unable to afford premiums in the individual market.

Rather than consolidate markets, the ACA sought to shift the uninsured into one of the pre-existing insurance markets. The ultimate goal of the ACA was to provide access to health insurance for all Americans, regardless of health status or the ability to pay. Before the ACA was passed, insurance companies were able to exclude patients with pre-existing health conditions, such as cancer or

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<sup>4</sup> A public option is a government-run insurer that would compete against private companies in the private market. This is a hotly contested issue, with proponents arguing that this insurance option would drive prices down in the private market, and opponents arguing that it would be impossible for private companies to compete with the government on price.

<sup>5</sup> The elderly over the age of 65 are eligible for medical coverage under Medicare; most children are eligible for insurance under CHIP. Most of the uninsured population were low to moderate income Americans in between the age of 18 and 64.

diabetes; these conditions resulted in higher than normal health care utilization and cost, which insurance companies viewed as cutting into their bottom line, in addition to driving up premium prices for everyone else in the risk pool. While insurance companies could not technically deny coverage to those already enrolled in a plan, some did use creative ways to decline to pay for treatments or invalidate coverage for patients with costly conditions. In addition, they could deny coverage for persons with pre-existing conditions who had let coverage lapse or offer costly premiums that were unaffordable to exclude these people from coverage. While this requirement for continuous coverage existed to prevent issues of moral hazard, where patients only purchase health insurance after they know they are sick, it also created insurmountable barriers for people with pre-existing conditions who had lost employer-based insurance or had unplanned coverage gaps to access coverage.

### **3. Effects of the ACA on the Individual Market**

The ACA also included consumer protection requirements for health plans to follow, including requiring health plans to offer a list of essential health benefits. Since comprehensive coverage was expensive to offer in the individual market, many insurers offered high deductible plans with skimpy health benefits. While these plans provided affordable options, purchasers did not always understand that medical emergencies could leave them penniless, as insurance coverage would not kick in until the deductible was exhausted. It was possible that insurance did not cover childbirth or maternal healthcare, which policy holders would not realize until they had become pregnant. To ensure that these circumstances did not adversely affect those who purchased healthcare, the ACA sought to streamline and standardize the most basic care.

### **4. Effects of the ACA on the Employer Sponsored Insurance Market**

As the insurance offered on the existing employer sponsored insurance (ESI) market was generally comprehensive, the ACA did not set to change many aspects of the market. Most of the

requirements outlined for the individual market would not apply in the ESI market, such as the requirement to offer mandatory comprehensive benefits.

The ACA instead focused on ensuring that employers offered health insurance to their employees. Employers with over fifty employees were required to offer health insurance or face a tax penalty. As small employers with less than one hundred employees faced expensive health insurance plans due to small risk pools and high administrative costs, a Small Business Health Options Program (SHOP) would be set up in every state to create a group market for small businesses to purchase insurance. If an employer had fewer than fifty employees and did not offer insurance, these individuals would have the opportunity to purchase insurance on the individual market; if these employees made under 138 percent of the federal poverty line (FPL), they could qualify for Medicaid in expansion states (KFF, 2017).

#### **5. Effects of the the ACA on the Medicaid Program**

Most of the issues addressed by the ACA applied to the individual market, as both government-funded and employer health plans provided comprehensive coverage; however, even providing subsidies for plans in the individual market would not make them affordable enough for everyone to purchase health insurance. Rather than further subsidizing individual market plans for those near or under the FPL, the ACA would expand the Medicaid program to cover adults up to 138 percent of the FPL (KFF, 2015).

This portion of the policy was highly contested, and states balked at both the politics and the price tag. Although states would ultimately only be responsible for 90 percent of the cost of individuals covered under the expansion—the federal government would fund the rest—state governors balked at this expense. By 2021, states will be responsible for 10 percent of the cost of enrollees under the expansion, with the federal government reducing its funding each year until it reaches the 90 percent funding cap. In combination with the poor optics of accepting a health plan that was

so politically divisive, a group of states argued that the federal government had overstepped its power and violated the state's right to make the decision to expand its Medicaid program. Ultimately, the Supreme Court ruled the Medicaid expansion as optional—not unconstitutional—and 20 states moved to expand the program (KFF, 2015).<sup>6</sup>

## **6. Effects of Market Reform under the ACA**

Regardless of its demonstrated success in lowering the uninsured rate, the ACA has remained controversial. Before the ACA was passed, roughly 16 percent of the US non-elderly population was uninsured (KFF, 2017). While most of the provisions in the ACA did not go into effect until 2014, the implementation of early provisions in 2010 resulted in gradual improvements to the uninsured rate; by 2016, the ACA had been fully implemented, and the national uninsured rate had dropped to 10.3 percent of the non-elderly population (KFF, 2017).

The choice to expand the Medicaid program has the potential to strengthen state economies, largely driven by the influx of federal funding into state budgets, factors such as increased productivity by healthier workers, and significant investments in the growing health sector. Based on state budgets and projections, the Medicaid expansion is expected to bring increased economic activity to the state, increased resident employment and earnings, as well as provide a net positive impact to the state budget due to federal matching fund and a shifting of care from state-run health programs to the Medicaid program (Dorn, Holahan & McGrath, 2013). As the federal government has committed to funding 100 percent of the costs from the expansion population until 2016, early reports demonstrated no additional fiscal burden for state budgets (KFF, 2015). Further, there was also demonstrated net savings to the budget as state-run health programs for uninsured or disadvantaged populations received less demand for services (KFF, 2015). Longer term economic

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<sup>6</sup> National Federation of Independent Business et al. v. Sebelius, Secretary of Health and Human Services, et al., 567 U.S. 519 (2012)

gains have also been demonstrated; it has been estimated that for every \$1 invested in Medicaid, the state will receive 36 cents back in income taxes in the future (Brown, Kowalski & Lurie, 2017).

With new policies such as work requirements that restrict the access to the Medicaid program, it's important to understand what effects the Medicaid program and insurance access has on society, and whether these benefits outweigh the costs.

## **7. Impacts of the Medicaid expansion on Individuals and Families**

The impact of the Medicaid expansion under the ACA has been studied extensively. The broad thematic overviews of the literature include: overall coverage impacts, access to care, utilization of health benefits, health plan affordability, health outcomes, economic effects and overall impacts to society. States that have expanded their Medicaid program have largely enjoyed positive effects in each of these areas, with a few notable exceptions (KFF, 2017).

Overall, insurance coverage in states that expanded their Medicaid program has vastly improved. By September 2015—in the second year after full ACA implementation—uninsured rates in states that expanded their Medicaid program were estimated to be 7 to 8 percentage points lower than in states that had not expanded their Medicaid program (Miller & Wherry, 2017; Decker, Lipton & Sommers, 2017). While the uninsured rate has decreased in both urban and rural areas in states that adopted the Medicaid expansion, rural areas experienced larger decreases in uninsured rates than urban areas post-expansion (CCF & NC Rural Health Research Program, 2017). In addition, spill-over effects from the efforts to reach new enrollees in expansion states have been linked to greater increases in enrollment for children (who were already eligible for coverage under Medicaid or CHIP) in expansion states versus non-expansion states (CCF & NC Rural Health Research Program, 2017).

Access to care and the affordability of care were also impacted by the Medicaid expansion.

Compared to adults in non-expansion states, adults in expansion states reported more frequent

primary care visits, higher rates of diagnosis for diabetes and cholesterol, as well as lower rates of needing to delay medical care for financial reasons; however, adults reported more difficulty in scheduling appointments and longer wait times before being able to see a doctor in expansion states (Miller & Wherry, 2017; Seldon, Lipton & Decker, 2017; Sommers, Blendon & Orav, 2016). Increased wait times can be attributed to the higher demand created by the sudden enrollment jump in the first year of the ACA's implementation, as well as the fact that Medicaid reimbursement rates are significantly lower than private insurer or Medicare rates.

The Medicaid expansion has been associated with increased health outcomes in expansion states, both for children and adults. As maternal health care is linked directly to the health of the child at birth, expansions in health insurance are linked to greater health outcomes for babies and children both in childhood and beyond (). For example, while infant mortality has fallen for both expansion and non-expansion states, states that expanded their Medicaid program saw a 50 percent greater reduction in infant mortality rates than states that did not expand (Bhatt & Beck-Sagué., 2018).

While it was theorized that the Medicaid expansion would lead to a decline in employment or movement within the labor markets, it has been estimated to have no significant impact on the employment of childless adults who lacked access to health insurance before the expansion (Gooptu, Moriya, Simon, & Sommers, 2016; Leung & Mas, 2018). In addition, individuals with disabilities are more likely to be employed in expansion states (Hall, Shartzler, Kurth & Thomas, 2018).

The Medicaid expansion has also resulted in improvements in the financial well-being of low-income adults in expansion states. Low-income adults in expansion states have experienced a reduction in medical debt that is nearly double that of the reduction experienced in non-expansion states (Golberstein & Sojourner, 2017). Compared to non-expansion states, adults in expansion

states also reported declines in the inability to afford follow-up medical care, as well as decreases in worrying about paying medical bills (Miller & Wherry, 2017).

In addition to improvements to health and financial well-being, the Medicaid expansion has also been linked to positive effects for society that reach far beyond the direct goal of a healthier population. Based on previous research, health and wellness are determinants of financial security, educational attainment, and gains in social determinants. While the effects of increased coverage under Medicaid expansion has been studied extensively, fewer studies exist that link the Medicaid expansion to effects beyond simple coverage gains.

One study linked the Medicaid expansion to increased rates of volunteerism that was not observed in states that did not expand their Medicaid program (Sohn & Timmermans, 2017). Further study is needed in this area to examine the effects of health insurance access on the interaction of people within their communities, as well as the overall benefit to society.

### **8. The Impact of the Medicaid Program on Poverty and Crime**

Medicaid is the third largest poverty-reducing program in the US and was responsible for keeping roughly 2.6 million people out of poverty in 2010 (Sommers & Oellerich, 2017). Poverty in childhood has been linked to poorer outcomes later in life, including poorer mental health and lower educational attainment (Nikulina, Widom & Czaja, 2011). Medicaid expansions between 1997 and 2009 have been shown to improve mental health status among low-income parents, which is a determinant of childhood mental health (Mcmorrow, Kenney, Long & Goin, 2016).

Medicaid and CHIP expansions have demonstrated long-term benefits that stretch into adulthood for recipients; as enrollment for children also increased as a spill-over effect of the Medicaid expansion, states who expanded may expect to see long-term economic effects that are not immediately apparent. Having health insurance as a child is linked to greater economic security in adulthood as well as greater educational attainment. Long-term economic benefits include higher

payments in income taxes, lower Earned Income Tax Credit payments, and increased wages for women (Brown, Kowalski & Lurie, 2017).

Poverty and income inequality have also been linked to violent crime; homicide and assault are particularly closely associated with poverty and inequality, and they demonstrate a stronger relationship than that of rape and robbery (Hsieh & Pugh, 1993).

As Medicaid functions as one of the major poverty-reducing programs in the US, it is likely that it has an effect on crime. Few studies examine the effect of a Medicaid expansion on crime rates, and no studies examine the impact of the Medicaid expansion under the ACA. One recent study examined the impact of the Medicaid expansion under HIFA waivers on reported crime; this study found there were greater reductions in crime in states that expanded their Medicaid program (Wen, Hockenberry & Cummings, 2017). Most of the decline can be attributed to reduction in petty theft, burglary, and other crimes committed for monetary gain; the authors hypothesize that the greater financial security afforded to low-income recipients of Medicaid in expansion states has increased the opportunity cost for crime and lowered incentives to commit crime.

My original contribution to the literature is further study on the connection between poverty, health insurance, and rates of criminal homicide. While the effects of the Medicaid expansion on medical procedure utilization and health outcomes have been thoroughly examined, there is a smaller body of research that examines the fringe effects of health insurance access on society. With a current growing body of research on the social determinants of health and their impact on quality of life and health status, it is more important than ever to examine health insurance as a public good with benefits to society beyond improvements in health at the patient-level. By examining the impact of the Medicaid expansion on the rate of criminal homicide, I aim to provide a further link to solidify the fringe effects of health insurance on society as a public good that has value for all Americans—not only those who can afford it.

### **III. Theoretical Framework**

In this section, I develop a theoretical framework to measure the impact of the Medicaid expansion on criminal homicide. The empirical model that follows is based on this theoretical framework and is designed to explore the relationship between poverty, insurance status, and violence.

$$\text{Homicide} = f(\text{Poverty, Insurance Status, } D, \mu) \quad (1)$$

The Medicaid expansion is not only a vehicle for expanding insurance; it is also a mechanism to relieve poverty. If obtaining medical insurance provides access to comprehensive care, it follows that individuals should miss less work due to illness. Not only is care more accessible, but it is also more affordable; individuals will be more likely to pursue care if it is subsidized by health insurance. In addition, less individuals will fall into poverty due to medical debt. As demonstrated, the Medicaid program directly influences both the insurance status and likelihood of poverty for individuals near or below the poverty line. As poverty is correlated with increased rates of violent crime—including homicide—it follows that an individual with health insurance is less likely to experience poverty due to unpaid or expensive medical bills, and therefore less likely to commit an aggressive crime such as homicide.

## **IV. Data and Methods**

In the following section, I provide an overview of the data that I have included in my model, including the source of the data, collection methods, and observed inconsistencies in the data. I provide insight into the limitations and challenges presented by the collection methods for each data source, in addition to strategies that I have employed to lessen the impact of potential bias in my model. Where appropriate, I outline the reasoning behind the choice of data, in particular for cases where I chose between multiple sources of data or where I chose to estimate a population statistic for lack of an available data source.

The national homicide data set comes from the Murder Accountability Project a nonprofit group that compiles records from the FBI and local jurisdictions under the Freedom of Information Act. The FBI's dataset is generally regarded as the most reliable dataset for crime in the US; however, it has significant missing information due to non-response from police and sheriff agencies across the US.<sup>7</sup> The Murder Accountability Project seeks to remedy this issue of missing data by suing for missing records under the Freedom of Information Act and combining them with the FBI dataset to form a more accurate picture of homicide and corresponding clear rates.<sup>8</sup> The data is organized at the individual level and will be collapsed to the county-level; counties are identified in the dataset by the county FIPS number.

As gun ownership is correlated with increased rates of gun violence, I will be including a variable to control for the rate of gun ownership in each state. As there is no national registry for gun ownership and owners only register a new purchase, I estimate gun ownership per state using firearm suicides and hunting licenses as proxies. This methodology will be based on the theoretical

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<sup>7</sup> While the FBI database is comprehensive, it is not a complete dataset of all crime that occurs in the US; the FBI estimates crime rates for the jurisdictions that do not report crime data.

<sup>8</sup> A crime is cleared when the handling law enforcement agency charges an individual with the crime; a case is still considered cleared even if the individual charged with the murder is acquitted of the crime.

framework laid out in Siegel, Ross & King; 2014. Firearm suicide data will be gathered from the Center for Disease Control’s (CDC) Injury Prevention and Control data. Historical license data will be gathered from the US Fish & Wildlife Service’s Wildlife & Sport Fish Restoration Program. The combination of these measures divided by the state population (from the US Census Bureau) will yield an estimate of gun ownership at the state level.

Data regarding state expansion of Medicaid under the Affordable Care Act are gathered from the Kaiser Family Foundation’s online Medicaid tracker. These data include overall expansion status, date expanded, waivers that could impact access to services, and uninsured rates per state. The Kaiser Family Foundation is highly regarded as a primary source for information about healthcare access and the Affordable Care Act’s impact on insurance markets in the US. As the Medicaid expansion is adopted at the state level, these variables are also be matched at the state level.

Demographic controls are gathered from US Census data, and include socio-economic status, education, unemployment, and population statistics. See the following tables for descriptive statistics.

## 1. Summary Statistics

Table 1: Descriptive Statistics (Murder Accountability Project)

<b>Table 1. Descriptive Statistics (Murder Accountability Project )</b>						
	<b>Obs.</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>	<b>Sum</b>
<b>vic_hom</b>	7535	10.53	35.81	1	829	79312
<b>vic_female</b>	7535	2.23	5.60	0	99	16771
<b>vic_male</b>	7535	8.27	30.60	0	752	62336
<b>vic_black</b>	7535	5.36	23.54	0	636	40355
<b>vic_white</b>	7535	4.78	15.11	0	400	36032
<b>vic_hisp</b>	7535	1.20	10.26	0	344	9062
<b>vic_race_other</b>	7535	0.39	1.63	0	38	2925
<b>weapon_gun</b>	7535	0.27	0.98	0	30	2000

Table 2: Descriptive Statistics (KFF Medicaid Expansion Data)

<b>Table 2. Descriptive Statistics (KFF Medicaid Expansion Data )</b>						
	<b>Obs.</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>	<b>Sum</b>
<b>expanded</b>	15712	0.25	0.43	0	1	3963
<b>waiver</b>	15712	0.14	0.34	0	1	2150

## 2. Data Limitations and Challenges

One of the main challenges of the data used in the model is the presence of missing observations for certain counties in certain years. Due to the collection and summarization methods of the census, population estimates and economic indicators are missing for certain counties in many years, likely due to under-sampling in that particular census area. While most missing observations are available in the surrounding years, missing values lead to unbalanced panel data.

Additionally, the victim count variable in the FBI's homicide dataset does not accurately capture the number of deaths per incident. This points to issues in the tracking of homicide data, and how and when law enforcement agencies update their records. There is a discrepancy in many cases, where the total victim count does not correspond with the amount of individual entries associated with the case; this may have resulted from victims who succumbed to injuries related to the incidents after the police report was originally filed, or other reporting errors. For my analysis, I have chosen to sum the individual records rather than using the victim count field, as this count has an upward limit and has demonstrated inaccuracies against the individual homicide record data.

Similarly, the criminal homicide dataset I use relies on self-reporting from law enforcement jurisdictions with little oversight and no central reporting system. It is possible that there are missing data that could stem from inaccuracies in reporting, missing records, or the failure to properly log homicide data. The lack of a consistent database to log records across all law enforcement agencies, in addition to there being no requirement for all agencies to report crime data to the FBI, has stymied the ability for any agency to regulate or provide oversight for record

keeping in these agencies. While I believe that this dataset is has the most accurate criminal homicide data available, I cannot rule out potential bias in the model due to inaccurate reporting by the local law enforcement agency.

## V. Econometric Model

Next, I outline the underlying econometric model used in my analysis, followed by the methodology used to employ the model. I conclude this section with a discussion of the limitations of the model.

I estimate the following equations:

$$\begin{aligned} \text{homicide\_rate} = & \beta_0 + \beta_1\text{vic\_female} + \beta_2\text{vic\_black} + \beta_3\text{vic\_hisp} + \beta_3\text{vic\_other} + \beta_4\text{year} + \quad (2) \\ & \beta_5\text{mass\_killing} + \beta_6\text{gun\_ownership} (\text{hunting\_licenses} + \text{firearm\_suicides}) + \beta_7\text{expanded} + \\ & \beta_9\text{uninsured} + \beta_{11}\text{median\_income} + \beta_{11}\text{hs\_education\_less} + \beta_{11}\text{unemployed} + \mu \end{aligned}$$

$$\begin{aligned} \text{homicide\_rate} = & \beta_0 + \beta_1\text{vic\_female} + \beta_2\text{vic\_black} + \beta_2\text{vic\_black*expanded} + \beta_3\text{vic\_hisp} + \\ & \beta_3\text{vic\_other} + \beta_4\text{year} + \beta_5\text{mass\_killing} + \beta_6\text{gun\_ownership} (\text{hunting\_licenses} + \quad (3) \\ & \text{firearm\_suicides}) + \beta_7\text{expanded} + \beta_9\text{uninsured} + \beta_{11}\text{median\_income} + \beta_{11}\text{hs\_education\_less} + \\ & \beta_{11}\text{unemployed} + \mu \end{aligned}$$

Where:

**homicide\_rate** is the number of homicides per county per million people.

**expanded** indicates whether the state expanded their Medicaid program under the ACA; it equals one in a year in which a state has expanded and zero otherwise.

**vic\_female** is the percentage of homicide victims per county who are female.

**vic\_black** indicates the percentage of victims per county who are identified as black.

**vic\_hisp** indicates the percentage of victims per county who are identified as Hispanic.

**vic\_white** indicates the percentage of victims per county who are identified as white.

**vic\_other** indicates the percentage of victims per county who are identified as another race.

**hunting\_licenses** is the number of hunting licenses per state per year.

**firearm\_suicides** is the number of suicides committed with a firearm per state per year.

**firearm\_ownership** is the number of hunting licenses plus number of firearm suicides divided by the total population.

**less\_hs\_rate** is the percentage of the county population over the age of 18 that has not completed high school.

**median\_income** is the yearly average income per county.

**unemployment\_rate** is the percentage of the county population that is unemployed.

**year** indicates the year of the data, and

$\mu$  is the random error.

The purpose of this model is to examine the effects of the Medicaid expansion on rates of criminal homicide in states that expanded the Medicaid program under the ACA by comparing results to states that did not expand their Medicaid program. As counties have varying population sizes, homicide rates overall and per sub-population will be calculated as a percentage of the county population. A variable is included to estimate gun ownership rates at the state-level; as gun ownership is not currently tracked, I've created a variable using the rate of hunting licenses per state combined with the rate of firearm suicides per state. Victim demographic information is included to gauge whether specific types of violence that result in homicide are affected by the Medicaid expansion (i.e. sex of the victim, race of the victim, homicide weapon, etc.). I also include demographic controls to control for socioeconomic status, including median income, education level, and unemployment rates.

## **1. Methodology**

I examine data at the county-level as my main unit of analysis, with the addition of certain state-level demographic controls where county-level data is not available. For example, as the Medicaid expansion is adopted at the state level, the indicator variable is binary at the state level. As there is no database or reliable estimator for gun ownership in the US, I have combined the number of gun licenses and firearm suicides per state as a proxy for gun ownership. My underlying panel data is unbalanced due to missing observations in the census data for some of the demographic controls.

I then run a series of pooled OLS models, testing for model fit across variations. As it is likely that there are unobserved time-invariant characteristics for each county that impact my model, I run this preliminary linear model using fixed effects. Finally, I employ a Hausman test to determine whether a fixed-effects or random-effects model is more appropriate. After determining my final fixed effects model, I perform sensitivity tests to ensure that my demographic controls do not introduce bias into the model via multicollinearity. Using VIF testing, I examine different combinations of economic indicators to ensure that the demographic controls are appropriate measures for the model.

## **2. Model Limitations**

While the data in the model is gathered from reputable and reliable sources, there is a certain margin of error present in the estimations for each dataset. As US Census data are estimated based on random sampling of households at the county level, there is a certain degree of uncertainty present in the estimates; in addition, years in between the census are based on estimates extrapolated from the estimated data, resulting in values that could vary significantly from actual measures in certain localities. This uncertainty is accounted for in the underlying methodology used for the estimates, and county estimates that do not meet the minimum threshold sample size are missing in the data.

In addition, the years used in the final model are limited due to the lack of availability for much of the data in the model. The final model includes the years 2012 – 2016 so there are a balanced number of years before and after the Medicaid expansion in 2014. While additional years of data would provide further insight into the effect of the Medicaid expansion on criminal homicide rates, the absence of demographic controls for the year 2017 and many missing observations precluded the ability to include additional years in the estimates. Regression tables for the full dataset are included in the appendix, and should be examined with a grain of salt; it is likely that the expansion variable demonstrates upward bias from factors that are not controlled in the model and are not associated with the Medicaid expansion.

## VI. Empirical Results

To examine the impact of the Medicaid expansion under the ACA on rates of criminal homicide, I estimate four regressions using data for the years 2011 through 2016. As I believe that the relationship between the criminal homicide rate and expansion status is linear, I first estimate linear regressions using pooled Ordinary Least Squares (OLS) and fixed effects models.

I expect that on average, states that expanded their Medicaid program will see at least a modest decline in the rates of criminal homicide in their state; therefore, the coefficient on **expanded** should be negative in direction. As most homicide victims are male, and overall criminal homicide rates are in decline, I expect the coefficient on **vic\_female** to be small in magnitude and negative in direction. Although criminal homicide rates are declining, I would expect an increase in the proportion of black victims due to the proportionally large representation that black victims have in the data; therefore, I expect to see at least a positive, yet small in magnitude, coefficient for **vic\_black**. I expect to see a large effect of the Medicaid expansion on the rate of criminal homicides for black victims, and I expect the coefficient on **black\_expanded** to be negative in direction. I assume a positive direction for the coefficient on **vic\_hisp**, as I assume that proportionally homicide rates for Hispanics are on the rise. As homicide rates are falling over the time period, and whites make up a smaller proportion of homicide victims, I expect the coefficient on **vic\_white** to be negative, but smaller in magnitude than the other demographic categories. Finally, I expect **vic\_other** to have be negative in direction and small magnitude, as this category account for a relatively small proportion of homicide victims per year.

I expect that my demographic variables will have a varying impact on the rate of criminal homicide. **Firearm\_ownership** should have a direct relationship with the criminal homicide rate, where an increase in firearm ownership results in an increase in the homicide rate; therefore, the coefficient should be positive in direction. Similarly, I expect that counties with a greater percentage of people

with less than a high school education should experience higher rates of criminal homicide; therefore, the coefficient on **less\_hs\_rate** should be positive in direction. An increase in median income should yield a decrease in the county criminal homicide rate, which would indicate that the coefficient on **median\_income** should be negative in direction. As I expect that counties with a higher unemployment rate also experience higher rates of criminal homicide, I anticipate the coefficient on **unemployment\_rate** to be positive in direction. Finally, as the rates of criminal homicide are declining over time, I expect that the coefficients on the **year** variables will be negative in direction.

I estimate my first two regressions using pooled Ordinary Least Squares (OLS). While these initial regressions are jointly significant with large F statistics ( $p < 0.00$ ) and R-squared values over 0.75, I expect that there are county-specific time-invariant characteristics that are creating upward bias in the regression results. In particular, the coefficient for the variable that indicates Medicaid expansion is positive, which is a result that runs counter-intuitive to logic and previous empirical findings. While I have included various demographic controls within the regression, including victim sex, victim race, percentage of the population with less than a high school education, median income, and unemployment rate, it is likely that there are other underlying characteristics within counties that affect the rate of criminal homicide. These characteristics are partially absorbed into both the error term and variable of interest, resulting in biased results that in this case may have reversed the sign of the coefficient.

To control for these county-specific characteristics and mitigate this source of bias, I then estimate the same two regressions using a Fixed Effects model. To ensure that the results are both efficient and consistent, I tested the Fixed Effects results against a Random Effects model using a Hausman test; the results indicate that Fixed Effects is the appropriate model. As suspected, the county-specific time invariant characteristics had inflated the estimates of the OLS model; in the fixed effects models, the sign changes from positive to negative in the variable of interest. I find that all

else constant, an expansion in the Medicaid program under the ACA is associated with a modest decline in the average criminal homicide rate of four people per million. These results hold over different iterations of the model and become more pronounced as more controls are added to the model.

While the rates of gun ownership are not significant within the models, the proportion of criminal homicides carried out with a gun as the weapon holds explanatory power within the model.

Unsurprisingly, expansion has different effects on certain segments of the population, and the effect of the Medicaid expansion is largely attributed to declines in criminal homicide rates for white men.

This effect is not only seen in states that expanded Medicaid; in fact, most demographic groups experienced small but significant increases in criminal homicide rates over the time period. This calls into question the external validity of the study, as it is unclear whether states that already were experiencing high rates of violence against women and minorities selected into the Medicaid expansion group. It is quite possible that this analysis—and others involving crime rates—suffer from selection bias, as the positive impact of health insurance on economic and personal well-being, in addition to a desire to lower crime rates, may be a state’s motivation for expanding their insurance program. Due to these potential conflicting motivations, I can only speak of correlation; I cannot attribute causation to the results.

The final model specification resulting from my final empirical model are detailed below:

*Table 3: Model Results for OLS and Fixed Effects Models*

<b>Table 3. Model Results for OLS and Fixed Effects Models</b>				
	OLS (1)	OLS (2)	Fixed Effects (3)	Fixed Effects (4)
F Statistic	459.53***	417.62***	112.08***	266.86***
Prob > F	0.00	0.00	0.00	0.00

\*\*\* p<0.01, \*\* p<0.05, \* p<0.10

Table 4: Regression Results for OLS and Fixed Effects Models

<b>Table 4. Regression Results for OLS and Fixed Effects Models</b>				
	OLS (1)	OLS (2)	Fixed Effects (3)	Fixed Effects (4)
	homicide_rate	homicide_rate	homicide_rate	homicide_rate
expanded	4.229 (3.067)	5.201 (3.992)	-3.303** (1.637)	-4.077** (1.723)
vic_female	0.697*** (0.0528)	0.696*** (0.0525)	0.620*** (0.0556)	0.619*** (0.0556)
vic_black	0.767*** (0.0293)	0.763*** (0.0313)	0.760*** (0.0344)	0.753*** (0.0370)
black_expanded		0.0717 (0.0517)		0.0543** (0.0267)
vic_race_other	0.475*** (0.0705)	0.477*** (0.0713)	0.579*** (0.116)	0.578*** (0.116)
vic_hisp	0.265*** (0.0828)	0.264*** (0.0819)	0.574*** (0.0467)	0.573*** (0.0464)
weapon_gun	5.169*** (1.005)	5.144*** (1.021)	3.458*** (0.708)	3.520*** (0.669)
firearm_ownership	4.89e-07*** (6.54e-08)	4.89e-07*** (6.51e-08)	7.69e-08 (1.27e-07)	7.80e-08 (1.23e-07)
less_hs_rate	9.13e-06 (3.91e-05)	1.08e-05 (3.97e-05)	2.23e-06 (8.02e-05)	6.42e-06 (8.00e-05)
median_income	-0.000363*** (7.63e-05)	-0.000372*** (7.60e-05)	-0.000171 (0.000386)	-0.000153 (0.000385)
unemployment_rate	-1.382 (1.022)	-1.651 (1.113)	-0.620 (0.886)	-0.660 (0.889)
2013.year		-0.894 (1.313)	-0.491 (1.004)	-0.491 (1.007)
2014.year		-4.325* (2.231)	0.410 (1.507)	0.472 (1.508)
2015.year		-3.995* (2.247)	0.925 (1.424)	0.934 (1.423)
2016.year		-4.125 (2.756)	2.881* (1.588)	2.819* (1.584)
Constant	42.07*** (7.012)	46.02*** (7.945)	42.53* (24.33)	41.50* (24.27)
Observations	7,531	7,531	7,531	7,531
R-squared	0.754	0.755	0.551	0.551
Number of county_fips			2,374	2,374

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.10

First, the direction of the **expanded** coefficient differs in direction and significance between the OLS and fixed effects models; while it is insignificant and positive in the OLS models, it is statistically significant in the fixed effects models ( $p < 0.05$ ). In the pooled OLS models, the coefficient of expanded is positive and indicates that all else equal, an expansion in a state's Medicaid program leads to an average increase of between four and five deaths per million people. It is likely that there are county-specific characteristics that are causing upward bias in the pooled OLS models, which explains the positive direction. For example, it could be the case that states that expand their Medicaid programs also have rising homicide rates overall, which may influence the desire to expand health care access in the state. This could account for the sign reversal of the coefficient when utilizing a fixed effects regression methodology. In the fixed effects models, the negative magnitude of the expanded coefficient indicates that an expansion of the Medicaid program under the ACA is associated with a decrease in the rates of criminal homicide as compared to states who did not expand their Medicaid program. The fixed effects models indicate that all else equal, an expansion in the state's Medicaid program leads to an on average three to four persons per million decrease in criminal homicide<sup>9</sup>.

Second, the **vic\_female** coefficient is positive and highly significant across all pooled OLS and fixed effects models ( $p < 0.01$ ). This indicates that over the time period, the county-level criminal homicide rates rose overall for women, with the results staying relatively stable between iterations of the OLS and fixed effects models. On average (and regardless of expansion), a one percentage point increase in the female population is expected to yield just under a one person increase in the rate of criminal homicide, all else equal.

Third, the coefficient on **vic\_black** is also consistent in magnitude and direction across both pooled OLS and fixed effects regressions, in addition to being highly statistically significant in all models ( $p$

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<sup>9</sup> I have chosen to round my results to the nearest whole number, as it is difficult to discuss results that indicate that the criminal homicide rate rose by one half or one quarter of a person each year. For specific numerical results pre-rounding, please review the regression table.

< 0.01). Holding all else constant, the criminal homicide rate of black victims over the time period is expected to increase by just under one person per million for every one percentage point increase in the black population.

Fourth, the coefficient for the **black\_expanded** interaction indicates that criminal homicide rate for black victims rose over the time period in expansion states. In both the pooled OLS (Model 2) and fixed effects (Model 4) models, **black\_expanded** has a positive magnitude; however, the coefficient is only statistically significant in the fixed effects model ( $p < 0.05$ ). While the magnitude of this effect is small (and would round to zero), this result indicates that states that expanded their Medicaid program saw close to no effect on the criminal homicide rate for black victims; instead, the decrease in the overall criminal homicide rate that has been observed over this time period is largely attributed to decreases in the criminal homicide rates of other victim demographics, most notably of white victims. In fact, states saw a very slight increase in the rates of criminal homicide for black victims in states that expanded their Medicaid program, as opposed to states who did not. This indicates that while the Medicaid program has an effect on homicide reduction overall, this effect is not enjoyed equally across different racial demographics.

Fifth, the coefficient for **vic\_hisp** is positive in direction in all regressions, but varies in magnitude between the pooled OLS and fixed effects models. In the pooled OLS models, a one percentage point increase in the Hispanic population is expected to raise the criminal homicide rates for Hispanic victims by slightly over zero people per year ( $p < 0.01$ ). In the pooled OLS models, a one percent increase in the Hispanic population yields an increase in the criminal homicide rate of under one person per million, all else equal ( $p < 0.01$ ). This increase is lower than what is observed for both the female and black demographic populations, and is the lowest increase observed in the model.

Sixth, the coefficient **vic\_other** is positive in direction across all regressions, with the coefficients in fixed effects displaying a slightly higher magnitude than those in the pooled OLS models. The

coefficients are highly statistically significant across all models ( $p < 0.01$ ). The pooled OLS models indicate that a one percentage point increase in the population of a race other than white, black, or Hispanic is expected to result in an increase in the criminal homicide rate of between zero and one person per year for this demographic group. This effect is slightly higher in the fixed effects model, but still indicates the same increase in the criminal homicide rate of between zero and one person per year for every percentage point increase in the population of race group other.

Seventh, the coefficient on **weapon\_gun** is statistically significant and positive in all regressions, although the magnitude is higher in the pooled OLS models as compared to the fixed effects models ( $p < 0.01$ ). In the pooled OLS models, this coefficient indicates that all else equal, a one percentage point increase in the proportion of homicides committed with a gun leads to a just over five additional deaths per million people. In the fixed effects models, the same single percentage point increase in the proportion of crimes committed with a gun leads to between three and four additional deaths per one million people, all else equal.

Eighth, the coefficient for **firearm\_ownership** is positive in direction, yet very small in magnitude, across all models. While the estimate is insignificant in the fixed effects models, it is statistically significant in the pooled OLS models—although the magnitude is nearly zero ( $p < 0.01$ ); all else equal, a one percent increase in firearm ownership in the entire population is associated with a nearly negligible increase in the criminal homicide rate in the entire population. The magnitude of the estimate is even smaller in the fixed effects models, and the t-statistic indicates an imprecise estimate that includes zero in the confidence interval. Overall, the firearm ownership rate demonstrates an impact on the criminal homicide rate so small as to be nearly negligible.

Ninth, the coefficient for **less\_hs\_rate** is positive in direction, and very small in magnitude; the coefficient has little to no effect on the rate of criminal homicide, and the t-statistic indicates that the estimate is insignificant; this indicates a result that can be measured with very little precision.

Tenth, the coefficient for **median\_income** is also rather small in magnitude, yet negative in direction across all models. The estimate is highly significant in the pooled OLS models, indicating that all else equal, an increase in the median income by one dollar is associated with a nearly negligible decline in the criminal homicide rate across the entire population ( $p < 0.01$ ); when extrapolated, and all else equal, this indicates that an increase in the median income by ten thousand dollars would yield an expected decrease in the criminal homicide rate of nearly four people per million. While the magnitude of the estimate is slightly higher in the fixed effects models, the estimate is not statistically significant; therefore, I cannot determine that the estimate is precise enough to indicate that the impact of median income on the rates of criminal homicide is not zero.

Eleventh, the coefficient on **unemployment\_rate** is negative in direction and statistically insignificant across all models. While the magnitude of the coefficient in the pooled OLS models is greater than twice the magnitude seen in the fixed effects models, the t-statistic for each coefficient indicates that the estimate is imprecise enough that the observed unemployment rate could in fact have no impact on the criminal homicide rate. Regardless, this negative correlation is curious, as one would expect that an increase in employment would be associated with a decline in the criminal homicide rate; instead I find the opposite, where a decrease in employment leads to a decrease in the criminal homicide rate. This finding is misleading and could indicate that the unemployment rate does not actually capture the demographic that is intuitively assumed. The unemployment rate only indicates the proportion of people who are actively looking for work and cannot find it; it does not include individuals who would like to find employment but have left the labor market. In addition, it does not indicate under-employment or whether the employment provides enough income to lift an individual or family out of poverty. As higher rates of inequality have been linked to higher rates of criminal homicide, increases in employment that do not provide financial stability or an avenue out of poverty may not have the assumed impact of lowering the criminal homicide rate (Hsieh & Pugh, 1993).

Twelfth, the coefficient on **2013.year** is negative in direction and small in magnitude across all models, although the coefficient in the pooled OLS model is nearly double that of the coefficients in the fixed effects models. The t-statistic in each model indicates that the estimate is imprecise, and I cannot determine that the year 2013 has an impact on the criminal homicide rate as compared to the year 2012.

Thirteenth, the coefficient for **2014.year** has a negative direction in the pooled OLS model and a positive direction in the fixed effects model; however, the estimate is only significant in the pooled OLS model ( $p < 0.10$ ). In the pooled OLS model, the year 2014 is associated with just over a 4 person per million decline in the rate of criminal homicide as compared to the year 2012. The magnitude of the effect is positive and quite small in the fixed effects model; as the t-statistic indicates the estimate is imprecise, I cannot determine that the effect of the year 2014 is not zero in the fixed effects models.

Fourteenth, the coefficient for **2015.year** is negative in direction in the pooled OLS model and positive in direction in the fixed effects model. In the pooled OLS model, the estimate is significant and indicates that the year 2015 is associated with an on average four person per million decline in the rate of criminal homicide as compared to the year 2012, all else equal ( $p < 0.10$ ). In the fixed effects model, the coefficient is positive yet insignificant; as the t-statistic indicates that the confidence interval includes zero, I cannot determine that there is a measurable effect of the year 2015 on the criminal homicide rate, as compared to the year 2012.

Fifteenth, the coefficient on **2016.year** is negative and insignificant in the pooled OLS model, and positive and significant in the fixed effects models ( $p < 0.10$ ). As compared to the year 2012, the fixed effects models indicate that the year 2016 is associated with just under a three person per million decline in the criminal homicide rate, all else constant. While the magnitude of the coefficient is greater in the pooled OLS model and negative in direction, the t-statistic indicates that the estimate

is imprecise enough that I cannot determine that the impact of the year 2016 on the criminal homicide rate is not zero.

While overall my findings indicate that the Medicaid expansion is correlated with a decrease in the criminal homicide rate, all else equal, this benefit is not enjoyed equally across sex and race. In the next section, I discuss the policy implications of my findings and address potential gaps in employing a one-size-fits-all solution to health insurance reform.

## **VII. Discussion and Policy Recommendations**

In this final section, I describe the implications of my findings on the decision of states to pursue universal health coverage via the Medicaid expansion and discuss future policy recommendations that hold consistent with the benefits of expansion, as per the growing body of literature that supports the social and economic benefits of health insurance coverage expansion.

While the Medicaid expansion has been a polarizing topic largely split along partisan lines, the social and economic benefits to society of the expansion are undeniable. Though it is not inexpensive to provide insurance to low-income residents, states can expect to either break even or see positive economic benefits from the economic investments made to support the expansion due to the influx of federal funding into the state (Dorn, Holahan & McGrath, 2013). While most of the rhetoric against the expansion have focused on the drawbacks of increased spending and concerns around the ability of states to pay for the expansion once states assume more of the financial burden for the expansion population, these arguments largely ignore the long-run benefits of expanding health coverage. Even the simple act of securing additional federal funding has been linked to increased economic activity, creating jobs and new industries to satisfy the newly increased demand for healthcare services. States may also see their revenues grow in the years after expansion, as higher educational attainment has been linked to improvements in childhood health; as better educational outcomes have been linked to better and higher paying employment opportunities, it is not unlikely that states who pursue coverage expansion will reap the benefits years in the future as their tax base increases (Brown, Kowalski & Lurie, 2017). While short-run costs are sure to increase, the long-run benefits are likely to far outweigh the upfront investment by providing an avenue for states to develop and expand their state economies—both through infrastructure and industry investment, as well as an investment in people.

For states to expand their taxable base, it is essential for states to pursue programs and policies that address social determinants of health and aim to lift families out of poverty. The Medicaid program is one of the US' strongest anti-poverty programs, and it has been linked to both social and economic benefits for children and communities in poverty (Sommers & Oellerich, 2017). While the communities that benefit from the Medicaid expansion span many demographics, they are more likely to be low-income communities of color who also are more likely to be in poverty, experience violence, have lower levels of education, and have less economic mobility than white communities (Copeland, 2005). Expanding access to health insurance may be one of the most effective methods of addressing systemic inequality and poverty within the US, particularly for marginalized communities that have been left out of the traditional ESI insurance market.

Though my results ultimately differ from my original hypothesis, the implications of my analysis provide key insights into the interaction between race and health insurance coverage in the United States. As a greater proportion of people of color are enrolled in Medicaid (and represent a large proportion of the expansion population), I had assumed that access to health insurance would have a fringe effect on the criminal homicide rate for people of color. Instead, I found the opposite to be true; while criminal homicide rates were on average lower for white victims, there were modest increases in criminal homicide rates for African Americans. I believe that the difference in the effect of the Medicaid expansion on different demographic groups is tied to the cultural way in which different demographic groups utilize health care services, which is inextricably linked to both structural racism and social determinants of health (Copeland, 2005).

While providing health insurance is a key component of addressing social determinants of health in the US, it is not enough to simply improve coverage without addressing supply issues and the different ways in which sub-populations access healthcare services. There is a distinct difference

between health insurance coverage<sup>10</sup> and access<sup>11</sup>; although the Medicaid expansion under the ACA addressed both coverage and access, its focus lay mainly on improving coverage rates rather than truly addressing access to care. As African-Americans statistically access health care services at a lower rate than other demographic groups, more can be done to tailor health care services and outreach to address differences in lifestyle, as well as institutional distrust (Copeland, 2005). The disparities in health care access in the US run deep and have multiple root causes, many buried deep in institutional barriers that still have not fully addressed the historical consequences of slavery. By creating a system of health care that is tied to employment, the US has largely ignored groups that are underemployed or cannot secure jobs with benefits. Going to the doctor is both cultural and habitual; if the US is to fully address access issues, there is a need for strategic programming and policy making that target cultural underutilization of healthcare services and improves access to care alongside improvements to coverage.

There is no denying health insurance is expensive to provide to the entire nation, and improvements to access will increase healthcare costs if policies are not adopted in tandem to regulate the cost of care. As the government has been hesitant to regulate the cost for care in the US, prices are significantly higher than what is seen in the rest of the world. If modeled after national healthcare systems seen in other developed countries where price regulation or negotiation is standard—such as the UK’s system—the combination of price setting and collective bargaining power has the potential to greatly reduce the proportion of the US’ GDP dedicated to health expenditures. As of 2017, healthcare program expenditures compromised roughly eighteen percent of US GDP; this spending equates to \$3.5 trillion dollars, or \$10,739 per person (CMS, 2018). The commitments made to fund Medicaid and Medicare will, without action, add trillions of dollars to

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<sup>10</sup> Coverage indicates whether or not an individual or population has health insurance.

<sup>11</sup> Access refers to the ability of a person or population to utilize their health insurance coverage to consume health care service. Access is prevented by many factors, including (but not limited to) shortages in primary care physicians, lack of transportation to health centers, or the inability to secure time off to go to the doctor.

the national debt in the coming years. By expanding the Medicaid program to cover more Americans, the federal government may put pressure on the health care system to shift prices downward; however, expansion without government backed reform and regulation will not be not enough.

As the benefits of providing health insurance through the Medicaid program far outweigh the costs, I recommend that the US institute market reforms that constrain prices and promote access to care. In addition, the US would benefit from further research into access improvement for specific sub-populations so that the benefits of health care programs are enjoyed by all Americans, regardless of sex or color. Medical spending in the US is unsustainable in the long-term, and the two most popular options to curtail spending are to cut programs or regulate prices through a single payer system. A feasible option for the US likely lies in between these two options, however care should be taken in the design and implementation of a national health care system that addresses the needs of different sub-populations and recognizes that a successful strategy will require all voices to come to the table and be heard.

## VIII. Bibliography

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