2017

The Economic Impact of Incarceration: Measuring and Exploring Incarceration-Related Costs across the United States

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Senior Thesis in Economics
May 2, 2017

This thesis is submitted in partial fulfillment of the requirements for the course Senior Seminar (EC 375), during the Spring semester of 2017

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Abstract:

This study estimates and examines incarceration costs across the United States. It expands the definition of cost beyond state budgetary expenditures by aggregating various per inmate economic impacts that result from incarceration and crime. The study builds an econometric model to analyze an original dataset from 33 states in years 2002, 2007, and 2012. The results show state median salaries, crime rates, and police employment all positively impact total cost, while incarceration rates have a negative impact. Income inequality and the political climates of states may also affect cost.

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1. Introduction

What is the true economic impact of incarceration and crime across the United States and how does this total cost vary state to state? Understanding what drives these costs is an important theoretical and policy-related inquiry. In terms of research, there is simply limited to no existing scholarship that explores incarceration and crime as a state-level cost and the reasons it varies so dramatically. For policymakers, it is a public interest for fiscal and safety-related reasons for state governments to reduce costs associated with crime and incarceration. Identifying intervention points that offer the possibility of lowering costs is a priority, considering the large body of evidence that suggests the prison system is failing to prepare inmates for a productive and safe reentry into free society.

Since the 1980s, the national incarceration rate has skyrocketed, as have federal and state expenditures on prisons and law enforcement-related programs (Blumstein and Beck, 1996). The United States currently incarcerates approximately 1.6 million people in state and federal penitentiaries at rate four times greater than three decades ago. While incarceration rates have risen across all 50 states in the past several decades, states have handled this flood of inmates into their prison systems differently. This variation in response is evidenced by the fact that states spend dramatically different amounts on their respective prison systems annually. According to the US Census Bureauõ Annual Survey of State Government Finances, Alabama spent an estimated $17,045.54 per inmate in 2014, while New York spent $61,668.97 per inmate

that same year. Clearly, the United States' prison boom has produced a hefty price for state governments.[1]

State budgets, however, do not reflect the total cost incarceration and crime impose on state economies. Incarceration for crimes generates opportunity costs at the familial, communal, and social levels (Western and Petitt, 2010; Holzer, 2003). Incarcerating someone means that individual is no longer able to contribute to a state's economy through earnings and consumption. Prison sentences also reduce the accumulation of human capital in inmates and stall their careers. Removing mothers and fathers from families has a significant impact on the development of the children and places oftentimes unbearable stress on marriages and family bonds, leading to the collapse of many familial units. Upon release, ex-prisoners frequently find themselves reliant on a variety of welfare programs, which puts additional strain on state budgets (Harding et al., 2014).

Crimes also produce costs that are not reflected in a state's budget. High recidivism rates suggest that serving time in prison is not necessarily correlated with a decrease in the likelihood of committing another crime. The Bureau of Justice Statistics estimates in a report published in 2014 that over two-thirds (68.7 percent) of prisoners released in 2005 were rearrested within three years of leaving prison. This failure of the criminal justice system to decrease an individual's inclination to commit a crime is expensive for two reasons. One, the state must spend even more money re-incarcerating a repeat offender. Second, crime in general is costly, so an additional offense is an additional crime-imposed cost (McCollister et al., 2011). Bringing opportunity costs and crimes costs into the total estimate makes it obvious that the true cost of incarceration a state experiences is much greater than its budgetary expenditures suggest.

[1] Figures from 2014 are the most current data available. See Graphs 1 through 3 in the List of Graphs for Per Inmate Spending by State for the years 2002, 2007, and 2012.

The purpose of this study is to develop a cost-estimation strategy for measuring a state's total cost of incarceration and crime and explore the contributing factors to the variation in this cost across states. I build an original dataset that includes panel data of 33 states from years 2002, 2007, and 2012 to develop lower and upper cost estimates, which I analyze using a multivariate regression model. This paper makes both theoretical and policy-related contributions. From a research prospective, the study offers a method for estimating the aggregate per inmate state-level cost of crime and incarceration. Furthermore, while the differences in cost from state-to-state is clear, explaining why these differences exist has never been done before to the best of my knowledge. The results of these inquiries offer policy insights into how states can manage and reduce these economic drains on their economies.

State median salaries, crime rates, and police employment are all found to positively impact total cost, while incarceration rates have a negative impact. Income inequality and the political climates of states may also affect cost. Effective state prison systems, as evidenced by lower state recidivism rates, do not cost more. The following section explains the basic analytical model justifying my dependent variable and underpinning my theoretical approach. Next, relevant literature is reviewed to construct both the dependent and independent variables used in the empirical model. The methodology section describes the operationalization of the variables, hypothesizes the effect of each factor on total cost, describes the data and their sources, and gives the econometric model. Robustness checks are also provided. The final section includes a discussion of results and concludes with recommendations for future research and policy.

2. Analytical Framework:

The central research question concerns a cost, so the theoretical starting point is an orthodox cost function. Standard economic theory views cost as a function of various inputs. This relationship is typically expressed in simplified terms:

$$C = f(K, L),$$

where *C* is cost, *K* is capital, and *L* is labor. These inputs, however, are not restricted to capital and labor and can vary and be as numerous as relevant. This relationship dictates that, as input prices increase, so does cost. Classical economics pins these input prices to productivity: as input productivity increases, so does the price of that input, which further increases total cost. Each firm, industry, or sector has its own cost functions that are independent of on another.

Baumol (1967) complicates this relationship by identifying a phenomenon that links the costs of inputs in one industry, particularly labor, to the prices of inputs in other industries. To describe this effect, he delineates two sectors; one is growing (meaning productivity is increasing) and the other is stagnant (meaning productivity is stalled). In both industries, wage (price of labor) is initially equal to a worker's VMP_L (Value × Marginal Product of Labor). In the growing sector, as technological changes cause a worker's MP_L to increase, so does wage. The growing sector's increase in labor costs causes total cost to rise, but this change is offset by the additional profits accumulated from increases in productivity, or output. In the stagnant sector, MP_L remains constant. However, the increase in wages in the productive sector puts upward pressure on wages in the stagnant sector, triggering a rise in stagnant sector wages as well. The rise in cost from rising labor prices is not offset by labor productivity changes, which causes total cost to increase in the nonproductive sector.

This effect, known as Baumol's cost disease, suggests costs are not only dependent on an industry's own production inputs, but also the inputs of other industries as well. The fact that prisons and crime-reduction programs, like other public sector services, have an inherent inability to become more productive suggests they fall in Baumol's stagnant category. In a cost-disease framework, productivity and overall economic growth of state economies influence the input prices of these public, stagnant industries as well.

The next section provides an overview of previous cost estimates with respect to incarceration, crime, and their micro and macro level impacts. It also reviews factors beyond Baumol's cost disease that influence costs and the spending rates of governments, along with a summary of past literature on crime and incarceration rates.

3. Literature Review

What explains the observed variation in cost of incarceration across states? This question considers the factors that determine a state's total incarceration cost. This question requires a review of past scholarship for two reasons. First, deciding how to measure the total cost of incarceration requires a review of previous attempts to perform this estimation. I review several previous methods to measure this total cost. Because employment is so vital to a state's economy, I also look at past research on the effects of incarceration on the labor market. Second, to develop my own explanatory variables, I must look at previous literature from a variety of fields addressing crime prevalence, state spending, and public costs more generally.

i. Incarceration's Impact on Well-being and Employment

As mentioned, government spending is only a part of this total cost. Measuring my dependent variable, the total cost of incarceration, requires a basis in previous theoretical work as well. Incarceration and its effects fall into four main categories: government spending on

incarceration itself, victimization costs, loss of potential GDP (both during incarceration and post-incarceration due to the difficulties a felony status produces in getting a job), and lingering social and communal costs imposed on families and communities with members that have been to prison or are currently incarcerated.

Government financing a prison system that holds 1.6 million people is costly. Henrichson and Delaney (2012) conduct a 40-state study that finds that the full price of the United States prison system levied on American taxpayers is $39 billion annually. The study, encompassing more than 1.2 million inmates, estimates that the total per-inmate cost averaged $31,286 and ranged from $14,603 in Kentucky to $60,076 in New York. This growth in state correctional spending forces states to move resources from other areas of their budgets. From 1987 to 2007, states' spending on corrections as share of total state spending increased 40 percent, while spending share of higher education decreased 30 percent (Western, 2008). About 3 percent of GDP in 2008 was given in federal aid grants to statesÕ correctional departments, an indication of the amount of resources required to sustain the criminal justice system (Pettit, 2012). By devoting such a large share of its budget to spending on corrections, states deplete their ability to fund other state programs and expenditure categories.

Beyond state-spending, incarceration also imposes high costs on the families of prisoners and the communities in which they reside (Western and Pettit, 2010). They argue that the costs of incarceration are not limited to the justice system itself, as the fiscal impacts of the nationÕs incarceration boom stretch well beyond state budgets by diminishing the livelihoods of former inmates, their families and their communities. With a father in prison, they estimate a familyÕs income to fall around 22 percent relative to the fatherÕs income a year before incarceration. Incarceration leaves a mark on earnings post-release as well, as they find wages in the first year

of release to be 15 percent lower than in the year prior to incarceration. They also estimate that 2.7 million minor children had parents behind bars in 2010, which means 1 in 28 American children had a parent incarcerated (compared to 1 in 125 children in 1980).

This effect, most notably the removal of parents (especially fathers) from households, is especially taxing on Black families. Nearly 500,000 Black fathers are behind bars, which means one in nine Black children have a parent in prison or jail, compared to 1 in 28 across all races. StudentsÕ disciplinary records correlate with whether or not their parents have gone to prison, as a student with an incarcerated parent has a 23 percent chance of being expelled or suspended, compared with a 4 percent chance for those with non-incarcerated parents (Western and Pettit, 2010). A lack of parental guidance in a studentÕs developmental process oftentimes leads to poor decision making, leaving students with incarcerated parents especially susceptible to disciplinary troubles.

School disciplinary records tend to lead to conduct issues outside of the schoolhouse gate as well, leading kids to enter the juvenile justice system. Kids who enter the justice system committing less serious crimes tend to go on to commit more serious and violent ones. It has been estimated that the United States economy loses $2 million every time a juvenile offender turns to a life of crime (Weimer and Vining, 2009). Dropping out of high school not only increases a studentÕs chances of entering the justice system, it also significantly decreases his opportunity for economic mobility, as college quadruples a childÕs chances of making it to the top of the income latter when starting at the bottom (Western and Pettit, 2010). By incarcerating so many American parents, the criminal justice system diminishes millions of kidsÕ chances of upward economic mobility.

Previous literature has also found incarceration and its aftermath to affect both the supply and demand sides of the labor market. These effects create several barriers to employment for the formerly incarcerated community. Low access to social capital, health issues, resume gaps, antisocial attitudes, and restrictions on jobs available to those with felony convictions all factor into the employment penalty felt by ex-prisoners. Petersillia (2003) estimates a 25 to 40 percent unemployment rate amongst ex-prisoners one year out, and some studies have found that it could be as high as 80 percent in certain states. Travis (2005) found a 26 percent unemployment rate amongst the formerly incarcerated after two years of living in free society. Clearly, the unemployment rate amongst ex-prisoners is much higher than that of the general population, which stood at 4.8 percent as of January 2017, according to the Bureau of Labor Statistics.

Several factors work together to produce this high unemployment rates. On the supply side, much of past scholarship has found that the loss of social capital from serving time makes it difficult for ex-prisoners to find gainful employment (Holzer et al., 2003). Parole boards often force inmates to return to the communities they lived in at the time of their arrest, which tend to be areas of limited economic mobility, lack the type low-skilled jobs willing to hire ex-prisoners, and lack networking opportunities, making it difficult for many prisoners returning home to find jobs in their own communities. Holzer et al. (2003) also finds substance abuse and health problems to be common in the incarcerated community. These chronic issues decrease employability in the eyes of potential employers. Furthermore, many prisoners pick up habits and antisocial attitudes during their time of incarceration that do not enable them to work productively or safely in the workplace upon release.

Barriers to employment on the demand side of the labor market also create difficulties for gaining a meaningful job. Prisoners already tend to be under-skilled, undereducated, and face a

variety of health issues, which means their criminal record exacerbates already existing disadvantages. Holzer et al. (2003) estimates that only about 40 percent of employers are willing to consider hiring an ex-offender. In fact, asymmetric information between the applicant and the employer creates a disincentive to hiring a formerly incarcerated applicant, as employers must use caution when considering filling a vacancy with an ex-prisoner (Pager, 2007). This disincentive has a strong effect on the hiring outcomes of ex-felons. Pager (2003), in a survey-based study of employers in Milwaukee, finds that a criminal record reduces callbacks for job applicants by over 50 percent and Holzer et al. (2003) adds to this finding by estimating that black offenders tend to average less than one-seventh the number of job offers received by whites, even when controlling for skills and experience levels. Criminal records, coupled with racial bias in the hiring process, severely diminish an ex-prisonerÕs chances of gaining employment.

To summarize, market forces work against the formerly incarcerated on both the supply and demand sides of the labor market. Ex-prisoners have resumes that make it difficult to compete against those without a criminal record, and employers face a disincentive in the hiring of ex-prisoners. These effects drive up the unemployment rate of the formerly incarcerated community, which produce large economic opportunity costs from having such a large population not working. A Center for Economy and Policy Research (CEPR) report estimates that the incarceration of males lowers the total male employment rate by an average of 1.5 to 1.7 percentage points. In GDP terms, these reductions in employment cost the U.S. economy between $57 and $65 billion in lost output annually (Buckner and Barber, 2016).

Western (2006) suggests that while finding employment is clearly difficult, those who do land a job face a further set of challenges. Because the formerly incarcerated community often

lack the skills and contacts necessary to penetrate the primary sector economy, which offers careers that progress overtime and see wage and positional growth, ex-prisoners usually find themselves in the secondary, more informal labor market. These jobs produce high turnover rates, low wages, and low wage growth and upward mobility. He estimates that Blacks aged 25 who had never been incarcerated were found to work an average of 35 weeks per job, while formerly incarcerated Blacks of the same demographic only managed 21 weeks. For Hispanics, the never incarcerated averaged 28 weeks, while formerly incarcerated averaged 16 weeks. There was no statistically significant difference between Whites who had never been incarcerated and those who had been; however, formerly incarcerated Whites averaged longer job tenures at 34 weeks than black workers who had never been to prison. This discrepancy further highlights the ways in which racial discrimination is still a very active force in the labor market. Western and Pettit's (2010) finding that black men aged 20-34 without a high school diploma are 11 percentage points more likely to be incarcerated than employed (37 vs. 26 percent, respectively) demonstrates the magnitude of incarceration's effect on a Black American's employment chances.

Western (2006) also finds that wages stagnate with a criminal record. Amongst workers aged 25-35, White and Hispanic workers who have never been to prison can expect to see their wages increase by about 20 percent over 10 years. Never-incarcerated Blacks can expect a 15 percent increase. However, when a criminal record becomes a factor, these growth patterns disappear. Whites and Hispanics tend to see no growth and black wages grow at only 5 percent (but still make less than Whites even after 10 years of growth). Black former inmates see 9 percent less in total earnings than what they would make if they had never been incarcerated, compared to 2 percent for White former inmates (Western and Pettit, 2010). Estimates suggest

that an incarcerated male will have lost $179,000 in potential earnings by age 48, about $40,000 more than the average cost of attending a public university for four years (Western, 2010). Clearly, incarceration has a dramatic effect on both sides of the labor market. Its impact on wages, employment rates, and human capital suggest it suppresses GDP and growth opportunities for many communities and regions with high incarceration rates.

ii. Cost Estimation Strategies

There have been several attempts to measure this extended cost of crime and incarceration. Estimating incarcerationÕs immediate total impact is challenging; estimating its future cost on state economies in nearly impossible. Thus, while the ripple effect both in terms of time and affected parties is practically infinite, my aggregated nominal estimate and the majority of others from past studies mainly concerns the present, relatively immediate impact. Cohen et al. (2004) employs a contingent valuation (CV) method to estimate the perceived benefits the public feels of crime control policies. The primary advantage to this methodology is that it allows respondents to evaluate the monetary value of nonmarket goods themselves by obtaining each individualÕs willingness to pay (WTP) for a perceived increase in goods received. Their results reveal that, on average, people are willing to pay per year $104 for burglary, $110 for armed robbery, $121 for serious assaults, $126 for rape and sexual assaults, and $146 for murder for initiatives that guarantee a 10 percent reduction in each crime. Aggregated, this yields annual national WTPs of $25,000, $232,000, $70,000, $237,000, and $9,700,000 for burglary, armed robbery, serious assaults, rape and sexual assaults, and murder, respectively. Aggregated in this context means how much the U.S. would pay to prevent one additional crime. They arrive at these figures by multiplying the average individualÕs WTP of each crime by the number of

households in the United States and dividing the product by the number of crimes committed that year.

The CV method presents assessment and reliability issues, as the average American taking part in the survey is not a crime expert and may lack the knowledge and skills necessary to accurately estimate the realistic amount crime control policies require. However, the methodology's simplicity and theoretical orientation make it a useful cost-estimation strategy. The valuation of nonmarket goods is challenging for a variety of reasons, so asking an individual how much they would be willing to pay for an increase in consumption of a nonmarket good allows researchers to estimate the cost without having to directly confront each of these theoretical and practical challenges in aggregating direct and indirect costs.

McCollister et al. (2011) build on the Cohen et al. (2004) approach by estimating the true cost of incarceration by using four categories: victim costs, criminal justice system costs, crime career costs, and intangible costs. Victim costs are the direct economic losses suffered by the victims of crime, which include a victim's lost earnings, medical care costs when necessary, and destruction to property. Criminal justice system costs result from the government funds required to prosecute and incarcerate an offender. Crime career costs are the opportunity costs associated with the choice to engage in illegal activities rather than legal and productive endeavors. Intangible costs include indirect losses suffered by crime victims, including pain and suffering, decreased quality of life, and psychological distress. Their method relies on the obvious assumption that different crimes produce different costs. Violent crimes, for example, produce high medical costs, while crimes such as embezzlement do not necessarily produce a clear, targeted victim and are not by nature physically violent, so they do not accrue high medical costs. Nevertheless, they yield other negative impacts. It is necessary therefore for any model

that estimates crime costs to be expansive enough to capture this variation in the impacts of different crimes. For example, McCollister et al. (2011) estimates that each murder costs the state approximately $750,000 in victim costs alone. When factoring in these other less tangible costs, the cost estimate approaches $9 million. Other studies have produced a variety of valuations of the cost of crime (see Cohen, 1988; Miller et al., 1993; Miller et al., 1996; Rajkumar and French, 1997; Aos et al., 2001; and Cohen et al., 2004). McCollisterÕs et al. (2011) provides the most comprehensive and recent estimates to date, however.

One cost missing from the McCollister et al. (2011) model, as well as others, is the impact incarceration has on an offender's family and community. Incarceration can severely alter familial structures. This change, most notably the removal of fathers from families, can negatively impact childhood development. Western and Pettit (2010) find that a parentÕs incarceration status has a significant effect on a studentÕs disciplinary record; a student with an incarcerated parent has a 23 percent chance of being expelled or suspended, compared with a 4 percent chance for those with non-incarcerated parents. Romberger and Losen (2016) estimate that the fiscal impact of each high school dropout (their study tracked a cohort of 10th graders) is $163,340, while the social impact is over half a million dollars. They define social costs as the total losses incurred by dropouts, such as their lower income, reduced productivity, and higher expenditures on health care due to poorer health. Fiscal costs, while factored into social costs, are specifically the losses of the federal, state, and local government due to lower income tax revenues and higher levels of government spending on health and social services. Their findings suggest that dropping out of high school yields a sizable economic impact. However, they acknowledge that that even though there is a correlation between dropping out of high school and engaging in criminal activity as a youth, their estimates of social cost do not include the cost

of involvement in the juvenile justice system. Harlow (2003) finds that 41 percent of inmates in federal, state, and local prisons lack a high school diploma. This relationship suggests juvenile justice system costs should be factored into the cost of dropping out of high school as well. As mentioned, Weimer and Vining (2009) estimate that the United States economy loses $2 million every time a juvenile offender turns to a life of crime. Combining Romberger and Losen's (2016) estimate of the social cost of dropping out of high school with Weimer and Vining's (2009) calculation presents a host of statistical issues (most notably with double counting costs). However, the fact that prior research has found such a large economic impact from dropping out of high school, coupled with Western and Pettit's (2010) link between parental incarceration and high dropout rates, highlight the large scope necessary to measure the true cost of incarceration. Finding a scope sufficient in size to capture this total cost is next to impossible, but these estimates again suggest the economic impact of incarceration is felt by states well beyond the outlines of their budgets.

iii. Variation in State Spending and Costs

While scattered, there is nevertheless a relatively thorough body of cost-estimation literature with respect to crime and the effects of incarceration; however, there is limited to no prior scholarship that directly addresses the state-level variation in incarceration and crime costs. In order to overcome this gap, I draw on literature from several fields and disciplines that indirectly inform my inquiry and provide potential explanations for the state-level variation.

Baumol (1967), in his initial study on cost disease, argues that the real cost of certain goods rises overtime because the real wages of occupations increase as well, regardless of increases in productivity. As an empirical basis for measuring this effect, he compares manufacturing jobs (which he claims exist in the productive sector) to teaching and performance

arts-based jobs (which he categorizes as stagnant industries). While the productivity of a worker in the manufacturing industry has increased overtime from advances in technology, the productivity of teachers has not experienced the same growth. For certain reasons based in ethics and efficacy, society has decided that there is a maximum number of students a teacher can educate successfully at once. This number has not changed significantly in recent decades. However, because increases in the productivity of labor in productive sectors has led to wage growth in those same sectors, real wages in both production-focused sectors (like manufacturing) and non-production-focused sectors (such as teaching) have increased. This increase in real wages leads to increases in the total costs. While some of these rising costs are negated by increases in productivity and profits (in the productive sectors), increasing labor costs in the nonproductive sectors cannot be offset, as there has not been a change in overall productivity. Hence, goods produced in nonproductive industries, such as education and art, inherently become more expensive as an economy grows.

Nose (2015) applies BaumolÕs theory to explore the causes for the rise in per pupil spending on public education. Using country level panel data from 1995-2009 that covers 67 countries, he estimates a positive relationship between the rise in teachersÕ wages and the rise in per pupil spending. Increases in teachersÕ salaries and wage premiums drive public education spending, which are determined by government policy and other institutional factors. In order for the government to retain teachers in public schools, their wages must compete with other wage rates in the economy. This same effect may be true for prison spending. The cost to incarcerate someone increases for a state government in response to economic growth, which lead to rising institutional costs, such as the salaries of correctional officers and other prison personnel and infrastructure.

Prison costs may be rising because of a cost disease, but a state's capacity to spend on any of its programs is dependent on the general wealth of the state, too. Incarceration-related expenditures are no different. Mogull (1993) estimates the determinants of state welfare spending using a time-series dataset. He employs aggregated state spending data as a measure of his dependent variable, thus he does not look at the variation across states, but rather the total spending on social welfare of all 50 states over time (from 1946 and 1987). He includes several explanatory variables in his model, one of which is strength of economic activity (measured in Gross National Product of that year) to explain the changes in state spending during this period. He offers two hypotheses for the relationship between economic activity and state spending on social welfare. On the supply side, because an increased level of economic activity means a state has more tax revenue available to fund its social programs, one may expect a positive relationship between economic activity and state spending on welfare. However, a higher demand for welfare may exist if GNP is low, as more people need the benefits welfare provides. If this theory holds true, one should expect a negative relationship to exist between GNP and social welfare spending.

His model finds a significant positive correlation between economic strength (GNP) and spending levels, suggesting the supply-side effect overpowers the demand-side one. Using a double-log multivariate regression model, he estimates a 1.8 percentage point increase in social welfare spending for every percent increase in GNP. Increases in state wealth lead to increases in social welfare spending.

Building on Mogull (1993), Toikka et al. (2004) estimate the effect that a state's fiscal capacity has on a state's social welfare spending. They measure fiscal capacity using real per capita income and measure social welfare using per capita state spending on programs meant to

benefit low-income households. Unlike Mogul (1993), their analysis uses panel data from 50 states across a 24-year period, from 1977 to 1990. Their panel dataset allows them to capture the cross-state variation in spending habits over time. In line with Mogull (1993), their report finds that states with higher fiscal capacities spend more on social welfare programs than states with lower fiscal capacities. Their economic model estimates a positive, significant relationship between per capita income and all areas of social welfare spending and non-social welfare spending except Cash Assistance programs. GDP appears to increase government spending.

Beyond a stateÕs propensity to spend, political climate and party preferences may also affect spending levels on incarceration related programs. There is a conflict in past literature on the effect of partisanship and political ideology on a governmentÕs inclination to incarcerate, as both Democrats and Republicans have presented themselves as hard on crime at different times. However, politics at the state and national level undoubtedly affect crime policy choices and their intended outcomes. Smith (2004) constructs an econometric model that finds partisanship to influence the rate at which states incarcerate their populace. He measures partisanship in two ways: party control of the state legislature and party control of the executive, which he claims are the two most reliable ways to measure a stateÕs political leaning. After hypothesizing that Republicans tend to campaign on the promise of being tough on crime and thus are more willing to enact policies that call for harsher sentences, he finds that both Democratic control of the legislature and the executive lead to lower incarceration rates, confirming his hypothesis. However, only the legislature measure yielded statistically significant results.

In line with the theory that red states are more likely to incarcerate at a higher rate, Hudak (2016) argues that Republican President Ronald ReaganÕs escalation of the War on Drugs dramatically increased drug arrests and government spending on law enforcement and prison.

Building on President Richard Nixon's policies, Reagan criminalized drug use and poured resources into his policy campaign against drugs and drug-related crimes. His willingness to spend on incarceration-related policies further highlight the tendency for Republicans to spend more on law enforcement and prison systems. More arrests also mean more prosecutions and more legal fees, which means higher crime costs. However, Marion (2016) argues that crime has been a priority of every president's agenda since the 1960s. She suggests that President Bill Clinton, a Democrat, through his 1994 anti-crime bill was one of the toughest-on-crime presidents in U.S. history. His "three strikes and you're out" policy quickly gained notoriety for rapidly filling prisons and his stances on drugs on effectively continued Reagan's legacy of criminalizing drugs use.

Scheingold (1995) argues that the public of the United States in general, regardless of political leaning or party preference, has developed an obsession with fighting street crime. While crime rates have remained relatively stable since the 1990s, the demand for crime reduction influences politicians and policy alike through lobbying and other forms of advocacy. It remains unclear if this public reaction is rational (a response to the actual threat of an increase in crime rates) or rather groundless, meaning it is a reaction to a perceived increase in crime that is not necessarily based in any statistical reality. Regardless, the presence of a higher crime rate can mobilize a state's public to demand tough-on-crime policies, which translates to more resources put towards law enforcement and prison-related expenditures. Furthermore, states with higher crime rates may experience a higher marginal benefit from an increase in prison spending, as there is greater need for crime reduction. States with higher crime rates are also likely to rank crime as an important issue on their policy agendas. In areas of high crime rates, crime may occupy more space in the public mind and receive more air time from news and other media

agencies. Dowler (2003) examines the effect the media can have on a publicÕs fear of crime and its punitive attitudes. While he finds no strong relationship between media consumption and punitive attitudes, his regression analysis estimates that local media attention has a significant, positive influence on the publicÕs fear of crime. Higher crime rates, therefore, produce more opportunities for media coverage of crime, which in turn drives up the publicÕs interest in crime reduction policies. This effect higher crime has on the media may also incentivize politicians seeking election to prioritize crime reduction as well.

Crime prevalence may influence total incarceration and crime costs; however, there are other factors that might indirectly influence these costs via strong impacts on crime rates. Donohue and Levitt (2001) use panel data to estimate the lagged effect increased access to abortion in the 1970s had on the observed 1990s decline in crimes rates, as a result of the 1973 landmark Supreme Court decision *Roe v. Wade*. They measure abortion access using an effective abortion rate estimate, which defines the abortion rate relative to crime as the weighted average of legalized abortion rates across all cohorts included in the sample. They also include a variety of state-level characteristics in their empirical model. Their model estimates that abortion access has led to an approximate 13 percent decrease in violent crime, a 9 percent decline in property crime and 12 percent decrease in murder. They find increases in police per capita and prisoners per capita also reduce crime in all three categories of crime. In a meta-analysis following the 2001 study, Levitt (2004) argues that in crime rates decreased in the 1990s because of four mains reasons: increases in the number of police, rising incarceration rates, the end to the crack epidemic, and the legalization of abortion. He also argues that there are six frequently suggested explanations for the decline in crime rates that do not actually factor into the decrease in overall crime. These six reasons include macroeconomic strength, changing demographics, better

policing strategies, gun control laws, laws permitting the carrying of concealed weapons, and an increase in the use of capital punishment. His review of previous literature on each explanation lead him to several estimates. He finds increases in the number of police to account for a 5.5 percent decline in homicides, violent crimes, and property crimes. Increases in the number of incarcerated Americans caused a 12 percent decrease in homicide and violent crimes and an 8 percent decrease in property crimes. The decline of crack usage throughout the U.S. led to a 6 percent decline in homicide, 3 percent decline in violent crime, and a 0 percent change in property crime. Legalized abortion accounted for a 10 percent decrease in all three categories of crime.

Along with crime rates, incarceration rates have an impact incarceration costs. Blumstein and Beck (1996) analyze a dataset assembled from the BJS' annual surveys of federal and correctional facilities from 1980 to 1996 to explain the rise in incarceration rates in the United States. They find that during this period, the rate of incarceration rose 6.3 percent per year nationally. By 1996, the rate had quadrupled. They cite four main reasons for this rise. First, they find that types of crime (most notably drug offenses) received longer minimum sentences, thus putting more people in prison for crimes that previously did not translate to jail time. Second, they find that the incarceration rates of women and people of color far outpaced the incarceration rates of men and whites. These increases substantially contributed to the national rise in prison populations. Third, they find that changes in sentencing and parole-based policies have also contributed to the rise in incarceration rates. Over this period, an increasing number of those arrested were being sentenced to prison time, leading to an increase in the overall prison population. The authors note that this rise happened even though the arrest rates for most crimes decreased. Additionally, an increase in parole-based sanctions led to a greater opportunity for

parole violations, which meant an increasing number of inmates released on parole were sent back to prison. Fourth, harsher policies at the federal level led to a 333 percent increase in the federal prison population over the 16-year period. They find that 75 percent of this increase can be attributed to an increase in drug offenders.

4. Methodology

i. Description of Variables

My research question defines my dependent variable as the total cost of incarceration. Drawing on the McCollister et al. (2011) approach to cost estimation, I calculate total cost estimates by aggregating three distinct state-level costs for each inmate: state spending on incarceration, lost earnings from an inmate not working, and crime costs from expenses the state realizes when someone commits a crime.

I measure per inmate spending by dividing the total amount a state spent that year on its prison system by the number of persons incarcerated in that state. It is necessary to convert total state prison expenditures into per inmate spending to adjust for the fact that states with a higher population of prisoners (states with a larger overall population) will inherently have higher total expenditures than smaller states. While incarceration rates do vary state-to-state, this size effect overpowers any of this variation across states.

Incarcerating an individual also means that person can no longer work and consume in an economy. This loss in GDP produces a sizable economic impact for the state (some estimates put it in the $80 billion per year range nationally), which is why any cost estimation of incarceration must include the opportunity cost of someone not working in its calculation (Bucknor and Barber, 2016). To measure this cost, I assume an incarcerated individual would be making at least the minimum wage of that year if he was not in prison and multiply that wage by 2080 (the

standard number of hours worked in a year according to the Bureau of Labor Statistics). Total lost earnings per inmate vary because the minimum wage varies state to state, which suggests a stateÕs incarceration cost also depends on the economic nature of the state itself. Obviously, based on this method of measuring opportunity cost, states with high minimum wages can expect to experience higher lost earnings. Graphs 4, 5, and 6 show this variation in lost earnings across states. Lost earnings are relatively consistent because many states, rather than set their own minimum wage standards, default to the federal one.

Building on state spending and lost earnings, I employ estimates from McCollister et al. (2011) of specific crime costs to account for the impact crimes have on a stateÕs economy.[2] I use both tangible crime victim costs (which includes time lost, medical expenses, and legal fees of crime victims) and intangible pain-and-suffering costs to create lower and upper crime cost estimates, respectively. I create two estimates to compensate for the fact that estimating social costs requires a certain set of extrapolations and assumptions that can never be completely accurate and reflect true costs, as previously discussed. Since these estimates are proxies for a variety of social costs, it follows theoretically and practically to underestimate and overestimate these effects.

Different crimes produce different costs. The FBI records data on seven different property and violent crime types for each state: murder, sexual assault, robbery, aggravated assault, burglary, larceny, and motor vehicle theft. These are also the categories McCollister et al. (2011) uses in their cost estimations of different crimes. Table 1 provides a list of these lower and upper estimates by crime type. Using these categories, I calculate the expected value of crime to obtain an average crime cost for state *i* in year *t*:

[2] Estimates from McCollister et al. (2011) are in US 2008 dollars, which I adjust to 2012 dollars to account for inflation.

$$E(crime)_{it} = \left(murder\ cost * \frac{number\ of\ murders}{Total\ crime}_{it}\right) + \left(sexual\ assault\ cost * \frac{number\ of\ sexual\ assaults}{Total\ crime}_{it}\right) + \left(robbery\ cost * \frac{number\ of\ robberies}{Total\ crime}_{it}\right) + \left(aggrevated\ assualt\ cost * \frac{number\ of\ aggrevated\ assaults}{Total\ crime}_{it}\right) + \left(burglary\ cost * \frac{number\ of\ burglaries}{Total\ crime}_{it}\right) + \left(larceny\ cost * \frac{number\ of\ larcenies}{Total\ crime}_{it}\right) + \left(motor\ vehicle\ theft\ cost * \frac{number\ of\ vehicle\ thefts}{Total\ crime}_{it}\right).$$

In my lower cost estimate, I use solely crime victim costs in my calculation. In my upper cost estimate, I add the additional, intangible costs to my calculation (McCollister et al., 2011). Once I calculate my expected values, I convert them into per inmate crime costs:

$$crime\ cost\ per\ inmate = \frac{E(crime)_{it} * Total\ number\ of\ crimes_{it}}{number\ of\ inmates_{it}}.$$

Like yearly earnings, this average cost varies state-to-state based on the rates of different crimes, as certain crimes are more expensive than others, but may occur less or more frequently. Using my three main inputs (state spending, lost earnings, and crime costs), I can calculate lower and upper estimates of my dependent variable as follows:

Total incarceration cost lower estimate:

$$cost_{it}^{low} = c_{it} + (w_{it} * 2080) + j_{it},$$

where c_{it} is the cost per inmate, w_{it} is the minimum wage, and j_{it} the average crime cost per inmate (excluding intangible costs) of state i in year t.

Total incarceration cost upper estimate:

$$cost_{it}^{high} = c_{it} + (w_{it} * 2080) + z_{it},$$

where c_{it} is the cost per inmate, w_{it} is the minimum wage, and z_{it} is the average crime cost per inmate (including intangible costs) of state i in year t. Creating lower and upper estimates also creates the opportunity for independent variables to impact total cost differently. The upper cost estimate gives much more weight to costs imposed by crime, which means factors that

influence crime rates are likely to impact this estimate. However, because crime costs are estimated to be significantly lesser in the lower cost, variables that have an impact on state spending and lost earnings, but not necessarily on crime, may have a larger impact on cost.

Estimating a comprehensive economic impact of incarceration and crime addresses the first part the focus of this paper; the second part asks which factors best explain the variation in this total cost from state to state. I construct several independent variables to explore these causes. BaumolÕs (1967) cost disease posits that the input prices of an industry will inevitably rise in line with the economic growth of an economy, even if the growth of that industry has stalled. Drawing from NoseÕs (2015) study on education expenditures, which found a strong positive correlation between education costs and salaries, I use the median income of a state (*salary*) as a proxy for productivity growth to test if there is indeed a cost disease present in incarceration and crime costs. I hypothesize that the median salary of a state should be highly positively correlated to the total per inmate cost. Overall economic growth in the economy drives up the prices of labor and capital in all industries, despite the fact that prison as a policy to reduce crime and rehabilitate inmates has not become more efficient or effective overtime; the United StatesÕapproach to punitive punishment, crime reduction, and incarceration has never radically changed. However, as labor input prices in crime and incarceration-related programs and policies rise overtime in response to competitive pressures from rises in wages in other industries, these increases in wages drive costs up.

Beyond the cost disease effect, I expect several other factors to influence costs associated with incarceration and crime. As referenced, Donohue and Levitt (2001) find that abortion access reduced national crime rates throughout the 1990s. From this finding, I expect a stateÕs abortion access level *(abortion*) to be inversely related to its total cost estimate, as a state with a higher

rate of abortion will have a lower average cost of crime from reduced overall crime, which will lower total incarceration cost. I measure abortion access using a state's abortion rate as defined by the Center for Disease Control and many other government agencies (number of abortions per 1,000 women).

In addition to increased access to abortion, expansions in police forces have also been connected to reductions in crime (Donohue and Levitt, 2001; Levitt, 2004). I measure police force (*police*) by the number of employed police officers per 10,000 people. I expect a negative relationship between police employment and incarceration cost, as increases in police force should reduce crime, decreasing the overall cost to a state. I also include GDP per capita (*gdp*) for two theoretical reasons. One, Donohue and Levitt (2001) find that macroeconomic conditions to be systematically unrelated to crime rates. If this relationship holds true, GDP should have no impact on total cost of incarceration (as crime rates do not vary based on GDP levels). However, per capita income levels have been estimated to have a positive effect on government spending (Mogull, 1993; Toikka et al., 2004). Because a large share of incarceration cost is the result of government spending, prison spending should rise as GDP per capita rise. Thus, I predict a positive relationship between the cost and GDP.

Other state-level macroeconomic characteristics have been found to affect cost as well. Kelly (2000) finds a strong correlation between income inequality and violent crime (he found inequality to have no effect on property crime). I use his findings as a basis to test if a state's level of income inequality (*inequality*) influences its total incarceration cost. I measure inequality using the share of total income held by the top 10 percent of earners in each state. Based on Kelly's (2000) findings, I expect a positive relationship to exist between income inequality and total cost.

Along with economic variables, policy and political factors influence costs and expenditures as well. Many public officials and media outlets argue that capital punishment is a strong method for deterring people from committing violent crimes. However, there is little empirical evidence that suggests the death penalty is effective at reducing crime (Levitt, 2004). I create a dummy variable (*execution*) for capital punishment (1 if the state executed someone in the previous year, 0 if it did not) to test the popular opinion on this policy. If the death penalty deters individuals from committing violent crimes, it should have a negative impact on total cost, as it reduces the high costs associated with violent crimes (McCollister et al., 2011). There are competing theories on the influence of partisanship on incarceration costs (Smith, 2004; Hudak, 2016; Marion, 2016). However, political ideology and partisanship clearly have an influence on policies related to incarceration and crime. I hypothesize that partisanship has an unclear but substantial effect on incarceration cost. To measure the partisanship of a state, I use a dummy variable (*politics*) to track the party status of the state's current governor (1 = Democrat, 0 = Republican). If 2002, 2007, or 2012 was a gubernatorial election year for a state, I use the previous year's governor instead of the elected one (the elected one has not had an opportunity to influence policy yet).[3]

I also include several other state characteristic variables. I use a state's crime rate (*crime*) as an independent variable because crime rates influence the ways in which the government shapes policies related to incarceration and crime reduction strategies (Scheingold, 1995; Dowler, 2003). For this reason, I hypothesize a positive correlation between total incarceration cost and crime. I measure crime rate by dividing the number of crimes in a state by the state's population. Along with crime rates, Levitt (2004) argues that increased incarceration led to a

[3] Jessie Ventura, who ran as an independent, was the governor of Minnesota in 2002. However, I classify him as a Republican in my dataset due to his stated ideological and political positions.

decline in crime in the 1990s. If this relationship holds true, incarceration rates (*incarceration*) should negatively affect the average cost of incarceration in a state negatively. However, if a state's incarceration rate is high, it may mean that state's government must direct more resources into its prisons (Blumstein and Beck, 1999). Whichever effect dominates may determine impact of a state's incarceration rate on the overall cost of incarceration. I measure incarceration rate by diving the number of incarcerated people of a state by that state's total population. I create the variable *recidivism*, which I operationalize using state recidivism rates, as a proxy for the effectiveness of a state's prison system at reducing crime. Intuitively, successful systems cost more, as states put more resources towards rehabilitating inmates and preparing them for reentry into free society. A low recidivism rate should indicate that a state spends more to ensure offenders do not return to prison after release.

ii. Data and Descriptive Statistics

I collect data from a variety of sources to assemble my dataset (n = 99), which covers 33 states from years 2002, 2007, and 2012. State-level crime data comes from the FBI's Uniform Crime Reporting (UCR) database. Table 2 provides summary statistics on the frequency of each crime type. Larceny is the most frequent crime across states, averaging 62 percent of a state's total crime, while murder is the rarest, with a mean percent of total crime of 0.1 percent. These frequencies affect crime costs because different crimes produce different economic impact at various rates. Graphs 4 through 9 show lower and upper crime costs by state. The way in which crime cost is estimated changes the rankings of states in terms of costs. Washington, for example, has the third highest cost in 2002 using the lower estimation strategy. However, it drops to sixth when ranking the upper estimates (Graphs 4 and 5). Oregon ranks ninth lowest in cost in 2012 using the lower estimate; its rank decreases to third lowest in the upper estimate

rankings (Graphs 8 and 9). These rank changes suggest the additional costs captured by the upper estimate impact certain states more than others. States with higher murder and sexual assault rates, the two most expensive crimes, with have substantially higher upper crime cost estimates than states with high larceny rates or other less expensive crimes (see Table 1 for more cost comparisons across crimes).

State prison expenditures and data on the total number of incarcerated people in each state come from the US Census Bureau annual report on State and Local Government Finance and the Bureau of Justice StatisticsÕ annual survey of prisoners, respectively. Graphs 1, 2, and 3 provide per inmate correctional spending by state for the three years of data. Minimum wage data come from archival data from the Department of LaborÕs Hour and Wage Division. Graphs 10, 11 and 12 show lost earnings by state from years 2002, 2007, and 2012, respectively. Annual median salaries states come from the Bureau of Labor Statistics yearly Occupational Employment Statistics (OES) reports from. Graphs 13 and 14 show the relationship between median salary and total cost (both lower and upper estimates). Both scatter plots reveal an upward sloping tend, suggesting salary and cost are positively correlated. I obtain abortion rates from the Center for Disease ControlÕs Abortion Surveillance annual report. Information on state executions comes from the BJSÕ 2001, 2006, and 2011 annual report on capital punishment in the United States. I also obtain police employment data from the BJSÕ annual Justice Expenditure and Employment Extracts from. GDP per capita data comes from the Bureau of Economic Analysis state-level tables. Inequality data is from the World Wealth and Inequality Database of U.S. states. Information on the party status of governors was obtained from archival data from a variety of sources. Crime rates come from the FBIÕs UCR database. Incarceration rates come from annual BJS Surveys of Prisons and Jails. Recidivism rates are from a 2011 Pew

Study titled, ÒState of Recidivism: The Revolving Door of AmericaÕs Prisons.Ó[4] All monetary values across variables are chained to 2012 US Dollars.

Summary statistics of all variables are provided in Table 3. States incarcerate an average of 32,432 inmates. The average total cost (lower estimate) is 87,319.470, with a standard deviation of 29,016.620, while the upper estimate yields a mean cost of 279,720.014 (standard deviation = 84,966.148). The average lower and upper total cost estimates show the scale of total cost relative to state-spending, as the average cost per inmate reflected in a stateÕs budget is 42,055.458. These different means reflect the magnitude of the actual economic impact of incarceration and crime; the lower estimate is about twice the size of state spending per inmate alone and the upper estimate is over five times greater. Furthermore, the difference between the two total cost estimates show the large effect intangible crime costs have on the overall calculation: the mean lower crime cost is 30,609.980, while the average upper crime cost is 223,010.523. The mean median annual salary of states is 34,145.632, with a standard deviation of 4,101.232.

iii. Model

The empirical model used to estimate total cost of incarceration includes state median salary, along with several other explanatory variables, such that:

$$Y_{it} = \beta_0 + \alpha_i + \beta_1 S_{it} + X_{it}\Phi + \varepsilon_{it},$$

where Y_{it} is the natural log of *cost* (both lower and upper estimates), S_{it} represents the natural log of *salary*, X_{it} is the natural log of the other independent variables of interest (*abortion*, *police*, *incarceration*, *crime*, *gdp*), along with other state-characteristic variables such as the *politics*,

[4] Recidivism data is only available for years 2002 and 2007.

execution, *inequality* and *recidivism* of state *i* in year *t.* α_i accounts for unobserved heterogeneous state characteristics, β_0 is the constant, and ε_{it} is the error term.

I estimate four different regression models. Models 1 and 2 employ the natural log of the lower cost estimate as their dependent variables, while models 3 and 4 use the logged upper estimate. Models 1 and 3 include only logged *salary*, while models 2 and 4 regress all independent variables on the two different costs. The double-log regression form allows for the elasticities of various independent variables in relation to cost to be estimated and for any nonlinear relationships that exist between the dependent and independent variables to be explored.

iv. Robustness Checks

I perform several checks to ensure the estimates from the models are robust and unbiased. I calculate the VIFs of each independent variable as a check for multicollinearity. One possible collinearity issue is that abortion and crime rates, two of the regression functionÕs independent variables, are highly correlated (Donohue and Levitt, 2001). However, no collinearity is present, as all VIF values are under 5 and the mean VIF is 2.01 (Table 4). Because I use panel data in my analysis, I also must control for a variety of unobservable heterogeneous state characteristics. I estimate both fixed and random effects regression models to overcome this econometric issue. I conduct a Durbin-Wu-Hausman test (abbreviated to Hausman test) for each regression to pick which effects model estimates the most robust coefficients. The null hypothesis for this test is as follows:

H_0: fixed effectsÕestimates = random effects estimates.

Thus, if the test produces a p-value greater than 2.5 percent (two-tailed test), the null fails to be rejected and the random effects model is used. If the null is rejected (p-value < .025), the fixed effects is chosen.

I run a Hausman test for each regression model, the results of which are listed in Table 5. Model 1Õs test reports a p-value of .0133, which means the fixed effects model provides more reliable estimates (reject the null hypothesis). The Hausman tests for models 2, 3, and 4 produce a p-values of .8460, .0791, and .9417, respectively. For these models, the estimates from the random effects models are more robust than the ones from the corresponding fixed effects models (fail to reject the null hypotheses).

4. Discussion of Results

Results from the four regression models are presented in Table 6. The right two columns, models 1 and 2, provide logged lower cost estimate results, while the left two columns, models 3 and 4, show logged upper cost estimate results. Goodness of fit measures and whether or not the regression includes a fixed or random effects estimator are listed in the bottom two rows.

The results from models 2 and 3 provide evidence of a cost disease in incarceration costs. The coefficient of *salary* in model 2 is 1.034 (p-value < .01), meaning a 1 percent increase in a stateÕs median salary leads to a 1.034 percent increase in incarceration cost (lower estimate), even when holding all other independent variables constant. Model 2 also suggests that Because model 2 is a double-log regression model, the fact that the coefficient in this model is greater than one also suggests costs increase at an increasing rate; as median salaries in states increase, incarceration costs convexly rise in response. This result agrees with BaumolÕs (1967) initial report on cost diseases, which he claims will get worse overtime as economies experience increased growth at a diminishing rate. However, as growth slows, costs increase at an increasing

rate. Model 1 yields an insignificant coefficient for *salary*, yet this estimate is likely biased, as the lack of state characteristic variables creates too much weight in the residual term. Median salary has a positive impact on the upper estimate as well, as the coefficient in model 3 shows that a percent increase in median salary produces a 0.997 percent increase in total cost (p-value < .01). This result suggests there are cost diseases present in other industries beyond incarceration, such as law enforcement, court systems, and healthcare for crime victims. Like prison expenditures, efficiency in these industries, especially in relation to labor, cannot increase overtime. However, as other industries see gains in productivity that impact statewide wages, these public-sector expenditures experience corresponding rising costs.

The effect on the upper cost estimate becomes insignificant when including the state-characteristic variables (model 4). There is a lack of significance because there is no theoretical reason for the median salary of a state to affect some of the types of costs the upper estimate captures, such as pain-and-suffering experienced by victims of crimes and their families and decreases in quality of life (McCollister et al., 2011). These intangible costs hold a large share of the total the upper cost estimate. Thus, for the upper estimate, it follows that the crime-related variables, which are not the primary focus of this paper, have a bigger impact than those associated with explaining spending rates and cost. For example, *police* produces a coefficient of 0.576 (p-value < .01) when regressed on the upper estimate in model 4. However, the effect is reduced in model 2 for the lower estimate at 0.138 (p-value < .1). The difference in the magnitudes suggests police employment's effect on cost is greater when crime cost is estimated to be higher, suggesting growing polices forces increase crime costs, but does not affect costs for states accrued from incarceration. The positive relationships of *police* with total cost in both models 2 and 4 contrasts with Donohue and Levitt's (2001) finding. One explanation for this

unexpected sign is that there is a diminishing returns effect in police employment's ability to decrease crime. In previous decades, increasing police forces lead to the prevention of more crimes, which reduced the crime rates of cities and states. Once the effect weakens, a rise in police employment rates begin to increase costs associated with crime by producing more arrests and convictions, which means states must spend more on fees and legal costs to send more people through its court system. These expenses outweigh any reductions in cost resulting from prevented crime.

Like police employment rate, the incarceration and crime rates of states significantly impact costs in both models 2 and 4, but these impacts differ depending on the cost estimate. Using the lower estimate, the results suggest a 1 percent increase in *incarceration* reduces costs by .625 percent (model 2). This relationship agrees with Donohue and Levitt's (2001) result that illustrates how increasing incarceration rates decreases crime rates by removing the perpetrators of crime from general society. However, an alternate explanation is that states with high incarceration rates have extremely high prison populations relative to the total expenditures in their state budgets directed towards prisons. This skewed relationship decreases the per inmate spending ratio. Arkansas, Louisiana, and Alabama all incarcerate at the highest rates and consistently rank across all three years of data as states that have low per inmate spending costs, suggesting this effect plays a large role in decreasing state spending per inmate. *Incarceration's* coefficient increases to .63 percent in model 3, as Donohue and Levitt's (2001) effect of incarceration on crime reduction becomes greater in the upper cost estimate, which puts a larger emphasis on crime costs. Despite this increase, the coefficients of *incarceration* in both models 2 and 4 reflect a decline in incarceration's effect on cost; incarceration rates decrease both estimate

levels at a decreasing rate. This effect suggests that as incarceration rates rise, their impact on cost reduction dissapears.

As expected, models 2 and 4 show that states with higher crime rates experience higher costs (Scheingold, 1995; Dowler, 2003). Not only does more crime lead to more state spending on incarceration and policies oriented towards reducing crime, but higher crime rates also increase costs by increasing the overall economic impact of crime on a stateÕs economy. States face a dilemma. Increasing spending to reduce crime leads to an increase in total cost. However, increased crime also produces higher total costs. Therefore, states with high incarceration rates and high crime costs are essentially paying for the same cost twice. This increase in crime costs from higher crime rates has a larger impact on the upper cost estimate (model 4) than the lower one (model 2) because of the same estimation issue previously discussed; the average per inmate crime costs in the upper estimate is over seven times greater than the average lower estimate (Table 3). These differences between the coefficients of several explanatory variables across models 2 and 4 demonstrate the consequence of this disparity between the two estimates.

Model 4Õs highly significant constant term (p-value < .01) also points towards this issue. Because most of the upper estimateÕs cost comes from intangible, crime-related costs, much of the explanatory power for this estimate lies in the causes of crime, not the drivers of cost. The constant term captures many these unaccounted-for factors, hence the statistical significance. Model 4 still captures over 70 percent of the variation in the upper cost estimate (R-squared = .745); however, the fact that Model 2 produces a higher R-squared of .923 shows that the independent variables capture more of the variation in total cost if the crime-based cost estimates are lower.

Inequality and *politics* both produce significant coefficients in at least one model, but their results are not systematic; state political climates do not significantly affect the lower cost estimate and income inequality does have a significant impact on the upper estimate. However, while inequality may not necessarily affect total cost via increases in crime, it is possible increased inequality correlates with states that direct resources towards prison expenditures and away from other budgetary policies and programs that decrease income gaps. Western (2008) finds evidence of this redirection of resources out from programs such as education and towards incarceration-related expenditures. In terms of political climate, model 4's positive coefficient suggests states with Democrats as governors experience higher costs. One explanation for this finding is that Democrats in general spend more than Republicans on government programs. However, this budget effect should hold true when considering the lower cost as well, which it does not (model 2). An alternate explanation is that Democrats tend to govern more urbanized, populated states, which produce more frequent and expensive crime. There is no multicollinearity present between crime rates and the party status of governors, but it is still possible that democrats govern states the experience more frequent expensive crimes.

The lack of a significant relationship between a state's recidivism rate and its total cost also serves as further evidence of a cost disease in prison spending. If increasing state spending led to more efficient outcomes (lower recidivism rates), incarceration could be considered a productive industry. However, as the results show, effective state prison systems, meaning states with lower recidivism rates, are not categorically more expensive. Along with recidivism rates, abortion rates, GDP per capita, and use of the death penalty all do not have a significant impact on total cost in either estimate model. *Abortion*'s insignificance contrasts with Donohue and Levitt's (2001) theory on abortion rate and its significantly negative relationship with crime. On

explanation for these insignificant results is that the lagged effect of *Roe v. Wade* no longer exists; abortion has been legal nationally for over 40 years, so any woman of childbearing age is likely to have legal access to an abortion regardless of the state in which she resides. To be sure, while abortion has become easier to access since the court decision, a variety of stigmas and other factors still impede many women and families from choosing to pursue the operation. However, abortion access for women born in the 1990s and early 2000s is still easier than for those born in the 1970s. Given these changing conditions, it may no longer be a contributing factor to variations in crime rates across states and other regions, as differences in abortion rates between states have decreased.

5. Conclusion

The economic impact of incarceration is large, far-reaching, and varied. This study develops a cost-estimation strategy for measuring this total cost at the state level and explores the factors that contribute to its variation across the United States. The results of this paper present strong evidence of a cost disease in incarceration and crime-related costs: increases of 1 percent in state median salaries lead to an approximate 1 percent increase in total cost, even when holding a variety of state characteristics constant. Recidivism's insignificance across models also points to the prevalence of a cost disease, as effectiveness is not related to the cost of incarceration. Crime and police employment rates have a positive impact on cost, while incarceration rates negatively affect it. The impacts of income inequality and political climate are inconclusive, while abortion rates, GDP per capita, and a state's use of the death penalty do not have a significant impact on cost.

These findings point to several policy implications. It is in the state's fiscal interest to be as efficient as possible in both reducing incarceration and reducing recidivism rates, as evidence

suggests costs could continue to increase as the economy continues to grow. The most efficient and direct way to lower these costs is incarcerate less people. While increasing incarceration rates may reduce the overall cost per inmate, it is unclear if this effect is the result of reduced crime or the overpopulation of prisons, which forces states to spend less on each inmate. The fact that the impact diminishes as incarceration rates increase further suggests increasing incarceration rates is not an efficient strategy in reducing costs. States with high recidivism rates and high incarceration rates should look to see what specific programs and initiatives states with lower rates have used to reduce recidivism.

Reducing crime should also be a priority in decreasing the economic impact of incarceration. However, the results suggest that increasing police forces in individual states is not an effective strategy for doing so. States need to spend more time identifying which specific policing strategies reduce crime most efficiently and then apply these frameworks when crafting new laws and policies. Rising rates of income inequality also may contribute to the growth in total incarceration costs. Programs that seek to eliminate income inequality can have the added benefit of decreasing incarceration and incarceration cots. States can learn from each other through open communication; increasing inter-state communication on these issues in general is necessary in lowering these costs.

There are several limitations to this study. In terms of the cost-estimation strategy, the method still does not fully encompass every direct and indirect cost associated with incarceration. The main reason for this lapse is the lack of data on inmates post-incarceration. While this study mainly focuses on the costs imposed in the same year of incarceration, prison time and crime impact the future economic outcomes of a wide range of parties as well. More work needs to be done and more data collected to estimate these future costs and impacts to

expand on the methodology this study employs. Another limitation is that this study does not account for the fact that there are other factors beyond productivity that determine a worker's wage (competition in the labor market, union membership status, cost of living). These factors may have a direct or indirect effect on incarceration total cost. Directly, these influences can be mechanisms like the cost disease for increasing incarceration costs without changing productivity. Indirectly, these factors could amplify the cost disease's effect by affecting a state's median salary, which in turn would impact total cost.

A third limitation is the lack of demographic variability captured by the empirical model. The criminal justice system and its costs affect various demographic groups differently; costs for whites is much lower than costs for people of color (Holzer et al., 2003; Western and Pettit, 2010). Exploring the ways in which this cost varies across different groups is another topic worthy of further investigation. Clearly, much more needs be done to understand these large-scale impacts on states' economic livelihoods. However, this study offers a solid theoretical and empirical basis for continuing this exploration.

List of Tables:

Table 1: Crime cost estimates by crime type (2008 US Dollars)

Crime Type	Lower Estimate ($)	Upper Estimate ($)
Murder	737,000	8,442,000
Rape/Sexual Assault	5,556	198,212
Robbery	3,299	4,976
Aggravated Assault	8,700	13,435
Burglary	1,362	1,362
Larceny	480	480
Motor Vehicle Theft	6,114	6,114

Source: (McCollister et al., 2011; Tables 3 and 4)

Table 2: Crime type as percent of state's total crime summary statistics

Crime Type	Mean	Standard Deviation	Minimum	Maximum
Murder	0.0013	0.0006	0.0004	0.0029
Rape/Sexual Assault	0.0093	0.0039	0.0046	0.0300
Robbery	0.0294	0.0143	0.0056	0.0682
Aggravated Assault	0.0694	0.0213	0.0326	0.1183
Burglary	0.1905	0.0380	0.1029	0.3063
Larceny	0.6203	0.0525	0.5019	0.7412
Motor Vehicle Theft	0.0797	0.0281	0.0381	0.1688

Data source: UCR state data tables, 2002, 2007, 2012.

Table 3: Summary statistics

Variables	Observations	Mean	Standard Deviation	Minimum	Maximum
Number of State Prisoners	99	32432.061	35493.898	2900.000	174282.000
Total Cost Lower Estimate	99	87319.470	29016.620	43180.381	215229.759
Per Inmate Spending	99	42055.458	20206.109	12631.682	129078.719
Lost Earnings	99	14654.033	1818.587	11997.440	18803.200
Per Inmate Crime Cost (lower estimate)	99	30609.980	10528.137	14047.125	68179.839
Total Cost Upper Estimate	99	279720.014	84966.148	153082.091	626407.650
Per Inmate Spending	99	42055.458	20206.109	12631.682	129078.719
Lost Earnings	99	14654.033	1818.587	11997.440	18803.200
Per Inmate Crime Cost (upper estimate)	99	223010.523	71460.097	95465.754	479357.731
Salary	99	34145.632	4101.232	27820.000	43420.000
Recidivism	66	0.403	0.094	0.228	0.658
Politics dummy	99	0.434	0.498	0.000	1.000
Crime	99	0.036	0.009	0.020	0.064
Incarceration	99	0.004	0.002	0.001	0.010
gdp	99	48207.196	8633.401	31089.920	75002.720
Abortion	99	0.012	0.006	0.003	0.031
Execution dummy	99	0.273	0.448	0.000	1.000
Police	99	21.899	5.024	14.950	40.040
Inequality	99	0.448	0.052	0.351	0.623

Table 4: VIF estimates (VIF>5 indicates presence of multicollinearity)

Variable	VIF
Ln(gdp)	4.39
Ln(salary)	4.03
Ln(abortion)	2.24
Ln(incarceration)	1.76
Ln(crime)	1.47
Ln(police)	1.43
Inequality	1.27
Recidivism	1.24
Execution	1.20
Politics	1.12
Mean VIF	2.01

Table 5: Results of Hausman Test (Model 1)

H_0: fixed effects' estimates = random effects' estimates

	Model 1	Model 2	Model 3	Model 4
Chi-squared	-.034	5.62	3.08	4.12
P-value	.0133	.8460	.0791	.9417

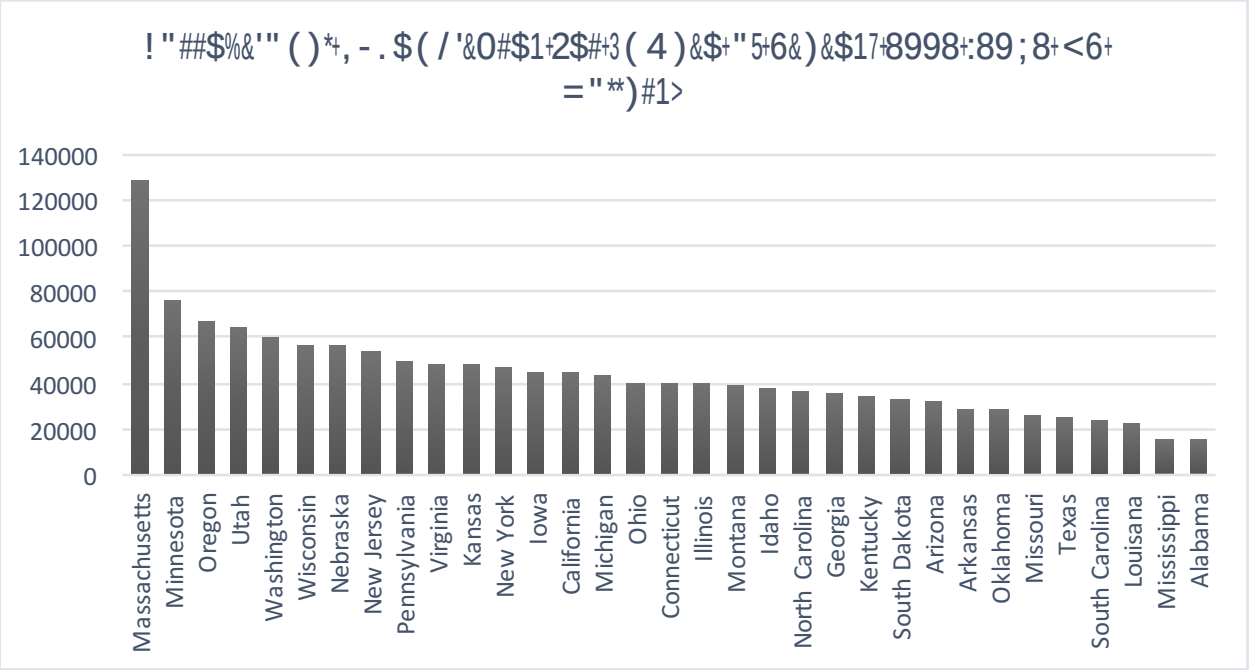
Table 6: Results of panel data regressions

Variables	(Model 1) Ln(low cost)	(Model 2) Ln(low cost)	(Model 3) Ln(high cost)	(Model 4) Ln(high cost)
Ln(salary)	-0.0344	1.034***	0.997***	-0.168
	(0.700)	(0.221)	(0.321)	(0.381)
Ln(abortion)	-	0.00674	-	-0.0303
		(0.0322)		(0.0532)
Recidivism	-	-0.0144	-	0.242
		(0.148)		(0.250)
Ln(crime)	-	0.324***	-	0.529***
		(0.0702)		(0.123)
Ln(incarceration)	-	-0.625***	-	-0.630***
		(0.0414)		(0.0714)
Ln(gdp)	-	-0.179	-	0.169
		(0.137)		(0.230)
Ln(police)	-	0.138*	-	0.576***
		(0.0823)		(0.146)
Execution dummy (t-1)	-	0.00461	-	0.0212
		(0.0216)		(0.0343)
Politics dummy	-	0.00731	-	0.0446*
		(0.0170)		(0.0268)
Inequality	-	0.347*	-	0.419
		(0.195)		(0.313)
Constant	11.69	-0.441	2.098	8.512***
	(7.297)	(1.781)	(3.346)	(3.097)
N	99	66	99	66
R-squared	0.4978	0.9226	0.2423	0.7449
Fixed Effects?	Yes	No	No	No

Standard errors in parentheses,
*** p<0.01, ** p<0.05, * p<0.1

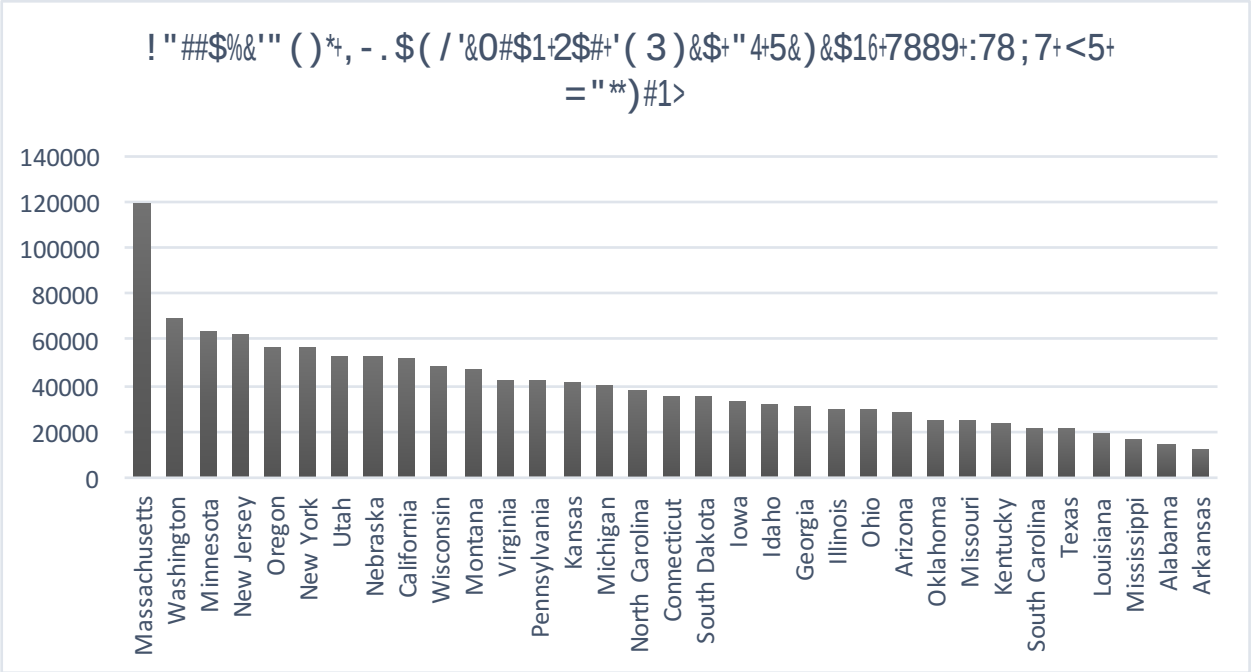
List of Graphs

Graph 1: Correctional Expenditures Per Inmate of States, 2002 (2012 US Dollars)



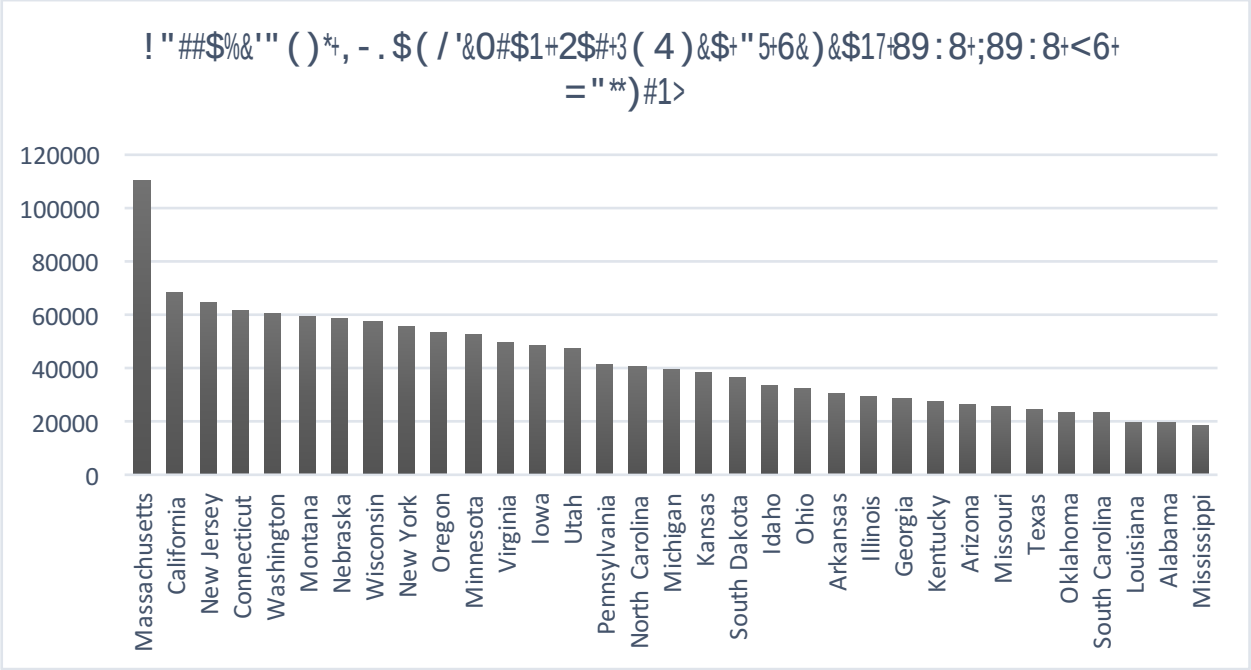
Data source: BJS, Prisoners in 2002, Table 4; US Census Bureau, State Government Finances, 2002.

Graph 2: Correctional Expenditures Per Inmate of States, 2007 (2012 US Dollars)



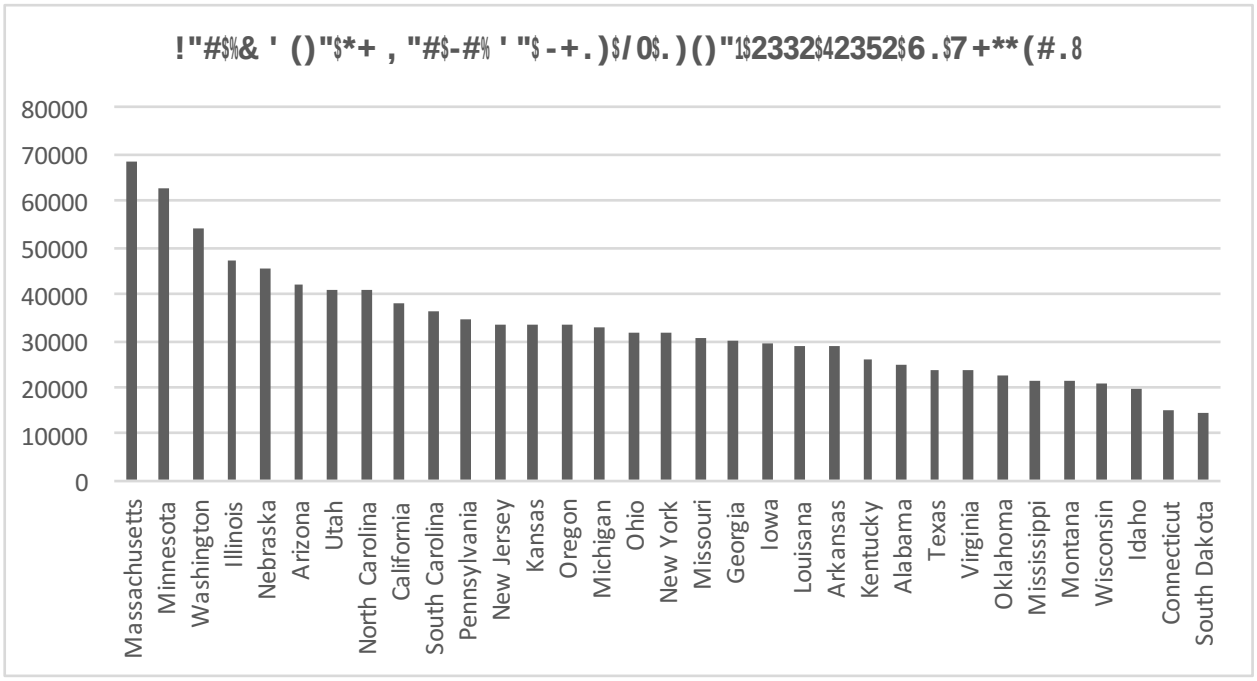
Data source: BJS, Prisoners in 2007, Appendix table 3; OES Data for states, 2007; US Census Bureau, State Government Finances, 2007.

Graph 3: Correctional Expenditures of States, 2012 (2012 US Dollars)

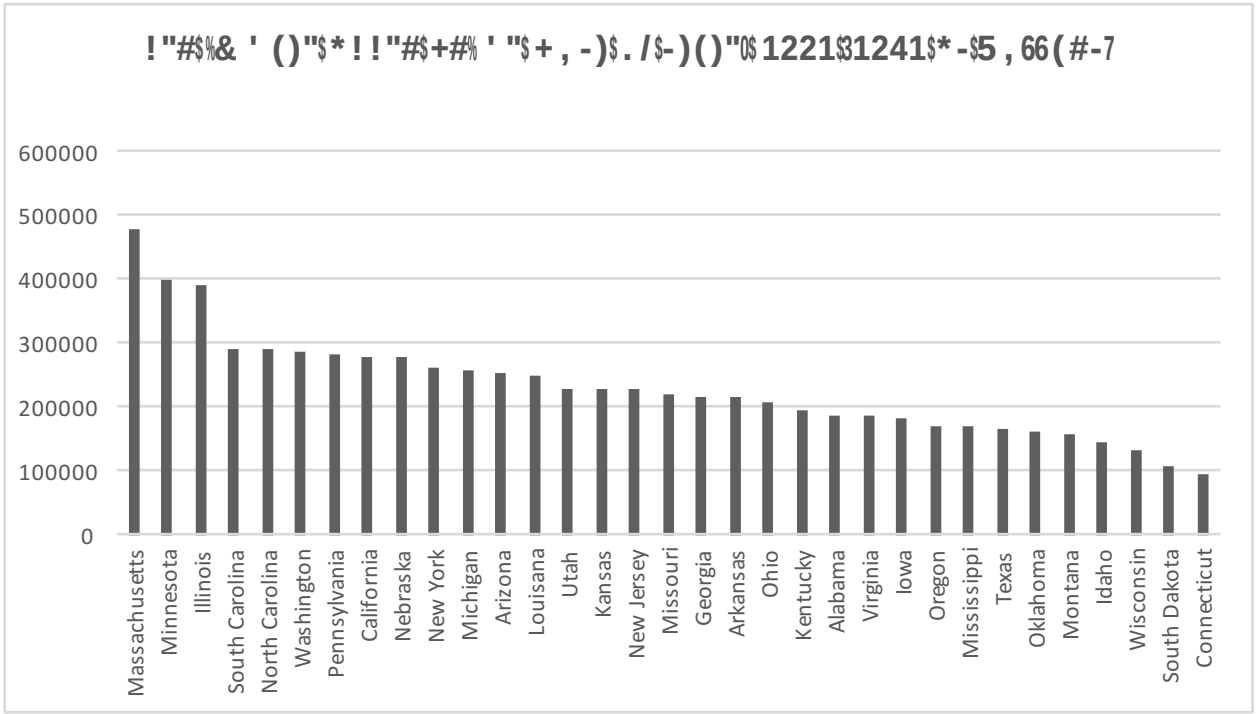


Data source: BJS, Prisoners in 2012, Table 17; US Census Bureau, State Government Finances, 2012.

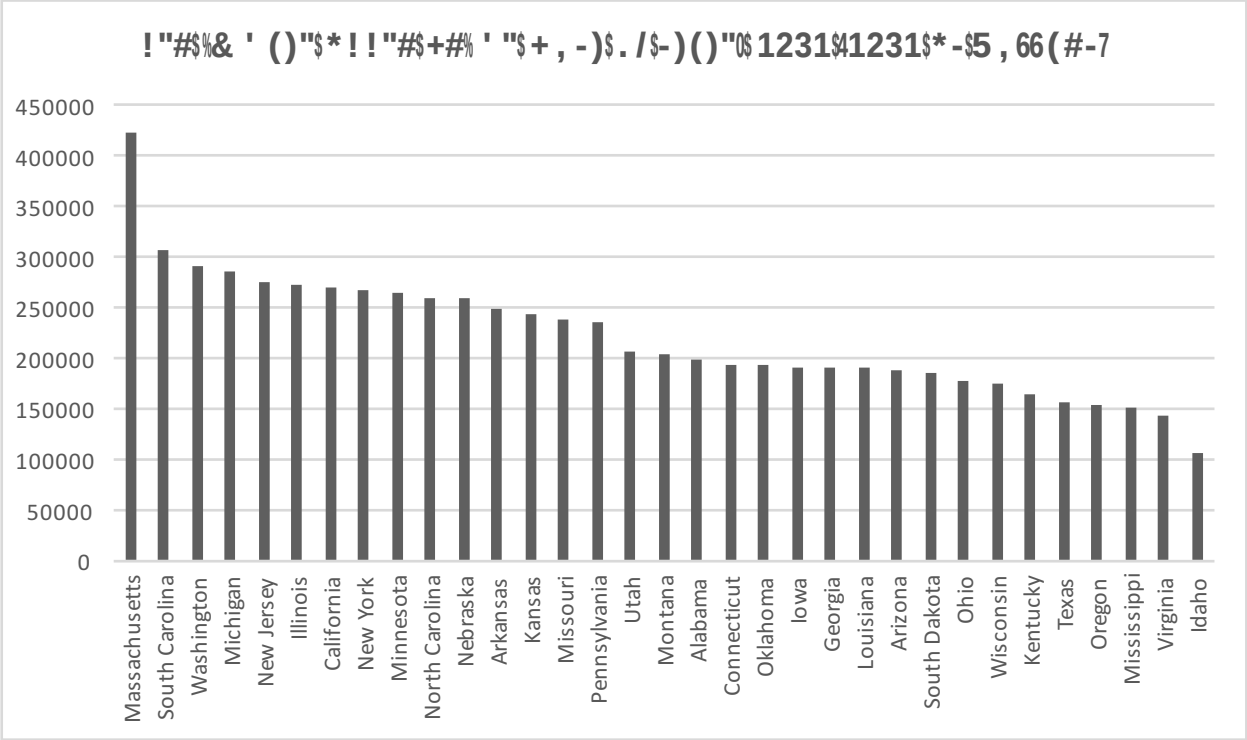
Graph 4: Per Inmate Lower Crime Cost by State, 2002 (2012 US Dollars)



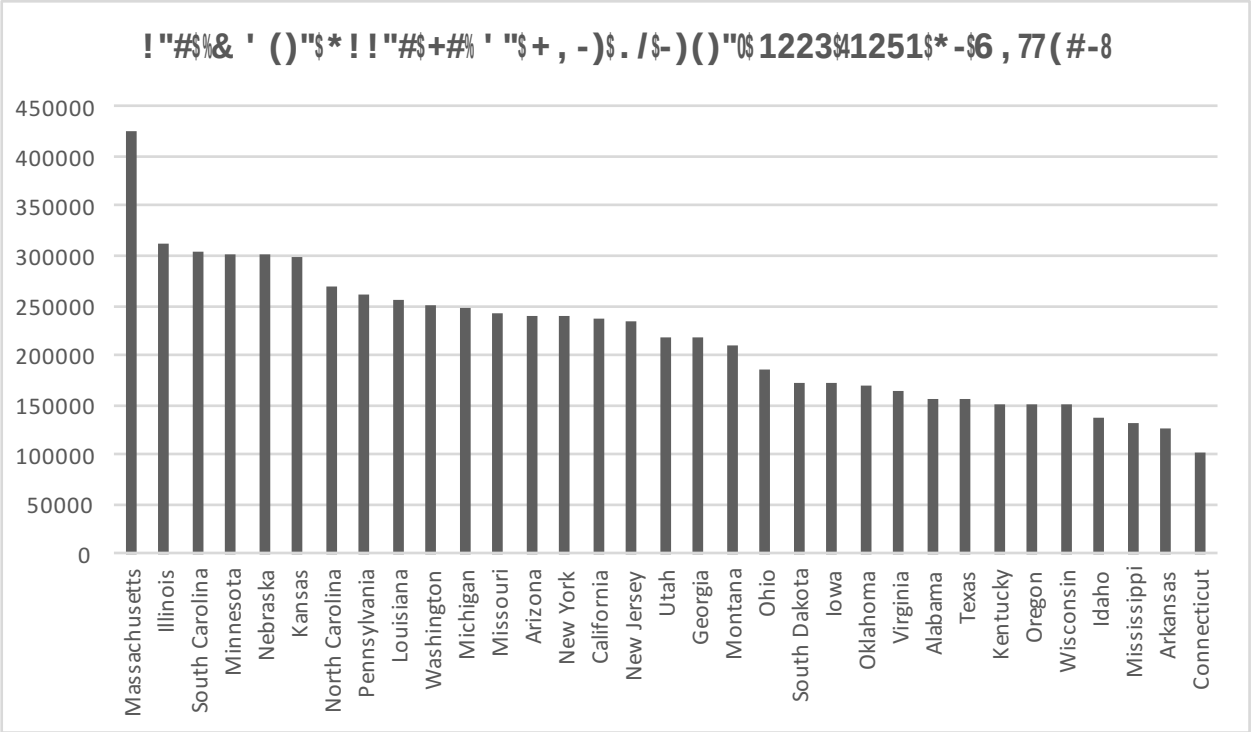
Graph 5: Per Inmate Upper Crime Cost by State, 2002 (2012 US Dollars)



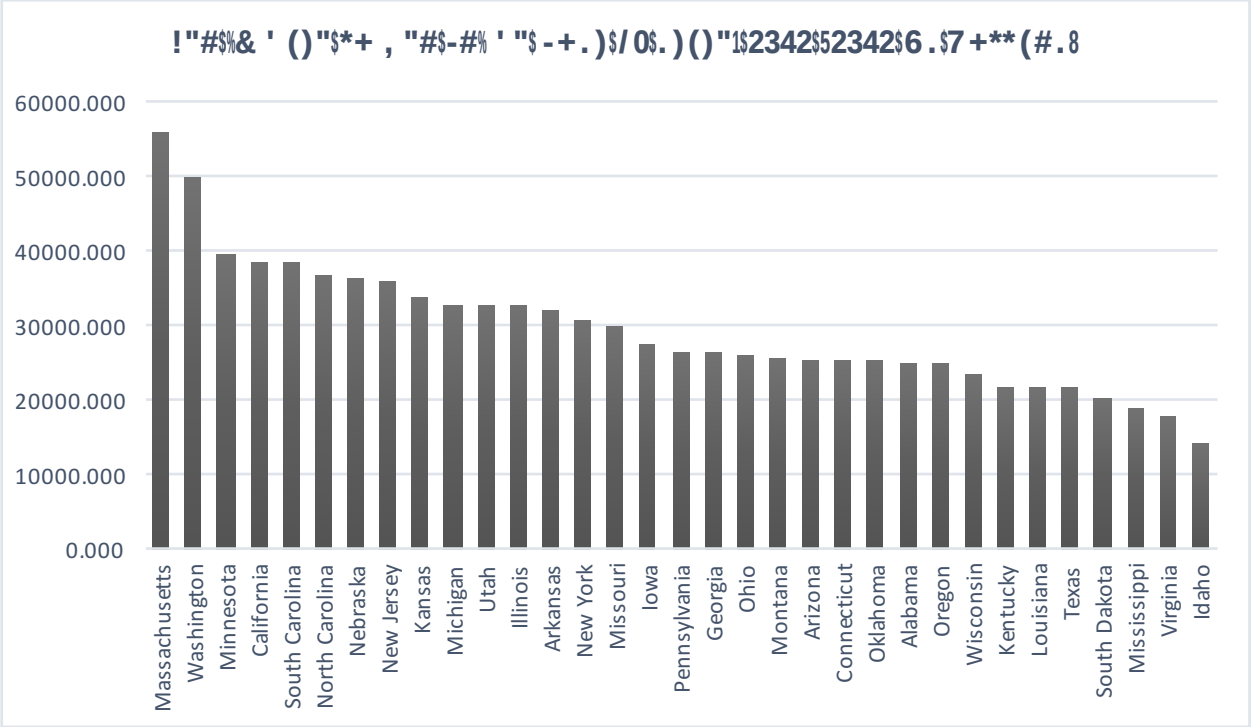
Graph 6: Per Inmate Upper Crime Cost by State, 2012 (2012 US Dollars)



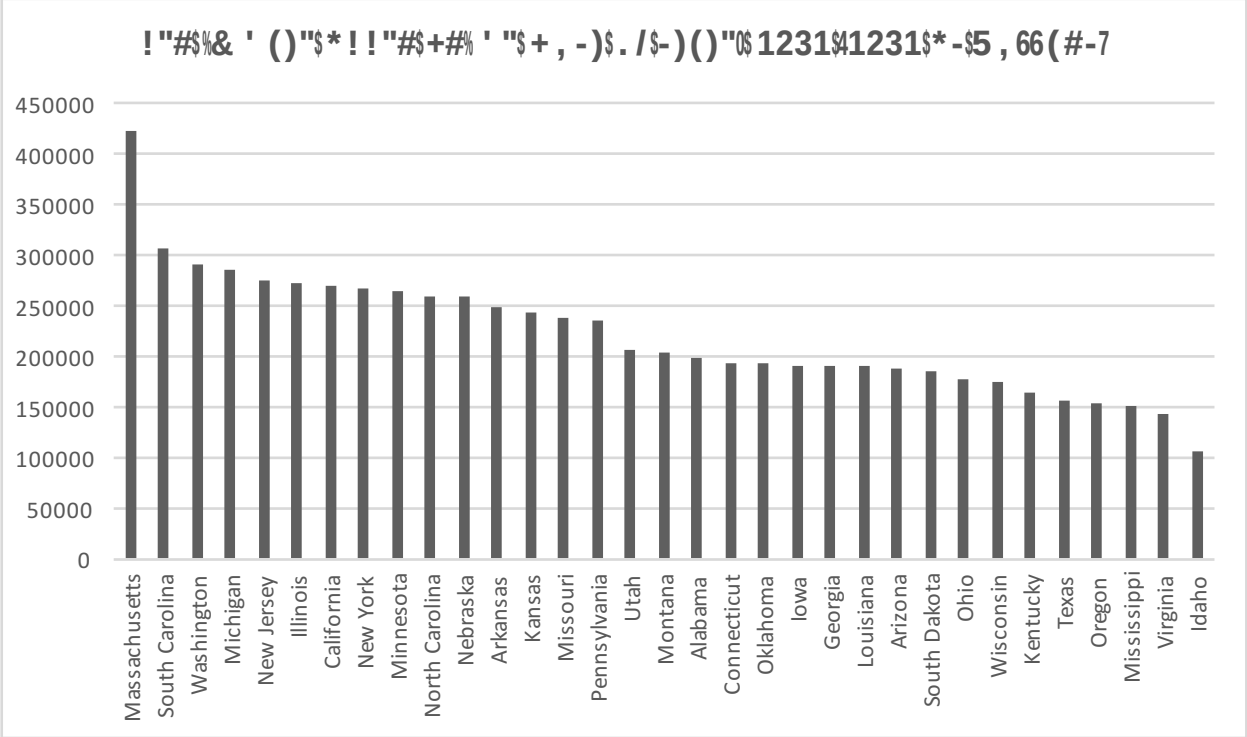
Graph 7: Per Inmate Upper Crime Cost by State, 2007 (2012 US Dollars)



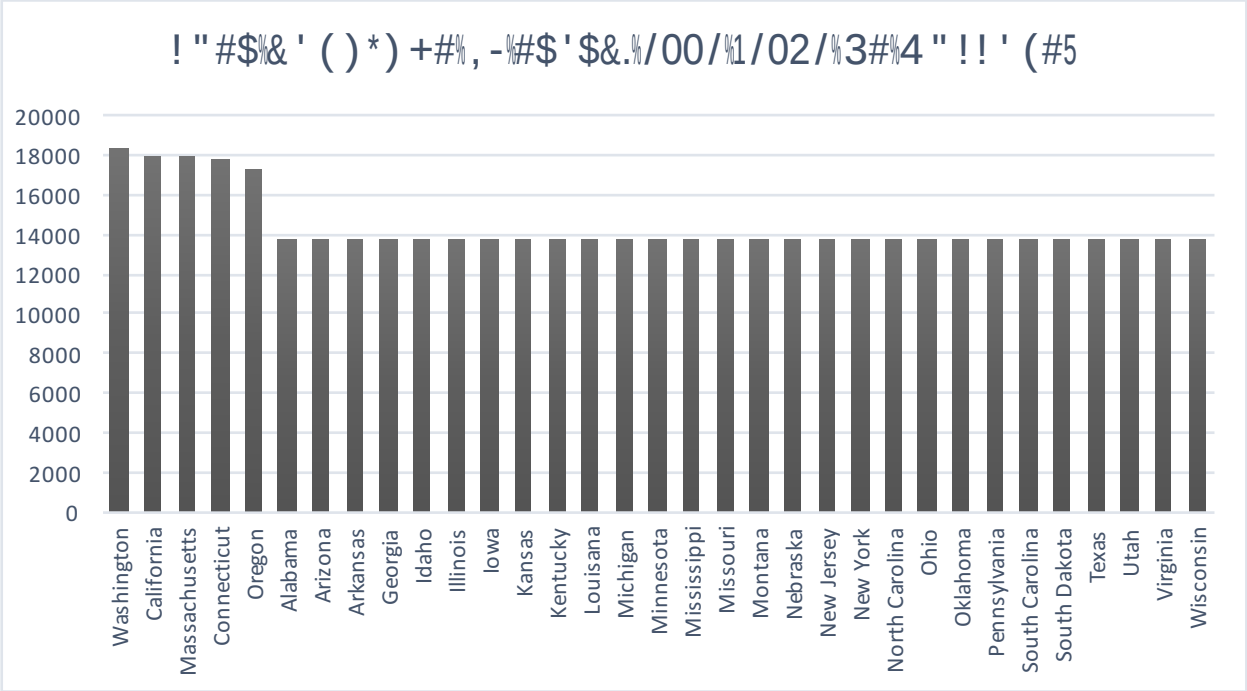
Graph 8: Per Inmate Lower Crime Cost by State, 2012 (2012 US Dollars)



Graph 9: Per Inmate Upper Crime Cost by State, 2012 (2012 US Dollars)

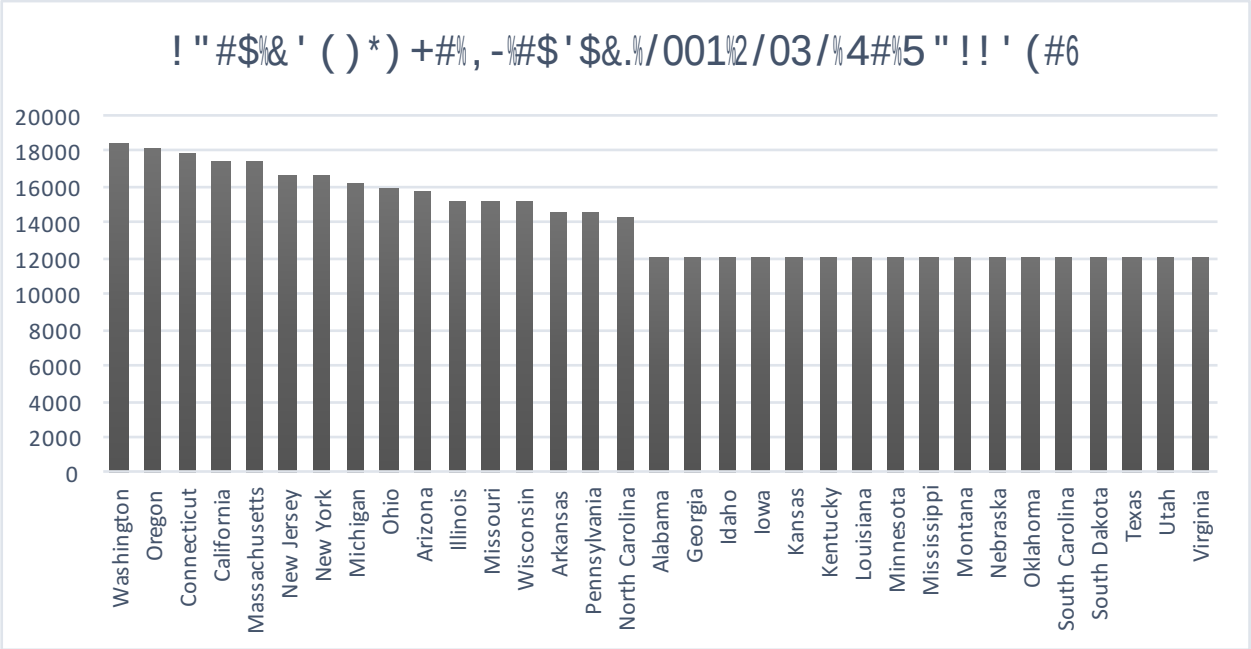


Graph 10: State Lost Earnings, 2002 (2012 US Dollars)



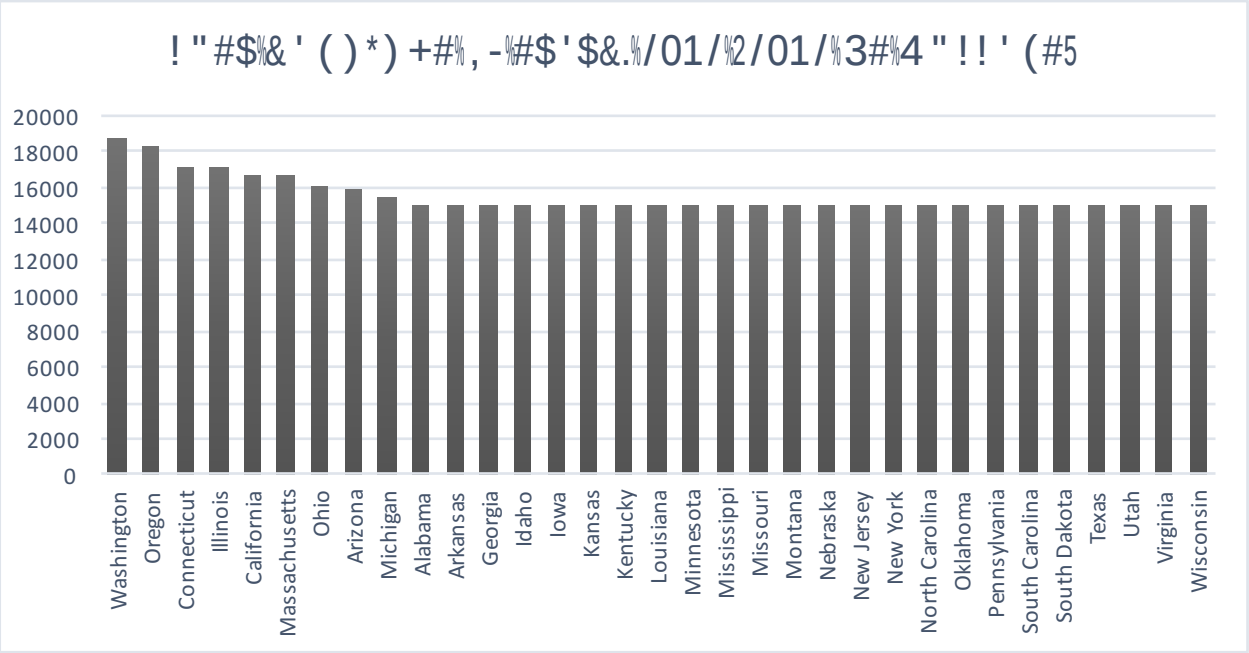
Data source: Department of Labor Wage and Hour Division, Changes in Basic Minimum Wages in non-Farm Employment Under State Law: Selected Years 1968-2016, Historical Table.

Graph 11: State Lost Earnings, 2007 (2012 US Dollars)



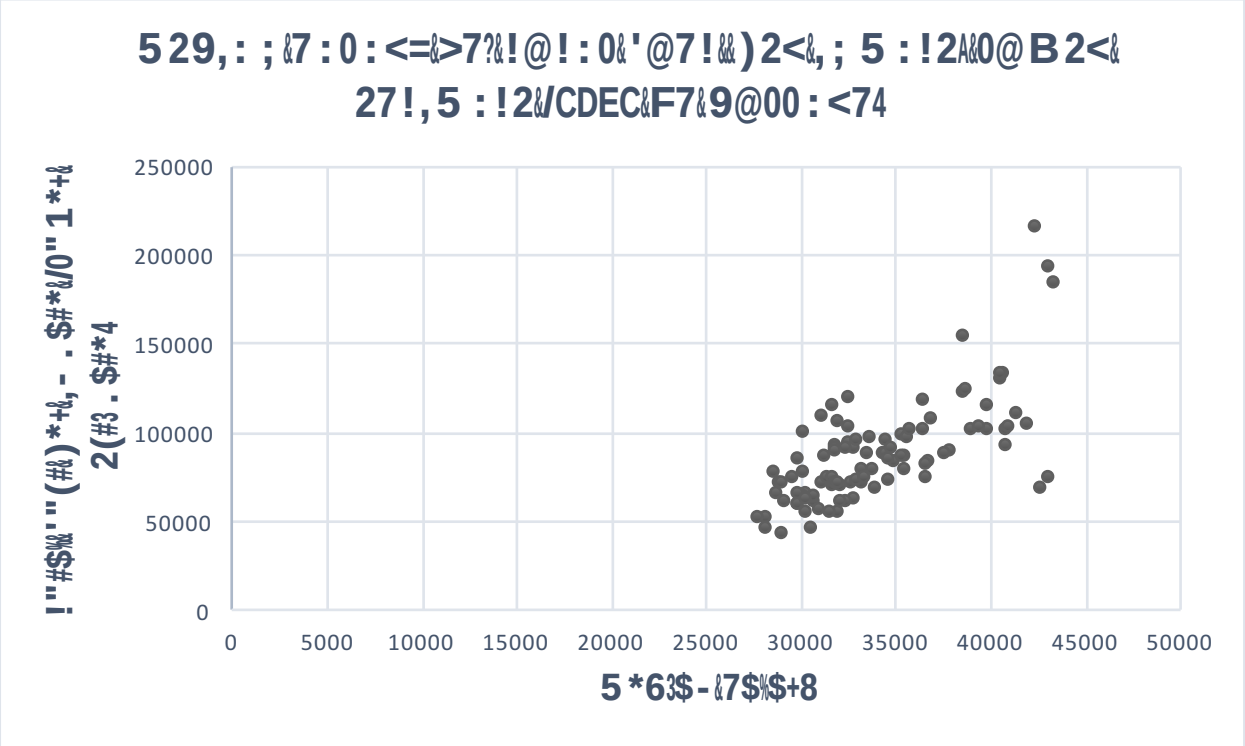
Data source: Department of Labor Wage and Hour Division, Changes in Basic Minimum Wages in non-Farm Employment Under State Law: Selected Years 1968-2016, Historical Table.

Graph 12: State Lost Earnings, 2012 (2012 US Dollars)



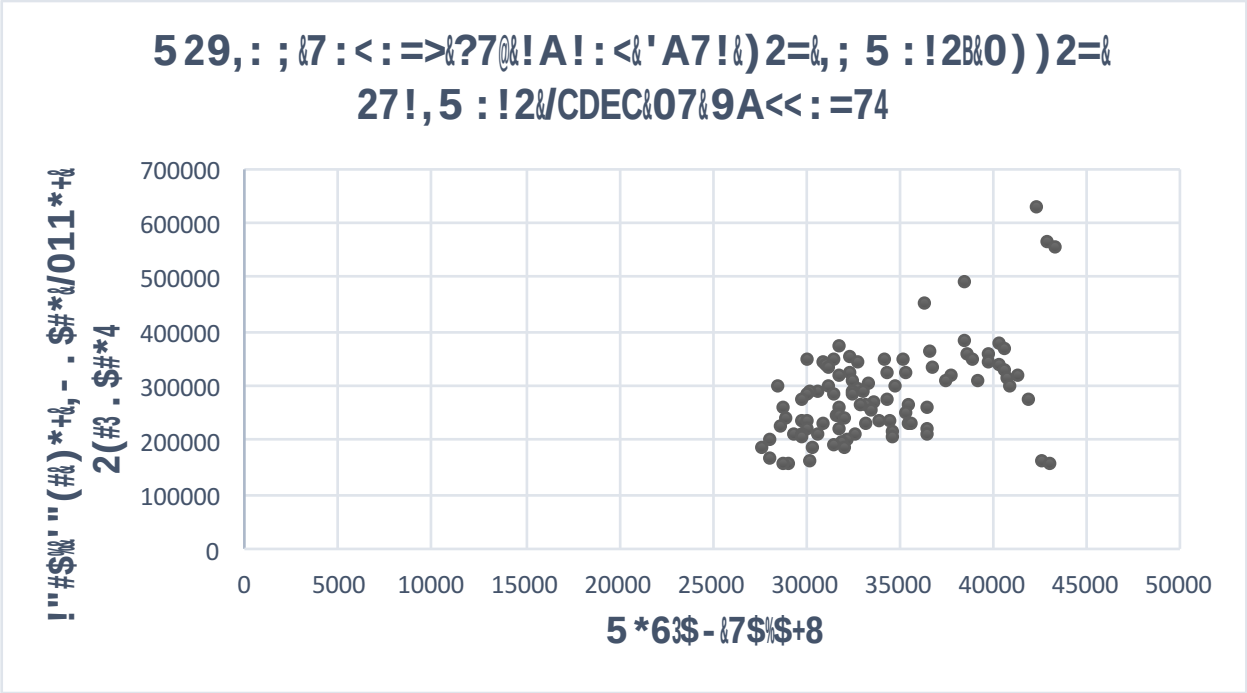
Data source: Department of Labor Wage and Hour Division, Changes in Basic Minimum Wages in non-Farm Employment Under State Law: Selected Years 1968-2016, Historical Table.

Graph 13: Median salary vs. total cost per inmate, lower estimate (2012 US Dollars)



Data source: Bureau of Labor Statistics, OES Data for states, 2002, 2007, and 2012.

Graph 14: Median salary vs. total cost per inmate, upper estimate (2012 US Dollars)



Data Source: Bureau of Labor Statistics, OES Data for states, 2002, 2007, and 2012.

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