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## **Why Are So Many Americans in Prison?**

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## **1. Introduction**

The United States currently incarcerates its residents at a rate that is greater than every other country in the world. Aggregating the state and federal prison populations as well as inmates in local jails, there were 737 inmates per 100,000 U.S. residents in 2005 (International Centre for Prison Studies 2007). This compares with a world average of 166 per 100,000 and an average among European Community member states of 135. Of the approximately 2.1 million U.S. residents incarcerated in 2005, roughly 65 percent were inmates in state and federal prisons while the remaining 35 percent resided in local jails.

Moreover, current U.S. incarceration rates are unusually high relative to historical figures for the U.S. itself. For the fifty year period spanning the 1920s through the mid 1970s, the number of state and federal prisoners per 100,000 varied within a 10 to 20 unit band around a rate of approximately 110. Beginning in the mid 1970s, however, state prison populations grew at an unprecedented rate, nearly quadrupling between the mid 1970s and the present. Concurrently, the rate of incarceration in local jails more than tripled.

Why are so many Americans incarcerated? Why did the incarceration rate increase so much in so short a time period? This chapter seeks to answer these questions.

A nation's incarceration rate at any given point in time is determined by both the criminal behavior of the nation's residents as well as by policy choices made by the electorate, elected officials, and representatives of the criminal justice system. The relationship between criminal behavior and incarceration is simple and mechanical: the more people engage in criminal activity the greater the proportion of the population at risk of doing time. The determinants of criminal behavior, however, are complex and multifaceted and may include economic conditions, demographic characteristics, the incentives created by the criminal justice system, and the institutional supports for individuals with a high propensity to offend.

Public policies defining which offenses are punishable by incarceration along with the pronounced severity of the punishment also play a key role in determining the overall incarceration rate. Clearly, the greater the scope of activities deemed deserving of a prison spell the higher the fraction of the population that will be incarcerated. Moreover, longer sentences holding offense type constant will result in more prisoners. Again, however, the determinants of both the scope and severity are complex and often involve multiple branches of the U.S. criminal justice system.

Understanding the phenomenal growth in U.S. prison and jail populations requires an analysis of changes in policy, changes in criminal behavior and the determinants thereof, as well as the manner in which policy changes and criminal behavior interact with one another with regards to their effects on overall incarceration rates. For example, the impact of changes in criminal behavior on incarceration rates will depend on the amount of resources allocated towards detecting and punishing offenders. The impact of changes in criminal behavior will also be magnified by the typical severity of punishment as measure by sentence length and actual time served in prison or jail. Moreover sentencing policy and the allocation of public resources towards enforcement are likely to respond to real as well as perceived changes in the threat of victimization. Conversely, the extent of criminal behavior (both in terms of the number of non-institutionalized people engaging in criminal acts as well as the intensity of criminal activity for any given offender) is certainly impacted by criminal justice policy. Higher incarceration rates are likely to deter would-be criminals, incapacitate actual offenders, and permanently alter the propensity to commit crimes among the formally incarcerated, for better or for worse.

The past 25 years have witnessed several shocks to the likely behavioral determinants of incarceration as well as many drastic policy changes pertaining to the scope and severity of punishment. Changes in illicit drug markets, the deinstitutionalization of the mentally ill, the

declining labor market opportunities for low-skilled men, changes in sentencing policy, and a more punitive community corrections system are all commonly offered as explanations of recent trends. This chapter seeks to sort out these competing hypotheses and to offer a comprehensive evaluation of the sources of the increase in U.S. incarceration rates.

We focus primarily on the growth in state prison incarceration though we often analyze variation in the overall incarceration rate inclusive of federal prisons and jails. Over the last two and a half decades, we observe two principal changes that bear directly on growth in the incarceration rate and that provides a framework for categorizing various behavioral and policy contributors to incarceration growth and for attributing responsibility among these various causes. First, conditional on the violation sending one to prison, the average time one can expect to serve until release has increased considerably. Interestingly, increases in time-served are not readily observable in the aggregate. That is to say, the average prisoner entering today will not serve more time on a given prison spell than the average prisoner admitted 25 years ago. Moreover, observable sentences handed down by the criminal justice system (for example, the maximum sentence on a felony conviction) are no longer today than in the past.

This stability is illusory, however. The composition of prison admissions across violation or offense type has shifted decisively toward less serious offenses, with particularly large increases in the proportion of admissions accounted for by drug offenses and parole violations, a factor that all else held equal should have led to a decrease in average time served among the nation's prison inmates. A comparison of actual time served for recently admitted inmates relative to prison inmates admitted in decades past who have committed similar offenses reveals quite large increases in actual time served. Our estimates suggest that this fact alone (increasing time served holding constant offense severity) explains roughly one-third of recent incarceration growth.

Second, in recent decades the rate at which inmates are admitted to prison has increased considerably, with overall prison admissions per capita more than doubling since 1979 and admissions per reported crime more than tripling. The lion's share of this increase in prison admissions is driven by a very large increase in the likelihood of being sent to prison conditional on being arrested for a serious crime. This fact suggests that changes in sentencing policy along the extensive margin (the margin defining the difference between offenses meriting incarceration and those meriting an alternative, less punitive sanction) as well as along the intensive margin (pertaining to the severity of or length of prison spells) explain most of the increase in U.S. incarceration rates. A smaller proportion of the increase in prison admissions and, in turn, a smaller portion of the overall increase in incarceration appears to be driven by increases in criminal behavior (at most, one-fifth of overall growth).

Below, we first discuss changes in sentencing policy along the intensive margin. We present an overview of key changes in sentencing policy that all tend to militate towards increase in the expected time served conditional on offense. We then present estimates of how the distribution of time served has changed over the past two decades and the likely contribution of these changes to overall growth in incarceration.

We then analyze the determinants and relative importance of the increasing prison admissions rate. We first present a rough accounting intended to attribute relative culpability for this increase to increases in criminal behavior and changes in policy that increase the likelihood of being sent to prison conditional on committing a crime. We then analyze the likely contribution of changes in several potential behavioral determinants, including changing demographics, the deinstitutionalization of the mentally ill, changes in the structure of the U.S. labor market, and the influence of recent drug epidemics.

## 2. The Dynamics of Incarceration Growth in the United States: A Simple Model

Over the past three decades, the U.S. prison incarceration rate has increased to unprecedented levels. Figure 1 displays the number of state and federal prison inmates per 100,000 U.S. residents. Prior to the mid 1970s, the incarceration rate was stable, hovering in a narrow band around 110 inmates per 100,000. Thereafter, however, the incarceration increases precipitously. Between 1975 and 2004, the prison incarceration rate more than quadrupled, from a rate of 111 to 484 per 100,000. The annual incarceration rate increased by an average of 15.7 inmates per 100,000 per year during the 1980s, 16.8 inmates per year during the 1990s, and 3.1 inmates per year during the first few year of the new century.

Behind this steady increase in the incarceration rate are large flows of inmates into and out of the nation's prisons. While there are certainly many prisoners that are serving very long sentences in the nation's penitentiaries (inmates that are most likely to be captured by point-in-time snapshots of the prison population), there are many more U.S. residents who serve relatively short spells in prison and/or who cycle in and out of correctional institutions serving sequential short spells over substantial portions of their adult lives. As demonstrated by Travis (2005), nearly all inmates are eventually released from prison, most within five years of admission. Most tellingly, annual admissions to U.S. prisons have consistently hovered around one-half the size of the prison population, while roughly half of all inmates are released in any give year. In recent decades, admissions have consistently exceeded releases, resulting in sustained increases in incarceration rates.

The relationship between the overall proportion of the population incarcerated and the annual inflow and outflow of inmates is best illustrated with a simple model. Let  $c$  be the probability that the average person commits a crime and  $p$  be the likelihood of being caught and incarcerated conditional on committing crime. In any given year, the probability that someone

who is not incarcerated is sent to prison equals the likelihood of committing a crime times the probability of being caught and punished,  $cp$ . The proportion of the population that flows into prison over a give year is simply the proportion not incarcerated times the likelihood of being sent to prison,  $cp$ .

Let  $\theta$  be the proportion of prison inmates incarcerated at the beginning of the year who are released over the course of the year. The proportion of the population that flows out of prison is simply the proportion incarcerated at the beginning of the year times the probability of release,  $\theta$ . The average release rate provides a proxy measure of the amount of time that the typical inmate serves on a given spell in prison. The higher the release rate, the lower the average time served. An approximation that we will use on several occasions is that the average time served is equal to one divided by the release rate.<sup>1</sup> Thus, a release rate of 0.5 corresponds to an average time served of two years while a release rate of 0.33 corresponds to an average time served of three years.

With these definitions, we can express the incarceration rate in year  $t$  as a function of the incarceration rate in the previous year,  $t-1$ , and the probability of transitioning into and out of prison. This is given by the equation

$$(1) \quad Inc_t = cp(1 - Inc_{t-1}) + (1 - \theta)Inc_{t-1}$$

where  $Inc_t$  is the proportion of the population incarcerated at time  $t$ . Equation (1) indicates that the current incarceration rate is equal to the sum of the proportion of the population that transitions from being non-incarcerated to incarcerated in the previous year (the first terms on the right hand side of the equation) and the proportion of the population that was incarcerated in the previous year but was not released (the second term).

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<sup>1</sup> This approximation would be exact when the distribution of actual time served follows an exponential distribution.



With the passage of time and stability in the propensity to commit crime, the likelihood of being punished, and the probability of being released from prison, the incarceration rate will eventually reach a long-run equilibrium where the incarceration rate does not change from year to year. In other words, the system eventually reaches a state where  $Inc_t = Inc_{t-1} = Inc$  (indicating that we can drop the time subscript). Substituting into equation (1) and solving for the long-run equilibrium incarceration rate gives

(2)

$$Inc = \frac{cp}{cp + \theta}.$$

This basic model provides a useful framework for thinking about changes in the nation's incarceration rate. Equation (2) tells us that anything that increases the propensity to commit crimes,  $c$ , or the likelihood of being caught,  $p$ , will increase the incarceration rate in the long run. In addition, any factor that increases the rate at which prisoners are released from prison will decrease the incarceration rate.<sup>2</sup>

Moreover, with estimates of how these parameters and their determinants change over time, equation (2) can be used to dissect growth in incarceration into its component parts. For example, more punitive sentences and longer prison spells decrease the proportion of inmates released in any given year, which our model tells us will increase the incarceration rate. Alternatively, an increased propensity to engage in criminal activity or a conscious policy decision to sentence more offenders to prison for given offenses will increase the likelihood of being admitted to prison, and thus increase the incarceration rate via equation (2).

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<sup>2</sup> These statements follow from the fact that both  $\frac{\partial Inc}{\partial c} = \frac{\theta p}{(cp + \theta)^2}$  and  $\frac{\partial Inc}{\partial p} = \frac{\theta c}{(cp + \theta)^2}$  are always positive, while  $\frac{\partial Inc}{\partial \theta} = \frac{-cp}{(cp + \theta)^2}$  is always negative.

To be sure, this basic framework is an oversimplification, and much of the analysis that we will present will rely on more complex theoretical constructs. The key parameters in equation (2) are likely to depend on one another, complicating the analysis of changes over time. For example, the manner in which admissions have increased in the U.S. would have likely impacted the overall release rate had average punishment conditional on being sent to prison not been enhanced. Moreover, the path of criminal behavior, as measured by the crime rate, has certainly been influenced by changes in sentencing length and the likelihood of being punished. Any attempt to measure the contribution of behavioral change must accurately account for such inter-dependencies.

While we explore these more nuanced relationships below, here we simply characterize the overall rates at which U.S. residents enter and leave prison and how these rates have changed in recent decades (the key components of equations (1) and (2) above). We also present some first pass simulations of the relative importance of changes in prison admission rates and changes in the distribution of time served in prison in explaining the increases in incarceration depicted in Figure 1.

The primary sources of new admission to U.S. prisons come from (1) offenders convicted of felony offenses receiving sentences of at minimum one year and (2) the return to custody of former prison inmates who have either violated the conditions of their parole or who have committed a new felony and have been sentenced anew to prison. Figure 2 displays these inflows as a proportion of the base population from which they come. The proportion of the non-institutionalized population (non-prisoners and non-parolees) sentenced to either state or federal prison increased steadily between 1980 and 2003. Over the entire period, this inflow rate increased by 240 percent, with the rate more than doubling between 1980 and 1990 and then increasing at a slower pace thereafter. Similarly, the proportion of parolees returned to custody

more than doubled over this two decade period, though increases are not observed in all years. After sustained increases in the return-to-custody rate between 1980 and 1990, there is a small retreat followed by further growth. When multiplied by their base populations, the admissions rates depicted in Figure 2 imply that total admissions to prisons are slightly over half the prison population in each year.

Inmates are released from prison in one of two manners. Prisoners are either conditionally released, with their continued liberty dependent on their compliance with a set of pre-specified conditions, or they are unconditionally released, often due to the expiration of their sentences. Figure 3 displays the annual proportion of prison inmates released, the proportion conditionally released, and the proportion unconditionally released for the period 1980 to 2003. The total proportion of inmates released increases during the 1980s, suggesting that time served for the average inmate admitted during the decade was declining. In contrast, release rates decline during the 1990s, suggesting either tougher sentencing at the front end of the admissions process, tougher parole decisions at the back end, or an inmate population comprised of more serious offenders. In all years, the numbers of prisoners released falls short of the number of new inmates admitted.

By the end of the time period depicted, average release rates are comparable to those observed during the early 1980s. This fact suggests that the average person admitted to prison in 2003 serves a spell of comparable length to that of the average admission in 1980. As we will see in the next section, shifts in the composition of inmates towards less serious offenders mask a substantial increase in sentence severity. On net, however, Figure 3 suggests (and our further analysis will demonstrate) that the overall distribution of time served at the end of this period is comparable to that observed for the beginning.

These admissions and release rates can be used to provide a first pass assessment of their relative importance in explaining changes in incarceration rates. Specifically, consider the following questions. What would the 2003 national incarceration rate be if the rate of new admissions to prison were held at its 1980 level? What would the rate be if the rate at which parolees were returned to custody were held to its earliest values? Alternatively, if we were to hold the prison release rate to its 1980 level, how would this have changed the evolution of incarceration rates over the subsequent two decades?

One method of answering these questions would make use of the admissions probabilities displayed in Figure 2 and the release probability in Figure 3 in conjunction with the formula for the equilibrium incarceration rate in equation (2).<sup>3</sup> For example one could use 2003 values for the release rate and 1980 values for the admissions rates to assess what the incarceration rate in 2003 would have been had admission rates been reduced to its previous level. One problem with this approach however is that equation (2) gives the incarceration rate that would be achieved in the long run with stable admissions and release rates, and Figures 2 and 3 reveal that these rates have not been stable over time.<sup>4</sup>

An alternative approach would be to use a variant of equation (1) to simulate the time path of incarceration one would have observed under the alternative hypothetical scenarios. For example, one could calculate the 1981 incarceration rate by first calculating the proportion of the non-institutionalized population flowing into prison during 1980, the proportional flow from parole failures, and the proportional flow from 1980 prisoners that are not released from custody, and then summing these three components. The 1981 proportions on parole and not on

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<sup>3</sup> Of course, the model would have to be expanded to account for flows into and out of the parole population.

<sup>4</sup> In fact, tabulations of equilibrium incarceration rates based on a three-state version of the model in equations (1) and (2) accounting for transitions between parole, prison, and non-incarceration revealed that in each year the national incarceration rate was below the long-run equilibrium rate (predicting future growth in incarceration). Notably, this disparity between the actual and equilibrium rates was the lowest in most recent years when year-over-year growth in the incarceration rate was the slowest.

parole/not incarcerated can be calculated in a similar manner. Repeating this calculation for 1982 (using the calculated proportions for 1981), and for subsequent years would then provide the aggregate incarceration rate as a function of the sequence of observed admission and release rates.<sup>5</sup> Figure 4 presents a comparison of the simulated national incarceration rate using this iterative process for the period from 1980 to 2003 with the actual annual prison incarceration rates for these years. As can be seen, the actual incarceration rates increases from 139 to 482 inmates per 100,000 over this period. While the simulated incarceration rate increases by slightly more (to 504 per 100,000), the differences between the simulated and actual rates are never more than 5 percent and are often smaller.<sup>6</sup>

Using this simulation process, we substitute the hypothetical transition probabilities posed by the question above for the actual values and then compare this alternative simulation to the base simulation in Figure 4. Figure 5 does this for admissions rates. The figure reproduces the simulated incarceration rate using observed flow probabilities for each year from Figure 4. The figure also displays the path incarceration rates would have taken under three alternative

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<sup>5</sup> More formally, define the vector  $\mathbf{P}_t$  as

$$\mathbf{P}'_t = [P^1_t \quad P^2_t \quad P^3_t] \quad \text{where} \quad \sum_j P^j_t = 1$$

and where the index values indicate the three potential states of not in prison/not on parole ( $j=1$ ), in prison ( $j=2$ ), and on parole ( $j=3$ ). Define the matrix  $\mathbf{T}_t$  as

$$\mathbf{T}_t = \begin{bmatrix} T^{11}_t & T^{12}_t & T^{13}_t \\ T^{21}_t & T^{22}_t & T^{23}_t \\ T^{31}_t & T^{32}_t & T^{33}_t \end{bmatrix}, \quad \text{where} \quad 0 \leq T^{ij}_t \leq 1, \quad \forall i, j \quad \text{and} \quad \sum_j T^{ij}_t = 1, \quad \forall j.$$

The proportional distribution of the U.S. population across the three states in any given year can be rewritten as a linear function of the state distribution in the previous year and the transition probability matrix,

$$\mathbf{P}'_{t+1} = \mathbf{P}'_t \mathbf{T}_t.$$

Similarly, the subsequent distribution of the population can be tabulated by applying the next matrix of transition probabilities to the first calculation, or

$$\mathbf{P}'_{t+2} = \mathbf{P}'_t \mathbf{T}_t \mathbf{T}_{t+1},$$

and so on.

<sup>6</sup> The disparity between the simulation and the actual incarceration rates is likely the result of measurement error in admissions and releases. Note, the structure of the calculations ensures that errors cumulate over the years of the simulation.

scenarios: (1) the rate at which parolees are returned to custody is held to its 1980 value, (2) the rate of new admissions to prison from the non-institutionalized population is held to its 1980 value, and (3) both the return-to-custody rates as well as the new-admissions rates are held to 1980s values.

The results suggest that had the parole failure rate remained constant, the incarceration rate in 2003 would be roughly 20 percent lower than that actually observed. Had new admission rates been held to the 1980 value, the 2003 incarceration rate would be less than half the observed rate. Had both parole failure and admission rates been held constant, the incarceration rate at the end of this period would have been 65 percent lower. In terms of the net change in incarceration between the beginning and end of this period, changes in these two prison admission rate account for 90 percent of the increase in incarceration rates.

By contrast, a similar exercise suggests that changes in release probabilities, and, by extension, changes in average time served plays a much smaller role. Figure 6 presents the base simulation based on actual transition probabilities and a hypothetical incarceration simulation holding the release probabilities to their 1980 values. The hypothetical path charts the base simulation quite closely. If anything, release rates and time served appears to have lowered the incarceration rate relative to what it would have been during the late 1980s and early 1990s (as is evidenced by the fact that the hypothetical simulation exceeds the base simulation in these years). While this pattern reverses in the mid 1990s perhaps due to federal incentives during this period to toughen sentences (which we will discuss shortly), by the end of the time period the two simulated incarceration rates are still quite close to one another.

What we will see in our more detailed analysis is that these base simulations overstate the relative importance of increases in admissions rates and considerably understate the relative importance of increases in the length of prison spells. This is due primarily to the fact that the

composition of inmates admitted to prison today is more heavily weighted towards less serious offenders than in years past. This change in composition implies that had punishment severity as measured by length of time served been held constant to 1980 levels, average sentence length should have decreased, and thus overall release probabilities should have increased rather than remained constant. For the moment, however, we will postpone this discussion and continue with our characterization of overall changes in admissions and releases probabilities.

In practice, U.S. incarceration rates reflect the operation of 52 individual and largely independent corrections departments (the 50 states, Washington, D.C., and the federal prison system). Given the uneven distribution of the U.S. population across states, the overall patterns presented above may be driven by the experience of a few large states such as Texas, California, and New York that have experienced fairly large increase in incarceration rates. To explore this possibility, we repeated these simulation exercises for each of the 50 states and for Washington D.C. These simulations are summarized in Figures 7 and 8. Figure 7 presents a scatter plot of the base simulated increase in state incarceration rates between 1979 and 1998<sup>7</sup> against the simulated change in state incarceration rates under the assumption that parole failure rates and new commitment admissions were held to their 1979 levels. The degree to which the data point lies below the 45 degree line (where the two simulated changes equal one another) is indicative of the extent to which changes in these admission rates explain changes in overall incarceration rates. We also present a line representing a linear regression of the base simulation on the simulation holding admission rates to their earlier values. The closer the slope coefficient is to zero, the more important are changes in these transition probabilities in explaining growth in incarceration rates

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<sup>7</sup> Data for later year at the state level are not yet available.

Interestingly, all of the data points with the exception of one state lie substantially below the 45 degree line, suggesting that the importance of changes in admission rates observed at the national level is observable in practically every state. Moreover, the regression line through the scatter plot has a slope coefficient estimates which is insignificant and near zero.

Figure 8 presents a similar comparison for the simulation holding release rates to their 1979 values. Here, the states are roughly distributed around the 45 degree line and the slope coefficient of the regression line through the scatter plot is statistically indistinguishable from one. The figure indicates that for most states, overall prison release probabilities do not change appreciably over the time period analyzed, and thus, holding these overall values to their 1980 levels do not produce lower incarceration rates. However, these results are subject to the same compositional criticism discussed above.

Thus, the dynamics of the increase in U.S. incarceration rates are quite clear. In any given year, the flows into and out of prison are quite large (equal to approximately half the population incarcerated at a given point in time), with the inflow consistently exceeding the outflow in each year of the last quarter century. The nation has experienced a broad-based increase in the rates at which prison inmates are admitted out of the non-institutionalized population and out of the population of former inmates on parole. On the other hand, average time served has not changed, as is evidenced by the relative stability in the likelihood of being released from prison. We now turn to a discussion of the specific factors likely to explain the time path of prison admissions and releases, and ultimately, the growth in incarceration depicted in Figure 1.



### 3. Changes in Actual Time Served and Growth in Incarceration

Since the mid 1970s, there has been a myriad of state and federal level policy changes pertaining to sentencing and parole that are likely to have impacted the actual length of time that inmates serve upon being admitted to prison. To begin, many states have moved from indeterminate sentencing structures, where judges had great latitude to set a wide range at sentencing between the minimum and maximum time to be served, to determinate sentencing, where judicial discretion is limited especially with regards to minimum sentences (Tonry 1996). In several instances, states as well as the federal government have created sentencing commissions that set sentencing guidelines with proscribed minimum and maximum sentences that are scaled according to offense severity and prior criminal history. There have been a number of state and federally enacted mandatory minimum sentences for certain offenses (Caulkin 199?, Kessler and Levitt 199?). In addition, the 1994 Violent Crime Control and Law Enforcement Act created incentive grants for prison construction for those states that passed “truth-in-sentencing” laws that ensure that prison inmates serve a minimum percentage of their maximum sentence, with many states shooting for 85 percent (Ditton and Wilson 1999).

Finally, states have greatly curtailed the discretion of parole boards with regards to release decisions. Many states have moved from discretionary parole systems with strong parole boards to mandatory parole systems with either weak or no parole boards and where inmate releases are governed by administrative rules. While during the 1970s, nearly all states had parole boards and operated under discretionary parole systems, by 2003 only 16 states retained this older form of community corrections (Petersilia 2003).<sup>8</sup> This shift towards mandatory parole may have also impacted the likelihood of being returned to custody once paroled, since

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<sup>8</sup> According to Petersilia (2003), states that still has powerful parole boards included Alabama, Alaska, Colorado, Idaho, Kentucky, Montana, Nevada, New Jersey, North Dakota, Oklahoma, Pennsylvania, Rhode Island, South Carolina, Utah, Vermont, and Wyoming.

inmates are often released as an administrative eventuality rather than an earned event, a fact contributing to the reentry challenges facing today's population of parolees (Travis 2005).

A number of studies have attempted to link these changes in sentencing to changes in the distribution of time served, overall incarceration rates, or prison admissions, with most concluding that such policy changes have had little effect on incarceration rates. Langan (1991) provides an early example. The author notes that many of the earlier sentence enhancements were either geared towards repeat offenders or violent offenders, a development that if binding should have increased the proportion of such offenders among the incarcerated population and among prison admissions. Langan finds no such change in the data through 1988. Moreover, Langan demonstrates a relatively stable distribution of maximum sentences as well as stability in the median time served among recently released inmates. Based on these patterns, Langan concludes that these policy changes bear little responsibility for increases in incarceration, at least through 1988.

Marvell (1995) explores the effects of sentencing guidelines on prison growth while Marvell and Moody (1996) assess the effects of the move to determinate sentencing and the abolishment of parole boards. In both studies, the authors find little evidence that these policy changes correspond to higher than average prison growth, with prison population actually growing slower in many states adopting these sentencing regimes. Two cross-sectional studies of the determinants of incarceration (Taggart and Winn 1993, Sorensen and Stemen 2001) fail to find evidence that states that have limited judicial and parole board discretion have higher incarceration rates.

More recent studies that address some of the weaknesses of this earlier research conclude that sentencing reform plays a much bigger role in explaining incarceration growth. For example, Nicholson-Crotty (2004) uses panel data methods to estimate the effect of

sentencing guidelines on incarceration rates distinguishing between those states with sentencing commissions that are mandated to calibrate guidelines to resources and those that are not. Confirming the earlier analysis of this question in Tonry (1996), the author finds that states with such resource guidelines had lower incarceration growth while guideline states that did not consider resources had higher than average growth.

Perhaps the most authoritative work on the importance of changes in time served in explaining incarceration growth is the study by Blumstein and Beck (1999). The authors note the many problems associated with inferring the amount of time that inmates serve from the experience of recently-released inmates. Prime among these concerns is the fact that inmates serving short sentences will be disproportionately represented among releases, creating a distorted picture. To avoid this selection problem, Blumstein and Beck assemble a time-series data set of offense-specific admissions and incarceration rates and use an indirect measure of the average time served; namely the ratio of the incarceration rate to the admissions rate.<sup>9</sup> Using this alternative measure, the authors find substantial increases in average time served by offense. In their assessment, longer prison spells account for nearly 40 percent of the increase in incarceration between 1980 and 1996.

Here, we assess whether today's inmates are serving longer prison spells relative to comparable inmates in times past. We then use these results to provide a rough estimate of the

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<sup>9</sup> The relationship between this ratio and average time served can be illustrated with the model in equations (1) and (2). We demonstrated that with a sufficiently lengthy period of stability in admissions and releases, the equilibrium proportion of residents incarcerated will settle at  $cp/(cp+\theta)$ , where  $cp$  is the admissions rate and  $\theta$  is the release rate. The ratio of the incarceration rate to the admission rate (used by Blumstein and Beck) is simple  $1/(cp+\theta)$ . Since in practice the overall admission rates is a relatively small number (admissions rates in the U.S. never exceed 0.0025) while the release rate is a relatively large number (approximately 0.5 in all years), this ratio is approximately equal to the reciprocal of the release rate,  $1/\theta$ . As we have already discussed, in the special case where the time-served distribution is exponential, the expected value of time served is equal to the reciprocal of the release rate. Thus, the indirect estimate in Blumstein and Beck is best interpreted as a close approximation to the expected value of time served under the assumption that time served is exponentially distributed.

importance of changes in actual incarceration spells in explaining the overall growth in incarceration.

*A. Are like offenders spending more time behind bars?*

We are specifically interested in how the expected time that an inmate will serve varies by one's year of admission and reason for admission. For example, we would like to know the proportion of inmates admitted for drug offenses in 1984 that are released within one year, two years, three years, etc., be able to compare these proportions to latter years, and be able to make similar comparisons for alternative offenses and admission types. Ideally, one would use longitudinal micro data on inmates with information on date of release to estimate such cohort specific time-served distributions. Unfortunately, such data are unavailable at the national level.

Nonetheless, it is possible to estimate these distributions using data from the National Corrections Reporting Program (NCRP) by constructing synthetic admission and release cohorts in a manner that approximates a longitudinal study. Specifically, the NCRP data provides microlevel information on all prison admissions and prison releases occurring within a given calendar year. Among the many variables included in the NCRP data are the reason for the most recent admission (e.g., new commitment, parole violation), the most serious offense (e.g., murder rape, drugs etc.), year of admission, and, for releases, the year of release. With this information it is possible to estimate the number of inmates admitted in a given year as well as the numbers of inmates released in a given year by their year of admission. For example, one could estimate the number of prisoners admitted in 1984, the number of prisoners released in 1984 that were admitted in 1984, the number of prisoners released in 1985 that were admitted in 1984 and so on. A comparison of these totals provides information on the proportion of prisoners admitted in 1984 who are released within one year, two years, three years, etc. of the year of admission.

We estimate these totals for state prisoners admitted in the years 1984,<sup>10</sup> 1994, and 1998. We first group admissions into two broad admissions types: (1) admissions due to a new felony conviction or to parole revocation with new terms, and (2) all other prison admissions, consisting predominately of parole violators. We further subdivide those admitted in the first group into eleven groups according to their most serious offense. We then estimate time served distributions for the 11 sub-groups admitted with a new commitment and for the group largely consisting of parole violators.

Before discussing the results, we should mention a few qualifications. First, this synthetic cohort construction requires data on admission for 1984, 1994, and 1998 as well as data on releases for the same years and for all years following. Not all states participate in the NCRP and many states do so only inconsistently. We find 26 states with data in all needed years and, thus restrict our analysis to what happens in the aggregate of these 26 prison systems. Fortunately, these are large states that accounted for 70 percent of the state prison population in 1984 and 75 percent of the growth in the prison population between 1984 and 1998. Thus, while this analysis is not strictly representative of the U.S. prison population, we do cover nearly three-quarters of all states inmates.

Second, for 1984 and 1994 we estimate the numbers released by admission type and admission year for the nine-year period following admission. Any disparity between observed admissions and the cumulative releases over the subsequent nine-year period are assumed to be serving spells in excess of nine years.<sup>11</sup> For 1998, we can only estimate releases through the subsequent five year period, since the most recent year available in the NCRP series is 2002.<sup>12</sup>

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<sup>10</sup> The earliest year of the NCRP data is 1983. However, many important large states did not report information in that year. For this reason, we choose 1984 as the base year.

<sup>11</sup> For some of the 12 groups in 1984, our estimates of releases over the subsequent nine years exceed our base estimates of 1984 admissions. When this occurred, we set the base admissions total for the category to the sum of releases over the nine-year period. We also readjust the total releases to reflect these changes. In total, the disparity

Figure 9 presents our estimates of the distribution of overall time served for all prisoners admitted in the years 1984, 1994, and 1998. The distributions are censored at more than five years for the sake of comparability between the 1998 cohort and the early cohorts. Consistent with our discussion of aggregate release rates, there is no aggregate shift towards longer sentences between 1984 and the latter years. While the fraction of inmates that serve five years or more increases, so does the fraction serving spells of less than one year. On average, we will see that these changes cancel one another out and that the expected length of the time served by the average inmate admitted in 1998 does not differ from that of an inmate admitted in 1984. This is consistent with the relative stability in release probabilities discussed above.

This stability is deceiving, however, since the distribution of prison admission across our twelve defined categories changes markedly. Table 1 presents the proportion of admissions to prison in each year accounted for by our twelve admission types.<sup>13</sup> Most notably, the percent of admissions in the “parole violations and other admissions” category increases from 19 to 36. The percent of admissions for a new commitment for a violent offense declines from 28 percent in 1984 to 16 percent in 1998. Finally, the percent of admission for drug offense increase from 12 to 21. Given these pronounced composition shifts towards relatively less serious offenders, the lack of change in Figure 9 is actually quite remarkable, as one would expect to observe a shift towards shorter sentence, all else held equal.

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for 1984 between estimated admissions from the admissions file of the 1984 NCRP and estimated admissions from subsequent releases was under 3 percent.

<sup>12</sup>An additional specification choice that bears mentioning concerns how we deal with observations with missing information. In several of the admissions records and release records, there is missing information on either admission type or offense. To address this issue for both admissions and releases, we first allot observations with missing admissions types to the new commitment or parole violator category in proportion to the representation of these groups among observations with complete information. We then performed a similar allotment of the adjusted new commitment records among offense types in proportion to the offense type distribution among observations with complete offense information.

<sup>13</sup> For the new commitments by offense group, the category “murder” includes all murder, homicide, and manslaughter commitment, “rape” includes all rape/sexual assault commitments, and “larceny” includes all larceny, fraud, and embezzlement commitments.

The importance of these compositional shifts in masking a general tendency towards longer time served becomes apparent when we analyze changes in the time-served distribution by admission category. Figures 10 and 11 present time-served distribution estimates for prisoners admitted for new felony offenses and for all other admissions. Notably, the offense distribution shifts towards longer sentences in the new commitments graph, with stability in the proportion serving less than one year, declines in the proportion serving between one and four years, and increases in the proportion serving more than five years (from 15 percent in 1984 to 22 percent in 1998). These shifts occur despite the fact that even among commitments to prison for a new offense, the composition of admits has shifted towards less serious offenders. By contrast, the time-served distributions for parole violators and other admissions are heavily concentrated among short spells.

Increases in time served are especially evident when we analyze changes in the distribution of time served for the specific offenses that generate new convictions (the sub-categories constituting the offenders whose overall distribution is displayed in Figure 10). Table 2 presents estimates of the time-served distributions for each offense and for each year. It is most instructive to review changes in the proportion of inmates serving more than five years within each offense category. This proportion increases by 16 percentage points for murder, 27 percentage points for rape, 12 percentage points for robbery, 14 percentage points for assault, 12 percentage points for other violent, 9 percentage points for burglary, 10 percentage points for larceny, 7 percentage points for motor vehicle theft, 13 percentage points for other property, and 11 percentage points for drug offenses.

In Table 3, we present rough estimates of the average time that an offender admitted in one of the three years can expect to serve using the time served distributions in Figures 9 through 11 and Table 2. We calculate the expected values by assuming that the actual time served for

each release equals the mid-point of the time interval of release (0.5 years for released within year, 1.5 years for released within 2 years etc).<sup>14</sup> For all admissions, expected time served declines slightly between 1984 and 1994 and then increases slightly in 1998. Overall, there is very little change in this estimate, with the average inmate serving 2.7 years at the beginning and end of this period.

For our individual admission categories, however, the calculations reveal nearly uniform substantial increases, ranging from an approximate 20 percent increase in time served for robbery to a 75 percent increase in average time served for rape. Even the expected time served for parole violators increases by roughly 11 percent. Thus, when we compare apples with apples, the average time served has certainly increased.<sup>15</sup>

Interestingly, we do not observe comparable increases in the severity of the sentence handed down to offenders at the time of conviction. Figure 12 presents key percentiles of the distribution of maximum sentence for prisoners admitted in each year between 1984 and 2002. These distributions are re-weighted to hold the distribution of prisoner admits across offense types to the distribution observed in 1984/1985.<sup>16</sup> Below the median maximum sentence, the

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<sup>14</sup> Note, for 1984 and 1994 we tabulate the proportion released within one, two, three, four, five, six, seven, eight, and nine years. For most offenses and years, the estimated proportion serving over nine years was relatively small, although these proportions are substantial for murder in all years and for rape in 1994. For inmates serving for more than nine years, we assume the expected value above this cutoff is 15 years for murder and 12 years for all other offenses. For 1998, we are only able to tabulate the proportion released within one, two, three, four, and five years. For those admitted in 1998 who serve more than five years, we assign the expected value of time served for those serving over five years in 1994 in a similar admission category in order to calculate the overall average time served. This imputation would fail to pickup any lengthening of sentences between 1994 and 1998 occurring above the five year cutoff.

<sup>15</sup> Incidentally, our estimates of the expected value of time-served using direct estimates of the time-served distribution correspond to the estimates in Blumstein and Beck (1999) that use the indirect method of taking the ratio of prisoners to admissions. For example, between 1984 and 1996 Blumstein and Beck estimate that average time served increases from 7 to 11.5 years for murder, from 3 to 5.1 years for rape, from 3.7 to 4.8 years for robbery, from 3 to 3.5 years for assault, from 2 to 3 years for burglary, and from 1.7 to 2.3 years for drugs. While these numbers are not exactly equal to ours (they correspond to the nation and the end year is different), they are quite close both in terms of levels and absolute changes.

<sup>16</sup> These distributions are also estimated from the NCRP data. We omitted 1986 due to an unexplainable spike in maximum sentences in this year.



distributions are basically stable for the entire period. For the longest sentences however, the sentences handed down during the late 1990s seem to have moderated.

Taken together, the increase in time served coupled with the stable, if not slightly more moderate sentencing distribution indicates that not only are today's inmates serving longer spells, but they are also serving greater proportions of the sentences handed down at conviction. Moreover, the fact that the time served distributions have shifted towards longer prison spells within offense categories indicates that these changes are likely the result of changes in sentencing policy rather than changes in criminal behavior. We now turn to an assessment of the contributions of these changes to the overall growth in incarceration rates.

*B. How much of the increase in the incarceration rate can be explained by longer spells?*

Prisoners today are serving longer sentences than comparable prisoners in years past, a fact that is missed in simple comparisons of the overall average release rate or the aggregate time-served distribution. With the shift in the composition of prison admissions towards less serious offenders, the average time served would have declined and the overall release rate would have increased had the various criminal justice policies that determine actual time served not become more punitive. Thus, the current release rate is lower than it would have otherwise been and the average time served longer. When filtered through our simple model of equilibrium incarceration rates, these facts imply that longer sentences have indeed contributed to incarceration growth.

Here we assess by how much. First, we estimate how much the shift towards more punitive sanctioning has increased average time served above what it would have otherwise been given the shift in admission composition. We then use these results to fashion a rough estimate of how much the release rate would have increased if the time served distribution had not

changed. Finally, we use this result to characterize the importance of changes in prison spell length in explaining increasing state prison incarceration rates.

To calculate the time that today's average prisoner would serve under the sentencing and release policies of 1984, note the following. The overall average time served in any given year (presented at the top of Table 3) represents an average of the time-served estimates for each of the twelve admissions categories. Of course, the overall estimate is a weighted average where the offense-specific estimates are weighted by the proportional importance of each offense category in the composition of prison admissions for that year. With this in mind, the change in average time served between say 1984 and 1998 will be driven by both changes in these weights (that is to say, the composition of admits) as well as changes in average time served within category. We would like to know how average time served would have changed over this period had time-served severity within offense categories been held constant. This calculation simply requires taking the weighted average of the 1984 time served averages using the 1998 admissions proportions as weights.

Table 4 presents this calculation. The first row of figures reproduces our estimate of the average time served for 1984 and 1998. The second row then presents our estimate of what average time served would have been had expected time served by offense remained constant at the 1984 values. The calculation suggests that the increases in the severity of punishment between 1984 and 1998 increased the expected value of time served in 1998 by approximately one-half of a year. Thus, while average time served does not change overall, time served does increase considerably relative to what would have been had sentencing and parole policies remained stable.

These averages can be used to calculate a rough estimate of the prisoner release rate in each year. As we noted in Section 2, one over the release rate provides a rough estimate of the

expected time that the average inmate will serve. Conversely, one over the expected time served provides an estimate of the average release rate. Table 4 also presents these calculations. The table indicates stability in the overall release rate. However, had punishment severity remained constant, the prisoner release rate would have increased by approximately 21 percent given the change in the composition of admits.

Thus our estimates indicate that changes in sentencing and parole policy have resulted in a decrease in the annual likelihood of being released from prison of approximately 21 percent. Armed with this figure, we can now estimate the relative importance of these policy changes in explaining the increase in incarceration. Table 5 presents these estimates. The first row of the table presents the actual incarceration rate in 1984 and 1998 for the 26 states covered by our NCRP data. As can be seen, over this fourteen year time period the actual incarceration rate increased from 170 inmates to 422 inmates per 100,000 residents, a change of 252. The next row presents estimates of the equilibrium incarceration rate for each year that would be achieved with stable admission and release rates based on the overall rate at which prisoners are admitted to prison, the overall rate at which inmates are released in each year, and the relationship between these transition rates and the equilibrium incarceration rate described in equation (2). The equilibrium rates are somewhat higher than the actual incarceration rates in each year, reflective of the fact that the equilibrium rates are what the incarceration rate would eventually settle to given enough time.<sup>17</sup> Nonetheless, the change in equilibrium rates over this time period (an increase of 264 inmates per 100,000) is quite close to the actual change in incarceration rates (252 inmates per 100,000).

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<sup>17</sup> A change in one of the underlying admission rates will induce a multi-period adjustment from the old to the new equilibrium. Thus the actual value of the incarceration rate may not equal the implied equilibrium value if these rates have recently changed. Johnson and Raphael (2007) demonstrate that for all of the 1980s and 1990s, the actual incarceration rate lagged the implicit equilibrium incarceration rate, a fact predicting future growth in incarceration in subsequent years.

The final row of the table presents tabulations of two equilibrium incarceration rates: (1) the incarceration rate based on actual 1984 admission and release probabilities, and (2) the incarceration rate based on the actual admission probability in 1998, and a release probability for 1998 that is increased by 21 percent over the actual value. The idea behind the latter calculation is that the manner in which admissions increased over this period would have given rise to a 21 percent increase in release rates, holding punishment severity constant. The calculated increase in incarceration rates of 187 inmates per 100,000 in this simulation is considerably more modest than the 264 unit increase in the equilibrium rate and the 252 increase in the actual rate. The change in incarceration rates net of changes in time served constitutes 71 percent of the increase in equilibrium rates and 74 percent of the increase in actual incarceration rates.

Thus, the results here suggest that between 26 and 29 percent of the increase in incarceration in recent decades can be attributed to longer time served conditional on being sent to prison. While this is somewhat lower than the 37 percent estimate presented in Blumstein and Beck (1999), we are in the same ballpark. Distinguishing whether this increase in time served reflects a more punitive system or more severe offending is a more difficult question. To be sure, the offenses behind later prison admissions may differ from those driving earlier prison admissions along dimensions that vary within offense categories.

Nonetheless, the coincidence of increases in time served along with two decades of policy choices that have largely been aimed at enhancing the severity of punishment suggests that these changes are largely policy driven. Thus, we conclude that an upper bound estimate of the contribution of longer sentences conditional on being sent to prison to growth in state prison incarceration in recent decades is roughly 30 percent.

#### **4. Decomposing Growth in Prison Admissions Rates into Behavioral and Policy Components**

The analysis of the previous section revises upwards our estimate of the contribution of longer prison terms to growth in U.S. incarceration rates. Specifically, we demonstrated that within groups of inmates defined by the offense sending them to prison, expected time served increase considerably. In the aggregate, these changes were masked by shifts in the composition of prison admissions towards less serious offenders. Taking this fact into account, we believe that roughly 25 to 30 percent of the increase in incarceration over the past two decades is attributable to longer prison spells conditional on being sent to prison.

Since longer sentences are more likely to reflect policy choices rather than changes in behavior (a supposition supported by the increases in time served within offense categories juxtaposed against stable maximum sentenced), changes along this particular dimension of correction policy explain a sizable share of what has happened. However, sentencing policy may impact admissions as well. At the point of sentencing of convicted offenders, society draws the line between crimes that merit a prison term and crimes that do not. That line can be drawn liberally to incorporate relatively minor offenses or with greater austerity, applying imprisonment to only the most egregious offenders. Moreover, enforcement and policing are also determinants of admissions rates, and thus the proportional responsibility of policy choices broadly defined is certainly greater.

By a simple accounting identity, the rate at which inmates are admitted to prison can be expressed as the product of the crime rate, the likelihood of being arrested conditional on committing a crime, and the likelihood of being sent to prison conditional on arrest (Blumstein and Beck 1999), with the product of the latter two factors giving the risk of incarceration for those who commit crimes. While both behavior and policy are likely to impact these three components, the general propensity to engage in crime will clearly be the key determinant of the

crime rate while the socially determined margin distinguishing incarcerable from non-incarcerable offenses will be the key determinant of the likelihood of being sent to prison conditional on arrest. To be sure, behavior may certainly impact the fraction of arrests resulting in prison admissions, if the average severity of offending changes. Moreover, criminal behavior will certainly be responsive to changes in the probability of being sent to prison. Thus, the decomposition of changes in admissions into changes attributable to behavior and changes attributable to policy using this accounting identity has its limitations.

Nonetheless, such a decomposition does provide an overall characterization of the contribution of changes due to change in crime vs. changes in all other determinants. Moreover, one can adjust such decomposition to account for the likely interdependence between the likelihood of committing a crime and the probability of punishment.

In this section, we begin our analysis of the determinants of changes in the prison admissions rate, a factor that we believe explains a minimum of seventy percent of the increase in state incarceration rates since 1980. We first characterize the large increase in admissions in terms of the offense generating the admission. Next, we provide a rough accounting of the change in admissions due to change in criminal behavior as opposed to changes in the propensity to punish less serious offenses with prison terms. In following sections, we evaluate the importance of specific behavioral determinants.

### *Basic empirical facts*

Three facts characterize the change in prison admissions over recent decades. First, the proportion of the U.S. population that is flowing into state and federal prisons has increased considerably. As we saw in Figure 2, both the rate at which new inmates are admitted to prison on new court convictions as well as the rate at which parolees are returned to custody on the basis of parole violation doubled between 1980 and 2000. Second, the proportion of prison

admits accounted for by parole violators has increased to historic proportions. Finally, the composition of recent prison admissions has shifted decidedly towards less serious offenders. These three factors have operated to increase the prison admission rate. Moreover, this increase corresponds to an increase in the likelihood of being committed to prison conditional on being arrested.

Here we use data from the admissions files of the NCRP to document these facts. As in our analysis above, we only use data for the subset of states that consistently report admissions information to the NCRP for all years between 1984 and 2002. Fortunately, the 30 states that consistently report account for an average of 70 percent of annual prison admissions over this time period. Thus, we are able to characterize the overwhelming majority of prison admissions with the NCRP data.

Figure 13 displays the percent of prison admissions in each year attributable to admissions that are not for a new felony commitment. As we discussed above, most of these admissions are driven by individuals returned to custody for parole violations. This category of admissions has become an increasingly important source of prison admissions over the past two decades, increasing from approximately 29 percent of admissions in 1984 to over 40 percent in 2002. Note, this change in the composition of prison admits corresponds to an increase in the proportion of parolees returned to custody each year (documented in Figure 2).

Figures 14 and 15 present the composition of prison admissions for new felonies and other prison admissions by most serious offense. For those admitted on a new felony conviction, the proportion admitted for a violent or property crime declines considerably during the 1980s and then stabilize during the 1990s. While in 1984, roughly 75 percent of prison admissions are accounted for by offenders convicted of violent or property felony offenses, by 2002 this figure falls to below 60 percent. The proportion importance of drug offenders, on the other hand,

increases considerably, increasing from slightly over 10 percent in 1984 to over 30 percent by 1990, and fluctuating around 33 percent of admissions thereafter.

Similar changes are observed in the original offense composition of those returned to custody without a new felony. In 1984, almost 80 percent of former inmates returned to custody were originally committed to prison for either a violent or property crime (with those convicted of property crimes predominating). Drug offenders accounted for only 5 percent of this inflow. By 2002, the importance of property and violent offenders diminishes while the importance of drug offenders increases. By 2002, those originally convicted of drug offenses constitute approximately one-third of inmates returned to custody without a new term.

One can use these compositional figures to estimate actual admissions rate by type of offense. Specifically, if we assume that the offense distributions for the 30 percent of admissions not covered by the NCRP are similar to those observed for the 70 percent of admissions covered by the data, then multiplying the proportion of admits attributable to a given offense category by the national prison admissions rates provides an estimate of the offense-specific admissions rate. Figures 16 and 17 present such estimates. Figure 16 uses the compositions for admissions with new felony terms in conjunction with the national rate of new felony admissions to split new admissions into offense categories. Figure 17 presents similar estimates for all prison admissions, where the original offense is used to characterize the infraction of those returned to custody without a new term. This latter figure can be interpreted as the total effect of various types of convictions inclusive of the impact on returns to custody.

Both figures display increases in the admissions rate that are occurring within offense categories. However, there are some important differences between the figures and between the offense categories that bear mentioning. First, the most glaring pattern in both figures is that increases in drug admissions are the most pronounced. In both figures, the difference between



the drug admission rate in 2002 and 1984 amounts to roughly one half of the overall increase in admission rates. In addition, most of the increase in drug admissions occurs prior to 1990 and stabilizes thereafter. Second, increases due to new commitments play a larger role prior to 1990, while growth in admissions due to returns to custody drive up admissions rates thereafter. This fact is evident in the steeper admissions-time profiles post 1990 in Figure 17 relative to Figure 16.

While we cannot characterize how the criminal propensities of those admitted to prison have changed over time using the NCRP data, there are a few dimensions of potential criminality and offense severity that allow us to assess how newly-admitted inmates have changed on the margin. For example, the research on life-course involvement in criminal activity provides strong evidence that the criminally active desist from illegal activity as they age, with the late teens and early twenties being the most criminally active period.<sup>18</sup> Since the NCRP data includes nearly complete information on the age of prison admits, we can explore whether along this dimensions the U.S. has been admitting less criminally active persons to prison.

Figure 18 presents the 25<sup>th</sup> percentile, the median, and the 75<sup>th</sup> percentile of the age distribution of those admitted to prison for each year between 1984 and 2002. As can be seen, there have been striking increases in the age of prison admits throughout the age distribution. The age of the admit at the 25<sup>th</sup> percentile has increased by 2.2 years over this period, the median age has increase by 5.2 years, while the age at the 75<sup>th</sup> percentile has increase by over 6 years. Thus, to the extent that older inmates are less criminally active, the U.S. has been admitting less dangerous offenders in recent years.

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<sup>18</sup> The fact that criminal offending declines with age is a well known empirical pattern. Grogger (2000) demonstrates that the proportion of youth in the 1979 National Longitudinal Survey of Youth self-reporting involvement in criminal activity declines with age, a fact the author attributes to increasing legal opportunity costs. In a series of papers, Sampson and Laub (1993, 1997, 2003, 2005) find little evidence for a group of life-course criminal persisters in a long panel of offenders and individuals at high risk of offending as youth. Moreover, these authors find evidence that certain life events, such as getting married, having children, or being steadily employed correspond with desistence in adulthood via a “knifing-off” of the past from the present.

We can also use the sentences received by offense category to characterize the severity of the offense and then use changes in this variable over time to characterize the change in prison admissions over time. Such an analysis, however, would have to account for the fact that sentencing may have changed over time. To perform such an analysis, we do the following. First, for each of 70 offense categories we tabulate the median maximum sentence handed down to prisoners admitted in 1984. Next, we assign this median value to each admission in 1984 and each admission in 2002. Assigning the typical maximum sentence in 1984 to those admitted in 2002 allows us to characterize the sentences these latter prisoners would have received under the earlier sentencing regime. Finally, we calculate the percentiles of this distribution for each year for comparison. If offenders in 2002 are admitted for less serious offenses (as judged by the courts), then the distribution of sentences should have shifted towards shorter prison spells.

Figure 19 presents the results of this exercise. The figure shows no change at the 10<sup>th</sup> percentile and an increase in sentence length at the 25<sup>th</sup> percentile (largely driven by the increased importance of drug offenders). For sentences at or above the median, however, offense severity (as measured by the maximum sentence that would have been handed down in 1984) diminishes by substantial amounts. In conjunction with the patterns in the age distribution, this suggests that indeed the average admit in 2002 was less criminally pre-disposed and had committed a less serious offense relative to the typical admit in 1984.

*Decomposing the change in admissions: defining the correct counterfactual crime rate*

At any point in time, the rate at which inmates are admitted to prison can be expressed as the probability of engaging in crime,  $c$ , and the probability of being caught, convicted, and incarcerated,  $p$ . Changes in prison admissions over time will be driven by either changes in  $c$ , changes in  $p$ , or changes in both parameters. Since  $c$  is clearly a measure of criminal behavior and  $p$  is a summary measure of the operation of the criminal justice system, a natural method for

decomposing a change in the admissions rates into behavioral and policy components would be to assess the relative importance of the changes in these parameters.

For example, suppose that at some earlier time period the prison admissions rate is given by  $c_0p_0$  while at a later time period the admissions rate is given by  $c_1p_1$ . Suppose further that the later admissions rate exceeds the earlier admissions rate. The change in admissions rates is given by

$$(3) \quad \text{Change} = c_1p_1 - c_0p_0$$

which can be rewritten as<sup>19</sup>

$$(4) \quad \text{Change} = c_1(p_1 - p_0) + p_0(c_1 - c_0).$$

The first term in this decomposition can be characterized as the portion of the increase in the admissions rate driven by the change in criminal justice policy (the end crime rate times the change in the likelihood of being sent to prison conditional on committing a crime). Similarly, the second term can be characterized as the proportion of the increase attributable to changes in criminal behavior (the base-period likelihood of being sent to prison conditional on a crime times the observed change in criminal behavior). With data on crime rates and admissions per crime, this decomposition is relatively straightforward to calculate.

However, when changes in incarceration are driven in part by behavioral shocks in the propensity to commit crime, this decomposition is likely to understate the relative contribution of changes in behavior and overstate the contribution of policy choices. This will be the case when the parameters  $c$  and  $p$  depend on one another. For example, the crime rate is likely to decline with higher values of  $p$  holding all else constant. This would occur when criminals are deterred by a higher likelihood of being punished or when the parameter  $c$  varies across the population and those with high values of  $c$  are more likely to be incarcerated first. Similarly, policy makers

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<sup>19</sup> The decomposition follows by adding and subtracting  $c_1p_0$  to the right side of the equation and then factoring.

are likely to increase the likelihood of incarceration conditional on committing a crime in response to an increase in the propensity to commit crimes. In other words,  $p$  should be an increasing function of  $c$  holding all else constant.

In the presence of shocks to criminal behavior, mutual dependence among the determinants of admissions is likely to bias the estimate of behavior downwards. This is illustrated in Figure 20 which presents the model described in the previous paragraph. The crime rate is listed on the vertical axis and the likelihood of being sent to prison is listed on the horizontal axis. The parameter  $c$  declines with increases in  $p$  due to deterrence and selective incapacitation. The parameter  $p$  increases with  $c$  due to responses of the criminal justice system to changes in criminality. An initial equilibrium occurs where these two curves cross, giving the initial crime rate  $c_0$  and incarceration risk  $p_0$ . The prison admission rate is easily identifiable on this graph. Since the admission rate is simply the product of  $c$  and  $p$ , the admission rate corresponds to the area below the horizontal line at  $c_0$  and to the left of the vertical line at  $p_0$  (equal to the product  $c_0p_0$ ).

A shock to underlying criminal behavior results in an increase in  $c$  to  $c_1$ , an increase in  $p$  to  $p_1$ , and an increase in the prison admission rate to  $c_1p_1$  (the area under the horizontal line at  $c_1$  and to the left of the vertical line at  $p_1$ ). Equation (4) decomposes the difference in area between the old prison admissions rate ( $c_0p_0$ ) and the new prison admissions rate ( $c_1p_1$ ). The decomposition attributes  $p_0(c_1-c_0)$  to behavior (the area between the horizontal lines at  $c_1$  and  $c_0$  and to the left of  $p_0$ ) and  $c_1(p_1-p_0)$  to policy (the areas between the vertical lines at  $p_0$  and  $p_1$  and below  $c_0$ ). The sum of these two areas equals the total change in admissions rates.

The problem with this decomposition is that it assumes the wrong counterfactual admissions rate under the scenario where policy does not respond to this behavioral shock. To be specific, the decomposition implicitly assumes that in the absence of the policy response,

admission rates would have been equal to the old admission rate  $c_0p_0$  plus the component attributable to changes in behavior, or in total,  $c_1p_0$ . However, in the absence of the policy response,  $c$  would have increased even further, to  $c_2$  rather than  $c_1$ . In other words, had policy not responded, the admission rate would have increased to  $c_2p_0$  which exceeds  $c_1p_0$  as is plainly evident on the graph. Thus equation (4) will over-estimate the relative importance of the policy response in explaining the increase in admissions rates by the area  $p_0(c_2-c_1)$  and under-estimate the relative importance of behavior by an equal amount.<sup>20</sup>

Fixing this decomposition requires knowledge of what crime rates would have been had policy makers not responded to the crime shock with an increase in  $p$ , which of course, we do not have. Nonetheless, there are reasons to believe that the basic decomposition in equation (4), with some modification, can provide a good rough approximation. First, the fact that crime had declined while admissions have increased suggests that a toughening of corrections policy beyond a response to increases in criminality (in the model, an outwards shifts in the  $p(c)$  curve) must be behind some of the increase in incarceration, thus limiting the importance of changes in criminality. Second, the bias associated with behavioral responses should be smaller when deterrent effects are smaller (when the curve  $c(p)$  is flatter). Since estimates of the total effect of

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<sup>20</sup> More formally, Johnson and Raphael (2007) present a simple model of crime and incarceration that illustrates this point. Suppose that criminality is determined by two factors: a variable  $x$  measuring criminogenic influences that are unresponsive to policy, and the overall incarceration risk  $p$ . Assume further that criminality is determined according to the additively separable function  $c = h(x) + f(p)$ , where  $h'(x) > 0$  and  $f'(p) < 0$ . Also assume that the incarceration risk is a monotonically increasing function of the criminality parameter – i.e.,  $p = g(c)$  where  $g'(c) > 0$ . The assumption that  $p$  is increasing in  $c$  best describes the recent history of corrections policy in the United States. The equilibrium incarceration values of  $p$  and  $c$  are defined by the equation  $h(x) + f(p) = g^{-1}(p)$ , where  $g^{-1}(p)$  is the inverse function of  $g(c)$ . Totally differentiating this condition with respect to  $x$  (the equivalent of a criminogenic shock) as well as the equation for  $c$  gives the response of  $p$  and  $c$  in response to a change in  $x$ :

$$\frac{dp}{dx} = \frac{h'(x)}{g^{-1'}(x) - f'(p)}, \quad \frac{dc}{dx} = h'(x) \left[ 1 + \frac{f'(p)}{g^{-1'}(p) - f'(p)} \right]$$

Note, given our assumption, both the propensity to commit crime as well as the probability of being sent to prison increase. However, the increase in the crime parameter is less than it would have been had policy makers not responded (this follows from the fact that the second multiplicative term in this derivative is between zero and one). Thus, changes in policy in response to changes in underlying criminality and the ensuing behavioral response of those committing crimes may partially mask a behavioral shock to crime. The extreme case would occur when the policy response is infinitely elastic. In such an instance, a shock to  $x$  would result in no increase in  $c$  and a large increase in  $p$ .

changes in incarceration on crime (equal to the sum of deterrence and incapacitation effects) are quite close to the findings of research that estimates the incapacitation effect in isolation, the deterrent effects of changes in incarceration are likely to be small.<sup>21</sup> Third, one can build assumptions into such a decomposition regarding the overall change in crime that are likely to bias the decomposition towards concluding that behavior matters (for example, assuming that the entire increase in drug arrests is driven by behavior rather than policy choices). Finally, with estimates of the cumulative incapacitation and deterrence effects of prison, one can roughly estimate what the overall crime rate would have been had the incarceration rate not increased. In our decompositions, we employ such adjustments.

*Decomposing the increase in admissions rates: empirical findings*

With these caveats in mind, here we decompose the change in prison admissions rates into changes attributable to increased criminal behavior and changes driven by an increased likelihood of being sent to prison conditional on committing a crime. Following Blumstein and Beck (1999), the prison admission rate at any given point in time can be written as the product of the crime rate, the arrest rate, and the rate at which those arrested are sent to prison, or *Admission rate*<sub>*t*</sub> =  $c_t a_t r_t$ , where the subscript *t* indexes year,  $c_t$  is the crime rate as defined above,  $a_t$  is the number of arrests per crime committed, and  $r_t$  is the number of prison admissions per arrest.

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<sup>21</sup>This idea is noted by Nagin (1998) in a review of the empirical and theoretical literature on deterrence. In general, estimates of the aggregate effect of changes in incarceration on the number of index crimes find that each inmate reduces the number of index crimes by 10 to 15. This is comparable to the low range of estimates in the incapacitation literature reviewed by Spelman (1994). One situation where this simple decomposition would accurately reflect the relative importance of behavior and policy responses to behavior would be when the propensity to commit crime parameter is completely insensitive to changes in the likelihood of going to prison. For this to be the case, two conditions would have to be met. First, the deterrent effects of changes in  $p$  would have to be negligible. There is a large literature on the deterrent effects of changes in the risk of incarceration (reviewed in Nagin (1978, 1999) and Bushway (2007)) which suggests that deterrent effects are indeed quite small, and thus one may argue that to a first approximation, this condition is met. The second condition concerns the possibility of heterogeneity in the propensity to commit crime. If the parameter  $c$  is constant across all individuals, then combined with no deterrent effects  $c$  will be perfectly insensitive to changes in  $p$ . However, if  $c$  varies across the population with some individuals more inclined to commit crimes than others, an increase in  $p$  may result in a lower average  $c$  among the non-institutionalized population. This would be the case if individuals with a high propensity to commit crime are incarcerated first, followed by the less criminally-prone as the incarceration rate increases. Indeed, both Raphael and Stoll (2004) as well as Johnson and Raphael (2007) find evidence that the crime-incapacitation effects of prison have declined as the incarceration rate has increased. Thus, this second condition is unlikely to be met.

Note, the likelihood of going to prison conditional on committing a crime (what we labeled  $p$  above) is simple the product of these last two terms, or  $p_t = a_t r_t$ . To assess the importance of changes in behavior relative to changes in the conditional risk of incarceration, we simulate what the admissions rate would have been had the risk of incarceration (the arrest rate multiplied by the ratio of admissions to arrest) been held to its 1980 value. The observed change in admissions rates in this hypothetical scenario is then attributed to changes in criminal behavior. The remainder (the difference between this hypothetical change and the actual change) is attributable to the higher risk of incarceration.

As our theoretical discussion demonstrated, had the risk of incarceration remained constant the U.S. would have likely experienced higher crime over the 1980s and 1990s. This follows from the fact that the increase in incarceration would have been 70 to 75 percent lower (assuming time served length still increased) and that this lower incarceration rate would have translated into higher crime. Thus, in simulating what the admissions rate would have been in the absence of the increase in the incarceration risk, we must account for the additional crime that was essentially averted by the increase in incarceration.

Johnson and Raphael (2007) estimate that each additional prisoner incarcerated between 1979 and 2002 prevented an average of 3.5 reported index crimes and approximately 10 index crimes accounting for non-reporting.<sup>22</sup> One might argue that the adjustment to the crime rate should be based on averted reported crimes, since reports to the police are likely to generate police activity that will in turn generate arrests and convictions. To present conservative estimates of the effect of increasing incarceration risk, however, we use the higher figure of 10 crimes averted for each additional prisoner. Thus, to measure crimes averted for the period 1980

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<sup>22</sup> This estimate accounts for the simultaneous determination of incarceration and crime and is similar in magnitude to point estimate of the prison-crime elasticity presented in Levitt (1996) when models are estimated for similar time periods. This study also demonstrated that while the average effect is approximately 10 crimes, the marginal effects decrease as the incarceration rate has increased.

to 2003, we tabulate the difference between the prison population in each year and the prison population in 1980 and multiply this difference by ten. We then add these averted crimes to total reported violent and property crimes to construct the counterfactual crime rate.<sup>23</sup> This is similar to the adjustment made by Freeman (1996) in his attempt to characterize the time-path of criminality among American men.

An additional complication to measuring the counterfactual crime rate concerns how to handle drug crimes. We have already seen that an increasing fraction of prison admissions over the past three decades have been due to drug offenses. Unlike violent and property felony offenses, there is no count of drug crimes reported to the police, thus one does not have a time series of offending behavior for this important determinant of admissions. Moreover, drug arrests (the principal indicator of drug crimes) trend in the opposite direction relative to property and violent crime. Figure 21 displays the violent and property index crime rates based on crimes reported to the police for the period 1980 to 2003. While there is spike in violent crime in the late 1980s and early 1990s, these crime rates are considerably lower at the end of this period relative to 1980. By contrast, Figure 22 displays large increases in adult drug arrests (a rate that more than doubles between 1980 and 2003). While this increase in arrests is driven in part by stepped up enforcement, one cannot rule out an increase in the propensity to engage in incarcerable drug crimes.

To account for a possible increased propensity to engage in drug crimes, we assume that the entire increase in drug arrests is driven by greater criminal activity among the American public (ruling out any role for increased enforcement under the guise of the “war on drugs”). Moreover, we assume an arrest rate of 0.17 for drug offenses equal to the number of property

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<sup>23</sup> Note, this adjustment attributes all of the increase in incarceration to the change in the risk of incarceration conditional on committing a crime. We have already seen that 25 to 30 percent of this increase is attributable to longer effective sentences. Thus, this adjustment will over-estimate the amount of crime averted by the change in the incarceration risk, and will bias upwards the estimate of the contribution of changes in behavior to the overall increase in incarceration.



crime arrests per property crimes reported to the police. In sum, our counterfactual crime rate is estimated by adding total reported violent and property crimes, the number of drug arrests divided by 0.17, and the number of crimes averted (reported as well as unreported) in each year by the increase in incarceration between 1980 and 2003.

Figure 23 displays three alternative crime rate measures. Ignoring drug offenses, the number of violent and property index crimes reported to the police declines by roughly 30 percent between 1980 and 2003. For the series including drug crimes but ignoring crimes averted, criminal activity spikes in the late '80s and early '90s, but decreases back to its 1980 level by 2003. The final series presents our assessment of what the crime rate would have been (inclusive of drug offenses) had the incarceration rate not increased between 1980 and 2003. The series indicates a crime rate that increased by approximately 50 percent by the end of the period depicted.

Figure 24 presents the other components of the admissions rate for each year; namely, the arrests per crime and the number of prison admission per arrest. Incorporating drug offenses in the crime measure, the figure reveals an arrest rate which is quite stable over time (with a 2003 value 3 percent greater than the 1980 value). Note, this series is tabulated assuming that all of the increase in drug arrests is driven by behavior rather than policy, and thus, this represents a conservative (or downward biased) estimate of how the risk of being arrested has changed over the period. The ratio of prison admissions per arrest, however, exhibits sharp, steady, and sustained increases in each year. Over the time period, admissions per arrest increases by 290 percent.

Finally, Figure 25 presents the actual prison admission rate per 100,000 as well as the hypothetical prison admission rate that the country would have experienced had the risk of incarceration been held constant. The hypothetical admissions rate is based on the counterfactual

crime rate in Figure 23. This exercise finds that had the risk of incarceration not changed, the prison admissions rate would have increased from 75 per 100,000 to 113 per 100,000, for a total change of 38. This amounts to roughly 26 percent of the actual increase in the prison admissions rate. Thus, an increasing propensity to engage in criminal behavior explains no more than 26 percent of the increase in prison admissions.

*What are the effects of changes in the admissions components on the overall incarceration rate?*

Our decomposition indicates that change in behavior play a minor role in explaining increases in prison admissions. Even under relatively extreme assumptions regarding changes in the propensity of U.S. residents to engage in criminal activity, only one-quarter of the increase in admissions can be attributable to behavior (in our assessment, a generous upper-bound estimate).

How much of the increase in overall incarceration can be attributed to changes in the propensity to commit crime? To answer this question we need to tabulate equilibrium incarceration rates using alternative values of the prison admissions rates from our simulations. Table 6 presents these results. The first row of the table presents the actual incarceration rate in 1980 and 2003. The next row presents the implied equilibrium incarceration rates for each year given observed admissions and release rates and using the equilibrium relationship between incarceration and the transition probabilities expressed in equation (2). The equilibrium rate increased by 320 inmates per 100,000 while the actual rate increased by 314. Thus, the change in the equilibrium provides a close approximation to the actual change.

The following row presents equilibrium incarceration rates assuming a 21 percent higher release rate in 2003. This adjusts the comparison for the changes in time served documented in section 3. Accounting for time served reduces the predicted change in incarceration to 240 (suggesting that the change in time served explains 25 percent of the increase in incarceration rates in this simulation). The final simulation assumes a 21 percent higher release rate in 2003

and an admissions rate in 2003 equal to the counterfactual admissions rate under the scenario of no increase in the incarceration risk (which we tabulated to be 113 per 100,000). Note, this final simulation nets out the effects of both changes in time served as well as changes in the risk of incarceration conditional on committing a crime. Here, the incarceration rate is predicted to increase by 52.

With these tabulations, we can now apportion the overall change in equilibrium rates (the increase of 320) into three components. Changes in time served drives up the incarceration rate by 80 (320 less 240), explaining 25 percent of the increase. The change in the risk of incarceration conditional on committing crime increases the incarceration rate by 188 (240 less 52), accounting for roughly 59 percent of the increase. Finally, the remaining increase of 52 (roughly 16 percent of the total increase) is attributable to changes in criminal behavior.

## **5. Potential Sources of Changes in Criminal Behavior**

Our decomposition suggests that at most, changes in criminal behavior are likely to explain no more than 16 percent of the increase in incarceration since 1980. As we built a number of conservative assumptions into this decomposition that tended to bias us towards finding an important role for behavior, we are fairly confident that this estimate provides an upper bound.

Having pinned down the likely contribution of behavioral shifts, here we turn to a discussion of factors that are external to the criminal justice system that may have altered the average criminality of the American public. In particular, we look at four topics. First, we discuss the likely impact of the nation's changing demography on the average propensity to commit crime and on incarceration rates. Second, we assess the potential role of the deinstitutionalization of the mentally ill. Third, we discuss the potential effects of changes in the

legitimate labor market opportunities available to low-skilled men. Finally, we discuss shocks to drug markets in the United States, in particular, the introduction of crack cocaine. Since 1980, all of these factors have changed to some degree. Moreover, there are clear pathways by which each may impact the average likelihood of committing a crime.

### *Changing demographics*

In recent decades, we have observed several important demographic changes that bear directly on criminal offending and changes in incarceration rates. First, the proportion of the population foreign born has increased substantially.<sup>24</sup> Recent research by Butcher and Piehl (1998, 2006) indicates that immigrant men are considerably less likely to be incarcerated, and thus increased immigration should have reduced incarceration rates all else held equal.

Second, the population has aged. Between 1980 and 2000 the proportion of the U.S. resident population over 65 increased from 0.113 to 0.124. Moreover, among non-elderly adult men, our tabulations from the census indicate that average age has increased overall and within race/ethnicity groups.<sup>25</sup> Since the likelihood of committing a crime decreases with age, this demographic shift should have also decreased crime and incarceration.

Finally, American adults have become more educated. Increases in average educational attainment have occurred within all racial and ethnic groups. There is a strong negative association between education and the likelihood of committing a crime. Moreover, recent research by Lefgren and Moretti (2004) suggests that the relationship between education and the likelihood of going to prison is indeed causal.

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<sup>24</sup> In 1970, the foreign-born accounted for 4.7 % of the U.S. population. By 2000, the percent foreign born increased to 10.4%. During these three decades, the resident immigrant population increased by 16.2 million, accounting for roughly one-quarter of overall population growth (U.S. Census Bureau 2001).

<sup>25</sup> Our tabulations of the 1980 and 2000 Public Use Microdata Samples of the U.S. Census of Population and Housing indicate that for men between 18 and 65 years of age, average age increased from 38 to 40 for non-Hispanic whites, from 35 to 37 for non-Hispanic blacks, from 35 to 37 for non-Hispanic Asians, and from 34 to 35 for Hispanics.

The associations between these demographic factors and the likelihood of being incarcerated are evident in the tabulations in Table 7. The table uses data from the 1980 and 2000 Public Use Microdata Samples (PUMS) of the U.S. Census of Population and Housing to calculate the proportion of men between 18 and 65 years of age that were residing in institutionalized group quarters on the day of the census. From 1980 on, the lion's share of the non-elderly in such institutions are either in prison or jail.<sup>26</sup> Black men, men less than 40 years of age, and the least educated men are the most likely to be institutionalized, with uniform increases in these rates between 1980 and 2000.

The nation's recent demographic trends have shifted population across these sub-groups in a manner that should have decreased incarceration. In other words, the increases that we have experienced have bucked demographic trends given the correlations between these dimensions and the likelihood of being in prison or jail. This is most evident when looking at the distribution of the non-elderly adult male population across the sub-groups defined by the categories in Table 7. To demonstrate this fact, we first split the non-elderly adult male population into 80 demographic sub-groups defined by the complete interaction of the four race/ethnicity groups, the five age groups, and four educational attainment groups used in Table 7. Next, we use the 1980 PUMS data to calculate the proportion institutionalized for each group and then rank these groups by their institutionalization rates from lowest to highest. Finally, we compare the distribution of the male population across these 80 ranked groups in 1980 and 2000.

Figure 26 presents the results of this exercise. The figure presents the cumulative proportion of the male population in these 80 demographic groups ranked from least to highest institutionalization rates for 1980 and 2000. The distribution for 2000 is everywhere to the left

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<sup>26</sup> See Raphael (2005) for a detailed comparison of the incarceration estimates using these data and estimated correctional populations from the Bureau of Justice Statistics.

of the distribution for 1980, indicating that the adult male population has shifted decidedly towards lower-offending demographic groups. Stated differently, had incarceration rates remained constant for each of these demographic groups, changing demographics would have lowered incarceration rates between 1980 and 2000.

This point is made explicit in Figure 27. The figure presents actual institutionalization rates for 1980 and 2000 as well as a hypothetical calculation giving what the institutionalization rate would have been in 2000 had the rates for 80 individual groups been held constant yet the distribution of men across groups shifted as in Figure 26. For all men and for men defined by race/ethnicity, the institutionalization rate in 2000 would have declined relative to that for 1980. Thus any change in behavior towards greater criminality would have had to occur within these relatively detailed demographic sub-groups.

Note we have only characterized the direction of the effect on incarceration of the shifts in the distribution of the male population across groups defined by age, education, and race/ethnicity. Other demographic factors have also changed that are likely to have reduced the average criminality of the American public. First, as we have already noted, the increasing proportion foreign born tends to reduce crime as documented in the research of Butcher and Piehl (1998, 2006). An additional factor that has received much attention that we have not addressed is the impact of the legalization of abortion on changes in the composition of the population beginning around 1990. Donohue and Levitt (2001) hypothesize that the legalization of abortion has shifted the composition of those born towards wanted pregnancies and away from unwanted pregnancies. To the extent that children born under the latter category are more likely to commit crimes as a young adult, legalization should have had a lagged effect on criminal behavior, a supposition consistent with aggregate movement in violent and property crime rates.

Regardless, the analysis here as well as these additional research findings indicates that demographic trends should have reduced incarceration, all else held equal.

*The deinstitutionalization of the mentally ill*

According to the BJS, there are nearly 300,000 mentally ill inmates in U.S. prisons and jails (Ditton 1999). These inmates account for 16 percent of state prisoners, 7 percent of federal prisoners and, 16 percent of local jail inmates. Considering that roughly 2.8 percent of the adult population suffers from severe mental illness over the course of a year (Torrey 1997), these figures indicate an incarceration rate for the mentally ill considerably greater than that of the general population.<sup>27</sup> By contrast, by the end of the 20<sup>th</sup> century, there were roughly 60,000 inpatient residents in state and county mental hospitals. Thus, the population of incarcerated mentally ill is nearly five times the inpatient mental hospital population.

That the incarcerated mentally ill population exceeds the inpatient population of mental hospitals is a relatively new development. In fact, as of mid century, the number of mental hospital inpatients per 100,000 U.S. residents greatly exceeded the overall prison incarceration rate. This fact is illustrated in Figure 28. The figure presents state and county mental hospital inpatients per 100,000,<sup>28</sup> state and federal prisoners per 100,000, and the sum of these two series for each year between 1930 and 2000. Through the 1950s, the mental hospital inpatient rate was approximately three times the prison incarceration rate. Beginning with the deinstitutionalization of the mentally ill in the 1960s,<sup>29</sup> the inpatient rate declines precipitously, falling below the incarceration rate in the mid 1970s, and continuing to decline thereafter.

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<sup>27</sup> Over five percent of the mentally ill adult population is incarcerated, a figure roughly size time the incarceration rate of the general adult population.

<sup>28</sup> Data on inmates in state and county mental hospitals was drawn from Palermo, Smith, and Liska (1991) through 1970 and from Raphael (2000) for later years.

<sup>29</sup> The term deinstitutionalization refers to a set of policies leading to the half million person decreases in the population of state and county mental hospitals between 1955 and the present. Rather than resulting from an explicit deliberate agenda, however, the decline has been determined by a host of factors (Johnson 1990). Initial declines during the 1950s are often attributed to the introduction of medications, particularly phenothiazine, designed to

Most notably, the overall institutionalization rate (defined as the sum of prisoners per 100,000 and inpatients per 100,000) at the end of the century is not high by historical standards. While the overall rate declines with deinstitutionalization, growth in state and federal prison populations more than compensates for this decrease by the late 1990s.

The deinstitutionalization of the mentally ill juxtaposed against the increase in incarceration rates as well as the high incidence of severe mental illness behind bars begs the question of whether the mentally ill have been trans-institutionalized from mental hospitals to prisons and jails. To the extent that the mentally ill are more likely to commit crimes, the deinstitutionalization of the mentally ill may have contributed to growth in U.S. incarceration rates.<sup>30</sup>

Several studies have attempted to estimate the extent to which the mentally ill move between hospitals and correctional institutions. Penrose (1933) is perhaps the first to raise this issue. Data on 18 European countries revealed a negative correlation between the size of the prison and mental hospital populations. Based on this inverse correlation, Penrose advanced what he labeled the “balloon theory”; assuming a stable population in need of institutionalization, squeezing the population of one institution will cause a ballooning of the

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control psychotic symptoms, that often permitted outpatient treatment for the least severe cases of mental illness. In addition, the Medicaid and Medicare programs introduced in 1966, committed the federal government to covering half the costs of treatment in nursing homes which induced states to transfer all eligible residents of mental hospitals (primarily the elderly mentally ill and those suffering from dementia). This incentive to shift costs accounts for much of the decline in the inpatient census between the 1960s and 1970s (Mechanic and Rochefort 1990). The one policy change that embraced deinstitutionalization as an explicit goal occurred under the Kennedy administration. The Community Mental Health Services Act established Community Mental Health Center (CMHCs) designed to provide outpatient, emergency, and partial hospitalization services for the mentally ill.

<sup>30</sup> Torrey (1997) note that the mentally ill are often arrested for minor crimes such as shoplifting, engaging in publicly lewd behavior, or failure to pay for a restaurant meal. Several studies address the issue of whether the mentally ill commit violent acts at a higher rate than that observed for the general public. Prior to the mid 1950s, most research found few differences, though the methodological approaches taken in this research have been questioned by some. Reviews of more recent research draw conclusions that are uniformly to the contrary. In her review, Godwin-Tabkin (1979) notes that in these latter studies discharged mental patients were arrested and convicted for violent offense at rates substantially higher than those observed for the general population. In a literature review extending through the 1990s, Monohan (1992) draws similar conclusions. In a recent study, Steadman et. al. (1998) finds no difference in violent behavior between the mentally ill that do not abuse drugs and members of the general population with no symptoms of substance abuse. For substance abusers, however, the mentally ill are relatively more violent, suggesting an interaction effect between mental illness and substance abuse.



other, as the displaced population is transferred. Palermo, Smith and Liska (1991) find significant negative correlations between the size of mental hospital population and prison and jail population in the United States over the period 1926 to 1989.

At least one recent study by Bernard Harcourt (2006) argues that the explosion in the U.S. prison population may be more illusory than real given trends in mental hospital population counts. This study documents the inverse correlation between the two populations at the national level, and tests for a negative association between total institutionalization and homicide rates. To quote the author “As a practical matter, empirical research that uses confinement as a value of interest should use an aggregated institutionalization rate that incorporates mental hospitalization rates. At a theoretical level, these findings suggest that it may be the continuity of confinement – and not just the incarceration explosion – that needs to be explored and explained.” (page 1751)

Despite this research, there are several reasons to believe that the deinstitutionalization of the mentally ill plays only a minor role in explaining the massive increases in incarceration rates depicted in Figure 1. Prime among these reasons is the large compositional differences between those who are incarcerated at the end of the 20<sup>th</sup> century and those who were the inpatients of mental hospitals at mid century.

Prison and jail inmates in the United States are overwhelmingly male, disproportionately minority, and are relatively young. The same cannot be said for mental patients at mid century. Table 8 uses data from the PUMS census files for 1950 through 1980 to characterize mental hospital inpatients, prison and jail inmates, and the non-institutionalized.<sup>31</sup> Beginning with 1950, there are several notable differences between the inpatient population and correctional population. First, the mental hospital population is considerably older, with larger proportions over 40, and a population 65 and over that is more than 10 times the comparable figure for the

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<sup>31</sup> For each of the census years, one is able to distinguish those in mental hospitals from those in correctional institutions using the detailed group quarters variable.

correctional population. Second, the proportion black or Hispanic is not appreciably larger than the comparable proportions for the non-institutionalized population, while minorities are very much over-represented in prisons and jails. Finally, nearly half of the mental hospital population is female, while in 1950 only 9 percent of those in prison or jail are women. By 1980, this proportion declines to 6 percent.

Between 1950 and 1980, the mental hospital inpatient population becomes younger, more minority, and more male, although the elderly and women still constitute larger proportions of the population of mental hospital inpatients than they do of prison and jail inmates. These changes suggest that deinstitutionalization proceeded in a non-random fashion.

The limitations of deinstitutionalization as a major contributor to growth in incarceration are best illustrated by looking at overall institutionalization rates (combining mental hospital, jail, and prison populations) by demographic sub-groups. Figure 29 displays overall institutionalization rates for adult men between 18 and 65 years of age by race/ethnicity using data from the PUMS files for 1950 through 2000. For the latter two years (1990, 2000) the data do not permit separately identifying mental hospital inpatients and prison and jail inmates. Nonetheless, the mental hospital population in these years is trivially small relative to correctional population, and thus the overwhelming majority of the institutionalized in these years are in jails or prisons. The most notable pattern in this figure is the large increase in the overall institutionalization rate for black men (the group that contributes the most to increases in incarceration since 1980). Prior to 1980, the peak institutionalization rate for this group was slightly less than 4,000 per 100,000. By 2000, this rate exceeds 8,000. This fact alone points to a limited role of deinstitutionalization (a statement that we will quantify shortly). For white and Hispanic men, overall institutionalization rates mimics more closely the time path of overall institutionalization rates for all adults.

Figure 30 presents comparable results for women. Here, the most notable fact is the large sustained decline in the overall institutionalization rate of white women (a demographic group that constituted a sizable portion of the mental hospital inpatient population in 1950). Hispanic women also experience large declines in overall institutionalization rates, while the time path for black women mimics the time path for all adults.

This group-specific analysis can be used to place an upper bound on the potential contribution of changes in the inpatient population on prison and jail growth. We perform this analysis in Table 9. The first column presents the number of mental hospital inpatients per 100,000 adults between 18 and 65 for men and women by race and ethnicity in 1980. The second column presents the change in the overall institutionalization rate between 1980 and 2000 for each group using data from the census. Note, since the census data do not permit separately identifying prison, jail, and mental hospital populations in each year, these changes show the net increase after accounting for further deinstitutionalization post 1980. The third column presents the maximum proportional contribution of deinstitutionalization to increases in the incarceration rate for each group. We calculate this figure by simply dividing the inpatient rate in 1980 by the change in institutionalization between 1980 and 2000. For white women, we set this rate to zero, since overall institutionalization declined. For other women, we set this rate to one since the inpatient rate in 1980 exceeds the increase in institutionalization between 1980 and 2000.

The fourth column presents the absolute increase in the number institutionalized for each group, with the total population in correctional institutions increasing by roughly 1.3 million between 1980 and 2000.<sup>32</sup> The next column presents estimates of the contribution of deinstitutionalization assuming that the mental hospital population is reduced to zero and that the

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<sup>32</sup> Note, the overall mental hospital population declined over this period. Since those in non-military institutionalized group quarters are predominately prisoners, jail inmates, and mental hospital patients, this implies that the net change is a lower bound for the absolute increase in the number jail and prison inmates.

trans-institutionalization rate is one for one. The final column presents similar estimates assuming a trans-institutionalization rate of one new prisoner per 100,000 for every two person decline in the number of mental hospital patients per 100,000.

The larger of the two estimates suggests that deinstitutionalization contributed at most 255,702 bodies to growth in the nation's prison and jail populations. This would constitute roughly 20 percent of growth between 1980 and 2000. However, this estimate is certainly too large, since the mental hospital population in 2000 was not zero (it was actually closer to 60,000), and since many of those in mental hospitals in 1980 were elderly, or were people who were unlikely to commit serious felonies. Assuming a trans-institutionalization rate of 0.5 yields a contribution of 127,851 (roughly 10 percent of the increase).

An alternative method of pinning down the contribution of deinstitutionalization would be to directly estimate this trans-institutionalization rate and use this figure to estimate the likely contribution. This is the strategy taken in Raphael (2000). The study uses state level data for the period 1971 to 1996 to estimate the effect of the state mental hospital inpatient rate on the state prison incarceration rate. After adjusting for state and year fixed effects and observable covariates, the model yields a trans-institutionalization rate of approximately -0.15. When combined with the decline in the number of mental hospital inpatients per 100,000, this rate implies that between 1971 and 1996 deinstitutionalization increased the state incarceration rate of roughly 18 per 100,000 (roughly 5 percent of the increase in incarceration rates over this time period).

Thus, our upper bound estimates indicate that deinstitutionalization accounts for no more than 10 percent of the increases in incarceration in recent decades. Previous research that attempts to directly estimate the trans-institutionalization rates suggests an even smaller role (5 percent).

*The effects of increasing earnings inequality*

The increase in U.S. incarceration rates since the mid 1970s coincides with profound changes in the distribution of earnings and income. Beginning in the mid 1970s wage inequality increased greatly, with real absolute declines in the earnings of the least skilled workers and stagnating wages for workers at the center of the wage distribution (Autor and Katz 1999). Coincident with these changes in the earnings distribution are pronounced declines in the labor force participation rates of less skilled men (Juhn and Potter 2006). In particular, the labor force participation and employment rates of relatively less educated black men have dropped precipitously (Raphael 2005).

The potential connection between these labor market changes and the increase in incarceration is relatively straightforward. The wage that one's time can command in the legitimate labor market represents the opportunity cost of allocating one's time towards other uses, such as participating in crime, taking leisure, engaging in home production etc. The lower one's potential earnings, the more attractive are criminal opportunities with income generating potential. For individuals who are amoral and who are risk-neutral, necessary and sufficient conditions for committing a crime are that the expected return to devoting a small amount of time to crime must exceed both the value placed on free time (one's reservation wage) as well as potential legitimate earnings should this time be supplied to the labor market. For those morally averse to criminal activity and averse to risk, participating in criminal activity requires that the difference between the expected returns to crime and returns to legitimate work exceed a threshold that is increasing in the degree of moral as well as risk aversion.<sup>33</sup> Regardless, the

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<sup>33</sup> Grogger (1998) presents one of the clearest micro-theoretical expositions of these ideas. The author presents a model of time allocation between criminal activity, legitimate work, and leisure where it is assumed that the return to crime diminishes with the amount of effort devoted to crime. With risk neutral and amoral decision-makers, committing a crime requires that the return to the first hour of criminal activity exceed potential wages and the individual's reservation wage. The model also predicts that many will find it optimal to both work in the legitimate

likelihood of engaging in criminal activity (or stated differently, one's supply of time to the criminal pursuits) should increase as potential earnings in legitimate employment decline.

Declining wage offers for the least skilled workers will induce a greater proportion to participate in crime, as the more risk averse and the least morally pre-disposed towards crime are peeled out of the legitimate labor market and into criminal activity on the margin. This relatively larger pool of criminals increases the fraction of the group at risk for incarceration and, holding the incarceration risk constant, increases the incarceration rate.

There is now considerable evidence that economically-motivated crime increases with unemployment and decreases with average wages, especially the average wages of low skilled workers. For example, Raphael and Winter-Ebmer (2001) find consistently positive effects of higher unemployment rates on property crime in an analysis of state-level panel data covering roughly the last quarter of the 20<sup>th</sup> century. Using similar data, Gould, Weinberg, and Mustard (2002) find that property crime decreases with increasing wages. Grogger (1998) models the decision to participate in crime as a function of the wages one could earn in the labor market using microdata from the 1979 National Longitudinal Survey of Youth (NLSY79) and finds that a ten percent increase in wages decreases the likelihood of participating in income-generating criminal activity by roughly 2.5 percentage points. As a final example, Freeman (1987) finds that those youth who believe that they could earn more on the streets than in legitimate employment are more likely to engage in criminal activity.<sup>34</sup>

With regards to the question at hand, it is possible to formally characterize the chain of effects linking wage declines to incarceration and then glean estimates of these various effects to provide a rough assessment of the potential importance of increasing earnings inequality. To see

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labor market and engage in criminal activity. This latter result follows from the assumption of decreasing returns to crime.

<sup>34</sup> Fagan and Freeman (1999) provide a detailed summary of existing research regarding the interaction between work and criminal participation conducted through the mid 1990s.

this, suppose that the proportion of the population that engages in crime,  $c$ , is a decreasing function of wages (--i.e.  $c=c(w)$  where  $c'(w) < 0$ ). The equilibrium incarceration rate will thus be given by the equation

$$(5) \quad Inc = \frac{c(w)p}{c(w)p + \theta},$$

where the incarceration rate is the same as that given in equation (2) but where we have expressed the proportion engaging in crime as a function of wages in the legitimate labor market. The change in the incarceration rate caused by a small change in wages can be found by differentiating equation (5) with respect to wages. Doing so gives

$$(6) \quad \frac{\partial Inc}{\partial w} = \frac{\partial Inc}{\partial c} \cdot \frac{\partial c}{\partial w} = \frac{\theta}{(cp + \theta)^2} \cdot p \cdot \frac{\partial c}{\partial w}$$

The final expression in equation (6) indicates that the effect of a small change in wages on the incarceration rate can be broken down into three components which we will discuss from right to left. First, a change in wages will impact the proportion of men supplying time to criminal pursuits (accounted for by the term  $\frac{\partial c}{\partial w}$ ). Second, this increased criminality will generate new admissions to prison, as some proportion of new offenders (given by the parameter  $p$ ) will be caught and incarcerated.

Finally, the impact on the incarceration rate of the increase in prison admissions (generated by  $p \frac{\partial c}{\partial w}$ ) will be magnified by the amount of time an imprisoned offender is likely to serve. This magnification factor derives from the term  $\frac{\theta}{(cp + \theta)^2}$ . Note, in practice the product  $cp$  is likely to be a relatively small number (below 0.003) while the release rate,  $\theta$ , is likely to be

relatively large. These two empirical facts imply that the magnification factor should be approximately equal to the ratio  $1/\theta$ . As we discussed above, one over the release rate provides a pretty good approximation of the expected value of time served. Thus, the longer is the average time served (or the lower the release rate) the greater the likely effect of a change in wages on the overall incarceration rate.

We use equation (6) to provide a rough approximation of the potential impact of changes in the national wage structure on the overall incarceration rate. Specifically, let  $i=(1, \dots, I)$  index  $I$  racial groups and  $j=(1, \dots, J)$  index  $J$  educational attainment groups. For sub-groups of men defined by race and educational attainment, we estimate how much lower the 2000 incarceration rate would have been had the average wages of the group not declined between 1980 and 2000. Specifically, we tabulate the estimates

$$(7) \quad \Delta \hat{Inc}_{ij} = \frac{\theta}{(cp + \theta)^2} \cdot p \cdot \frac{\partial c}{\partial \ln w_{ij}} \cdot \partial \ln w_{ij},$$

where we have substituted the natural log of wages for wage levels (a switch we will discuss in a moment) and where  $\partial \ln w_{ij}$  gives the change in the average log wages for group  $ij$  between 1980 and 2000. Since average wages decline for those groups experiencing the largest increase in incarceration, the calculation in equation (7) provides us with an estimate of what the incarceration rate in 2000 would be if wages were restored to their earlier levels.

With the group-specific calculations in equation (7), one could then estimate the proportion of the increase in incarceration attributable to changes in the wage structure. Specifically, taking a weighted average of the group-specific incarceration-wage effects in (7) would give

$$(8) \quad \Delta \hat{Inc} = \sum_{i=1}^I \sum_{j=1}^J w_{ij} \Delta \hat{Inc}_{ij},$$



where  $w_{ij}$  is the proportion of adult males accounted for by demographic group  $ij$ . Equation (8) gives the overall effect of changes in the wage structure on the 2000 incarceration rate, accounting for the proportional representation of the different race/education groups among the adult male population. Comparing the group-specific predicted changes in (7) to actual increases in incarceration provides an estimate of the proportional contribution of changes in labor market opportunities for each group. Comparing the weighted change in (8) to the overall change in male incarceration rates provides an overall estimate of the effect of economic changes.

Estimating equations (7) and (8) requires that we choose values for the parameters in these equations. Beginning with the term  $\frac{\partial c}{\partial \ln w}$ , the only estimate of the responsiveness of criminal participation to changes in wages that we are aware of is provided by Grogger (1998). Grogger estimates that the effect of a change in the natural log of hourly earnings (hence the substitution to log wages in equation (7)) on the likelihood of engaging in income-generating activity is approximately -0.25. Note this estimate pertains to a sample of males from the NLSY79 in the year 1980, between 15 to 22 years of age who were not enrolled in school, not in the military, and where disadvantage minority men are over sampled. This particular demographic group is likely to be the most pre-disposed towards criminal activity, and thus the estimated responsiveness will certainly be on the high side when applied to older and more educated men. As this is the only estimate we have to work with, our calculations presented below should be interpreted as upper bound estimates.

To estimate the likelihood of being caught and incarcerated, one could pursue a number of potential strategies. Here we look to those who admit to engaging in criminal activity and assess the likelihood that they serve time during a given period. The 1980 survey question on

which criminal participation is gauged in the study by Grogger (1998) inquires about the extent to which one's income over the previous year came from illegal activity. Taking those who indicated any income from crime as the base population, the proportion interviewed in prison or jail at the time of the 1980 survey provides an indicator of the likelihood of being caught and incarcerated. Figure 31 presents the proportion of NLSY79 male respondents interviewed in prison or jail by their self-reported relative proportion of income derived from criminal activity. The figure clearly reveals that those more engaged in crime are more likely to end up incarcerated. However, the average incarceration probability across all those engaging in crime is relatively low (0.02) since the majority of respondents (75 percent) who report income from crime report very little income from crime.

We take 0.02 as an estimate of the likelihood of ending up in prison or jail for those who commit income generating crimes in 1980.<sup>35</sup> Since the ratio of prison admissions to crimes committed has roughly tripled between 1980 and the present, we assume that the risk of incarceration in 2000 for those engaged in income generating crimes is 0.06.<sup>36</sup>

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<sup>35</sup> With an annual incarceration risk of 0.02 and making the assumption of no desistance among this population as they age, one can simulate the fraction that will eventually be interviewed in prison or jail over the course of the panel. Specifically, the likelihood of not having been incarcerated after  $t$  periods is given by  $0.98^t$ . For any given period, one minus this calculation provides an estimate of the fraction that has ever served time. By 1996, the proportion of men who admit to engaging in income generating crime in 1980 that are interviewed in prison or jail at least once is roughly 0.11 (consistent with the tabulations of presented in Freeman (1996)). Assuming no desistance and a 2 percent annual incarceration risk, roughly 30 percent should have been interviewed in prison or jail. While criminal activity is likely to have declined with age, this over-estimate is also likely to indicate that our assumed incarceration risk parameter is perhaps too high. Thus, similar to the estimate of wage responsiveness that we employ, the assumed risk of incarceration further reinforces our interpretation of the numbers below as upper-bound estimates.

<sup>36</sup> We explored several alternative strategies for estimating  $p$ . One possibility is to estimate the amount of crimes reported to the police that would be generated by the typical prison inmate and then estimate the likelihood of being caught and incarcerated for this amount of crime. Johnson and Raphael (2007) estimate that the average inmate incarcerated between 1979 and 2002 Reduced index crimes reported to the police by approximately 3.5 (the effect on overall crime is closer to 10 given under-reporting). Since reported crimes are likely to generate the police actions leading to an arrest and conviction, one estimate of the likelihood of incarceration is to estimate the likelihood that such an average prisoner would be caught and convicted again should he be released. With an average admissions/crime ratio of approximately 0.019, the likelihood of being caught and incarcerated for committing four index crimes in one year is approximately 0.074 (calculated as  $1-(1-0.019)^4$ ). Certainly, the marginal offender drawn into crime is not likely to engage in criminal activity with the intensity of the average prison inmate. Thus our slightly more modest choice of 0.06 seems justified. A further alternative is to make use of the stylized fact presented in Levitt and Venkatesh (2001) that roughly 1/3 of the 16 heads of the Chicago drug gang

The magnification factor,  $\frac{\theta}{(cp + \theta)^2}$ , will be higher the lower is the release rate, or alternatively stated, the higher the expected value of time-served. In fact, under certain distributional assumptions, the expected time served will provide a close approximation. As we have already documented, the prison release rate at the end of the century was slightly less than 0.50, indicating an estimate of the magnification factor of two. However, those offenders coaxed into criminal activity by declining wages are likely to commit fewer and less serious crimes relative to those already incarcerated. Thus, we assume that such marginal offenders that wind up in prison or jail serve no more than 1.5 years on average.

Finally, we use results from Juhn (2003) as estimates of the changes in average log wages by race and educational attainment. Juhn adjusts the log wage change for the decline in labor force participation among low-skilled male workers by estimating hourly wages from annual data (thus being able to observe the earnings of a larger proportion of men than one would capture by looking at a monthly survey) and by assigning the wages of comparable part year workers to individuals with no annual wage and salary income. Juhn presents estimated changes in the legal opportunity cost of crime for white men and black men by educational attainment.<sup>37</sup> For Hispanic men and other men, we assume that the changes in the wage structure experienced by black men with similar levels of education attainment apply.

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that they studies were in prison at any given time. Since all 16 men can be accurately described as full time criminals –i.e.,  $c=1$  -- the incarceration equation (1) for this group can be written as  $0.33=p/(p+\theta)$ . With an estimate of the release probability, one could back out the annual risk of incarceration for these full time criminals. The release probability for all inmates in 2000 was slightly less than 0.50, corresponding to an expected time served of two years. It seems reasonable to assume that the leaders of a violent drug gang are likely to be serving somewhat longer sentences than the average inmate. If we assume a release probability for this group of 0.33 (corresponding to an expected time served of three years), then the annual incarceration risk would be equal to 0.16. Thus, our estimated risk of 0.06 implies that the incarceration risk for a marginal offender is roughly 40 percent the incarceration risk for a full time criminal. While these are clearly speculations, this seems like a reasonable approximation.

<sup>37</sup> Juhn's 2003 published study does not include estimates of adjusted changes in hourly log wages for those with some college education but no degree. However, the author provided us with these additional tabulations.

The results of this exercise are presented in Table 10. The first column presents estimates of the change in log wages between 1979 and 1998 for men by race and ethnicity (approximately equal to the proportional change in wage levels). The numbers document the well-known erosion of the legal opportunity cost of the least skilled men. The second column presents group-specific estimates of the effects of these wage changes on group-incarceration rates (corresponding to equation (7) above). For each racial/ethnic group, we also estimate an overall change by taking the average of the effects by educational attainment weighted by the proportion of the group's men in each education level. These overall figures suggest that changes in the wage structure increased the 2000 incarceration rate by 0.001 for white males, 0.002 for black males, 0.003 for Hispanic males, and 0.001 for other males.

Column (3) presents estimates from the 1980 and 2000 censuses of the actual change in the proportion of males institutionalized by race/ethnicity and by race/ethnicity and education (taken from Table 8 above). Note, these figures pertain to men in either jail or prison. This seems like a reasonable bench mark since the NLSY79 data used to calculate the risk of incarceration are based on whether the respondent is interviewed in prison or jail. The final column presents the ratio of the predicted wage effects on incarceration to the actual changes.

The results suggest that changes in the wage structure account for 23 percent of the increase in incarceration among white men, 4 percent of the increase among black men, 21 percent of the increase among Hispanic men, and 33 percent of the increase among other men. For all men, estimating equation (8) above suggests that changes in the wage structure accounts for roughly 13 percent of the increase in incarceration. The disproportionate contribution of black male incarceration to overall growth pulls this estimate disproportionately towards the lower number for blacks.

To be sure, the results in Table 10 are clearly biased upwards and thus represent upper bound numbers. First, we are applying an estimate of the sensitivity of criminal participation to changes in wages estimated for a sample of disproportionately disadvantaged male youth to all men. A priori, we believe that the generally high criminality of younger men should make them more sensitive to the relative returns of criminal as opposed to legitimate work opportunities. Second, we use an estimate of the likelihood of being caught for those just on the margin between offending and not offending that is comparable in magnitude to the likelihood of being sent to prison for engaging in the amount of crime that the average inmate would commit were he not incarcerated. Finally, we have implicitly assumed that the declines in wages depicted in Table 10 occur for reasons that are independent of the increase in incarceration rates. If wage declines reflect in part a negative effect of having a criminal record on earnings and employment, these estimates will be biased upwards.

#### *Changes in drug markets*

The last half of the 20<sup>th</sup> century witnessed the rise and fall of several illicit drug epidemics. Each of these epidemics entails separate subcultures of use and sales, idiosyncratic economic relationship and market organizations, and particularly pathways by which drug use and sales likely impacted crime and incarceration. During the 1960s and 1970s, intravenously injected heroine was the hard drug of choice among urban users in American inner cities. During the late 1970 and 1980s, recreational use of powder cocaine, injected through inhaling or freebasing became popular and widespread. The introduction of crack cocaine in the mid 1980s greatly increased cocaine use in relatively poor minority neighborhoods, and is commonly cited as a key determinant of the spike in violent crime occurring between the mid 1980s and the early 1990s. Finally, with the waning of the crack epidemic, marijuana use among criminally active youth increased substantially during the 1990s (Johnson, Golub, and Dunlap 2000).

The effects of these individual drug epidemics on incarceration growth operate primarily through an impact on crime. Moreover, the introduction of a new drug can be thought of as a behavioral shock to the criminality of a nation's residents. Johnson, Golub, and Dunlap (2000) lay out three avenues by which specific drug epidemics are likely to impact criminality that provide a useful framework for thinking about the consequences of recent drug epidemics for crime and incarceration. First, each drug has unique psychopharmacological effects on users that may impact aggression, heighten a sense of paranoia, or alter other psychological factors that may predispose one towards violence. Second, users may turn to income-generating crime to support their habits. Such "economic-compulsive" criminal behavior may take the form drug dealing, robbery, or burglary. Finally, as drug transactions are not governed by the legal system –i.e., there are no formal mechanisms for contract enforcement and the protection of property rights – violent crime is likely to arise in the process of settling disputes, protecting market share, and in collecting payments.

The timing of the crack epidemic along with the particular connections between the market for crack and violence suggests that this particular behavioral shock may have been an important behavioral contributor to growth in incarceration. First, while the exact timing of the start of the epidemic is uncertain, two careful studies of this question date the introduction of crack to 1984 at the earliest, with sales and use spreading throughout the country by 1988 (Grogger and Willis 2000, Fryer et. al. 2005).<sup>38</sup> As we saw in Figures 14 through 17, this corresponds to a time period when prison admissions for drug related crimes increased absolutely, proportionally to the population, and proportionally to all prison admissions.

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<sup>38</sup> Grogger and Willis (2000) use data from the Drug Awareness Warning System (DAWN) on cocaine related emergency room visits as well as a survey of police chiefs in large cities to date the onset of the crack epidemic for different urban areas. Fryer et. al. (2005) use data from the DAWN, data on Drug Enforcement Administration (DEA) cocaine seizures, newspaper citations on crack related stories, cocaine arrests, and cocaine deaths to construct a single index. Both date the beginning of the crack epidemic to 1984/1985.

Second, the psychopharmacological effects of crack cocaine are more likely, relative to other drugs, to predispose the user towards violence. In contrast with heroine and marijuana which are depressants, cocaine is a stimulant that induces hyperactive states.

Third, the number of transactions per user is particularly high for crack cocaine, reflecting its sale in small, relatively inexpensive quantities.<sup>39</sup> A higher frequency of contact between dealers and users increases the number of opportunities for violence. Each contact carries a risk of the user victimizing the dealer, the dealer victimizing the user, or a third party bent on robbery victimizing either the user, the dealer or both.

Finally, the structure of the crack cocaine market was such that many young men were effectively employed by drug selling operations in various capacities (MacCoun and Reuter 2001), with competing organizations often engaging in violent confrontations with one another over market share. At least one author (Grogger 2000) has hypothesized that the waning of violent crime during the 1990s was driven in part by a greater level of cooperation among drug-selling gangs and a greater propensity to rely on non-violent means for settling turf conflicts.

A number of studies have attempted to estimate the effect of the crack cocaine epidemic on crime rates. For example, Blumstein (1995) attributes the sharp increases in homicide among minority youth to the introduction of crack cocaine, the widespread availability of handguns, and the ensuing violence between rival suppliers of the drug. Grogger and Willis (2000) exploit differences in the timing of the introduction of crack cocaine across cities to estimate the effect of the drug on various aggregate crime rates. The authors conclude that had crack cocaine not been introduced, the peak in urban crime rates in 1991 would have been roughly 10 percent lower than that actually observed, and would have been below the earlier 1981 peak (which it

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<sup>39</sup> Crack cocaine is derived from its powder form by dissolving cocaine in water, mixing it with baking soda, and boiling (Grogger and Willis 2000). The resulting “rocks” are smoked, concentrating cocaine in the blood stream and brain at a particularly fast rate. This causes a short intense high followed by an intense depression and possibly desperation caused by the rapid decline in cocaine levels (Johnson, Golub, and Dunlap 2000).

actually exceeded by 6 percent). Fryer et. al. (2005) develop an index of crack cocaine usage that varies by city and state based on several indicators of the intensity of use, including cocaine related emergency room visits, cocaine related deaths, arrests, and drug busts, and the relative frequency of newspaper articles that mention crack cocaine. In a series of panel data regressions of various outcomes on the constructed crack index the authors find that the introduction of crack cocaine predicted sizable portions of the increase in black male youth homicide rates, changes in the proportion of black babies that are low birth weight, as well as changes in the proportion of births among black women born to unwed mothers. Estimates of the effect of crack on overall crime rates in this study, however, are rather imprecise and with a few exceptions are statistically insignificant.

Despite the timing of the epidemic and the clear connections between crack and violent crime, there are reasons to believe that the potential role of crack cocaine in explaining the explosion in incarceration growth is limited. First, the decomposition of the increase in prison admissions presented above indicated that even under relatively extreme assumptions pertaining to the counterfactual crime rate in the absence of the prison increase, changes in criminal behavior can explain a relatively small portion of the increase in incarceration (no more than 20 percent). Second, the crack epidemic has diminished since 1990 while the incarceration rate has continued to grow. Johnson, Golub, and Dunlap (2000) document a sharp decline in the proportion of young men arrested in New York City who have ever used crack relative to older arrestees. Moreover, through their ethnographic work, the authors document a cultural shift away from crack cocaine driven in large part by the negative experiences with the drug of the older generation. To the extent that crack drives growth in incarceration during the 1980s, the waning of the epidemic should have given rise to a decline during the 1990s (with fewer prison admissions for crack cocaine violations and with the release of earlier offenders).



Finally, the one study (Fryer et. al. 2005) that attempts to estimate the effect of crack cocaine usage on prison admissions finds no evidence of an impact. We reproduce there basic finding here. Specifically, we match the crack cocaine index measured at the state level from Fryer et. al. (2005) to state level data on overall prison admissions per 100,000, new commitment per 100,000, and admissions due to returns-to-custody per 100,000. We restrict the data to the period from 1985 to 2000, due to the fact that the authors have little confidence in the signal associated with variation in their index prior to 1985. We then use these data to estimate a series of linear regression models where the key dependent variable is the state level prison admissions rate and the key explanatory variable is the crack index.

Table 11 presents these results. The first row of numbers provides the coefficient on the crack index from a simple bivariate regression of the specific prison admissions rate on the index. The next row presents the same coefficient estimates after adding a complete set of state fixed effects. The inclusion of these fixed effects means that the effect of crack is being estimated using variation that occurs within states over time in the intensity of crack usage. The final specification adds a complete set of year fixed effects. This is perhaps the most important specification, since the time fixed effects removes from the two variables of interest all year-to-year changes in incarceration and crack usage that are common across states. In essence, this final regression estimates the effect of the introduction of crack by assessing whether admissions rate increased earlier in states where crack appeared first (these results also correspond to the models estimated in Fryer et. al. 2005).

Beginning with the total admissions rates, there is a significant positive association between admissions and the crack index (as is evident from the simple bivariate regression coefficient), a somewhat larger positive estimate when we only use variation within states, but a significant negative effect when time effects are included in the specification. The largest

estimate of the effect of crack on prison admissions (the coefficient of 14.71 in the model with state fixed effects only) predicts that the change in the crack index increased prison admissions between 1985 and 2000 by approximately 14 admissions per 100,000. As the actual rate increased by 114 over this period, the largest estimate in the first column of Table 11 suggests that crack explained no more than twelve percent of growth in prison admissions over this time period.<sup>40</sup>

This certainly is an over-estimate, however. The fact that the marginal effect of the intensity of crack usage does not survive adjusting for common year to year shifts casts serious doubt on this estimate. The results in the final row indicate that states where the intensity of crack use increased above and beyond the average increase for the nation experienced declines in the prison admissions rate. While this result may be biased by a reverse causal effect of prison on the crack epidemic (the explanation offered in Fryer et. al.), the large disparity between the estimated impact of crack omitting year effects and the effect including these effects suggests that crack cocaine has played a minor role.

## 6. Conclusion

Why then are so many Americans in prison? We find that the answer to this question lies mostly with the collective series of policy innovations at the state and federal level. In other words, so many Americans are in prison because through our collective public choices regarding sentencing and punishment we have decided to place so many Americans in prison. For those who would have been sentenced to prison in past years, we have increased the amount of time that such offenders will serve. For many other less serious offenders, we now punish with a spell

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<sup>40</sup> We can use this number to provide a rough approximation of the implied ultimate effect on incarceration of this estimate. We estimate above that increases in the admissions rates accounts for at most 75 percent of the increase in incarceration. If crack accounts for 12 percent of the increase in admissions, than roughly 9 percent ( $0.75 \times 0.09$ ) of the increase in incarceration rates can be attributed to this particular shock.

in prison many who in the past would have received an alternative, less punitive sanction. Collectively, these changes in who goes to prison (expansion along the extensive margin) and for how long (expansion along the intensive margin) explain 80 to 85 percent of prison expansion over the last quarter century. Thus the characterization by William Spelman (2000) of the doubling of the prison population between the mid 1970s and 1980s and then doubling once more through the end of the century as one of the largest *policy* experiments of the 20<sup>th</sup> century is indeed correct.

To be sure, we do find evidence that there have been changes to some of the underlying fundamental determinants of criminal behavior that have militated towards higher criminal activity. With regards to shocks that are likely to have increased crime, the severely mentally ill are much less likely to be institutionalized today than in the past, a factor likely to contribute to some violent crimes and the amount of public order violations. Moreover, the labor market prospects of low skilled men, especially low skilled minority men, have deteriorated considerably starting around the mid 1970s. Finally, the introduction of crack cocaine in the mid 1980s clearly reeked havoc on American inner cities, contributing substantially to youth homicide and likely contributing to growth in the incarceration rate.

Nonetheless, we have shown that the likely impact of each of these shocks to behavior is small. We also presented evidence of demographic shifts that all else held equal should have reduced criminal offending as well as incarceration rates. Specifically, the U.S. population has aged, the fraction immigrant has increased (a factor associated with lower crime and incarceration rates), and the U.S. adult public has become considerably more educated with declines in the fraction who are high school dropouts and increases in the proportion with some college education observed within all ethnic and racial groups. All of these shifts would have decreased crime and incarceration had incarceration rates not increased within demographic

groups defined by age, race, and education groups. Moreover, research by John Donohue and Steven Levitt (2001) pertaining to the crime-abating effects of legalized abortion suggests another factor likely to have reduced the overall tendency towards criminal behavior among the non-institutionalized (and perhaps, even the institutionalized) public. In conclusion, while there were some quite visible shocks to criminal behavior as well as public order, there were many less visible underlying changes in the nation's demography that tended to counter the effects of the former on crime rates. In the end, it's not surprising that we find a small role for behavior in explaining the increase in the nation's incarceration rate.

Assuming that our characterization of the increase in incarceration is correct, the obvious question that this research raises is whether the benefits of this policy experiment justify the costs. In 2004, the nation spent roughly \$60 billion on corrections, with roughly two-thirds of these expenditures attributable to prisons. Several states corrections systems currently operate under severe over-crowding (California being the most salient example) and face pressing choices regarding whether and by how much to expand prison capacity and whether to alter sentencing in a manner that diverts a greater portion of offenders to alternative sanctions. Certain states, New York for example as described in Jacobson (2005), have chosen the latter route and have presided over recent declines in their state incarceration rates. Clearly, the "correct" choice depends on the extent to which marginal changes in incarceration at this point in history impact crime rates and the value we place on crime-abatement relative to the value placed on the benefits from alternative public investments or private expenditures. The choice also depends on whether there are other viable options, such as early childhood interventions, job trainings, or even public works campaigns, that may have similar crime abating effects at lower public cost (as explored by Donohue and Siegelman 1998).

To be sure, we have not presented the detailed analysis needed to answer this pressing question. The ultimate effect of further increases in incarceration or a deliberate decrease in any state's incarceration rate on crime would clearly depend on the manner in which such changes were carried out (which offenders are diverted, which released early etc. (Nagin 1998). Moreover, alternative manners of expanding or drawing down prison populations will have different cost implications, with policies that divert offenders who have never been to prison perhaps having smaller long term costs relative to policies that shorten time served for those already incarcerated. Finally, any such analysis would need to account for the hard to measure social costs of incarceration, such as the impact on the long-term employment prospects of current and former inmates, the effects on public health problems such as the AIDS epidemic and the spread of other infectious diseases, as well as the effects of incarceration on the families of the incarcerated.

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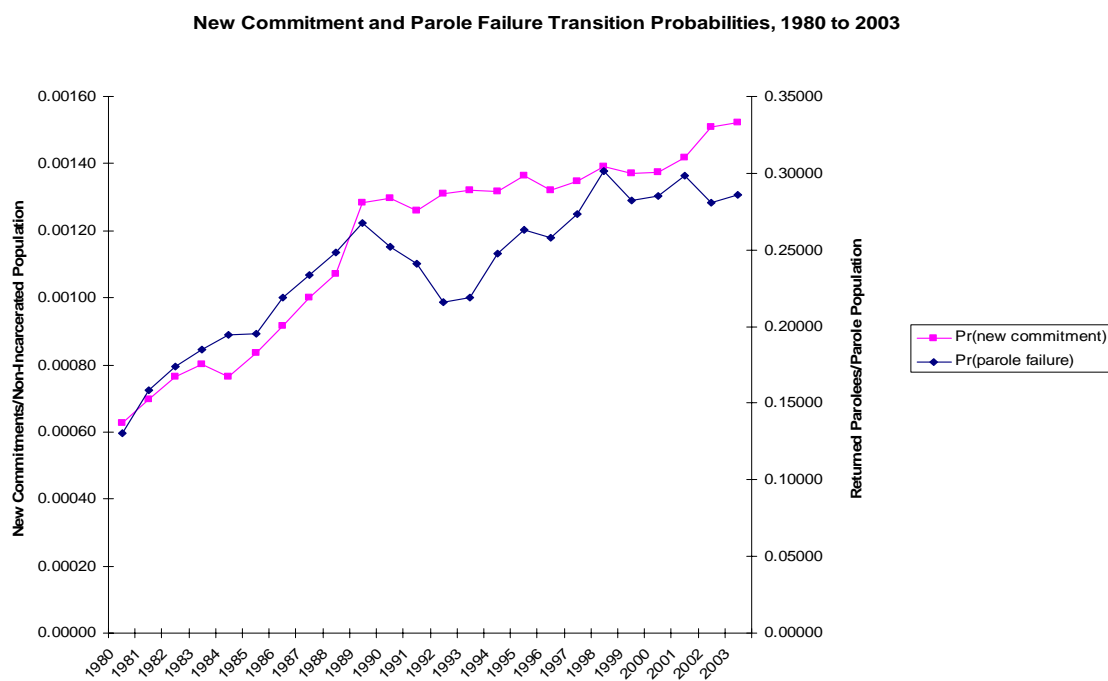
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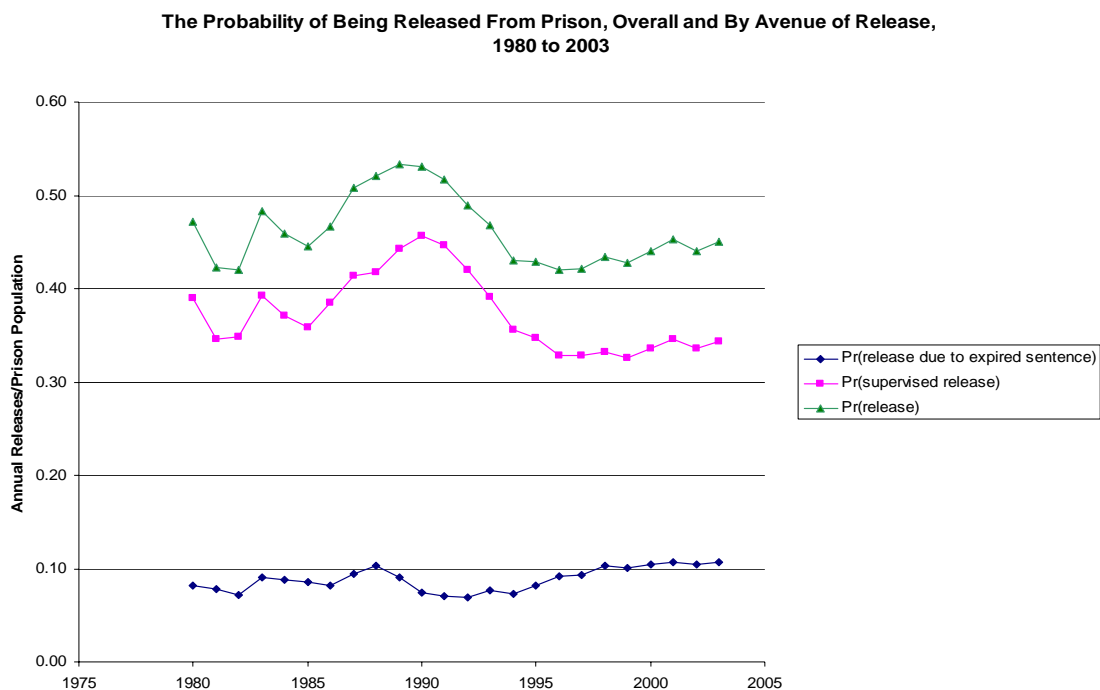
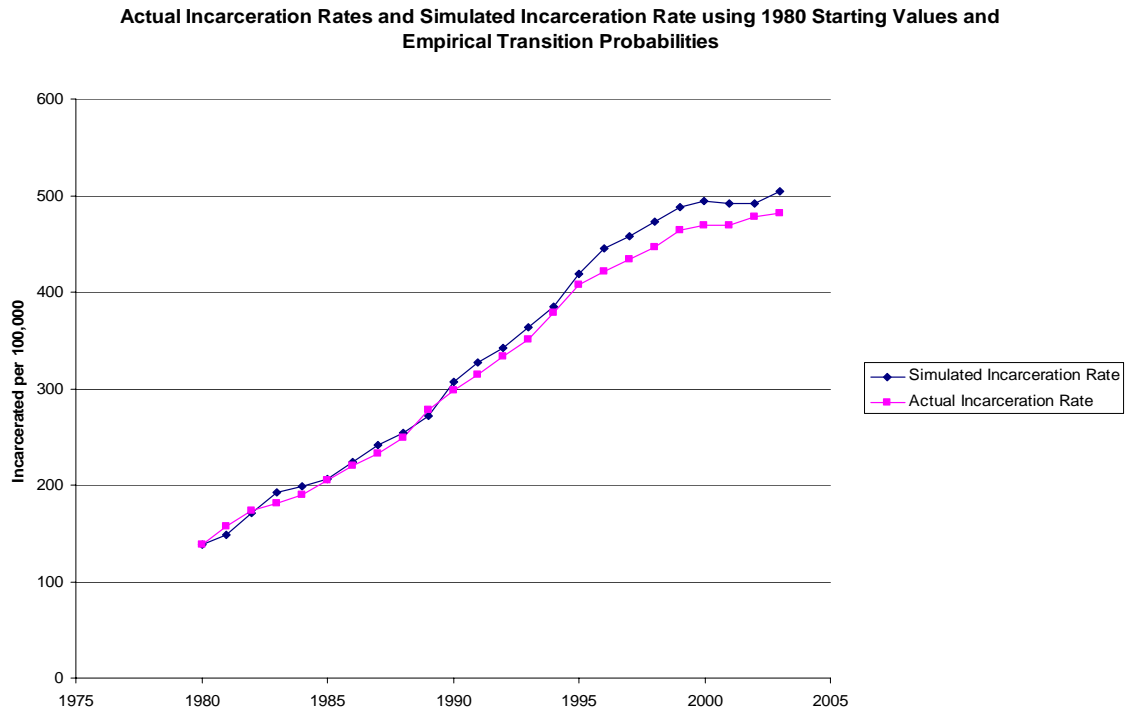
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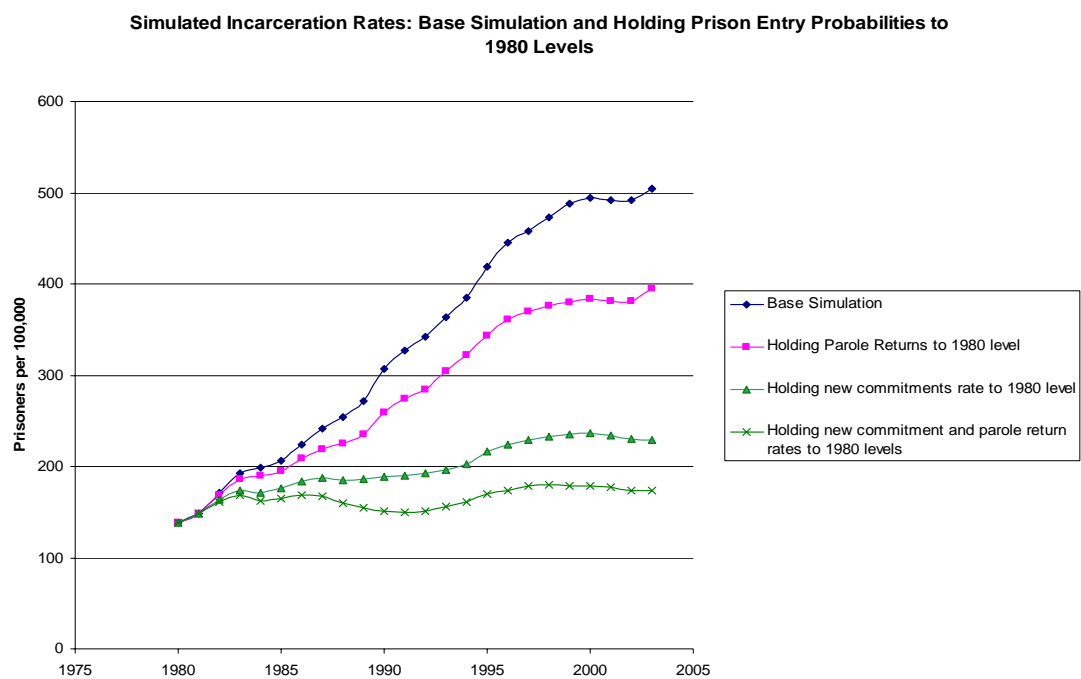
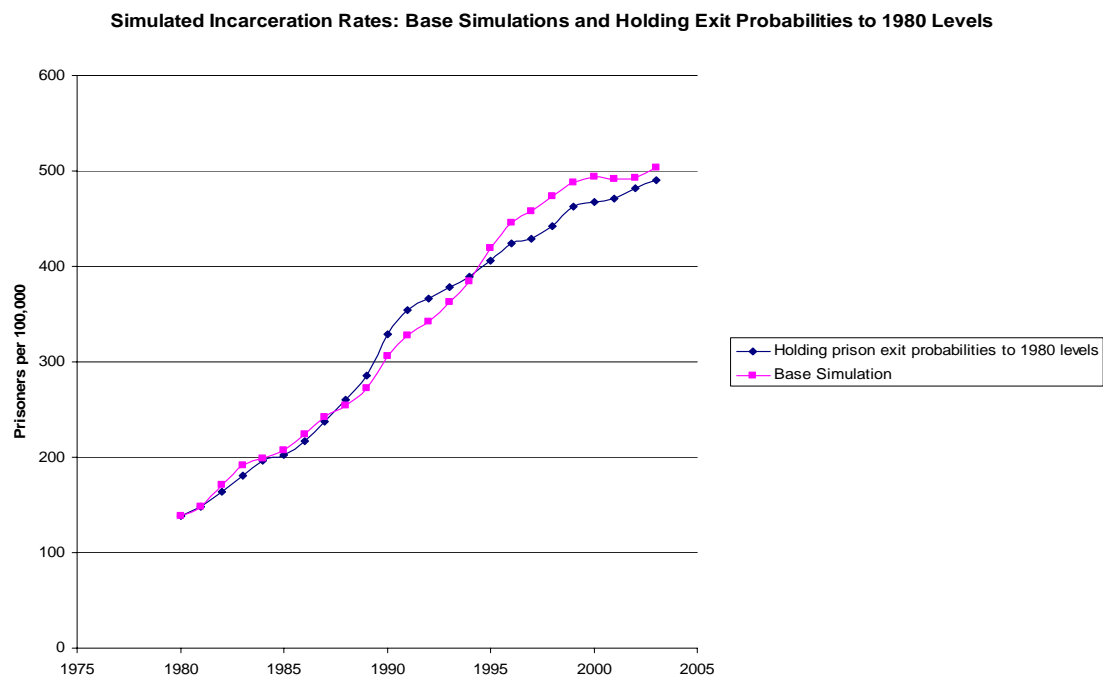
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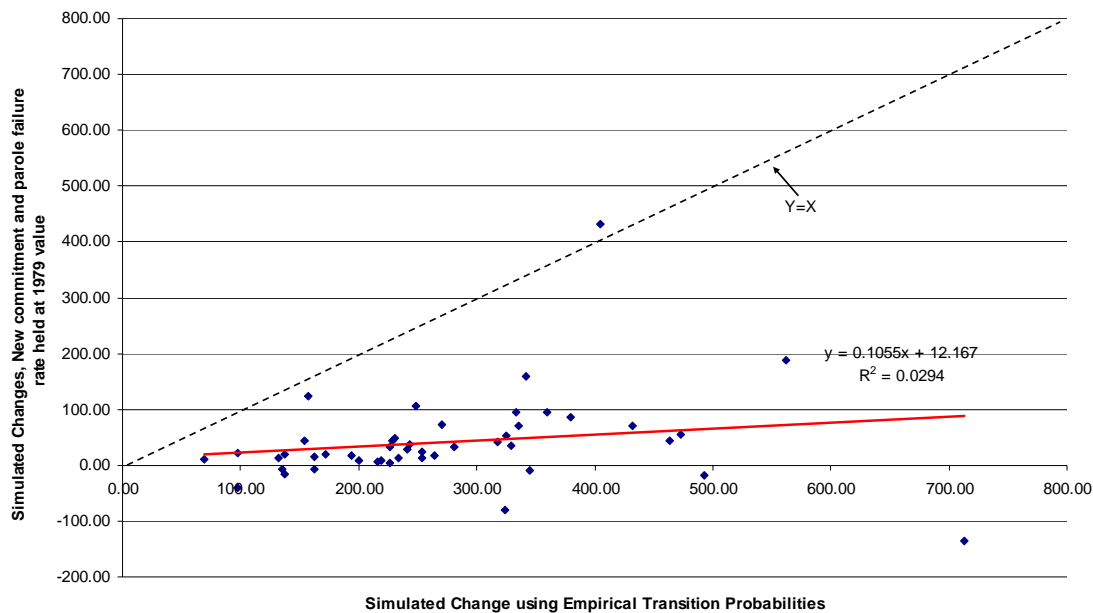
**Figure 1****Figure 2**

**Figure 3****Figure 4**

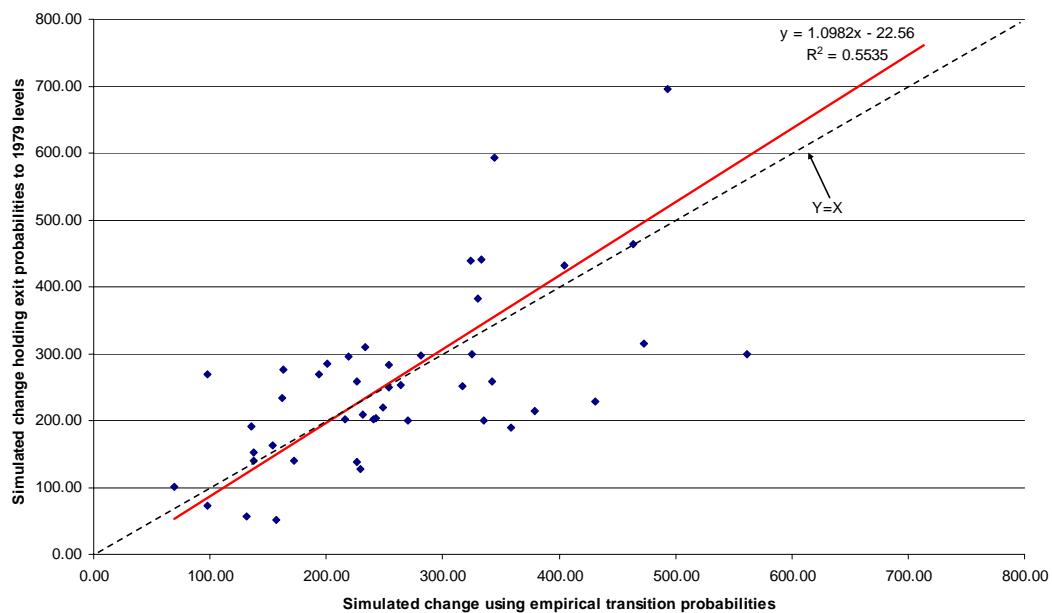
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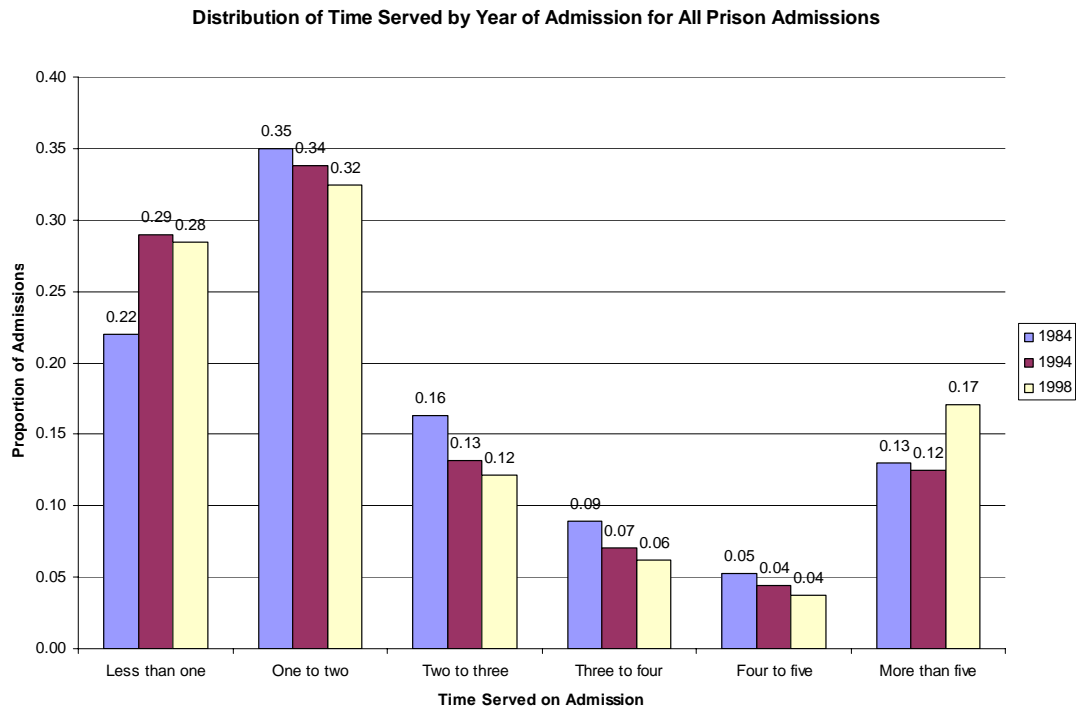
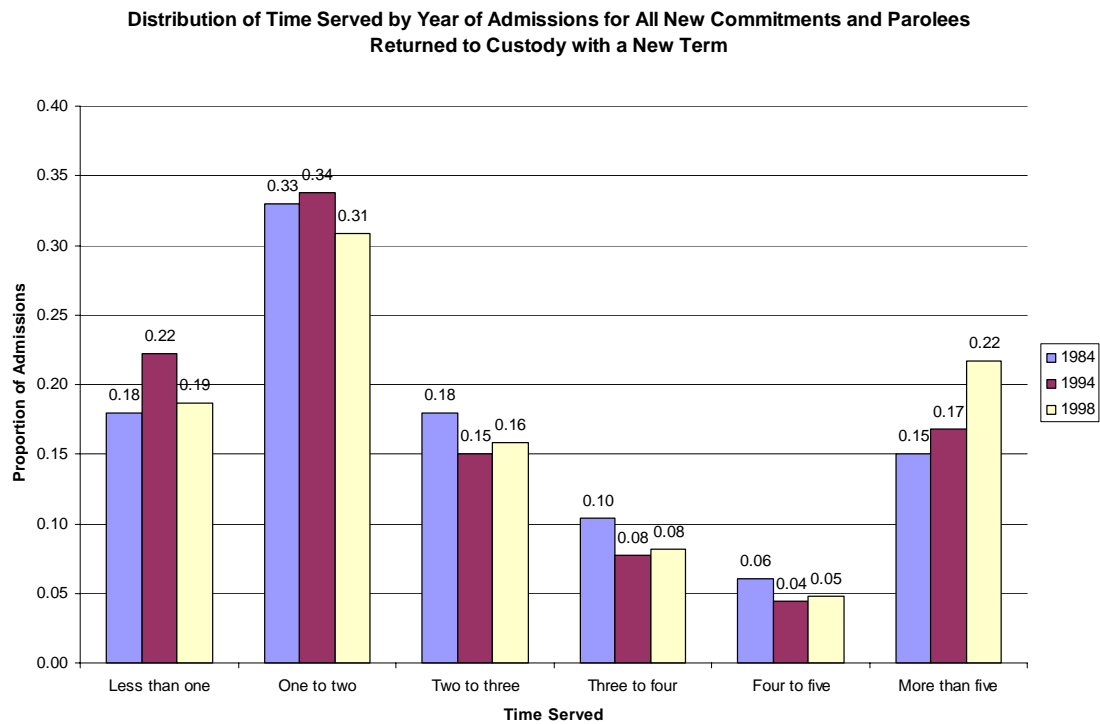
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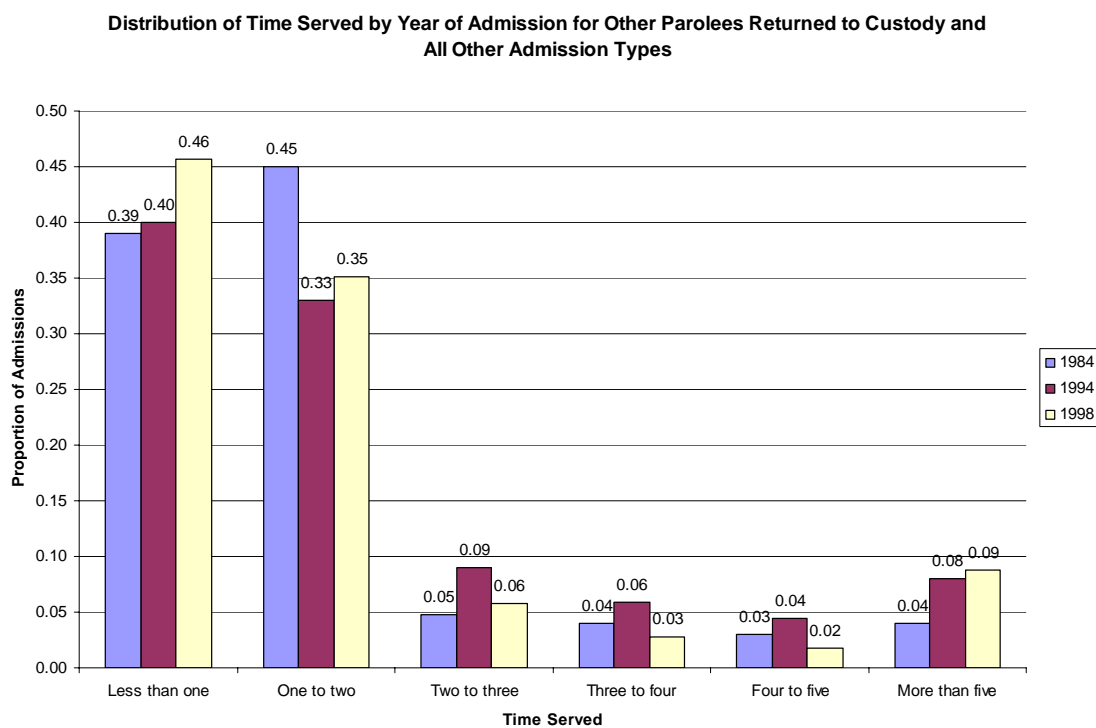
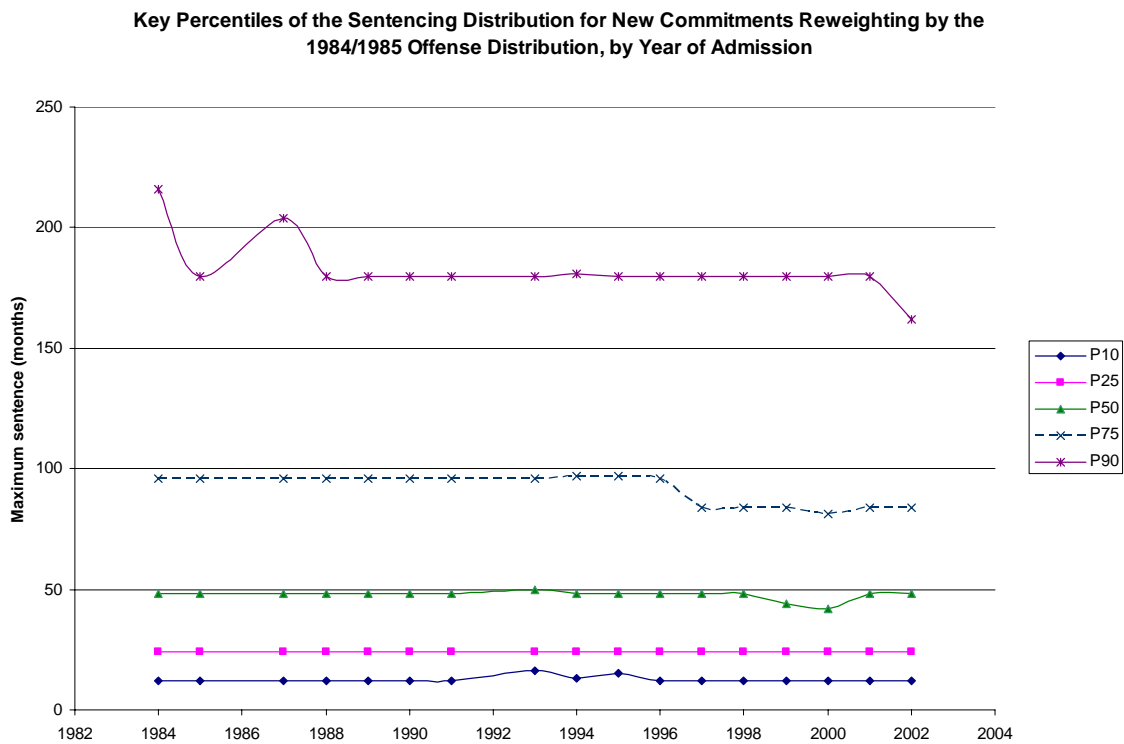
Scatter plot of simulated changes in state-level incarceration rates (1979 to 1998) holding new commitment and parole failure rate at 1979 values against simulation using empirical transition probabilities

**Figure 8**

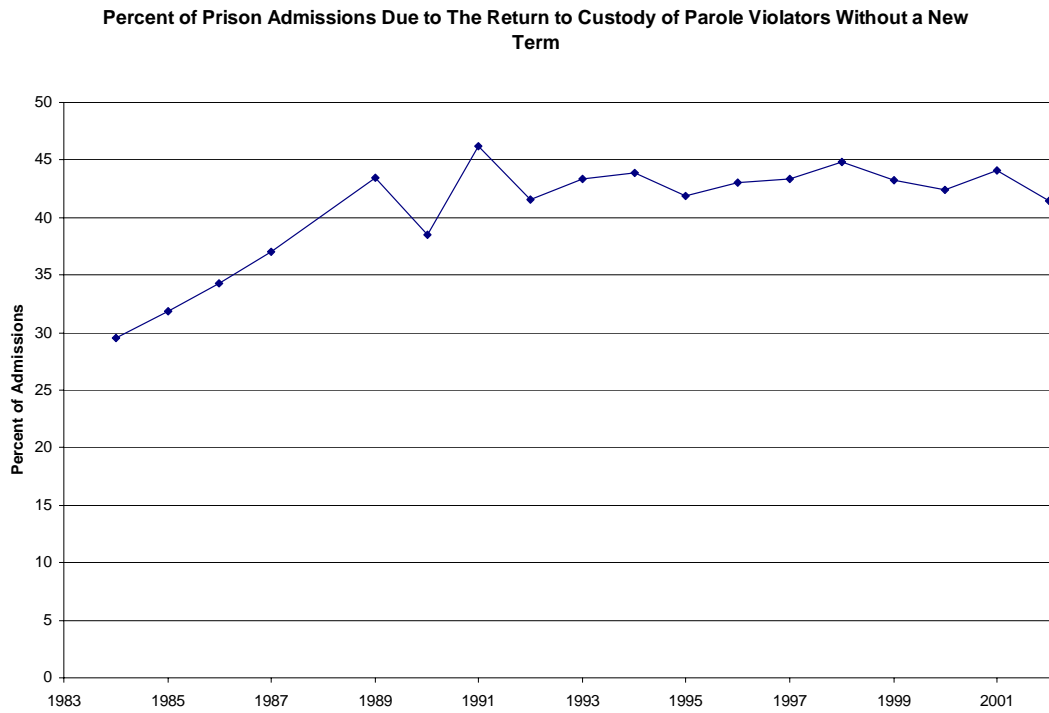
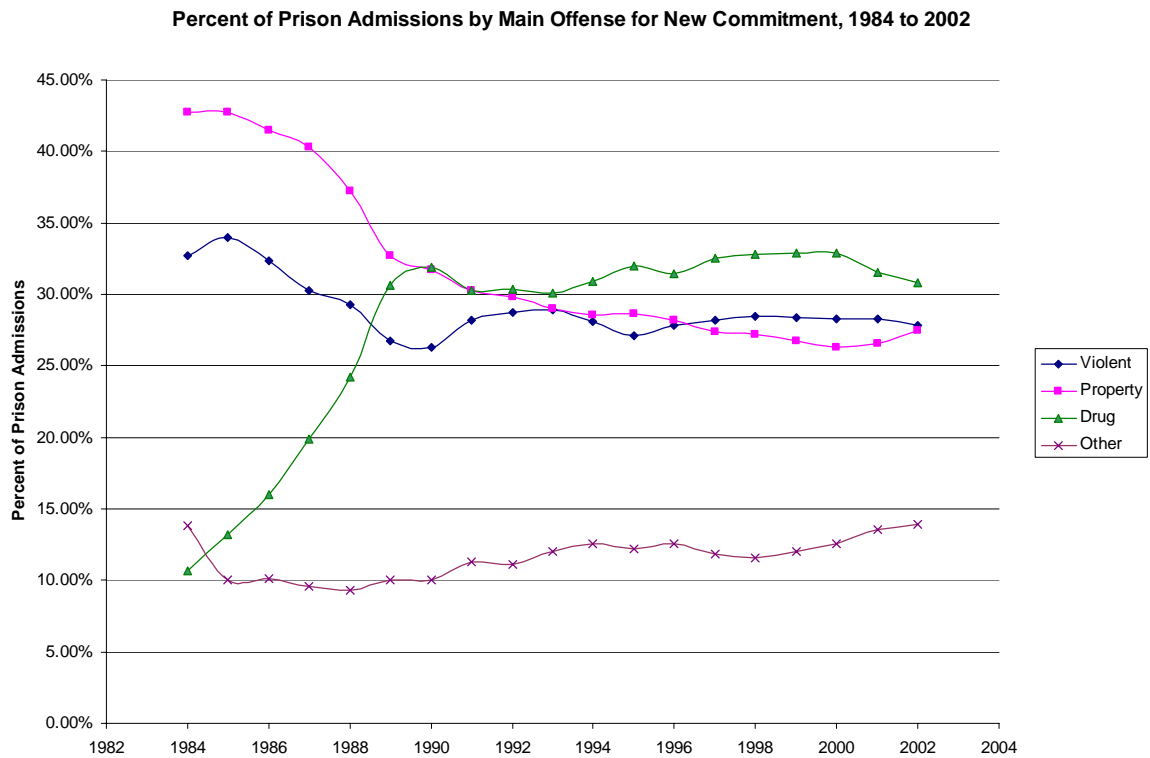
Scatter plot of simulated changes in state-level incarceration rates (1979 to 1998) holding exit probabilities constant against simulated changes using empirical transition probabilities

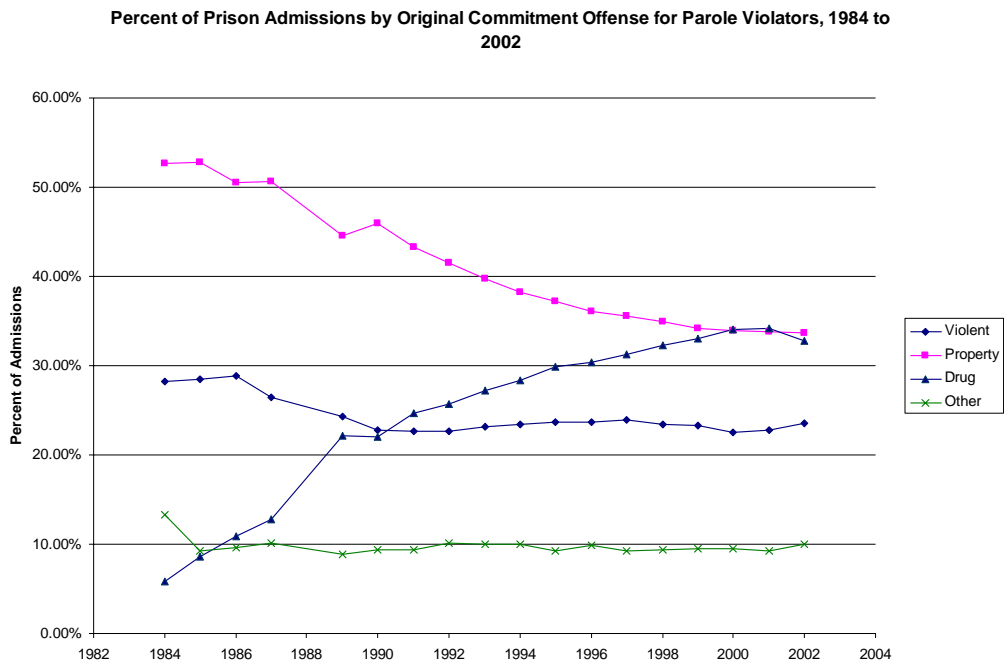
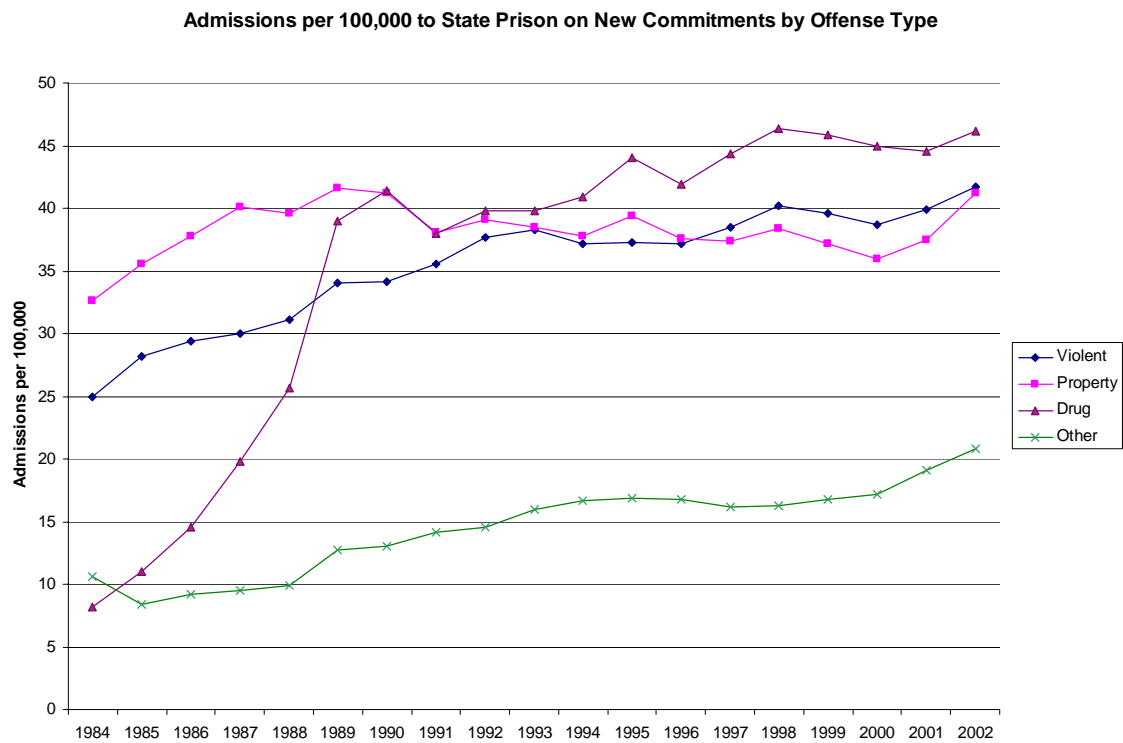


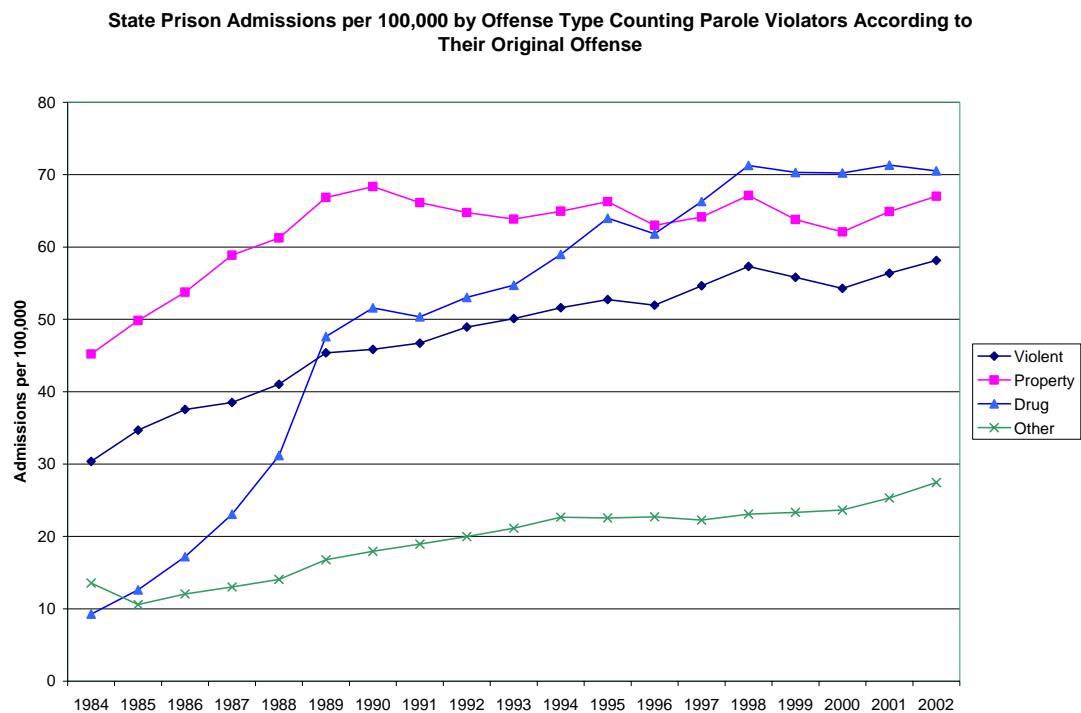
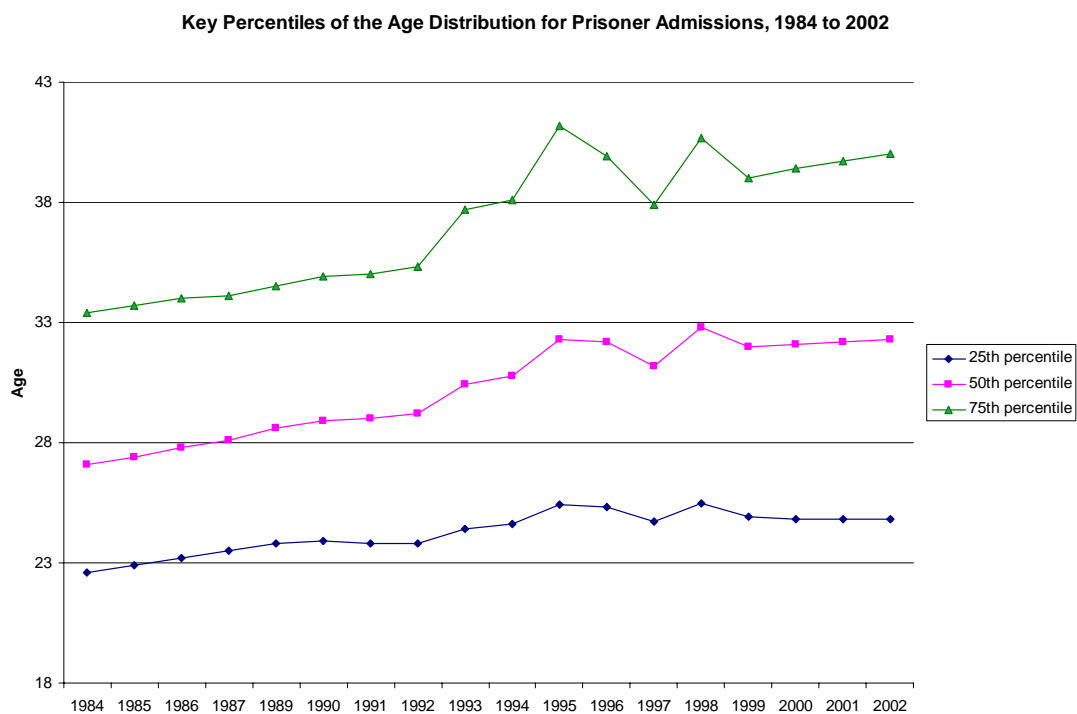
**Figure 9****Figure 10**

**Figure 11****Figure 12**



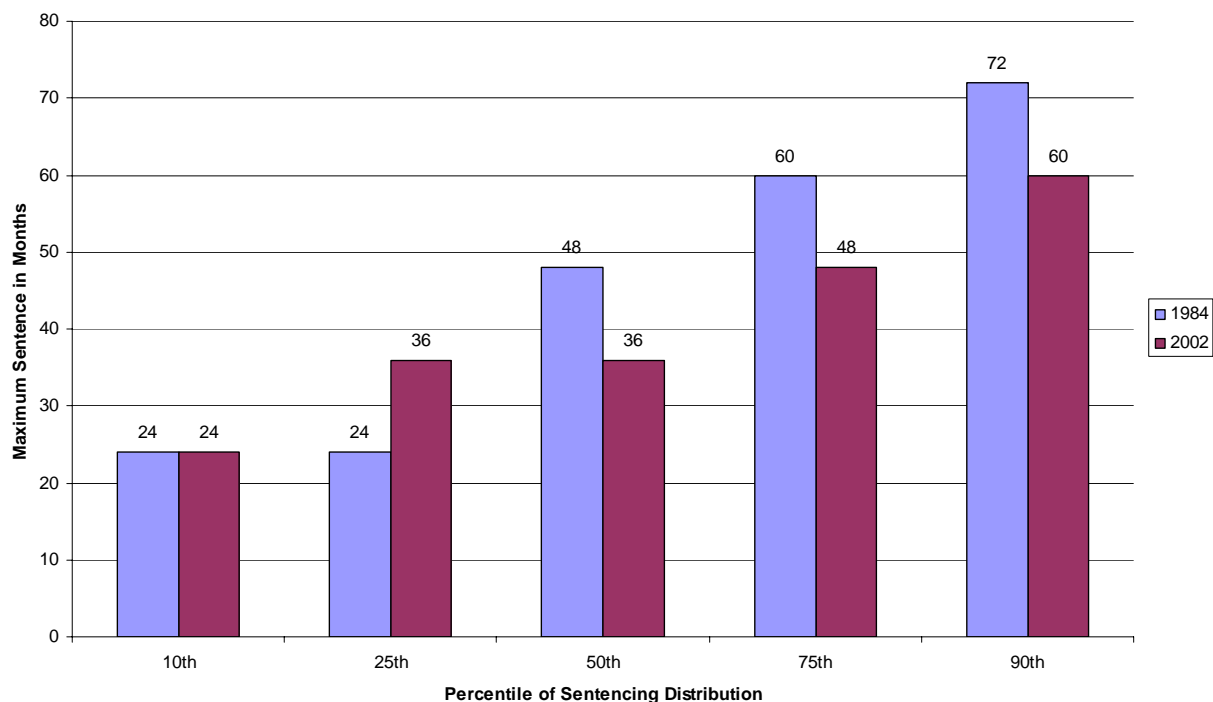
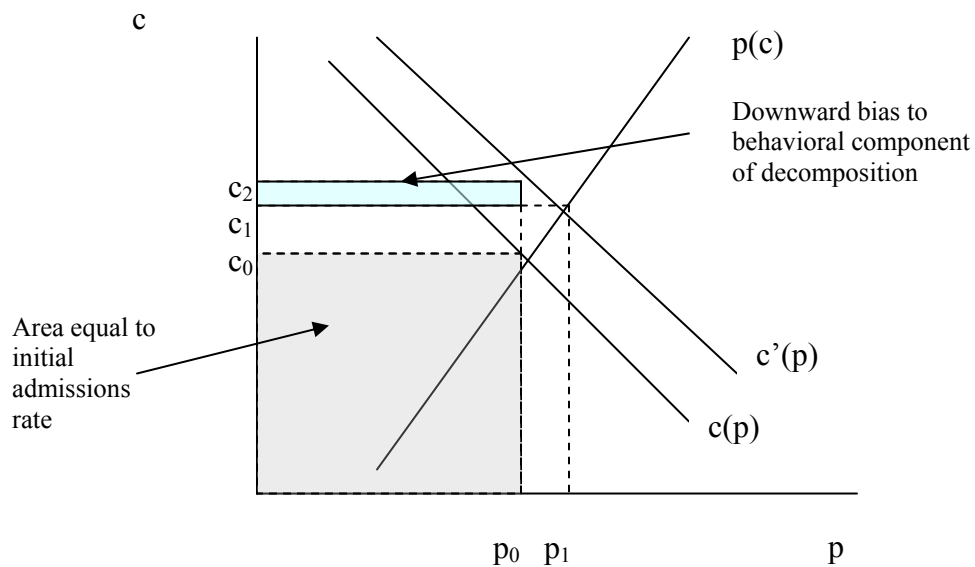
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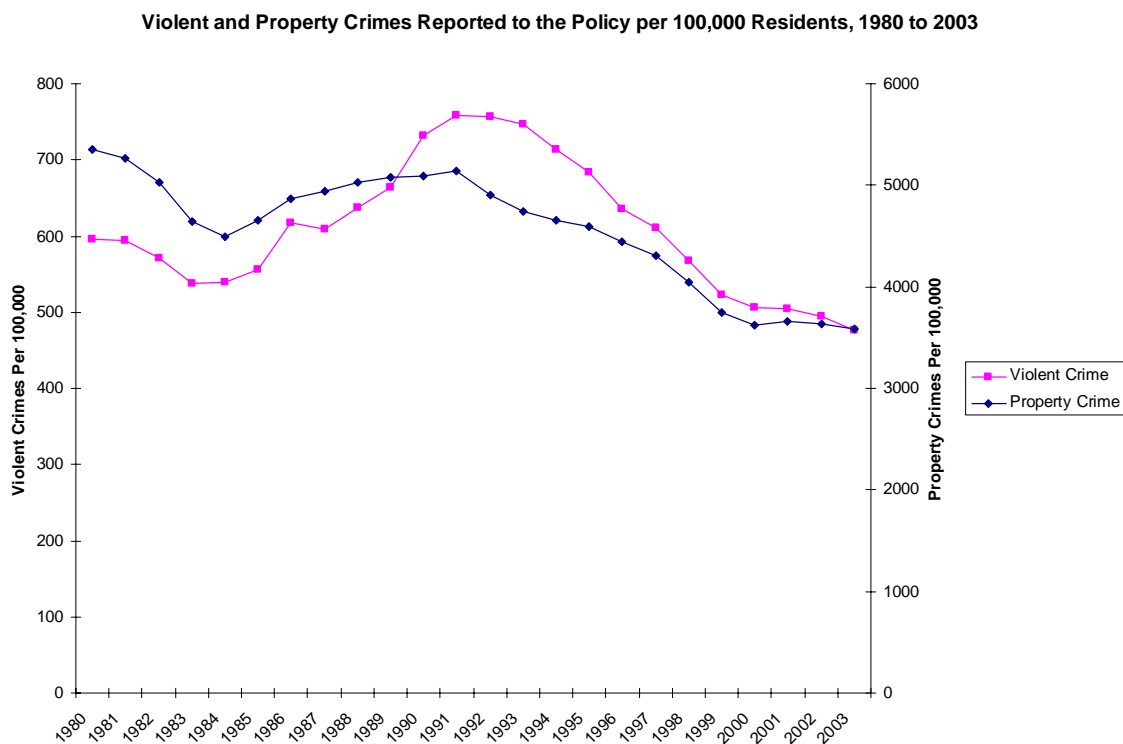
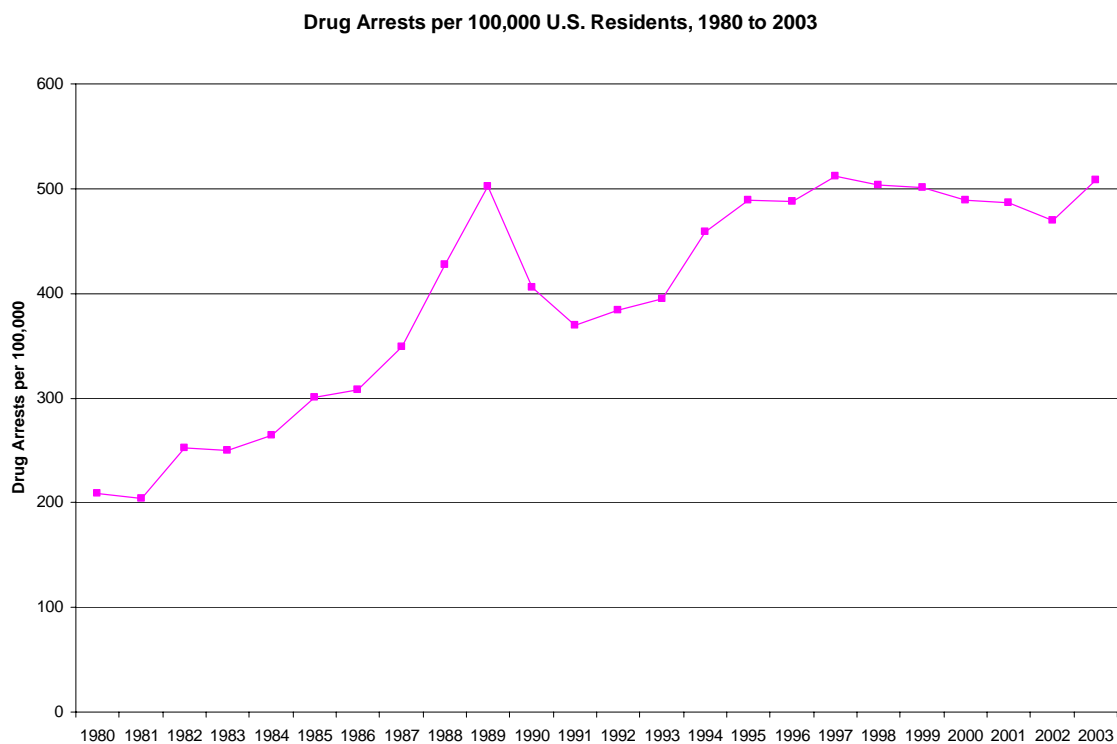
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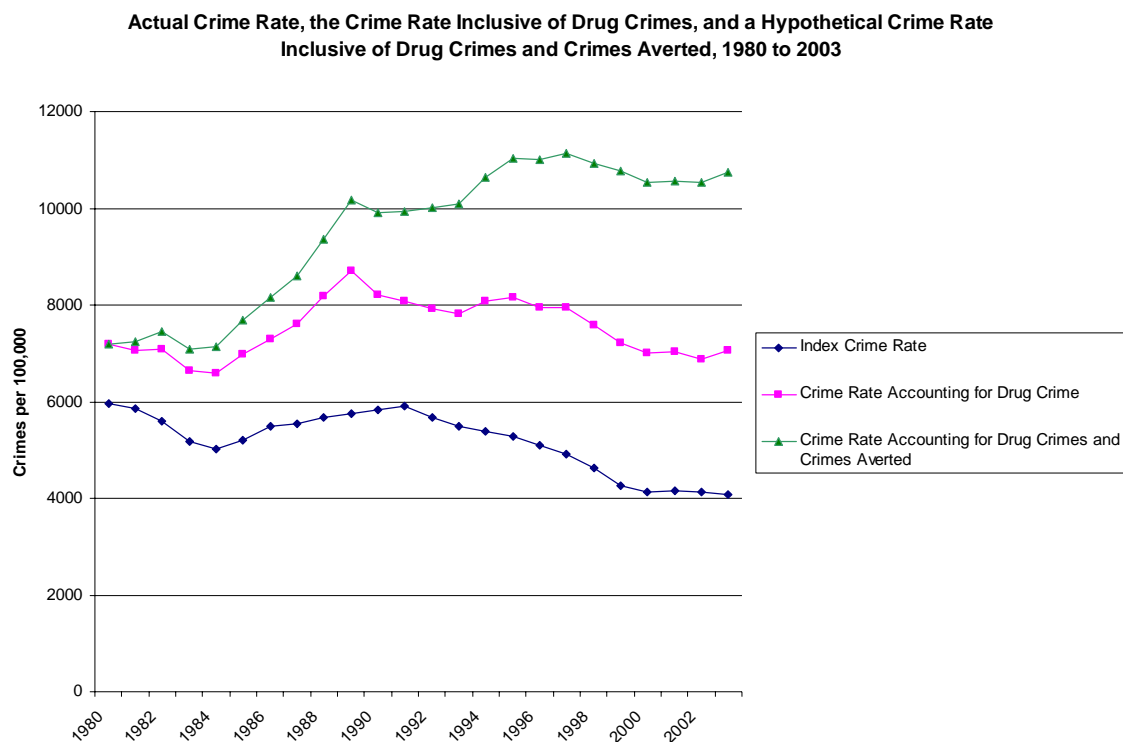
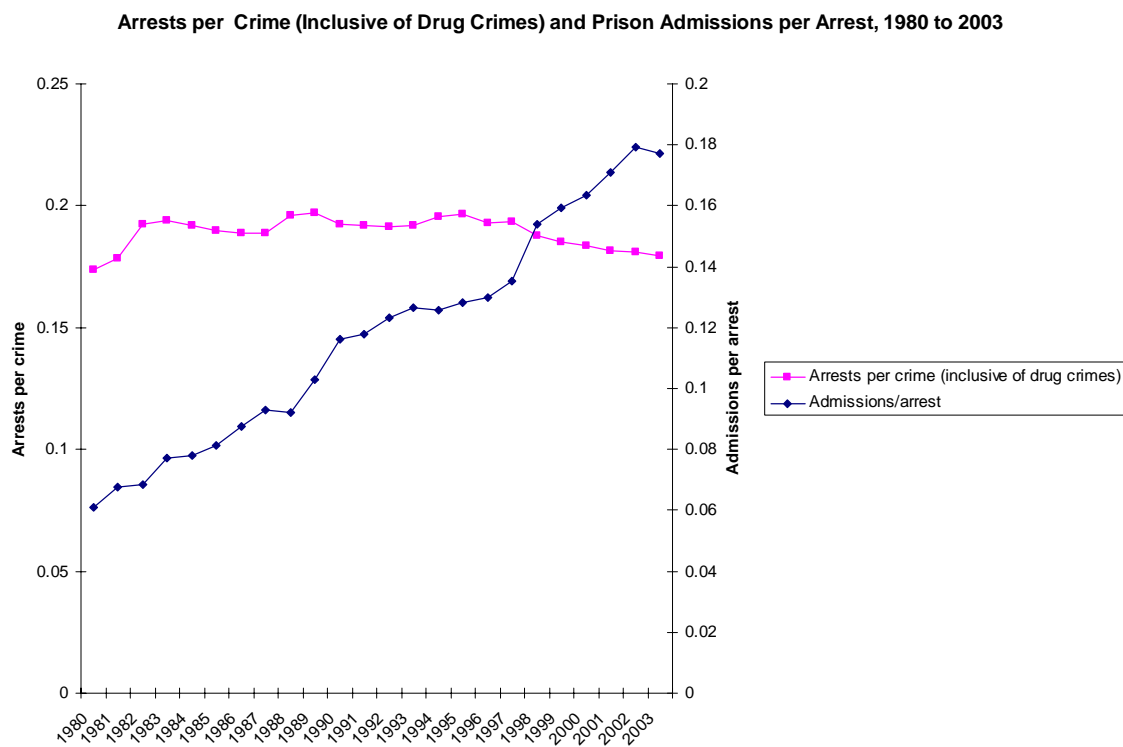
**Figure 17****Figure 18**

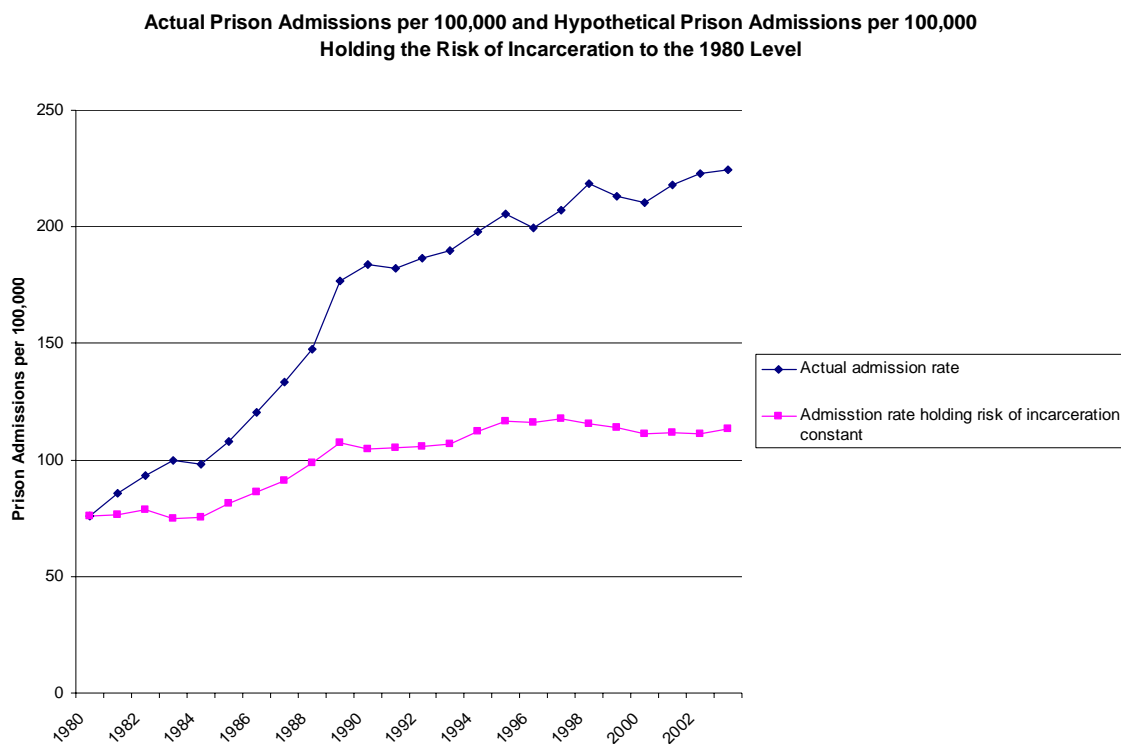
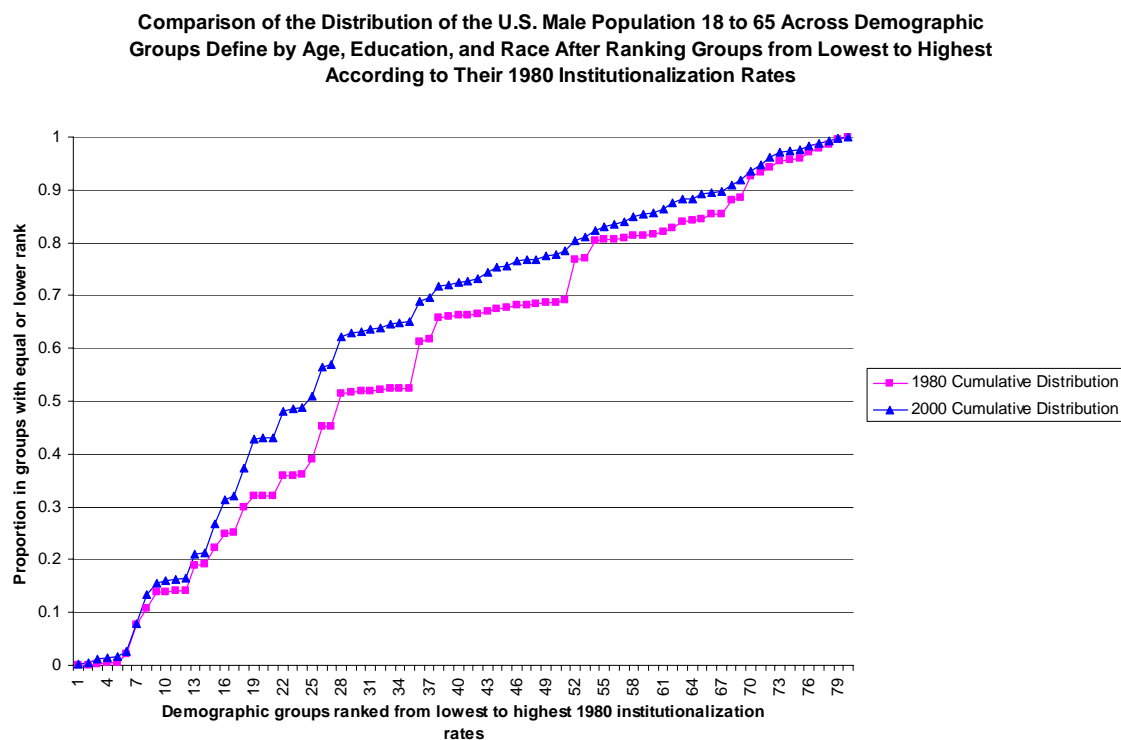
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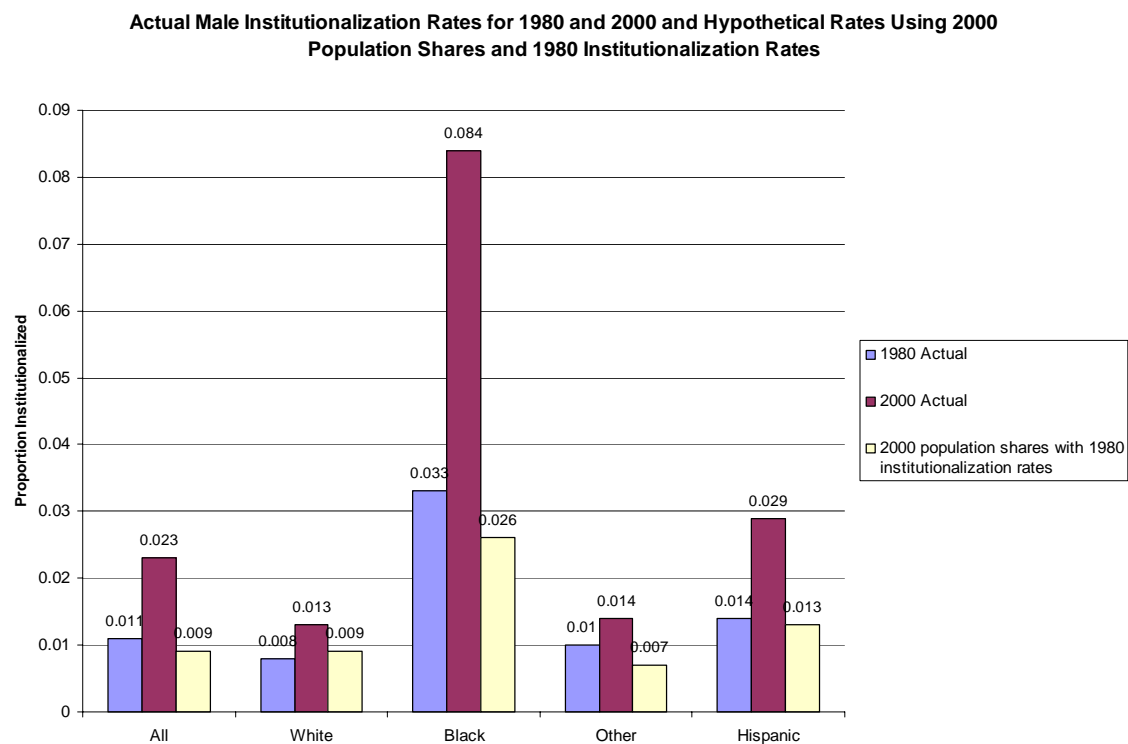
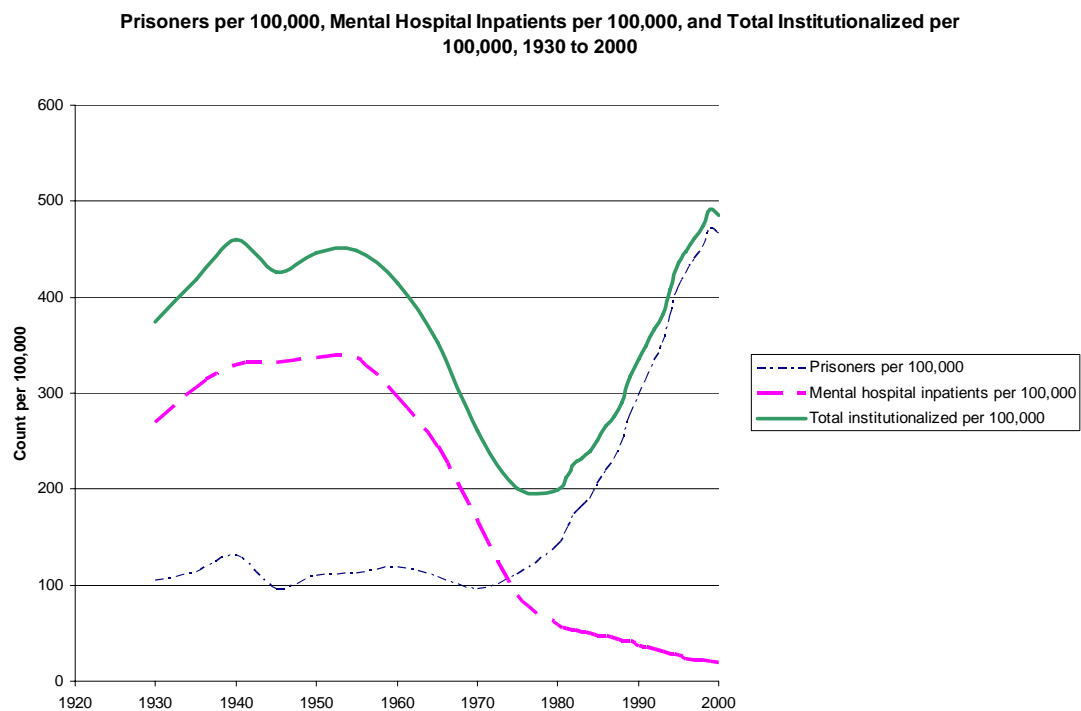
**Distribution of Maximum Sentences Assigning the Median Sentence For each of 70 Offense Categories Handled Down in 1984 to Each Admission in 1984 and Each Admission in 2002**

**Figure 20: Demonstrating the Bias to the Behavioral Component of the Decomposition of Admissions Rates Due to Crimes Averted**

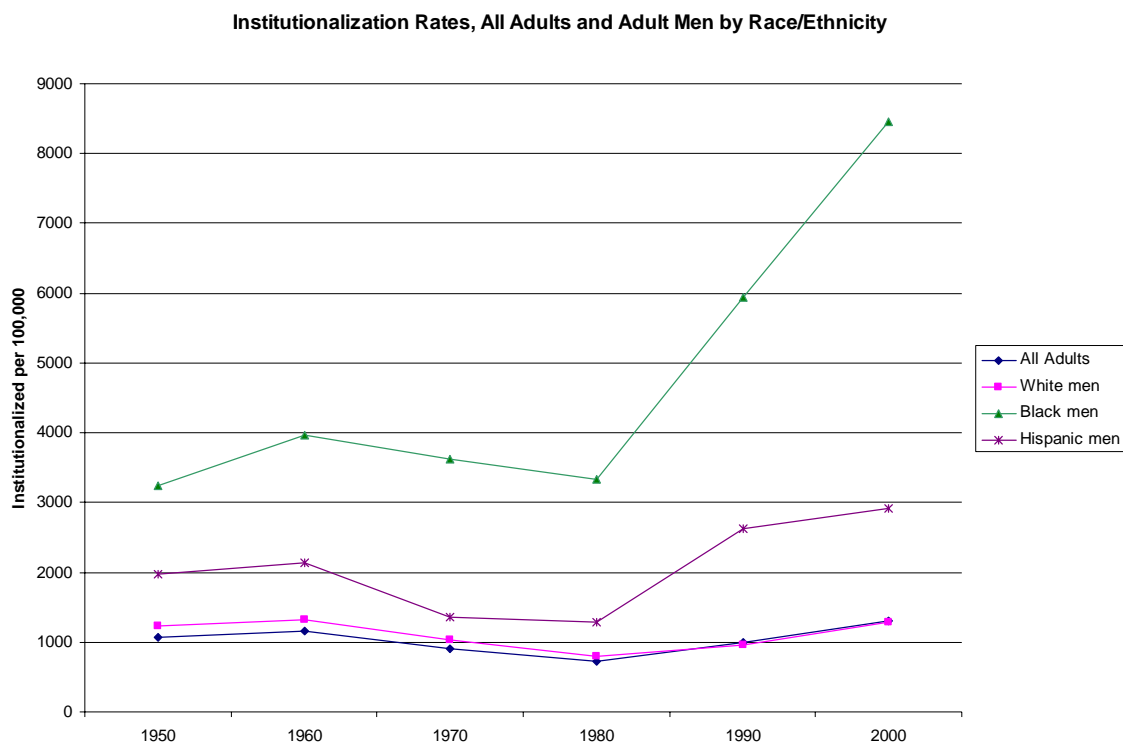
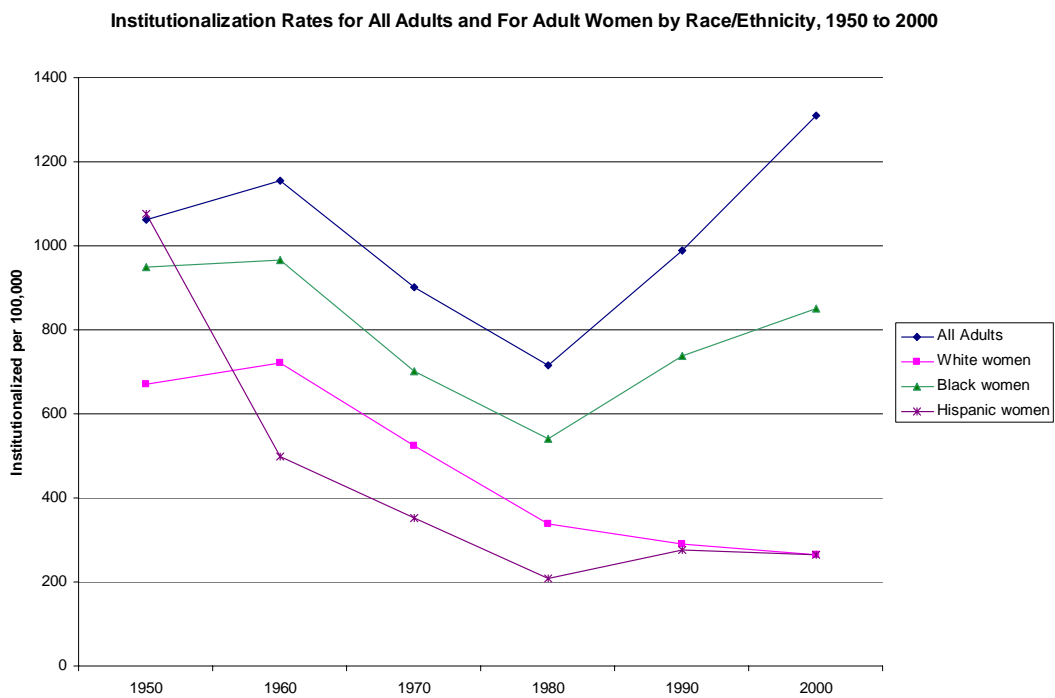
**Figure 21****Figure 22**

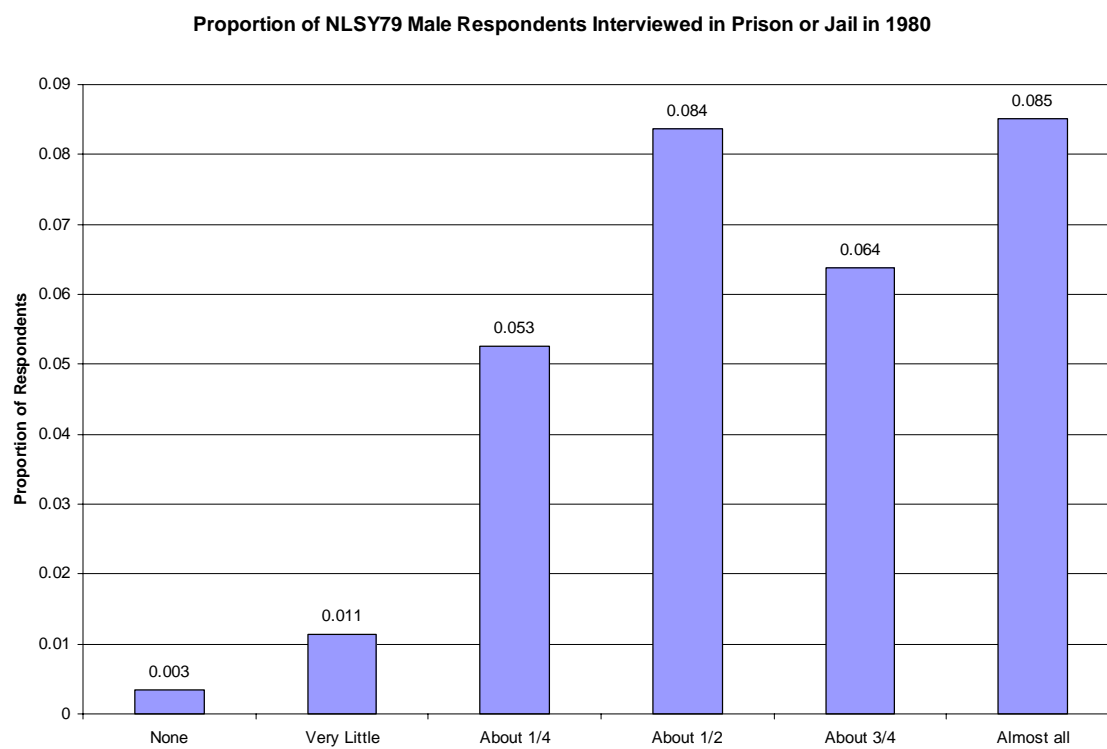
**Figure 23****Figure 24**

**Figure 25****Figure 26**

**Figure 27****Figure 28**



**Figure 29****Figure 30**

**Figure 31**

**Table 1**  
**Distribution of Prison Admissions Across Admission type**

	<b>1984</b>	<b>1994</b>	<b>1998</b>
All Admissions	100%	100%	100%
New Commitments			
Murder	5	3	2
Rape	4	3	3
Robbery	12	6	5
Assault	5	4	5
Other Violent	2	1	1
Burglary	18	8	7
Larceny	13	8	8
Motor Vehicle Theft	1	1	1
Other Property	3	2	2
Drugs	8	20	21
Other	12	8	8
Parole Violators and all other prison admissions	19	35	36

Tabulated from the admissions files from the 1984, 1994, and 1998 National Corrections Reporting Program.

**Table 2**  
**Distribution of Time Served by Year of Admissions and Offense for New Commitments and Parolees Returned to Custody with a New Term**

	Time Served in Years					
	< 1	1 to 2	2 to 3	3 to 4	4 to 5	5 +
Murder						
1984	0.05	0.10	0.12	0.10	0.09	0.55
1994	0.04	0.07	0.07	0.07	0.05	0.71
1998	0.02	0.08	0.08	0.07	0.06	0.70
Rape						
1984	0.05	0.20	0.21	0.16	0.14	0.24
1994	0.06	0.15	0.13	0.11	0.08	0.47
1998	0.04	0.13	0.13	0.10	0.09	0.51
Robbery						
1984	0.06	0.21	0.21	0.17	0.10	0.25
1994	0.13	0.21	0.16	0.12	0.08	0.29
1998	0.06	0.19	0.16	0.12	0.10	0.37
Assault						
1984	0.17	0.33	0.23	0.11	0.06	0.10
1994	0.18	0.32	0.16	0.10	0.06	0.17
1998	0.16	0.28	0.17	0.09	0.06	0.24
Other Violent						
1984	0.15	0.29	0.20	0.11	0.08	0.15
1994	0.15	0.27	0.15	0.10	0.06	0.27
1998	0.15	0.25	0.17	0.09	0.06	0.27
Burglary						
1984	0.15	0.37	0.23	0.12	0.06	0.09
1994	0.19	0.35	0.17	0.09	0.05	0.15
1998	0.16	0.33	0.18	0.09	0.05	0.18
Larceny						
1984	0.28	0.44	0.16	0.06	0.03	0.03
1994	0.30	0.39	0.13	0.05	0.03	0.10
1998	0.28	0.37	0.13	0.05	0.03	0.13
Motor Vehicle Theft						
1984	0.18	0.56	0.17	0.05	0.02	0.02
1994	0.22	0.49	0.18	0.06	0.02	0.04
1998	0.21	0.41	0.18	0.08	0.03	0.09
Other Property						
1984	0.29	0.40	0.15	0.07	0.04	0.05
1994	0.30	0.39	0.13	0.06	0.02	0.11
1998	0.26	0.35	0.12	0.05	0.02	0.18
Drugs						
1984	0.19	0.44	0.21	0.09	0.03	0.04
1994	0.24	0.40	0.17	0.08	0.04	0.07
1998	0.20	0.35	0.18	0.08	0.04	0.15
Other						
1984	0.34	0.29	0.10	0.04	0.02	0.22
1994	0.34	0.38	0.12	0.05	0.03	0.09
1998	0.26	0.35	0.15	0.06	0.04	0.14

Tabulated from the National Corrections Reporting Program Files from 1984 through 1988 and 1994 through 2002.

**Table 3**  
**Average Time Served in Years by Year of Entry, Type of Admission, and Offense**

	<b>1984</b>	<b>1994</b>	<b>1998</b>
All Admissions	2.64	2.47	2.73
New Commitments			
Murder	7.86	9.78	9.64
Rape	3.61	5.92	6.29
Robbery	3.79	3.91	4.51
Assault	2.43	2.94	3.39
Other Violent	2.79	4.05	4.12
Burglary	2.41	2.69	2.94
Larceny	1.74	2.34	2.57
Motor Vehicle Theft	1.72	1.85	2.22
Other Property	1.84	2.35	2.96
Drugs	1.97	2.07	2.50
Other	3.53	2.10	2.69
Parole Violators and all other prison admissions	1.54	1.87	1.71

Expected values are calculated from offense specific time-served distributions estimated from various years of the NCRP. For 1984 and 1994, the proportion of admissions released is tabulated for nine one-year periods following admissions. To calculate an expected value, we assume offenders released within one year serve 0.5 years, offenders released within two years serve 1.5 years, and so on. For admission serving more than nine years, we assume an average time served of 15 years for murder and 12 years for all other offenses. For 1998, the average time served for those serving five or more years is set equal to the comparable values for 1994.

**Table 4**  
**Average Time Served in Years by Year of Admission and Implied Release**  
**Probabilities, Actual and Holding Time-Served Distributions to Those for 1984**

	1984	1998
Overall expected time served	2.64	2.73
Expected time served using 1984 time-served distributions and 1998 offense distribution	-	2.26
Implied release rate, actual <sup>a</sup>	0.38	0.37
Implied release rate using 1984 duration distributions <sub>a</sub>	-	0.44

Based on tabulated time-served distributions from various years of the NCRP series.

a. Release rates are calculated by taking the reciprocal of the expected value of time served.

**Table 5**  
**Actual Incarceration Rates, Implied Equilibrium Incarceration Rates, and**  
**Simulated Incarceration Rates Allowing the Release Rate to Increase with**  
**Admissions for 1984 and 1998**

	1984	1998	Change
Actual incarceration rate	170	422	252
Equilibrium incarceration rate <sup>a</sup>	190	454	264
Equilibrium incarceration rate using actual flow rates for 1984 and a 21 % higher release rate for 1998	190	377	187

Incarceration rates are expressed per 100,000 residents. Rates pertain to the 26 states from the NCRP with the needed data to estimate time-served distributions.

a. Equilibrium rates calculated by taking the ratio of the admission rate to the sum of the admissions and release rates and then multiplying by 100,000.

**Table 6**  
**Actual Incarceration Rates, Implied Equilibrium Incarceration Rates, and**  
**Simulated Incarceration Rates Varying the 2003 Release and Admissions**  
**Probabilities to Reflect Changes in Time-Served and Criminal Behavior**

	1980	2003	Change
Actual incarceration rate	131	445	314
Equilibrium incarceration rate <sup>a</sup>	144	464	320
Equilibrium incarceration rate using actual flow rates for 1980 and a 21 % higher release rate for 2003	144	384	240
Equilibrium incarceration rate using actual flow rates for 1980, a 21% higher release rate in 2003, and a 2003 admission rate equal to 113 per 100,000	144	196	52

Incarceration rates are expressed per 100,000 residents.

a. Equilibrium rates calculated by taking the ratio of the admission rate to the sum of the admissions and release rates and then multiplying by 100,000.



**Table 7**  
**The Proportion of U.S. Male 18 to 65 Institutionalized by Race/Ethnicity, Age, and Education, 1980 and 2000**

	Non-Hispanic							
	White		Black		Other		Hispanic	
	1980	2000	1980	2000	1980	2000	1980	2000
All	0.008	0.013	0.033	0.084	0.010	0.014	0.014	0.029
Age								
18 to 25	0.010	0.017	0.045	0.107	0.014	0.018	0.018	0.033
26 to 30	0.009	0.016	0.050	0.121	0.011	0.022	0.015	0.033
31 to 40	0.007	0.017	0.033	0.106	0.009	0.014	0.015	0.033
41 to 50	0.006	0.011	0.016	0.062	0.004	0.011	0.009	0.024
51 to 65	0.008	0.007	0.017	0.029	0.008	0.006	0.007	0.013
Education								
HS dropout	0.019	0.040	0.047	0.185	0.020	0.041	0.019	0.035
HS Grad	0.006	0.017	0.027	0.081	0.013	0.020	0.010	0.034
Some Coll.	0.004	0.008	0.023	0.047	0.005	0.010	0.009	0.019
Coll. Grad.	0.002	0.003	0.008	0.015	0.002	0.002	0.004	0.008

Tabulated from the 1980 and 2000 5 Percent Public Use Microdata Samples from U.S. Census of Housing and Population.

**Table 8**  
**Distribution of Institution and Non-Institutional Populations Across Age Groups, Race/Ethnicity Groups, and Gender, 1950 through 1980**

	1950			1960			1970			1980		
	Mental hospital	Prison & jails	Non-Institut.	Mental hospital	Prison & jails	Non-Institut.	Mental hospital	Prison & jails	Non-Institut.	Mental hospital	Prison & jails	Non-Institut.
Age groups	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
<10	0.85	0.84	19.51	0.43	0.03	22.03	0.57	0.15	18.48	0.73	0.04	14.77
10 to 17	1.06	11.10	11.51	1.66	2.85	14.21	3.59	3.43	16.18	6.26	2.23	13.69
18 to 25	5.31	27.54	12.13	5.03	30.01	9.86	9.09	39.67	12.76	14.63	43.15	14.80
26 to 30	6.32	17.28	8.19	4.30	16.38	6.13	6.13	16.67	6.43	9.18	21.66	8.41
31 to 35	8.02	12.88	7.54	5.94	13.76	6.73	5.75	11.24	5.50	9.02	12.90	7.41
36 to 40	8.40	8.69	7.45	7.36	11.86	6.90	6.50	9.15	5.51	6.91	7.65	5.97
41 to 45	8.34	7.23	6.53	8.32	8.39	6.39	8.04	6.69	5.85	6.95	4.60	5.06
46 to 50	11.16	5.24	6.08	9.52	6.40	5.89	8.02	5.34	5.90	5.81	2.67	4.91
51 to 55	11.69	4.08	5.20	10.11	4.78	5.28	9.00	3.29	5.28	7.76	2.41	5.20
56 to 64	18.54	3.25	7.75	18.61	4.50	7.71	18.33	3.35	8.11	12.52	1.63	8.54
65+	20.30	1.88	8.10	28.72	1.03	8.88	24.99	1.03	10.00	20.24	1.06	11.24
Race/Ethnicity	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
White	87.62	62.20	87.99	85.03	58.86	86.63	82.80	54.67	85.52	79.40	47.14	81.50
Black	10.52	33.40	9.90	12.73	35.57	10.47	15.45	40.29	11.03	17.15	42.65	11.65
Other	0.43	1.26	0.43	1.00	1.87	0.89	0.93	1.82	1.18	1.95	5.14	3.41
Hispanic	1.43	3.14	1.68	1.24	3.69	2.01	0.82	3.23	2.27	1.50	5.07	3.45
Gender	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Male	52.55	90.79	49.60	53.23	95.10	49.01	55.95	94.84	48.45	60.79	94.10	48.37
Female	47.45	9.21	50.40	46.77	4.90	50.99	44.05	5.16	51.55	39.21	5.90	51.63
Population Estimate (000)	621	315	151,274	698	356	178,247	440	341	202,257	246	461	226,024

Tabulates from the 1950, 1960, 1970 and 1980 1% Public Use Micro Data Samples from the U.S. Decennial Censuses of Population and Housing.

**Table 9**  
**Assessing the Maximum Possible Contribution of Deinstitutionalization to Growth in Prison and Jail Incarceration Between 1980 and 2000**

	Mental hospital inpatients per 100,000, 1980	Change in institutionalization per 1000,000, 1980 to 2000 <sup>a</sup>	Maximum possible proportional contribution of deinstitutionalization <sup>b</sup>	Actual absolute change in population institutionalized, 1980 to 2000	Absolute contribution of deinstitutionalization with trans-institutionalization rate of 1 <sup>c</sup>	Absolute contribution of deinstitutionalization with trans-institutionalization rate of .5 <sup>c</sup>
Men						
White	157	479	0.33	328,326	107,207	53,604
Black	323	5,120	0.06	584,251	36,836	18,418
Other	148	68	1.00	47,738	47,738	23,869
Hispanic	83	1,631	0.05	294,197	14,958	7,479
Women						
White	91	-73	0.00	-33,066	0	0
Black	134	311	0.43	48,786	21,000	10,500
Other	25	15	1.00	7,816	7,816	3,908
Hispanic	51	57	0.89	22,692	20,147	10,073
Total	-	-	-	1,300,740	255,702	127,851

a. Figures provide the change in the total institutionalization rate between 1980 and 2000.

b. Maximum proportion contribution is set to 1 when the change in institutionalization rate exceeds the 1980 mental hospital inpatient rate.

c. Tabulations assume that complete deinstitutionalization between 1980 and 2000.

**Table 10**  
**Estimates of the Effect of Changes in Earnings Opportunities on Male Incarceration Rates (Jail and Prison Incarceration Combined)**

	$\Delta \ln$ wage offers, 1979 to 1998 <sup>a</sup>	Predicted effect of wages on percent incarcerated $(\Delta \hat{Inc}_{ij})^b$	Actual change in incarceration observe in the census <sup>c</sup>	Proportion of increase attributable to change in $\ln(\text{wages})$
<b>White men</b>				
< High school	-0.26	0.006	0.021	0.28
High school	-0.14	0.003	0.011	0.28
Some college	-0.04	0.001	0.004	0.21
College plus	0.13	-0.003	0.001	-2.95
All White men	-	0.001 <sup>d</sup>	0.005	0.23
<b>Black men</b>				
< High school	-0.24	0.005	0.138	0.04
High school	-0.11	0.002	0.053	0.05
Some college	-0.04	0.001	0.024	0.04
College plus	0.04	-0.001	0.007	-0.12
All Black men	-	0.002 <sup>d</sup>	0.051	0.04
<b>Hispanic men</b>				
< High school	-0.24	0.005	0.016	0.34
High school	-0.11	0.002	0.024	0.10
Some college	-0.04	0.001	0.010	0.09
College plus	0.04	-0.001	0.004	-0.21
All Hispanic men	-	0.003 <sup>d</sup>	0.015	0.21
<b>Other men</b>				
< High school	-0.24	0.005	0.021	0.26
High school	-0.11	0.002	0.007	0.34
Some college	-0.04	0.001	0.005	0.18
College plus	0.04	-0.001	0.000	0.00
All Other men	-	0.001 <sup>d</sup>	0.004	0.33

a. Figures in this column are estimates of changes in wage opportunity costs accounting for labor market dropouts presented in Juhn (2003). We assume that the changes in wage offers by education for black men apply to these other two race/ethnicity groups.

b. The predicted effect of changes in wages on incarceration is calculated by multiplying the likelihood of being sent to prison conditional on engaging in criminal activity (we assume .06), the magnification factor (1.5), the effect of a change in  $\ln$  wages on criminal participation (estimate of -.25 from Grogger 1988), the actual change in the natural log of wages, and -1.

c. Based on figures reported in Table 7.

d. The change in incarceration figure in these cells is the sum across education groups of the product of the proportion of males in the group of the given education level multiplied by the predicted change in incarceration for the race-education group.

**Table 11**  
**Estimated Marginal Effects of Variation in the State-Level Crack Index on Prison Admissions per 100,000 State Residents Based on State-Level Panel Data Covering the Period 1985 through 2000**

	Total Admissions Rates	New Commitment Rate	Returns to Custody per 100,000
No state or year effects	11.83 (2.59)	6.22 (1.59)	7.63 (1.79)
State effects only	14.71 (2.40)	10.49 (1.51)	4.65 (1.35)
State and year fixed effects	-6.24 (2.32)	-0.57 (1.62)	-7.81 (1.38)

Standard errors are in parentheses. Figures in the table are the coefficient on the crack index taken from Fryer et. al. (2005).