Male Incarceration, the Marriage Market and Female Outcomes *

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Abstract

This paper studies how rising male incarceration has affected women, through its effect on the marriage market. Variation in the marriage market shocks caused by incarceration is isolated using two facts: the tendency of people to marry within marriage markets defined by the interaction of race, location and age; and the fact that increases in incarceration have been very different across these three characteristics. We find strong evidence that women have been affected by rising incarceration precisely as the standard marriage market model would imply. Higher male imprisonment has lowered the likelihood that women marry, reduced the quality of their spouses when they do, and caused a shift in the gains from marriage away from women and towards men. We find that women increase schooling and labor supply in response to these changes, but this investment has been insufficient to prevent an increase in female poverty.

Preliminary and Incomplete.

1 Introduction

Whether measured in totals, or as a percentage of the population, more adults are incarcerated in the United States than in all but a few countries in the world.[1] The desire to punish criminals and lower crime has led to a more than threefold increase in the incarcerated population over the past forty years, and there is little evidence of any slowdown in this trend.[2] But rising levels on incarceration may have important social ramifications quite separate from any effect on crime. This paper is interested in a particular incarceration "externality": how rising incarceration levels, by changing the number of men in the marriage market, affects women's marital outcomes, behavior and wellbeing.

The theoretical basis for the effects we study is the marriage market model, first outlined by Becker in a series of seminal papers (see Becker (1973), (1974), (1981) and (1982)). Since most prisoners are male, rising incarceration lowers the number of men relative to women in society. The most obvious marriage-related effect of increased imprisonment should be to lower the likelihood that women marry, simply because there are fewer men as potential husbands to go around. Less obviously, a reduction in the number of men should shift the distribution of the gains from marriage away from wives and towards husbands, and should make women more likely to marry men whose marital advances they would have previously rejected. These effects tend to lower female incomes and economic well being. Women confronting high male incarceration rates might thus be expected to make investments which augment their earnings power and economic independence.[3]

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[1]The Bureau of Justice Statistics reports that there were more than 2.1 million Americans held in jails or prisons in 2003. This reflects a total rate of incarceration of about 715 Americans per 100,000: a rate of more than 1,300 per 100,000 for men, and one of about 113 per 100,000 women. These rates are higher than all comparable rates in all OECD countries. See *Society at a Glance: OECD Indicators*, 2001.

[2]Several factors account for this increase, but most commentators think that the "War on Drugs" of the late 1980s, and changes since 1970 in sentencing guidelines are the two main reasons for the growth.

[3]This paper is interested in the effect of male incarceration on women's outcomes. The standard model does make some predictions about how un-incarcerated men should be affected, but these are

Has the trend of increased incarceration produced the effects outlined above? There is some evidence that it may have; for example, rising incarceration levels have coincided with a nationwide reduction in marriage. However, there are several reasons to be dubious that these, or other, correlations in aggregate trends represent causal relationships. We might think, for example, that incarceration could not have caused nationwide marriage reductions because imprisoned men are the kinds of men women would be loath to marry had they *not* been in prison or jail. Moreover, secular increases in male incarceration occurred at the same time as important changes in social norms about sex roles, family forms and other social arrangements which likely had independent effects on women's choices. Without some way of controlling for the effect of these confounding factors, correlations in aggregate national trends tell us little, if anything, about incarceration's causal effects.

This paper exploits the fact that the overwhelming majority of marriages occur between women and men in sharply distinct markets, defined by the interaction of race, age, and geographic region. Because the trend increase in incarceration has varied tremendously over these three categories, rising incarceration has lowered the relative presence of men by very different amounts in different marriage markets. Our research strategy uses this variation to identify the effects of interest. Importantly, since most of the variation used in the paper is within marriage markets over time, the estimates should not be contaminated by the effect of unmeasured, fixed factors correlated with race, state, or age. On the whole, we find that, indeed, rising male incarceration seems to have produced effects on women's outcomes and behaviors strongly consistent with the predictions of the marriage market model. In addition, we show that rising levels of male incarceration have redounded to the material detriment of young women, despite investments women appear to have made to deal with the negative marriage market changes.

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not nearly as sharp as the predictions for women. At the end of our main analysis, we present and discuss some results for men.

Our work directly extends two different literatures. The first is the literature on the effects of incarceration policy. Not surprisingly, most research on incarceration has focused on the connection between prison populations and crime (Levitt and Kuziemko (2001), Levitt (1996), and Marvell and Moody (1994)).[4] But much of the controversy about rising prison levels has actually not centered on whether the policy has been effective at lowering crime. Rather, critics have raised questions about the severity of sentencing, especially for non-violent drug offenses, the alleged inequities of sentencing along racial and class lines, and the notion that incarceration may negatively affect the communities from which prisoners come.[5] There has, however, been little in the way of formal analysis on these claims. Determining the magnitude and nature of incarceration's effect on the marriage market, presumably one of the mechanisms by which the communities in question are affected, is this paper's main task.

The paper also extends the literature that studies the connection between the number of men relative to women in a market, and marriage outcomes. Identifying exogenous variation in composition of the marriage market is a challenge faced by all of these studies. Many empirical researchers, including Guttentag and Secord (1983), Cox (1940), Freiden (1974) have used cross sectional variation to estimate the relationship between the presence of men relative to women in a given area, and the incidence of female marriage. Other work, using essentially the same identification strategy, examines the link between sex ratios and female labor supply (see Chiappori, Fortin and Lacroix (2001), South and Trent (1988) and South and Lloyd (1992). Unfortunately,

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[4]Incarceration is thought to lower crime by two mechanisms: an "incapacitation effect", whereby crime is lowered because criminals are removed from society; and a "deterrence effect", whereby the threat of imprisonment dissuades would-be criminals from engaging in criminal activity in the first place.

[5]For example, the organization The Drug Policy Alliance, argues in its literature that incarceration policy has had a disproportionately devastating impact on minority families. (See http://www.drugpolicy.org/communities/race). No rule determining imprisonment has generated more controversy than the mandatory sentencing drugs laws of New York State, known as the Rockerfeller Laws. In recent years, criminal justice experts, judges and prisoners' rights groups, a former "Drug Czar" (Gen. Barry McCaffrey), and former supporters like former State Senator John Dunne have called for the repeal or reform of these laws on the grounds that the prison sentences they mandate are unjust and disproportionate to the crimes. (See *New York Times Editorial*, May 12, 2002.)

the results from all of these papers may be compromised by the fact that, in the cross section, there may be reverse causality between marriage market outcomes and the makeup of the marriage market in a particular place.

Angrist (2002) studies the effect of changes in sex ratios following the massive immigration into the United States in the early decades of the 20th century. Since new arrivals were disproportionately male, this immigration wave generally increased sex ratios, and did so differentially for different ethnic groups. Instead of the typical identification strategy in the literature of using point in time differences across location in the relative presence of men, Angrist's analysis exploits differences across ethnic groups in the change over time in the sex ratio. This approach almost certainly improves upon the approaches employed in earlier work. However, immigration into a marriage market, even if that immigration followed the passage of laws whose timing was essentially random, necessarily means that there was systematic sorting into the market. Immigrants *voluntarily* migrated into the U.S., and to particular markets within it. Although it seems reasonable that this migration hinged mainly on a desire to earn higher incomes, considerations about marital preferences and possibilities may have also played some role in the decision. For example, ethnic men who placed a relatively high value of marriage and family were presumably less eager to migrate to a foreign country with relatively few available brides.

Our analysis focuses on an ongoing and controversial policy, about whose social effects there is independent interest. Although imprisonment is a marriage market shock that may be subject to some of the same endogeneity concerns as voluntary migration, the fact that we are able to characterize marriage markets finely by race, age, and state of birth, and control for the confounding effects of these three factors, makes it likely that the effects we estimate are indeed the causal effects of incarceration. In extensions, we assess how sensitive the results are to the addition of various controls for the levels crime in the particular market. If they are indeed robust, it is more likely that the estimated effects are indeed the result of the men being removed from the market

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because of incarceration, and not merely the "criminality" of those men. Finally, we study a full set of marriage market outcomes, including the effect of incarceration on marital sorting, and the connection between marriage market outcomes and schooling investment and employment. Estimated effects for these other outcomes which are also consistent with the predictions of the standard model serve to raise confidence in notion that incarceration indeed causally affects women through the marriage market channel.

The remainder of the paper is organized as follows. The next section offers a brief overview of the connection between the number of men in a marriage market and women's marriage market outcomes. Section 3 describes the data. It discusses how we characterize markets, summarizes changes in incarceration across those different markets, and graphically illustrates the basic identification strategy. Section 4 presents the main results. Section 5 presents extensions and robustness tests and Section 6 concludes.

2 Theoretical Overview

The standard marriage market model assumes that marriages are monogamous; that there is full information about the returns to marriage; and that utility is determined by consumption of a perfectly divisible, household-produced good.[6] Output is produced by a technology that uses the talents - or "quality" - of the adults in the household as inputs. Although output is jointly produced in a household, it is divided between the spouses. This insight highlights the fact that, within a marriage, husbands and wives compete over marriage rents. Debates over who will wash dishes, whose entertainment choices will be honored and the like are all subsumed in this idea of the within-marriage competition between spouses. Utility is assumed to be strictly increasing in the fraction of the gains from marriage the person can command. One can think of a person's share of these gains as the "price" their partner pays to induce them to marry at all, or to

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[6]The main papers from which this analysis borrows are Becker ((1973) , (1974), (1981) and (1992)).

not marry a different person.

People of a given sex compete in the marriage market by offering different prices to potential spouses. There are, of course, a huge number of possible pairwise combinations in a marriage market. Fortunately, we know that any sorting that is an equilibrium must satisfy two conditions. First, identical people must receive the same income in equilibrium. Second, any equilibrium sorting arrangement must maximize total societal output. If either of these conditions is violated for a particular sorting arrangement, then there is an alternative arrangement under which at least one person in the marriage market could be strictly better, with no else any worse off, meaning that the original sorting could not have been an equilibrium.

Using these two conditions, it is easy to describe the effect of a change in the number of men in the market. Consider first the case where there are no differences in quality among either men or women. Suppose that unmarried men and women receive income of 0, and that married output is strictly positive so that there are always gains from marriage. When the total number of men equals the total number of men, each person marries and receives more income than they would if single. Now, suppose that some men are removed from the marriage market, so that women outnumber men in total. The optimal sorting is now for all men to marry, and for some women to remain single. Each single woman receives income of 0. And, because receiving anything more would cause her to underbid in a competitive market, each *married* woman also receives income of exactly 0. Men therefore receive all of the gains from marriage.[7] When there is no difference in quality among men and women, a reduction in the number of men relative to women lowers women's marital probabilities, lowers female incomes, and ensures that the gains from marriage are redistributed away from women and towards men.

The results are much the same if there are quality differences among men and

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[7]The situation is reversed if there are more women than men in the market. In that case, some men remain married, receive income of 0, with the rest of marital output going to women.

women. Suppose that men in the marriage market are of either "high" or "low" quality - $j = H, L$ for men, and $k = H, L$ for women.[8] Let Y_{jk} be the output from a marriage between a type j man and a type k woman, and let the incomes of unmarried men and women be g_m^j and g_f^k, respectively. That there are always gains from marriage implies that $Y_{jk} > g_m^j + g_f^k$ for all j and k. It is standard to assume that male and female quality are complements in the production of output, meaning that whatever the quality of one spouse, output is higher the larger the quality of the other spouse. Complementary implies that increasing both male and female quality raises household output by a larger amount than the sum of separate increases in male and female quality, or

$$Y_{HH} - Y_{HL} > Y_{LH} - Y_{LL} \tag{1}$$

Given (1), the requirement that any equilibrium sorting maximize total societal output implies that optimal sorting in the marriage market will demonstrate positive assortative mating.[9] That is, in equilibrium:[10] as many HH marriages form as possible; redundant high quality persons after these matches are formed marry low quality persons of the other sex; as many LL marriages form as possible from among remaining low quality persons; and, finally, some low quality persons from whichever sex has the larger total number of people remain unmarried.

A reduction in the number of men raises the likelihood that women outnumber men in total, and thus lowers the probability of marriage for women overall, just as in the case where there are no quality differences. This reduced marriage probability is not felt evenly by all women; because high quality women are the most desired women, they are the least likely to end up unmarried. Since male scarcity raises the odds that each man ends up with a woman he most prefers, low quality women are displaced

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[8]The expression "quality" stands for anything that constitutes attractiveness, and may represent different things for men and women.

[9]There will be negative assortative mating in the unlikely event that male and female quality are substitutes.

[10]Although this is written as though there were a temporal ordering to the matches, this set of outcomes will be simultaneously determined.

from any marriage they otherwise would have formed with high quality men and, if the total reduction in men is large enough, are even forced out of their marriages to low quality men. A reduction in the number of men therefore lowers the probability that a woman marries a "superior" man and/or raises the probability that she marries an "inferior one", conditional on her being married at all.

Fewer men in the marriage market should also affect the output that men and women receive in equilibrium. Since some low quality women are likely to be rendered unmarried by an increase in male scarcity, the income of all low quality women - whether they marry or not - should be forced down to g_f^L. Incomes, or the gains from marriage, should also fall for high quality women. If the reduction in the number of men is so large that even some high quality women remain unmarried, then competition forces the incomes of all high quality women down to g_f^H. If the reduction in the number of men is smaller, so that no high quality women remains unmarried, but some are forced to marry low quality men, incomes received by all high quality women will be lower because total output in LH marriages is lower than in the HH ones they would have previously formed. Finally, even if the reduction in the number of men is so small that all high quality women continue to marry high quality men, they must transfer more of the gains from marriage to those men in order to induce them away from marriages to low quality women who would now demand virtually none of the marriage gains to be married to them.

This discussion forms the foundation of the empirical work to follow. The standard marriage market model suggests that a reduction in the number of men resulting from increased incarceration should produce a diverse set of effects. Specifically, it should: (a) reduce the likelihood of marriage for women overall; (b) do so especially for the "lowest quality" women; (c) transfer marriage rents from women to men; and (d) raise the likelihood that, conditional on marrying at all, women form marriages with men of lower "quality" and/or lower the probability that they marry men of higher quality. All of these effects tend to lower women's incomes. Women faced with declining relative

number of potential husbands should thus (e) exhibit a greater propensity to make investments that raise their economic independence and cushion the negative effects of the marriage market changes. The analysis tests for all of these effects.

3 Marriage Markets and Incarceration Trends

The empirical work hinges on the notion that changes in incarceration over time have differentially affected different marriage markets. Our first task in this section is to summarize changes in incarceration by race, age and state over the past 30 years. Next, we show that men identified by race, age, and state of birth constitute distinct marriage markets, which is the key assumption underlying the empirical strategy.

3.1 Imprisonment over the Past 30 Years

The paper uses data from four Census IPUMS from 1970 to 2000. The 1970 and 1980 Censuses identify inmates in jails or prisons.[11] However, in 1990 and 2000, the Census indicates only whether a respondent is "institutionalized". We treat the young men characterized as "institutionalized" as being incarcerated. Several things justify this decision. For one thing, given the set of institutions used by the Census to define the "institutionalized" population, mental institutions are the only other kind of institutions in which young men could logically be located.[12] Work by Grob (2000) shows that the number of persons in mental institutions has plummeted in the past few decades, meaning that in later years, "institutionalized" effectively means "incarcerated".

Using the 1970 and 1980 data, we compute the fraction of people who would have been classified as institutionalized in those Census years according to the 1990 and

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[11] "Jails" in the United States are institutions which house individuals with incarceration terms a year or less. "Prisons" house persons with longer terms of imprisonment. We will not distinguish between these terms in the paper.

[12] In 1990 and 2000, institutionalized persons are in: jails and prisons, mental institutions, institutions for the elderly handicapped and poor, nursing and convalescent homes, homes for neglected/depend children, other institutions for children, deaf/blind schools, schools for "feeble minded", sanataria, poor houses and almshouses, poor farm/workhouses, homes for unmarried mothers, widows and single women, and detention homes.

2000 definitions, but who were actually in jails or prisons in 1970 and 1980. We find that for the men in the sample, in these early years when mental institution populations were much higher, more than three-quarters who would have been classified as "institutionalized" were in fact inmates, as expected.[13] Finally, the patterns of incarceration from the definitions we use line up in the aggregate nearly perfectly with data on the incarcerated population from the Bureau of Justice Statistics.

We study men aged 20-35, splitting them throughout the analysis into younger (20-27) and older (28-35) groups. Census respondents report not only their age, but also their race and state of birth. We focus on three race categories: Whites, Blacks, and non-Black, non-White Hispanics. For each state of birth, we compute the proportion of men of a given race and age group who are incarcerated in a given Census year. Later, we discuss the choice of state of birth rather than state of residence. Figure 1 graphically summarizes these numbers, which are depicted in Appendix Table 1.

The middle line in each graph shows the mean, across all states of birth, of the incarceration rate of men on the type indicated in the graph heading. The top line in each figure shows the 90th percentile of the distribution of incarceration rates across states. The bottom line shows the 10th percentile of the same distribution. These figures, which are all drawn with the same scale, reveal several interesting facts. First, for all races and age groups, incarceration rates have risen dramatically over the last 30 years, and especially over the past twenty years.[14] Nor have these increase been due only to trends in high-incarceration states; the graphs show the essentially the same pattern for the 90th and 10th percentile as well as the mean.

Second, the figures show that there has been tremendous variation across race in both the level and rate of growth in incarceration. This difference is most pronounced between Whites and the two racial minority groups. For example, while around 2

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[13]For younger men aged 20-27, the proportion was 78% in 1970 and 1980; for men aged 28-35, the proportions was 68% in the two years.

[14]These trends are consistent with all other evidence about changes in the inmate population. See, for example, U.S. Department of Justice, 2003.

percent of young White men aged 20-27 were incarcerated in 2000, the corresponding numbers for young Hispanics and Black men were 10 and 18 percent, respectively. Differences across races in the growth rate in the incarceration rate between 1970 and 2000 are equally striking. Most notably, the incarceration rates of blacks aged 20-27 from the highest incarceration states reached nearly thirty percent by 2000. For no other group was the rate nearly as high.

Third, the figures show that the time series pattern of incarceration has not been uniform across all states, and has differed across age groups for persons of the same race. The gap between high and low incarceration states changed sharply, and differentially, by race and age group between the 1970-2000 interval. For example, incarceration rates for black men aged 20-27 from states with high and low incarceration rates converged sharply between 1970 and 1980, and widened from 1990 to 2000. Among Hispanics by contrast, while there was a widening in the incarceration experience over the last decade studied, rates in the two types of states increased by essentially the same percentage amounts between 1970 and 1980. The figures also show that the time series increase in incarceration was generally higher for men aged 28-35, with the trend for Blacks in this age group being especially explosive.

3.2 Marriage Markets: Who Marries Whom?

Do the men shown in Figure 1 belong to different marriage markets - distinct groups of men and women who tend to marry within the group? If so, the patterns depicted in the Figure 1 indicate that incarceration produced different shocks to these different markets - a fact which could be exploited to identify the effects of interest.

Table 1 summarizes sorting by race and age among married couples in the United States from 1970 to 2000.[15] The first panel shows the fraction of all women of a given race and age group who marry men of particular races. The results are striking: virtually all marriages occur between people of the same race. This is especially true for

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[15]We have examined sorting in other Census years and find patterns by age, race and state that are, if anything, stronger than those in these more recent years.

Black and White Americans. For these groups, well over ninety percent of marriages are within-race. The numbers are lower for Hispanics, probably because being "Hispanic" is partly an ethnic classification. However, even for this group within-race marriage is by far the most common outcome.

The second panel looks at marital sorting by age category. The table shows that, irrespective of race, women tend to marry men who are slightly older. For example, among wives aged 18-25 of all races, more than seventy percent are married to men aged 20-27. For wives aged 27-33, similarly high fractions are married to men aged 28-35.

These numbers indicate that men of a given race and narrow age range compete among themselves for slightly younger wives of the same race. Marriage markets also surely involve a spatial dimension. We know Census respondents' state of birth and state of residence, as of the survey. One problem with using state of residence to characterize a marriage market is that where a person chooses to live may be partly determined by local marriage market conditions. More importantly, because being a prisoner in a given state does not indicate that the person lived in and socially interacted in that state, using state of residence would systematically assign people to the wrong marriage market.[16] In particular, states with a large number of federal prisoners, who are drawn from all over the country, would tend disproportionately to be coded as having a large fraction of their men behind bars. For these reasons, we distinguish persons in the sample by their states of birth.[17] In fact, the assumption that sorting occurs by state of birth is borne out in the data, as sixty percent of all the wives we study, irrespective of race or age, marry men born in the same state.

In summary, in the analysis that follows a marriage market will consist of men and women of a specific race, born in a given state, and who are aged either 18-25 for

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[16]Prisoners in the state prison system will generally have committed their crimes in the state, but need not have lived there. In the federal system, which houses many persons serving drug related sentences, convicted persons may serve their sentences in any of the country's federal facilities.

[17]In robustness tests later in the paper, we present results using state of residence instead of state of birth.

women and 20-27 for men, or 26-33 for women and 28-35 for men.

3.3 Graphical Analysis

Before moving on to the formal regression analysis, we graphically illustrate the paper's identification strategy, and explore whether there is any first order evidence to support the notion that higher incarceration rates for the men within a particular marriage market affect the marriage market outcomes for women in that market.

In the data there are 3 races, 51 states of birth, and 2 age groups. For each of these 306 marriage markets (for example, the market for younger whites from Connecticut), we have observations from four census years. The paper argues that in markets with high rates of male incarceration, marriage outcomes should be worse for women. The concern is that high inmate populations and negative female marriage market outcomes may be related because of unmeasured factors. For example, it may be that states that incarcerate many young men at a point in time, or which, because of their sentencing guidelines, exhibit relatively high growth in incarceration over time, happen to be places with high welfare payments, strong women's rights movements, or other things that directly lower female marriage probabilities. Our empirical methodology examines variation within narrowly defined marriage markets defined above, so our estimates should not be contaminated by these unmeasured factors that vary at the level of the state. Much the same logic applies to concerns about factors that covary with race.

Figure 2 shows the logic of our preferred approach. In this expositional analysis, we use only observations from the beginning and end of the sample period - the 1970 and 2000 Censuses. We also focus only on the incidence of marriage within the particular marriage market, as this should be the first order marriage market effect on women of higher male incarceration. For each marriage market, panel A of the figure plots the incarceration rate of men (the number of men from that race/state/age cell who are incarcerated, divided by the total number of such men) against the proportion of the women in the market who report ever having been married, in the particular year.

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The figure also has a fitted regression line showing the connection between these two measures. The estimated relationship is strongly negative: each one percentage point increase in the incarceration rate is associated with a 2.4 percentage point reduction in the fraction of women in the marriage market who are ever married, with a t-statistic well in excess of 15. This estimated relationship is as the theoretical discussion suggests should be true.

The relationship in Panel A is estimated using variation marriage markets which differ in terms of race, states, age group and time. In all likelihood, systematic differences across various marriage markets may account for the correlation between the two variables depicted in the graph. In the second panel of the figure, we relate the change in the level of incarceration between 1970 and 2000 for a given marriage market to the change in ever married experience of the women in that market over the same time period. To the extent that there are unobserved differences across different race/state/age group marriage markets, these estimates should be purged of the effect of these factors.

As shown in the figure, the relationship remains strongly negative in the differenced estimates. The figure also shows a smaller estimated relationship: the estimated regression line now suggests that a 1 percentage point reduction in the incarceration rate for men within a marriage market lowers ever married probabilities for women in that market by 0.6 of a percentage point, with a standard error of 0.1. The relatively large change in the point estimates in going from the cross-sectional to the difference analysis indicates that there are indeed unobserved factors within particular markets for which it is crucial to control. In the analysis that follows, we study the full set of outcomes described above, and use regression analysis to control for systematic differences across markets by race, state and age group.

4 Regression Analysis

4.1 Marriage Realizations

The first set of results assess the effect of higher male incarceration rates on the probability that women marry, and whom they marry when they do. We assume that whether a woman i of race R, in state s, and in age group a, has ever been married as of year t is given by

$$y^i_{Rsat} = \beta_0 + \beta_1\, I_{Rsat} + \sigma_{Rsa} + \epsilon^i_{Rsat} \tag{2}$$

where y is a binary variable denoting the woman's ever married status; σ_{Rsa}, is a dummy variable representing which of the 306 race/age/state marriage markets the woman belongs to; β_0 and β_1 are coefficients, and ϵ^i_{Rsat} is a random error term. The term I_{Rsat} is the incarceration rate of the men in woman i's marriage market at time t. In (2), the effect of incarceration on whether a woman has ever been married is estimated off of changes over time *within* a woman's marriage market. In some specifications, we add year controls. When these are added to the model, the effect of incarceration is estimated of the *differential* variation in the incarceration rate in a market over time, relative to overall trends. This latter specification accounts for the effect of other variables which vary over time and have an effect on both incarceration and the outcome variable.

The second marriage realization studied is the sorting patterns of women and men who do marry. We use men's and women's levels of completed schooling as an indicator of their "quality". People are sorted into three education attainment categories: less than high school graduate; high school graduate; and a person with any college training. To assess sorting, we run two different models. One, which measures how high incarceration rates affect wives' propensity to "marry down", estimates a linear probability model in which the outcome is equal to one if a wife has greater schooling than her husband. The other model, which measures wives' propensity to "marry up" is also another linear probability model, in which the outcome is a dummy variable

which equals 1 if a wife has less schooling than her husband. In both sets of models, the regression specifications are precisely as in (1). If incarceration has the effect on sorting suggested by theory, the estimated effect of a higher incarceration rate should be negative in the "marry up" regressions, and/or be positive in the "marry down" regressions.

Table 2 presents the results for the regressions assessing the connection between the incarceration rate in a young woman's marriage market, and whether she reports ever having been married. The standard errors reported in this and other tables allow for arbitrary clustering across observations within a marriage market. In all models, the incarceration rate is also measured in integer form - 1 for one percent, 3.4 for three point four percent, etc. Column (I) shows the pairwise association between the two variables. The estimated relationship is negative and strongly statistical significant. However, as argued earlier, there is reason to be concerned that this estimate may be biased. The second column adds the 306 marriage market fixed effects, ensuring that all of the variation in within a marriage market over time. The point estimate is smaller than the simple estimate in the first column which uses not only time variation, but also variation across states, races and ages. The within-market estimate remains negative and strongly significant. The point estimate indicates that a one percentage point increase in incarceration in a market leads to a reduction of -0.025 percentage points in the likelihood that a young woman has ever married by the time she is observed. The standard deviation of the incarceration rate across the marriage markets is 2.8 percentage points, meaning that a one standard deviation increase in the rate of incarceration reduces the probability of a woman ever being married by 0.07, or about twelve percent of the mean.

Column (III) adds year controls to the model. The estimated effect remains negative and strongly significant and is slightly higher in absolute value. Because this specification accounts for the effects of effect of national level trends, estimating the effect of incarceration off how the changes in the incarceration rate in the market

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depart from that trend, this is arguably the preferred specification.

If high incarceration rates do indeed lower women's marriage probabilities, this effect should be most pronounced for the lowest quality women in the marriage market. As noted earlier, we index a woman's quality by her level of completed schooling. Column (VI) adds two terms to the specification with the marriage market effects and period controls: an indicator variable denoting that the woman has completed only a high school education or less, and the interaction between this variable and the incarceration rate. A larger negative effect of incarceration on low quality women implies that the interaction term should be strongly negative and significant. The results in column (VI) show that this prediction is strongly confirmed: higher incarceration rates lower marriage probabilities more for less educated women. The final column is an alternative specification to get at the same issue; this regression measures quality at the highest end of the schooling distribution, denoting "high quality" by whether a woman was at least a college graduate. The results from this specification show that incarceration has smaller effects on high quality women, as expected. On the whole, the results in Table 2 and the earlier graphical analysis both strongly suggest that higher incarceration rates indeed lowered women's probabilities of ever marrying.

Table 3 presents the linear probability estimates for marital sorting. The first four columns shows various models for the likelihood that woman marries "down"- that she has more schooling than her husband. The second four columns show the estimated effect of the incarceration rate on the likelihood that a woman marries a man with less schooling than she has.

On the whole, these results strongly support the notion that increases in male incarceration produce the effects on sorting discussed in Section 2. The raw correlation between the incarceration rate and the likelihood of marrying down is positive and strongly significant. When marriage market fixed effects are added, so that the variation is within a marriage market over time, the effect remains positive and strongly significant. The point estimate of 0.007 implies that a one standard deviation increase

in the incarceration rate of 2.8 percentage points raises the probability that a woman marries a man with less schooling by 0.0196 - an increase of about 10% relative to the mean "marry down" rate in the sample. The first three sets of results for the "marry up" show that higher male incarceration rates lower the likelihood that women marry men with more schooling. The preferred point estimate, from the specification in which marriage market fixed effects and time period are both controlled for, are negative and strongly significant. Indeed, these estimates suggest the marginal effect of higher incarceration is higher (in absolute value) for the "marrying up" probability than it is for the probability that the woman marries down.

More than any other set of results discussed, the theoretical discussion suggests that marital sorting may be especially sensitive not only to the overall incarceration rate of the men in the marriage market, but also to where in the distribution those men are drawn from. In the last set of results for both sets of linear probability models, we separately include the incarceration rate for each of three types of men in the marriage market, rather than the overall incarceration rate. These regressions include marriage market fixed effects and period controls. The results for both sets of regressions show that the rate for men with exactly a high school education is by far the most important in determining sorting patterns for women in a market. These men - who constitute the middle group of men in the tripartite classification - are the ones who women with the highest level of schooling are most likely to marry when they marry down, and are also the men who the lowest quality women are most likely to marry when they marry up. It is thus not surprising that it is how incarceration affects this group that most sensitively affects sorting patterns among married couples in the marriage market.

4.2 Behavioral Responses

The foregoing analysis shows that higher incarceration rates worsen women's marriage realizations, both in terms of whether they marry at all, and what types of men they marry when they do. How do women respond to these changes? As marriage becomes

a less viable option, theory suggests that women should be more likely to engage in activities that raise their level of economic independence. We focus on two behaviors: a woman's decision to work in the labor market, and her schooling attainment.

Table 4 shows the results for these two behavioral responses. Labor supply is measured by an indicator denoting that the woman is working for pay. The table presents linear probability estimates for this measure for the entire sample of women, and for married and unmarried women separately. In the education attainment regressions, schooling is measured both as a continuous variable reflecting years of completed schooling, and as a binary measure indicating whether the woman has obtained any positive amount of college training. All of the regressions control for marriage market fixed effects and for time period controls.

The schooling regressions show that women in marriage markets with rising incarceration rates respond to these changes by increasing their educational attainment. The very strongly significant point estimate in the years of schooling suggests that a one standard deviation increase in the incarceration rate of 2.8 percentage points raises female educational attainment by slightly more than 0.33 years. A significant portion of this increased schooling comes in the form of some college training: a one standard deviation increase in the incarceration rate of young men raises the probability that the young women in the market attend college for at least one year by 0.14 percentage points.

This movement towards increased economic independence is also evident in women's labor supply response to higher incarceration rates. Increases in the number of men behind bars are associated with strongly statistically significant increases in the probability that a woman works for pay. Not surprisingly, the effect is strongly significant for single women. High incarceration rates mean that these women are less likely to marry, so working in the labor market is an economic necessity. Interestingly, the increased labor supply effect is especially large for married women. At first blush this effect might seem strange. Recall, however, that the marriage market model suggests

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that a reduction in the number of men available to marry should shift within-marriage rents away from women and towards men. Assuming married women remain principally responsible for home production, an increase in their labor market work means that they are shouldering more of a couple's "work" and are receiving less of the rents from marriage. These results are, on the whole quite supportive of the predictions of the theory.

4.3   Wellbeing

What is the overall effect of higher male incarceration rates on female welfare? On the one hand, we find evidence of a reduced probability of marrying at all, and an increased probability of marrying low quality men when marriage does occur. These effects should both lower female well being. On the other hand, we also find that women appear to invest in higher schooling and increase their labor supply in the face of higher incarceration, both of which should increase female material well being. Table 5 assesses the overall effect of these changes by focusing directly on a measure of female wellbeing - whether a woman lives in a poor household.

Column (I) presents linear probability estimates of the effect of the incarceration rate of the young men in a marriage market on whether a woman lives in a household below the official Census poverty line. This first regression is an estimate of the simple pairwise relationship between the variables and contains no other regression controls. The results show that the estimated relationship is positive and strongly statistically significant. The point estimate implies that a one standard deviation increase in the incarceration rate raises the likelihood of a woman living a poor household by 6 percentage points, a change of thirty percent relative to the mean.

This estimated effect is suspiciously large, and in all likelihood reflects the fact that marriage markets with high marriage rates tend to be markets in which women have higher poverty rates for other reasons. The next column shows the preferred estimates, in which we control for marriage market fixed effects and time period. As expected,

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this estimated effect of incarceration is reduced substantially, but remains strongly statistically significant. Thus, a one standard deviation increase in the incarceration rate raises the probability that a woman lives in a poor household by about 0.015 $(2.8 * 0.0053)$, or about seven percent relative to the mean poverty rate.

The third column adds a control for whether the woman has ever been married. The result shows that much of the positive effect of incarceration on higher poverty is in fact due to reduced marriage probability for the women in question. When the marital status is controlled for, the effect of incarceration is substantially reduced (although it remains positive) and is no longer statistically significant. In columns (IV) and (V), the regressions control in turn for women's educational attainment and labor supply. The estimated effect of incarceration in these regressions is larger than the summary estimate in (II), and is strongly significant in each case. If women had not reacted to declining numbers of men by raising their schooling attainment and by working more, these estimates suggest that their poverty rates would have been about twenty-five percent larger than the preferred summary estimate in column (II).

The final column controls simultaneously for marital status, schooling attainment, and labor supply. This regression asks how incarceration affected women's poverty, net of any effect of changes in marriage outcomes, and net of the two offsetting investments made by women. The point estimate of 0.0043 is smaller than the summary estimate in column (II), but is strongly statistically significant. Consistent with the prediction of the standard model, incarceration lowers the well being of women in the communities from which imprisoned men are drawn, principally by changing how they fare in the marriage market. Even the adjustments that women make to offset these effects are not large enough to override incarceration's negative effects.

5 Extensions

In this section, we conduct a series of extensions to the results shown in the previous section. Several possible tests come to mind. Perhaps the most obvious one has to do

with our argument that a reduction in the number of men *causes* the various effects for women documented above. One possible objection to this interpretation is that marriage markets experiencing high "social irresponsibility" would be characterized by both sharply rising imprisonment for men and falling marriage for women, with the two changes both caused by the fact that the community is socially dysfunctional. Any relationship between incarceration and marriage outcomes is, by this argument, purely spurious. It is not obvious how "social dysfunction" should be measured; any choice is open to debate and always measures, at most, one dimension of the nebulous entity we are after. We use the level of crime - both personal and property - in a given state as a measure of overall social dysfunction.[18] Adding these variables to the regressions should, to a substantial degree, purge the estimates of the confounding effect of any general effect of lawlessness, which would lead both to higher imprisonment for men and diminished interest in marriage for women.

The second extension has to do with the size of marriage markets. The earlier results do not control for the number women in the marriage market. One problem with this is that the estimated effect of incarceration rate may in fact be due to changes in cohort size. Men tend to marry younger women, so population growth or decline can have independent effects on women's marriage outcomes. For example, if there is population growth, women confront a situation where men of the sort they are likely to marry (i.e., older men) are scarce. If this growth coincides with rising incarceration, our analysis would incorrectly attribute all of the falling marriage to the increase in imprisonment, if population size were not controlled for. Controlling for marriage market size also accounts for any differential trends in large and small markets.

As discussed earlier, the main results define marriage markets by respondents' state of birth rather than state of residence because of concerns that the latter may be endogenously determined, and because incarcerated men in a given state may have lived

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[18]We get property and personal crime numbers for each state in each of the four Census years from the Bureau of Justice Statistics, http://www.ojp.usdo.gov/bjs.

in other states. Of course, it is simply impossible to know with perfect certainty what (spatial) marriage market men would have belonged to had they not been incarcerated. The final two extensions therefore do two things. First, we estimate the various models using the state of residence to define the marriage market. In these regressions, a marriage market is taken to be the men and women of a given age and race, *living* in a given state. The incarceration rate is the number of incarcerated men in the state divided by the male population of a given race and age in the state.

In addition, we estimate an alternative specification in which people and marriage markets are characterized by the Census "divisions" in which they are born.[19] Each of the nine division spans multiple states, and the overwhelming majority of persons live in a state in the Census division of their birth. One problem associated with using any measure of "state" as the spatial dimension of a marriage market is that some of race/age/state cells are small, especially for racial minorities. For example, there are very few blacks either born or living in Montana in the years in question. Using the Census division to characterize the marriage market ensures that estimated incarceration rates are very precisely estimated, even for the racial minorities, because of the large number of persons in every cell.

Table 6 presents the results for the various extensions outlined above. To conserve space, we report only the estimated coefficient and (robust) standard error on the incarceration rate term from each of the twenty regressions. The R-squared and other regression diagnostics are very similar in these specifications to the results shown earlier for each of the measures, so we do not report them in this table.[20] All of the regression control for marriage market fixed effects and period controls. For ease of comparison, the top row of the table reproduces the results from particular main specification shown

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[19]he nine Census Divisions are: (a) "New England" - CT, MA, ME, NH, RI, VT, (b) "Mid Atlantic" - NJ, NY, PA, (c) "East North Central" - IL, IN, MI, OH, (d) "West North Central" - IA, KS, MN, MO, ND, NE, SD, (e) "South Atlantic" - DC, DE, FL, GA, MD, NC, SC, VA, WV, (f) "East South Central" - AL, KY, MS, TN, (g) "West South Central" - AR, LA, OK, TX, (h) "Mountain" - AZ, CO, ID, MT, NM, NV, UT, WY, (i) "Pacific" - AK, CA, HI, OR, WA.

[20]The full regressions are available upon request.

in earlier sections.

The regressions in the second row of the table - the first extension - add controls for the level of crime in a state in a given year to the regressions in the previous section. Strikingly, the estimate effect of higher male incarceration rates is not only qualitative identical to the main results, but in most cases, except employment and poverty, controlling for local crime has no meaningful quantitative effect on the point estimate or implied marginal effect. For example, the results in Table 2 find a estimated effect of -0.0279 of higher incarceration on whether young woman has ever married. The comparable estimate from the main specification is a very strongly statistically significant -0.0245. A comparison of the other point estimates and significance levels show similarly tiny differences in the estimated effect between the main effect and the extension results. On the whole, the results suggest strongly that the negative relationship we find between incarceration and female marriage market outcomes is not at all attributable to some aspect of social dysfunction that might be responsible for the trend in both variables.

The third row investigates the importance of controlling for marriage market size. As with the crime controls, the results show that adding controls for the total number of men and women in the marriage market does not qualitatively change any of the paper's main conclusions: higher male incarceration rates lead to worse marriage outcomes for women, an increase in schooling and labor supply investment, and an overall increase in the incidence of poverty. If anything, controlling for the size of the population actually strengthens the results. Most of the point estimates are slightly larger than the main results once these controls are added. This makes intuitive sense. For the cohorts studied, population is growing over time, which tends to improve women's marriage prospects. Netting out this effect as the results in the third row do isolates a larger estimated effect of the incarceration rate.

The fourth row in the Table presents the results when the marriage market is defined relative to state of residence. Again, these point estimates are of the same sign

as the main results presented earlier. However, the estimated effects are, many cases, very different quantitatively from the main results, and are sometimes not statistically significant. The imprecision of some of the estimates is precisely what one would expect if, as we argue, being a prisoner in a state is often no indication of the state where the imprisoned man lived and socially interacted. It is reassuring that, despite its limitations, the "state of residence" results never contradict the main results in a statistically significant way.

The last row shows the results when marriage markets are defined in terms of a person's Census division of birth. Recall, a Census division spans many states, so under this definition each marriage market is much larger than with any of the other regressions. The estimates of the incarceration rate in the market is very precise for every cell. Also, this specification removes concerns about accurately identifying the spatial dimension of the marriage market in which a man interacts because most people live in the Census division in which they are born. The results show that the variation over time in the incarceration rate of men of a given race and age, and born in a given Census division, yields estimates effects on women's outcomes perfectly consistent with the main results and with the standard marriage market model. All of the estimated effects are strongly statistically significant. Note also that most of the point estimates are larger in absolute value than the main results. This is exactly what one would expect if, as we argue, the larger area over which marriage markets are being measured in this specification lowers measurement error on the incarceration rate and removes the associated attenuation bias in the regressions.

Although this paper is about women's outcomes and behaviors, what does the marriage market model say about the effect of higher male incarceration rates on un-incarcerated men? The naive view is that all the predicted effects for the outcomes studied should be opposite in sign to those for women. In fact, there are only two cases where this is unambiguously so. Firstly, if men do marry, they should marry women of higher quality the higher the incarceration rate. And, married men who marry should

unambiguously receive more of the gains from marriage when male incarceration rates are high. All of the other predictions for men are theoretically ambiguous.

One reason this is so has to with the very different way that men and women appear to regard marriage. For example, casual empiricism suggests that if men find themselves scarce they are unlikely to form marriages, even though the numerical advantage in their favor implies that they *could*. Rather, they are likely to do things like have multiple sexual partners, or engage in serial monogamy, and eschew formal marriage. As a result, whether unincarcerated men marry more of less when male incarceration rates are high is theoretically ambiguous. Also ambiguous is the effect incarceration on schooling and poverty. If men invest in schooling partly to make themselves attractive to potential spouses, diminished competition might lower the need for such actions and thus lower male schooling attainment. On the other hand, if men take advantage of the numerical advantage in their favor by not marrying, they forego some of the material gains from marriage, and have greater need to invest in schooling. By the same logic, the effect on male poverty is theoretically ambiguous as well.

Further contributing to the ambiguity is that, whereas one could plausibly argue that male incarceration affects women mainly through its effects on the marriage market, men in markets with growing incarceration may increase their schooling simply to prevent being imprisoned, with no consideration about marriage or the marriage market at all. Even more importantly, because incarceration does not draw evenly from the distribution of all men, higher male incarceration rates can *mechanically* affect many of the outcomes we study. For example, in markets with relatively higher rates of growth in incarceration, levels of schooling of the men left out of jail will tend to increase simply because less educated men are more likely to be in jail.

Before concluding, we nonetheless present some results for un-incarcerated men in Table 7. As before, the variation in these regressions comes from changes over time in the incarceration rate within specific race/state/age cells. The only outcome not

shown is that for sorting: whether wives have more education than their husbands. Since these regressions are run on precisely the same sample, and are simply the obverse of the results for women, we know that men who marry, are more likely to "marry up" when incarceration rates are high, confirming one of the two unambiguous predictions of the marriage market account.

The first column in the table shows the results for whether men report ever having been married. We find that higher rates of incarceration rates are associated with lower marriage probabilities for un-incarcerated men. Men appear to take advantage of being relatively scarce by putting off marriage. The second column presents results for schooling. Interestingly, we find evidence of increased schooling when incarceration is high. As argued earlier, this may have less to do marriage market considerations than with the tendency for higher incarceration to make this mechanically true. Unlike women, we find that higher incarceration rates are associated with lower labor supply for men. When the incarceration rate is interacted with a man's marital status, we find that virtually all of the effect of reduced labor supply is because of reductions for single men. Married men are no more or less likely to work when the incarceration rate is high. Note, this result, when this is combined with the earlier result that married *women* work more when incarceration rates are higher, lends credence to the earlier claim that the rents from marriage are shifted away from men and towards women when incarceration is high.

The final two columns in the table examine the effect of higher incarceration on male poverty. As with women, we view poverty as a summary indicator of wellbeing. The first result shows that, overall, men are more likely to be poor when the incarceration rate is high. However, when we control for the outcomes studied in the paper - marriage, schooling, and employment - the negative effect of incarceration on poverty vanishes. That is, although higher incarceration rates are associated with lower marriage for men, and with a tendency to lower labor supply, the fact that men invest in more schooling and marry "up" when incarceration rates are high completely offsets

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these negative effects. Although we do not present these results, we conduct all of the extensions for men that we do for women, and find that the results do not change substantially from those shown in Table 7. We caution that we do not view these results as testing the marriage market model, even when they are consistent with its predictions, because of the points discussed above. We present them because they may be of independent interest.

6 Conclusion

In this paper we study how women have been affected by rising male incarceration levels over the past 30 years. Our empirical strategy for breaking the possible endogenous relationship between marriage market outcomes and incarceration makes use of two facts. First, we show that the increase in incarceration has not been uniform across all types of men. Instead, there has been tremendous variation in rates of incarceration across men of different races, locations and ages, and also great variation within each of these categories. Second, we show that most marriages occur within relatively narrow marriage markets, defined by the interaction of race, age and location. Taken together, these two facts imply that different types of women have been exposed to dramatically different shocks to the relative presence of men in their respective marriage markets. We use these different shocks to identify the effects of interest.

Our results suggest that higher levels of male incarceration lower female marriage and increase the tendency for women to marry men of inferior quality when they do marry, precisely as implied by the standard marriage market model. We also show that women increase both their schooling and labor supply in the face of higher male incarceration, presumably as a rational reaction to the negative marriage market effects. The increase in labor supply occurs for both single and married women, indicating one mechanism by which rents from marriage are transferred from women to men. Finally, we find that the negative marriage market effects that women experience when men are made scarce by incarceration are not fully overcome by their investments in schooling

and market work: female poverty rises when marriage rates are high. A series of extensions to our basic specification show that the results are not driven by rising levels of "lawlessness" in the affected populations, nor to problems with correctly identifying the spatial dimension of marriage markets.

Our results identify an important externality of the policy of increased incarceration. Whether this policy is socially beneficial also depends, of course, on the degree to which imprisonment achieves it direct aim of lowering crime and punishing criminals, and the relative societal valuations of these ends. Our work has nothing to say about either of these things, but we argue that the results presented here should be a part of the debate about the societal wisdom of increased incarceration.

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Table 1. Marriage Markets: Fraction of Wives Marrying Husbands of Particular Races and Ages, from 1970 to 2000

Racial Sorting

Wife's Age	Wife's Race	Husband's Race				
		White	Black	Hispanic	Other	Total
18-25	White	95.9%	0.5%	2.5%	1.0%	100%
	Black	1.9%	96.2%	1.4%	0.5%	100%
	Hispanic	23.4%	2.5%	72.4%	1.6%	100%
26-33	White	96.6%	0.5%	2.0%	0.9%	100%
	Black	1.7%	96.7%	1.0%	0.5%	100%
	Hispanic	28.9%	2.3%	66.9%	1.9%	100%

Age Sorting

Wife's Race	Wife's Age	Husband's Age				Total
		20-27	28-35	Other		
Whites	18-25	72.5%	22.6%	4.9%		100%
	26-33	11.4%	68.7%	20.0%		100%
Blacks	18-25	70.2%	23.9%	5.9%		100%
	26-33	12.0%	65.7%	22.3%		100%
Hispanics	18-25	72.5%	21.8%	5.7%		100%
	26-33	14.6%	66.6%	18.9%		100%

Data in this Table are from the four Decennial Censuses between 1970 and 2000. See text for additional details.

Table 2. Estimated Effect of Changes in Incarceration Rate of Men in Marriage Market on Whether Young Womas Has Ever Married

Mean of Dependent Variable =0.58
Standard Deviation of Dependent Var.=0.49

	(I)	(II)	(III)	(IV)	(V)
Regressors					
Incarceration Rate	-0.0304	-0.0252	-0.0279	-0.0172	-0.0284
	(0.0018)**	(0.0018)**	(0.0020)**	(0.0016)**	(0.0020)**
High School Ed or Less?				0.1293	
				(0.0028)**	
Incarceration * High School Ed or Less				-0.0153	
				(0.0007)**	
College and Above					-0.108
					(0.0030)**
Incarceration * College and Above					0.0096
					(0.0006)**
Marriage Market Fixed Effect:					
State of Birth * Age Group * Race	No	Yes	Yes	Yes	Yes
Census Year Controls	No	No	Yes	Yes	Yes
Constant	0.6452	0.6341	0.6543	0.5793	0.6704
	(0.0133)**	(0.0039)**	(0.0047)**	(0.0041)**	(0.0048)**
Observations	4248319	4248319	4248319	4248319	4248319
R-squared	0.03	0.22	0.24	0.25	0.25

Robust standard errors in brackets are clustered by marriage market. * significant at 5%; ** significant at 1%

The data in this Table are drawn from the 4 decennial Censuses from 1970 to 2000.

Table 3. Linear Probability Estimate of Effect of Marriage Market Male Incarceration Rate on Likelihood that Women Have More or Less Schooling Than Their Husbands. - "Marrying Up" and "Marrying Down" Respectively.
(Schooling Measured as High School Dropout; Exactly High School; and At Least 1 Year College)

Proportion of Wives Marrying Men with Less, Same or More Schooling: 18.9%, 52.4%, and 28.6% respectively

	Pr(Wife's Education > Husband's Education)				Pr(Wife's Education < Husband's Education)			
Overall Male Incarceration Rate	0.0085	0.0057	0.0069		-0.0084	-0.0202	-0.022	
	(0.0004)**	(0.0007)**	(0.0008)**		(0.0007)**	(0.0014)**	(0.0017)**	
Incarceration Rate of H.S. Dropouts				-0.0005				-0.0011
				(0.0005)				(0.0012)
incarceration rate of H. S. Grad				0.0097				-0.0219
				(0.0014)**				(0.0029)**
Incarceration Rate of College Trained				-0.0039				0.003
				(0.0022)				(0.004)
Marriage Market Fixed Effect:								
State of Birth * Age Group * Race	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Census Year Controls	No	No	Yes	Yes	No	No	Yes	Yes
Constant	0.1644	0.1689	0.1608	0.1614	0.2814	0.2999	0.3112	0.3146
	(0.0022)**	(0.0012)**	(0.0014)**	(0.0012)**	(0.0043)**	(0.0023)**	(0.0029)**	(0.0032)**
Observations	1930944	1930944	1930944	1930815	1930944	1930944	1930944	1930815
R-squared	0.0018	0.0041	0.0046	0.0049	0.0013	0.0046	0.0054	0.0070

Robust standard errors in brackets allow for arbitrary clustering across marriage markets. Data are from 1970-2000 Census IPUMS. See text for details.
** indicates statistical significance at the 1% level. * indicates significance at the 1% level.

Table 4. Effect of Incarceration Rate in Marriage Market on Women's Educational Attainment and Labor Supply

	Educational Attainment		Labor Supply: Currently Work for Pay		
	Completed Yrs. Schooling	At Least 1 Yr. College	All Women	Unmarried Women	Married Women
Mean of Dep. Var.	*12.91*	*0.47*	*0.64*	*0.67*	*0.61*
Std. Dev. Of Dep. Var.	*2.16*	*0.5*	*0.48*	*0.47*	*0.49*
	(I)	**(II)**	**(III)**	**(IV)**	**(V)**
Incarceration Rate	0.1294	0.0305	0.0144	0.0081	0.0272
	(0.0099)**	(0.0021)**	(0.0012)**	(0.0010)**	(0.0021)**
Marriage Market Fixed Effect: State of Birth * Age Group * Race	Yes	Yes	Yes	Yes	Yes
Census Year Controls	Yes	Yes	Yes	Yes	Yes
Constant	12.5699	0.3912	0.5945	0.6487	0.5333
	(0.0248)**	(0.0048)**	(0.0031)**	(0.0035)**	(0.0041)**
Observations	4248319	4248319	4248616	2267917	1980402
R-squared	0.06	0.04	0.02	0.05	0.02

Robust standard errors in brackets allow for arbitrary clustering across marriage markets.

Data are from 1970-2000 Census IPUMS. See text for details.

** indicates statistical significance at the 1% level.

Table 5. Linear Probability Estimates of Effect of Incarceration Rate on Women's Likelihood of Living in Poverty.

Mean of Dependent Variable: 0.1839

Standard Deviation: 0.3874

Incarceration Rate	0.0204	0.0053	0.0007	0.0076	0.0078	0.0043
	(0.0011)**	(0.0008)**	(0.0005)	(0.0009)**	(0.0008)**	(0.0006)**
Married?			-0.1912			-0.2091
			(0.0040)**			(0.0032)**
Employed?					-0.1739	-0.1835
					(0.0032)**	(0.0019)**
Exactly 12 Yrs. Schooling				-0.1244		-0.0747
				(0.0040)**		(0.0040)**
More than 12 Yrs Schooling				-0.1313		-0.0752
				(0.0064)**		(0.0061)**
Marriage Market Fixed Effect:						
State of Birth * Age Group * Race	No	Yes	Yes	Yes	Yes	Yes
Census Year Controls	No	Yes	Yes	Yes	Yes	Yes
Constant	0.14	0.1687	0.2701	0.2723	0.2721	0.4495
	(0.0020)**	(0.0025)**	(0.0021)**	(0.0046)**	(0.0036)**	(0.0054)**
Observations	4248319	4248319	4248319	4248319	4248319	4248319
R-squared	0.02	0.05	0.1	0.07	0.1	0.17

Robust standard errors in brackets account for arbitrary clustering within marriage markets.

The excluded education category is less than a high school graduate.

* significant at 5%; ** significant at 1%

Table 6. Effect of Male Incarceration Rate on Women's Outcomes from Regressions Identical to Those in Earlier Tables, Except for Extension Indicated.
All Regression Control for Marriage Market Fixed Effects and Time Period Controls.
Table Reports Point Estimates and Robust Standard Errors.

	Ever Married	Sorting		Education		Employed	Poor
		Wife's Ed.>Husband's	Wife's Ed.<Husband's	Yrs. Of School	Some College		
Main Results from Earlier Tables	*-0.0279*	*0.0069*	*-0.022*	*0.1294*	*0.0305*	*0.0144*	*0.0053*
	*(0.0020)****	*(0.0008)****	*(0.0017)****	*(0.0099)****	*(0.0021)****	*(0.0012)****	*(0.0008)****
Extension							
Control for violent crime/100000	-0.0245	0.0059	-0.0184	0.1168	0.0258	0.0126	0.0044
Control for property crime/100000	(0.0024)**	(0.0010)**	(0.0019)**	(0.0124)**	(0.0026)**	(0.0010)**	(0.0009)**
Controls for Total No. of Men and	-0.028	0.0071	-0.0222	0.1294	0.0306	0.0142	0.0053
Women in Marriage Market	(0.0020)**	(0.0009)**	(0.0017)**	(0.0099)**	(0.0021)**	(0.0012)**	(0.0008)**
Marriage Market and Incarceration Rate	-0.1106	-0.0059	-0.0542	0.5222	0.0921	0.0252	0.0004
Measured by State of Residence	(0.0281)**	(0.0087)	(0.0265)*	(0.1335)**	(0.0329)**	(0.0122)*	-0.0089
Marriage Market and Incarceration Rate	-0.0324	0.0081	-0.0258	0.1536	0.0361	0.017	0.0058
Measured by Census Division of Birth	(0.0032)**	(0.0008)**	(0.0020)**	(0.0166)**	(0.0029)**	(0.0018)**	(0.0012)**
Sample	All Women	Married Women	Married Women	All Women	All Women	All Women	All Women

* significant at 5%; ** significant at 1%

Data are From 1970-2000 Censuses. See Text for Details.

Table 7. Effect of Male Incarceration Rate on Un-Incarcerated Men

	Ever Married?	Yrs. Of School	Any College	Employed?		Poor Household?	
				Outcome			
Incarceration Rate	-0.0277	0.0956	0.0162	-0.0085	-0.007	0.0026	0.0002
	(0.0020)**	(0.0104)**	(0.0013)**	(0.0014)**	(0.0012)**	(0.0006)**	-0.0006
Married?					0.1187		-0.0673
					(0.0024)**		(0.0013)**
Incarceration Rate * Married?					0.0077		
					(0.0005)**		
Employed?							-0.1934
							(0.0030)**
H.S. Graduate							-0.0711
							(0.0034)**
Any College							-0.0611
							(0.0046)**
Marriage Market Fixed Effect:							
State of Birth * Age Group * Race	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Census Year Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.6444	12.7955	0.4611	0.8582	0.7899	0.1157	0.3731
	(0.0045)**	(0.0253)**	(0.0030)**	(0.0035)**	(0.0028)**	(0.0020)**	(0.0052)**
Observations	4017423	4017423	4017423	4017423	4017423	4017423	4017423
R-squared	0.18	0.05	0.04	0.04	0.07	0.03	0.1

Robust standard errors in brackets

* significant at 5%; ** significant at 1%

Figure 1. Fraction of Men of Given Type, and Born in a Given State, Who are Incarcerated: Mean, 90th and 10th Percentile of Distribution Across All States of Birth
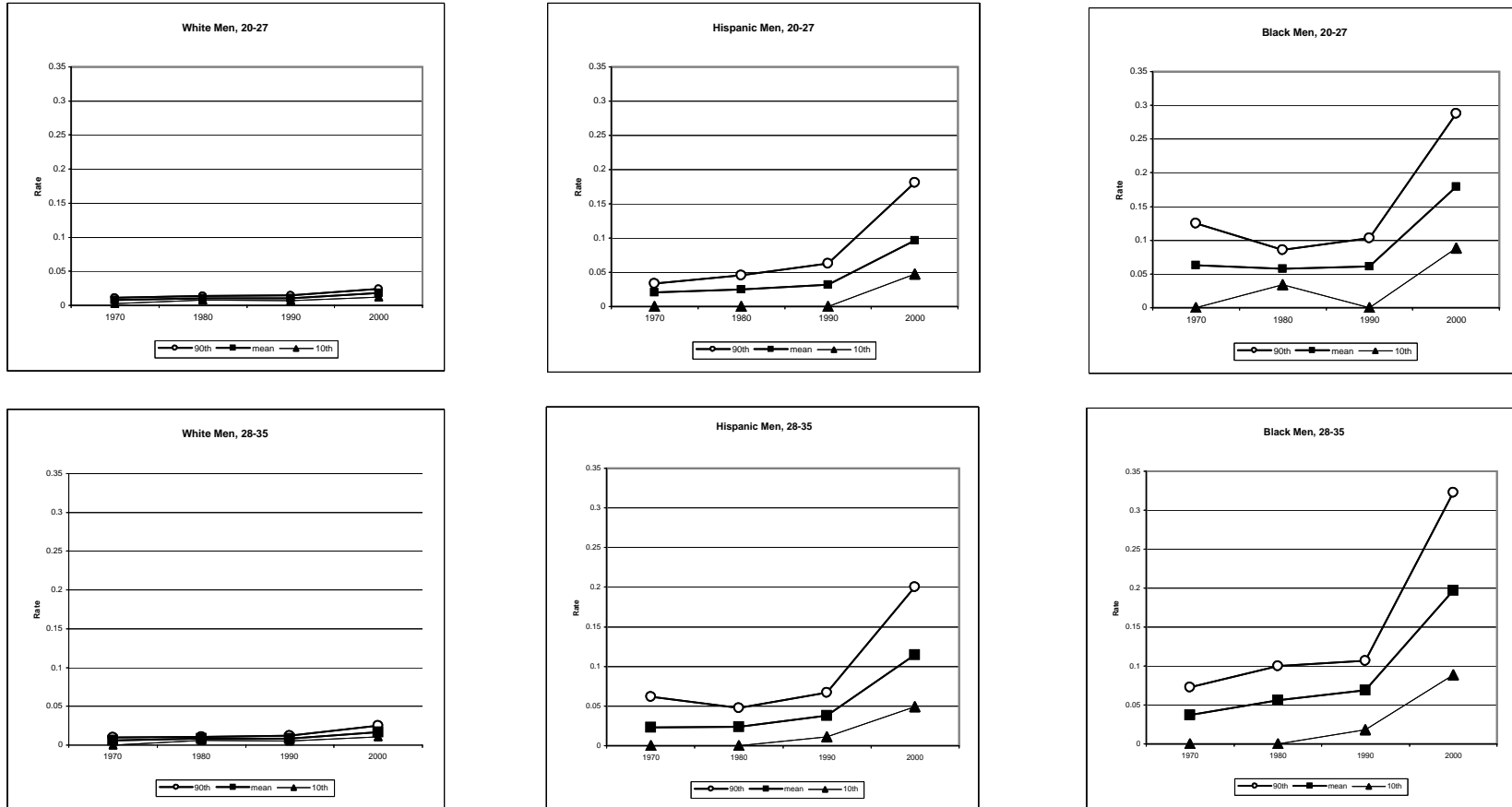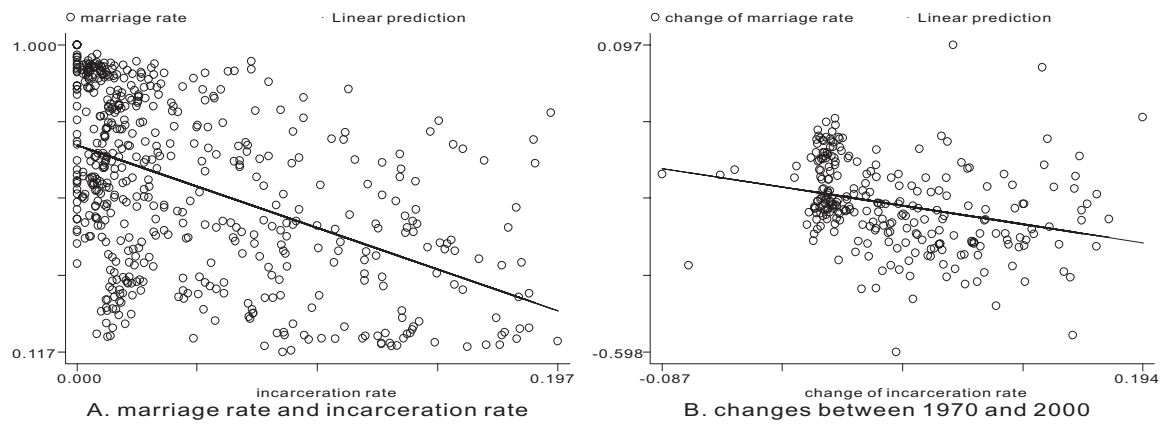
Figure 2: Marriage Rate and Incarceration Rate in 1970 and 2000

A. marriage rate and incarceration rate

B. changes between 1970 and 2000

Appendix Table 1. Iincarceration rate by state of birth, year and race, Men aged 20-35
All Men

	1970	1980	1990	2000
Alabama	1.3%	1.9%	2.0%	4.3%
Alaska	0.0%	1.6%	1.3%	4.0%
Arizona	1.1%	1.8%	1.9%	4.8%
Arkansas	1.1%	1.6%	1.6%	3.3%
California	1.6%	1.7%	1.7%	3.6%
Colorado	1.3%	1.2%	1.3%	3.0%
Connecticut	0.6%	1.0%	1.2%	3.0%
Delaware	1.1%	1.9%	1.6%	3.3%
District of Columbia	2.8%	2.7%	3.8%	4.6%
Florida	1.7%	2.5%	4.1%	5.3%
Georgia	1.7%	2.1%	2.9%	5.0%
Hawaii	0.7%	1.4%	1.7%	4.4%
Idaho	0.1%	1.0%	0.9%	1.9%
Illinois	0.9%	1.3%	1.2%	3.8%
Indiana	0.8%	1.3%	1.4%	2.6%
Iowa	0.4%	0.8%	0.8%	1.5%
Kansas	1.0%	1.0%	1.2%	2.1%
Kentucky	0.8%	1.2%	1.4%	2.8%
Louisiana	2.2%	2.2%	2.4%	5.4%
Maine	0.8%	1.1%	0.8%	1.9%
Maryland	2.1%	2.0%	2.1%	2.9%
Massachusetts	1.0%	0.9%	1.1%	1.9%
Michigan	1.0%	1.4%	1.2%	3.0%
Minnesota	0.8%	1.0%	0.4%	1.2%
Mississippi	1.7%	2.0%	2.2%	5.5%
Missouri	1.1%	1.4%	1.8%	2.3%
Montana	0.7%	0.8%	0.8%	2.8%
Nebraska	0.5%	0.8%	0.8%	1.7%
Nevada	1.2%	1.5%	2.2%	4.5%
New Hampshire	0.9%	1.1%	0.8%	2.5%
New Jersey	0.9%	1.1%	1.6%	3.8%
New Mexico	0.9%	1.5%	1.7%	3.5%
New York	1.0%	1.3%	1.6%	3.6%
North Carolina	1.4%	2.0%	1.9%	3.6%
North Dakota	0.2%	0.8%	0.6%	1.0%
Ohio	0.9%	1.2%	1.4%	2.6%
Oklahoma	1.3%	1.6%	2.0%	4.0%
Oregon	1.2%	1.2%	1.4%	2.5%
Pennsylvania	0.5%	1.1%	1.1%	2.7%
Rhode Island	1.0%	0.9%	1.0%	1.2%
South Carolina	2.0%	2.3%	3.0%	4.3%
South Dakota	0.6%	1.0%	0.7%	1.7%
Tennessee	1.2%	1.6%	1.8%	4.4%
Texas	1.5%	1.9%	2.1%	4.8%
Utah	0.6%	0.8%	0.8%	1.9%
Vermont	0.6%	0.9%	0.8%	1.4%
Virginia	2.0%	1.8%	1.9%	2.9%
Washington	1.0%	1.5%	1.2%	2.6%
West Virginia	1.2%	1.1%	0.9%	2.0%
Wisconsin	0.8%	0.8%	0.7%	2.3%
Wyoming	0.8%	0.9%	1.0%	4.1%

Data are from Multiple Census Years. See text for details.

Appendix Table 1. Iincarceration rate by state of birth, year and race, Men aged 20-35

Blacks

	1970	1980	1990	2000
Alabama	2.6%	3.6%	4.5%	10.0%
Alaska	0.0%	8.3%	5.3%	26.6%
Arizona	4.5%	8.6%	11.4%	22.0%
Arkansas	1.8%	3.8%	4.7%	8.5%
California	7.5%	5.9%	6.5%	13.0%
Colorado	13.6%	3.8%	7.6%	17.1%
Connecticut	2.0%	4.7%	8.0%	16.4%
Delaware	0.0%	6.0%	6.8%	12.3%
District of Columbia	6.1%	5.1%	7.7%	7.5%
Florida	4.5%	5.9%	12.0%	13.5%
Georgia	3.2%	4.2%	6.5%	10.2%
Hawaii	0.0%	5.9%	9.1%	16.3%
Idaho	0.0%	12.5%	0.0%	25.0%
Illinois	5.2%	5.2%	5.5%	15.8%
Indiana	5.4%	6.4%	7.3%	13.1%
Iowa	0.0%	6.4%	11.0%	16.5%
Kansas	6.3%	5.5%	8.0%	11.6%
Kentucky	4.2%	4.6%	5.3%	13.7%
Louisiana	2.9%	4.3%	5.0%	11.5%
Maine	.	5.1%	3.1%	40.0%
Maryland	6.9%	6.1%	6.5%	9.2%
Massachusetts	1.5%	5.9%	7.1%	12.3%
Michigan	5.5%	6.0%	6.3%	12.2%
Minnesota	0.0%	6.5%	4.6%	23.4%
Mississippi	2.4%	3.4%	3.9%	9.4%
Missouri	4.5%	6.4%	8.2%	9.0%
Montana	0.0%	0.0%	8.3%	42.9%
Nebraska	0.0%	8.0%	6.3%	12.2%
Nevada	0.0%	11.9%	11.0%	17.0%
New Hampshire	0.0%	0.0%	0.0%	47.6%
New Jersey	6.0%	5.5%	8.9%	15.1%
New Mexico	0.0%	11.3%	4.0%	29.9%
New York	5.6%	6.7%	8.9%	14.9%
North Carolina	3.1%	4.4%	4.4%	9.1%
North Dakota	.	3.8%	0.0%	25.0%
Ohio	6.2%	5.3%	7.1%	11.9%
Oklahoma	4.2%	5.6%	10.0%	17.5%
Oregon	15.4%	4.6%	7.1%	17.6%
Pennsylvania	3.3%	5.2%	6.8%	18.0%
Rhode Island	10.0%	3.6%	8.4%	12.6%
South Carolina	3.1%	3.6%	5.6%	8.1%
South Dakota	.	7.7%	8.3%	22.2%
Tennessee	3.4%	4.1%	4.8%	13.0%
Texas	4.5%	5.5%	7.2%	14.0%
Utah	20.0%	5.0%	7.0%	25.9%
Vermont	0.0%	0.0%	0.0%	42.9%
Virginia	4.9%	4.5%	5.2%	8.5%
Washington	14.3%	13.1%	6.0%	17.9%
West Virginia	7.0%	4.7%	3.7%	15.1%
Wisconsin	18.8%	6.8%	9.2%	23.0%
Wyoming	33.3%	10.5%	4.5%	56.1%

Data are from Multiple Census Years. See text for details.

Appendix Table 1. Incarceration rate by state of birth, year and race, Men aged 20-35

| | Hispanics | | | |
	1970	1980	1990	2000
Alabama	1.9%	4.5%	6.1%	9.4%
Alaska	0.0%	0.0%	0.0%	10.2%
Arizona	2.1%	2.0%	2.7%	6.3%
Arkansas	2.1%	0.8%	2.7%	26.2%
California	2.7%	2.5%	2.3%	4.5%
Colorado	1.8%	1.9%	3.0%	5.3%
Connecticut	2.5%	3.0%	7.2%	8.4%
Delaware	2.8%	5.9%	2.5%	4.9%
District of Columbia	4.1%	0.7%	6.5%	6.8%
Florida	3.9%	1.9%	2.8%	5.4%
Georgia	3.2%	4.0%	2.7%	18.3%
Hawaii	1.6%	2.3%	2.9%	9.0%
Idaho	0.0%	0.9%	4.5%	7.7%
Illinois	2.0%	2.1%	2.4%	5.5%
Indiana	2.1%	1.5%	2.9%	6.1%
Iowa	2.2%	0.8%	1.4%	7.1%
Kansas	1.0%	1.9%	2.2%	5.6%
Kentucky	1.0%	0.0%	4.2%	10.9%
Louisiana	7.4%	1.7%	4.0%	12.8%
Maine	1.1%	0.0%	5.0%	27.8%
Maryland	5.3%	1.7%	3.8%	3.4%
Massachusetts	4.0%	2.7%	6.8%	9.9%
Michigan	2.8%	3.0%	2.0%	6.4%
Minnesota	2.1%	2.1%	2.0%	8.2%
Mississippi	1.6%	1.9%	3.0%	14.4%
Missouri	2.6%	2.9%	3.5%	6.0%
Montana	3.8%	6.0%	0.0%	26.2%
Nebraska	1.4%	2.6%	1.6%	13.1%
Nevada	0.0%	3.1%	1.9%	9.4%
New Hampshire	0.0%	0.0%	15.8%	15.6%
New Jersey	1.7%	3.1%	4.6%	7.2%
New Mexico	1.0%	2.1%	2.3%	4.2%
New York	2.7%	2.9%	4.9%	7.3%
North Carolina	1.2%	3.0%	3.1%	11.4%
North Dakota	2.3%	8.1%	2.9%	4.7%
Ohio	1.5%	3.6%	2.9%	7.5%
Oklahoma	3.5%	2.4%	3.1%	11.1%
Oregon	4.7%	4.1%	1.4%	9.4%
Pennsylvania	1.6%	1.8%	4.6%	13.3%
Rhode Island	5.1%	6.8%	4.0%	3.1%
South Carolina	2.8%	4.3%	3.2%	10.2%
South Dakota	0.0%	0.0%	3.0%	10.6%
Tennessee	1.4%	1.7%	2.5%	28.7%
Texas	2.0%	1.9%	2.3%	5.4%
Utah	1.1%	1.9%	4.6%	10.5%
Vermont	0.0%	0.0%	0.0%	11.1%
Virginia	2.6%	3.7%	3.3%	5.7%
Washington	2.4%	2.2%	1.4%	6.3%
West Virginia	2.0%	1.1%	3.4%	22.4%
Wisconsin	0.7%	2.5%	3.6%	11.1%
Wyoming	2.1%	2.7%	4.9%	17.1%

Data are from Multiple Census Years. See text for details.

Appendix Table 1. Iincarceration rate by state of birth, year and race, Men aged 20-35

Whites

	1970	1980	1990	2000
Alabama	0.6%	1.0%	0.9%	1.8%
Alaska	0.0%	1.4%	1.1%	2.7%
Arizona	0.4%	1.3%	1.1%	3.2%
Arkansas	0.8%	1.0%	0.8%	1.8%
California	1.2%	1.2%	1.1%	2.0%
Colorado	0.9%	1.0%	0.8%	1.9%
Connecticut	0.5%	0.8%	0.7%	1.3%
Delaware	1.0%	1.2%	0.7%	1.4%
District of Columbia	1.4%	1.3%	1.0%	1.6%
Florida	0.6%	1.5%	1.9%	2.7%
Georgia	0.8%	1.1%	1.4%	2.4%
Hawaii	0.5%	1.0%	1.2%	2.5%
Idaho	0.1%	0.9%	0.8%	1.5%
Illinois	0.5%	0.8%	0.6%	1.3%
Indiana	0.5%	1.0%	1.0%	1.8%
Iowa	0.3%	0.8%	0.7%	1.3%
Kansas	0.8%	0.8%	0.9%	1.4%
Kentucky	0.6%	1.0%	1.1%	1.9%
Louisiana	0.5%	1.1%	1.1%	2.0%
Maine	0.8%	1.1%	0.7%	1.4%
Maryland	0.8%	1.0%	1.1%	1.3%
Massachusetts	0.8%	0.8%	0.9%	1.2%
Michigan	0.6%	0.9%	0.7%	1.7%
Minnesota	0.7%	0.9%	0.4%	0.8%
Mississippi	1.2%	0.9%	0.9%	2.0%
Missouri	0.7%	0.9%	1.1%	1.5%
Montana	0.4%	0.7%	0.8%	2.0%
Nebraska	0.4%	0.7%	0.6%	1.1%
Nevada	1.4%	0.7%	1.5%	2.7%
New Hampshire	1.0%	1.1%	0.8%	2.0%
New Jersey	0.5%	0.7%	0.7%	1.2%
New Mexico	0.9%	0.8%	1.1%	1.5%
New York	0.5%	0.8%	0.7%	1.1%
North Carolina	0.9%	1.1%	1.1%	1.5%
North Dakota	0.1%	0.7%	0.6%	0.8%
Ohio	0.6%	0.8%	0.9%	1.6%
Oklahoma	0.9%	1.2%	1.3%	2.5%
Oregon	0.8%	1.1%	1.4%	1.9%
Pennsylvania	0.3%	0.7%	0.7%	1.2%
Rhode Island	0.6%	0.8%	0.8%	0.8%
South Carolina	1.1%	1.4%	1.5%	2.0%
South Dakota	0.6%	0.9%	0.6%	1.5%
Tennessee	0.9%	1.1%	1.2%	2.3%
Texas	0.9%	1.1%	1.1%	2.6%
Utah	0.5%	0.7%	0.6%	1.4%
Vermont	0.7%	0.9%	0.8%	1.2%
Virginia	1.1%	1.0%	1.0%	1.4%
Washington	0.8%	1.1%	1.1%	1.9%
West Virginia	0.9%	0.9%	0.8%	1.4%
Wisconsin	0.7%	0.6%	0.5%	1.4%
Wyoming	0.3%	0.7%	0.6%	2.0%

Data are from Multiple Census Years. See text for details.