Baby's Gone: The Effects of Increased Sentencing Severity on Fertility and Family Formation*

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Abstract

The United States' incarceration rate has quintupled since 1970. By 2007, one percent of the adult population was incarcerated, and over 90% of those incarcerated were men. Since incarcerated men are physically separated from their communities, their absence may affect those who are left behind. Using the change in incarceration caused by a sentencing reform in North Carolina, together with an intensity of treatment research design, I show that incarceration policies have spillover effects on family formation patterns. In the wake of the policy change, unmarried and young black women reduce their fertility, and the composition of births shifts towards women of higher socioeconomic status. At the same time, I find that among those who gave birth, the quality of partner matches declines. White women are less likely to be married, but there is no effect on marriage rates of black women.

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1 Introduction

Family formation patterns have important consequences for social inequality and intergenerational mobility. If and when a woman has children affects her labor force participation, hours worked, and earnings (Angrist and Evans, 1998; Jacobsen et al., 1999; Lundborg et al., 2017). The family structure and circumstances around a child's birth are also important determinants of the resources available to him in childhood with far-reaching consequences for his life (Lundberg et al., 2016). Economic theory, starting with Becker's (1981) seminal marriage model, shows that a determining factor of these outcomes is the ratio of men to women in a community. When the male-female ratio decreases, there are fewer men available to form relationships. This increased scarcity can also affect relationships that still form by encouraging women to accept lower quality partners.

Many American communities have seen large changes in the ratio of men to women due to mass incarceration. Since 1970, the United States' incarceration rate has more than quintupled, reaching a peak of one percent of adults in 2007 (Kaeble and Glaze, 2016). As incarceration is most common for men, this has important compositional effects. Over 90% of prisoners in state and federal facilities are men, and black men are four to five times more likely to be incarcerated than their white counterparts. Incarceration is also concentrated among young men (Travis et al., 2014). Because of this age gradient, incarceration incapacitates (removes from the community) men during the "demographically dense" period of their lives, when people are most likely to partner and have children (Rindfuss, 1991). Male incarceration may also disrupt these processes for women in their partner market, with important consequences for family formation. Weaker family structure is associated with lower levels of upward mobility – not only for the children of single parents, but for all children in the community (Chetty et al., 2014). I exploit changes in incarceration driven by a state sentencing reform to understand how these changes to the sex ratio affect communities.

Many factors influence incarceration, including crime and enforcement practices, which complicates the identification of the effect of increased male incarceration on women's family

formation patterns. In this paper, I leverage changes in incarceration levels driven by the North Carolina Structured Sentencing Act (NCSSA). Enacted in October 1994, this policy increased the severity of criminal sentences, and the state's incarceration rate quickly grew in response.[1] Over the next year, the number of men incarcerated per prime-age black (white) woman increased by 60% (40%).[2] I employ an empirical design that leverages exogenous variation in a woman's level of exposure to this policy change across partner markets. Using administrative data from the North Carolina Department of Public Safety and the State Center for Health Statistics with the 1990 and 2000 Censuses, I find the NCSSA reduced the birth rates of affected women. This effect is driven by black women under age 25 and unmarried women. However, I find no observable effect on total competed fertility at later ages, implying that the observed reduction in fertility for young women is a *delay*. For women who continue to give birth, they are doing so with older and less educated or less committed partners. The NCSSA also reduced the probability of being married for white women.

My work speaks to a broad literature in economics on the effect of sex ratios. Previous studies have found evidence in support of Becker's theoretical predictions using war-time mobilization and mortality (Abramitzky et al., 2011; Bitler and Schmidt, 2011; Bethmann and Kvasnicka, 2012; Brainerd, 2017) or immigration inflows (Angrist, 2002; Lafortune, 2013) as exogenous shocks to sex ratios. However, the selection into and stigma associated with incarceration are different than that of military service or immigration. These effects are important in the context of Wilson's (1987) "marriageable men" hypothesis, which suggests there is a quality threshold men must achieve before women will consider them marriageable.[3] If incarcerated men are so negatively selected, their incapacitation may not affect the family formation patterns of women in their partner market. Alternatively, previously incarcerated

[1] This policy is typical of policies passed by states in the 1980s and 1990s that were designed to make criminal sentences more punitive by increasing the length of time offenders spent in prison (Travis et al., 2014).

[2] Author's calculations using National Prisoner Statistics and Surveillance, Epidemiology, and End Results Program (SEER) population data.

[3] Empirical work has found partial support for this hypothesis, particularly for the most economically disadvantaged (Ellwood and Crane, 1990; Oppenheimer et al., 1997; Ruggles, 2015). See Autor et al. (2018) and Kearney and Wilson (2017) for examples of recent work in economics motivated by this hypothesis.

men experience stigma across social settings (Braman, 2004; Pager, 2008). If a history of incarceration makes a man unmarriageable, increases in the incarceration rate may affect family formation beyond their contemporary effect on the sex ratio. These confounding effects may explain why previous studies of the impact of incarceration on family formation have not found consistent results across settings. Using variation in drug enforcement, Charles and Luoh (2010) find increased male incarceration decreases a women's probability of being married for black and white women. Focusing only on black women, Mechoulan (2011) does not find evidence of an effect on marriage when using variation in incarceration rates across states over time. Neither study looks directly at the fertility of adult women or cohabitation, although Mechoulan finds some evidence of a reduction in black teen births.

I contribute to this literature in several ways. First, I expand our understanding of the broader consequences of mass incarceration by focusing on a different and unexplored type of policy variation: a state sentencing reform. State sentencing reforms were important drivers of the growth in incarceration that occurred between 1990 and 2000 (Travis et al., 2014). I show that the NCSSA quickly increased the incarceration rate solely by lengthening the time offenders served in prison, while other potentially confounding factors were unchanged. This setting provides a natural experiment to isolate the incapacitation effects of incarceration apart from the selection and stigma effects discussed above. Second, I extend previous analyses beyond marriage and provide a comprehensive investigation of how changes in partner markets affect women's fertility patterns. There is extensive qualitative (Edin and Kefalas, 2011) and quantitative (Lundberg et al., 2016) evidence that women are increasingly making their decisions around fertility and marriage at different times in their lives. Focusing solely on marriage ignores an important margin of adjustment. Third, I show that incarceration changes the distribution of fathers. Since these fathers were not incarcerated at the time of conception,[4] this documents spillover effects beyond those directly affected by incarceration. Also, paternal quality is an important contributer to children's outcomes (Aizer et al.,

[4]The North Carolina prison system does not allow conjugal visits (Division of Prisons, 2010).

2018). Fourth, I observe differences in marriage outcomes by race: evidence consistent with Wilson's marriageable men hypothesis for black women and evidence more consistent with Becker's bargaining effect for white women. Finally, I improve on prior work by using more precise partner markets, which previous studies could not due to data constraints.

The rest of the paper proceeds as follows: section 2 discusses the policies and institutional factors that led to this sharp increase in incarceration rates. In section 3 I detail the data used in the analysis; section 4 discusses the empirical strategies I use to estimate the effects of this change. Finally, I present results in section 5 and conclude in section 6.

2 Policy Background

This paper leverages variation from a 1994 sentencing reform in North Carolina, the Structured Sentencing Act (NCSSA), to understand how increased incarceration affects family formation patterns. In this section, I describe North Carolina's previous sentencing framework, the political and institutional factors that led to the passage and quick implementation of the NCSSA, and the effects of the NCSSA on incarceration in North Carolina.

State sentencing reforms were an essential component of the policy landscape that contributed to the historic increase in incarceration rates in the United States. In the 1970s, initial reforms focused on increasing the consistency of sentences imposed by judges. Critics of the previous system, called "indeterminate sentencing", claimed that the lack of strict guidelines opened the door for racially disparate or otherwise arbitrary sentences (Travis et al., 2014). Beginning in the late 1980s, reforms focused on increasing the severity of criminal sentences, usually through sentencing laws that increased the time served per offense. A reaction to historically high crime rates, these reforms were a driving force behind increasing incarceration rates in the 1990s (Travis et al., 2014). The NCSSA was typical of reforms pursued by states in this later period. However, due to institutional and political factors unique to North Carolina, the NCSSA led to a sharp change in the state incarceration rate,

whereas other states experienced smoother increases throughout the 1990s.

2.1 The Fair Sentencing Act (the Pre-NCSSA Policy)

North Carolina's first attempt at sentencing reform, the Fair Sentencing Act (FSA) of 1979, was designed to move the state towards "determinant sentencing" by constraining the discretion of judges. The FSA attempted to achieve this by including an exact recommended sentence length for each class of felonies, called a "presumptive" sentence, intended to function as a default sentence. However, the law made it easy for judges to deviate from this default by listing either mitigating[5] or aggravating[6] factors in the written decision. Further, the guidelines included beyond the presumptive sentence were very broad.[7] In practice, judges still had wide discretion in sentencing (Markham, 2014).

Adding more uncertainty to sentence lengths, the FSA included a generous "Good Time" system. Most prisoners could receive one day of Good Time credit for every day without a major disciplinary infraction (Markham, 2014). Additionally, North Carolina still had a system of discretionary parole, which most offenders qualified for after serving one quarter of their sentence. The legislature had hoped to introduce consistency through the FSA, but the actual time served and the legal presumptive sentence were often unrelated (Wright, 2002).

As can be seen in figure 1, the incarceration rate stayed relatively stable after the implementation of the FSA. However, this was a time of population growth in North Carolina, so the rate masks true increases in the total prison population. Soon, the number of inmates in North Carolina prisons grew beyond their capacity, the number of inmates a prison can safely hold. In 1985, attorneys for state prisoners filed a class action lawsuit alleging that the extent of overcrowding in North Carolina prisons constituted cruel and unusual punishment. This case was not settled until 1988, but in 1985 the legislature passed the Emergency

[5]Mitigating factors include limited mental capacity or aiding in the apprehension of another felon.

[6]Aggravating factors include previous offenses or gang membership. For a full list of aggravating and mitigating factors in North Carolina see North Carolina General Statutes §15A-1340.16.

[7]For example, the presumptive sentence for a Class D felony (which includes crimes like first-degree burglary and arson) was 12 years. However, a judge could sentence the offender to a maximum of 40 years if she included a description of any aggravating factors in her written decision (Markham, 2014).

Powers Act which gave parole boards additional power to release prisoners before the end of their sentences.(Wright, 2002).

2.2 The Structured Sentencing Act

Hoping to avoid the issues that plagued the FSA, the legislature created the North Carolina Sentencing and Policy Advisory Commission, which had a mandate to create a system for criminal sentences that improved consistency in sentencing and take into account the corrections resources available, particularly prison capacity, hoping to avoid repeating the circumstances that led to the state's legal troubles related to overcrowding (Wright and Ellis, 1993).[8]

The total prison capacity was initially a source of uncertainty. After extensive political debate, the governor and state legislature compromised in July 1990 by authorizing the sale of $75 million in bonds for prison construction and placing a large bond issue of $200 million on the ballot the following November. The referendum passed, but by less than one half of one percent. The legislature estimated this amount would fund an increase of almost 7,000 beds. Leaders in state government interpreted the close margin of passage as a sign that voters would not be willing to fund any additional construction, and they made it clear to the commission that any new sentencing regime would have to work within that constraint (Wright, 2002). Figure A1 shows that capacity increased smoothly throughout the entire decade.

The commission presented its final recommendations to the legislature in January 1993; they were adopted with minimal changes on July 24, 1993, with an enactment date of October 1, 1994 (Wright, 2002).[9] The NCSSA created a detailed sentencing grid based on offense type, severity, and previous criminal record. Unlike the FSA, judges could not give sentences

[8]Twenty-five states crated a sentencing commission as part of the sentencing reform process during this time period (Neal and Rick, 2016).

[9]The NCSSA only applies to sentences for crimes committed on or after Oct 1, 1994. Inmates already in prison were not affected.

outside of these narrower bands.[10] The grid specified a specific minimum sentence for an inmate before which they could not be released. The NCSSA also replaced the previous Good Time system with an "Earned Time" system, which was less generous to inmates. Additionally, the NCSSA abolished discretionary parole (Collins and Spencer, 1999).

As seen in figure 1, the NCSSA had a dramatic effect on the North Carolina prison system. After years of relative stability, the North Carolina incarceration rate increased by close to one third between 1994 and 1995 before stabilizing again. Figure 3 shows the entry and exit dynamics that caused this quick increase and return to stability. While there was clearly year-to-year variation in entries into prison over this period, there was no trend break around the implementation of the NCSSA. Over this period, other characteristics about entrants (racial composition, age, felonies vs. misdemeanors, percent drug offenses, percent male) also remained stable (North Carolina Department of Public Safety, 1992-2000).

The increase in the prison population was caused by a decrease in exits. In figure 2, we see the time served by prisoners in North Carolina sharply increased after 1994, doubling from an average of 8.7 months for prisoners who entered in 1994 to 17.5 months for prisoners who entered in 1996. As the prison system adjusted to the new sentence lengths, exits temporarily diverged from entrances. By the end of the 1990s, entrances and exits converged again and the North Carolina prison system entered a new steady state level of incarceration. Although the incarceration rate increased for all groups after the enactment of the NCSSA, the increases for black and white men occurred on different absolute scales. Figure 4 shows that the incarceration rate for white men is consistently and significantly lower than that of black men before and after the enactment of the NCSSA.

The North Carolina incarceration rate drastically increased between 1994 and 1995 as a direct result of inmates serving longer sentences in accordance with the sentencing guidelines provided by the NCSSA. In section 4.1, I will discuss other potential confounders which also do not seem to be the driving force behind the increase in incarceration rates. I use this

[10] A 1996 study by the Commission found that all sentences judges gave in 1995 for felonies committed after the enactment of the NCSSA were in accordance with the sentencing grid (Collins and Spencer, 1999).

policy change as natural experiment to understand the effects of increased incarceration on fertility and family formation.

3 Data

I combine data from a variety of sources to estimate the effect of an increase in sentencing severity on fertility and family formation. In this section, I will describe the outcomes I examine and their sources. Then, I will detail the incarceration measures I use to capture women's exposure to the NCSSA. Finally, I will discuss additional data used as covariates in the primary analyses.

Fertility and birth related outcomes are from the North Carolina Detailed Birth Database. These files contain information derived from birth certificates for the universe of births occurring in North Carolina between 1989 and 2014. I limit my sample to women ages 15 to 40 who reside in North Carolina. I only include black and white mothers in my sample, who make up 96.8% percent of mothers in North Carolina from 1990 to 2000. These data include extensive information on the birth and on the mother, including her age, race, and county of residence. Most records include information on the completed weeks of gestation; in those cases, I estimate the time of conception by taking the date of birth minus the number of weeks reported. When that information is missing, I impute the time of conception as occurring nine months before the birth and use the respective year. I also use this sample to look at reported father characteristics and the composition of mothers. Data on fathers include his age, race, and education. To compare total fertility across cohorts, I supplement this data with the National Center for Health Statistics Natality Detail Data. These data are functionally identical to the North Carolina Detailed Birth Data but are available beginning in 1968.

Marriage data are from the 1990 and 2000 public use microdata samples (IPUMS-USA). By using these data, I can include cohabitation as an outcome of interest, an increasingly

important and common option for couples looking to form households (Lundberg et al., 2016). I limit my sample to black and white women in North Carolina ages 20 to 40.

The data used to measure a woman's partner market's exposure to the NCSSA are from the North Carolina Department of Public Safety (DPS). To create a measure of incarceration by age, race, and county, I use public offender information from the universe of convictions in North Carolina. These data are available beginning in 1972. This database includes information on the type of sentence (prison or probation) and time served, as well as offender characteristics, such as date of birth, race, sex, and the county of conviction. While it would be preferable to have incarceration by county of residence, this information is not available for the entire period. Using a separate state database, I can retrieve incarceration rates by sex, age, and race for both the county of residence and the county of conviction. However, these data are only available beginning in 1995. From the period that I can observe incarceration rates by both county of residence and conviction, I know that incarceration rates by county of conviction and by county of residence are positively correlated. For years 1995 to 2006, the unweighted correlation coefficient comparing the incarceration rate by county of residence and county of conviction is 0.49. The relationship is stronger when looking at the commuting zone level, the level at which I will define partner markets, with a correlation coefficient of 0.61. The discrepancies are driven by the least populated areas. Excluding the smallest one percent of partner markets raises the correlation coefficient to 0.85.

I restrict my sample to white and black men ages 15-44.[11] I observe when the offender began his sentence and can count the number of men within an age and race group who were in prison from each county over the course of a calendar year. I follow the procedure used by DPS and consider an offender in prison if his entry date is before either June 30 or December 31 and his exit date is after. I then use the offender characteristics to calculate the population by age, race, and county groups.

To create a measure of women's exposure to male incarceration, I divide the prison

[11] I observe too few men of other races to create consistent series for those groups.

population by the same age and race female population, using population data from the Surveillance, Epidemiology, and End Results Program (SEER). I use the female population for two reasons. First, since an important mechanism by which incarceration affects partner markets is by skewing the sex ratio, the number of men incarcerated per woman more directly captures this than the traditional incarceration rate. Second, this reduces potential measurement error arising from the fact that the incarcerated are considered part of the population in the county in which they are incarcerated, not the county they lived in before incarceration. This will artificially inflate the incarceration rate in areas where many incarcerated men come from and artificially reduce it in areas with larger prisons. North Carolina has a relatively decentralized prison system, with over 80 facilities in the early 1990s. However, women are incarcerated at a much lower rate, so any measurement error from misassignment is smaller.[12]

I also include information on local prison capacity, crime rates, police efficiency, and unemployment in my primary analyses to capture additional time varying factors that could influence partner markets. Information on the location of correctional institutions, as well as their capacity and staffing information, are from the Census of State and Federal Adult Correctional Facilities (CSFACF). Collected every five years by the Bureau of Justice Statistics, this series includes information on all correctional facilities in the state, including when they opened and how many prisoners they can accommodate, as well as their number of full time staff. To convert this information from a quinquennial series to a yearly series, I assume any major increase or decrease in staffing or capacity occurs at the time of a renovation or a move to a new building. For example, the Warren Correctional Center reports a maximum capacity of 56 in 1995 and 668 in 2000, with reported full-time staff increasing from 62 to 340. This institution moved to a new building in 1997, so I assign this increase to 1997. When necessary, information from the CSFACF is supplemented with information on opening, closing, and renovation dates from the North Carolina DPS website. The average

[12]Additionally, in section 5.4 I exclude the two CZs with a women's correctional facility as a robustness check.

state prison in this period holds 300 inmates.

Additionally, I use data on the crime rate, defined as the number of offenses known to police divided by the population, and the clearance rate, the number of clearances divided by the total number of offenses known to police, from the Federal Bureau of Investigation's (FBI) Uniform Crime Reporting (UCR) program. Data on unemployment are from the Bureau of Labor Statistics' (BLS) Local Area Unemployment Statistics.

The above series are defined at the county level. For analysis, I aggregate them to the commuting zone (CZ) level following the USDA 1990 CZ definitions. To estimate the effect of the NCSSA by marital status, I use data from the 1980 through 2000 IPUMS-USA Census samples to create a population series by sex, age, race, and marital status. I allocate the Census Public Use Microdata Area (PUMA) to CZs using the procedure in Dorn (2009). After obtaining the census year estimates of the number of married and unmarried women, I use linear interpolation to create a series over the entire period. However, my results are not dependent on this interpolation. I find similar results when restricting my sample to the 1990 and 2000 census years, discussed in section 5.4.

A summary of the sample used in this analysis is in table 1. Summary statistics by race are presented in table 2.

4 Specification

Because this policy is applied to the entire state at once, I cannot invoke a traditional differences-in-differences estimation strategy. Instead, I leverage the fact that the NCSSA had a much larger affect on partner markets with higher pre-period incarceration rates. This empirical approach is often called an "intensity of treatment" research design. Other examples include Acemoglu and Johnson (2007), Bleakley (2007), Lucas (2010), and Bhalotra and Venkataramani (2015). The intuition behind this approach is that the introduction of a policy that lengthens prison sentences will have a stronger impact in communities where a

high portion of men receive prison sentences.

Pre-period incarceration rates are a strong predictor of incarceration later in the period. Table A1 reports results from a regression using the 1990-1993 average incarcerate rate to predict the incarceration rate in years 1995 to 2000. Column (4) shows that pre-period incarceration rates have a statistically one-to-one relationship with later incarceration rates for both black and white men when the specification includes a partner market and year fixed effect and is weighted by population.

Importantly, the NCSSA did not change the rate at which people entered prison. Instead, the resulting increase in the incarceration rate was caused by prisoners serving longer sentences. In areas where few men are incarcerated, the increase in time served affected a smaller portion of men. Consequentially one would not expect to see a large effect of the policy change in partner markets where few men were ever incarcerated. Moreover, within areas with higher incarceration rates, the strong age gradient in incarceration patterns suggests that the effects of the policy should be much more pronounced among younger women.

Consistent with previous work, I define a woman's partner market to be men of her same race, in the same geographic area, who are her age or slightly older. Charles and Luoh (2010) confirm that marriages generally conform to this pattern in recent census years. Using North Carolina natality data, I can confirm this matching pattern for births as well. Figure A2 shows that only one to two percent of births report the father's race to be different than the mother's race. Like patterns for marriage, women are most likely to have children with men who are slightly older, but still close in age. Figure A3 shows that fathers are slightly older than mothers (by 2.3 to 2.4 years).

My analyses are based on commuting zones (CZ). CZs are units of analysis designed to reflect observed patterns of economic and social activity. Market (or other) relationships are not bound by the nearest county line, but often form across these boundaries. By using the CZ as the geographic level in my analyses, I can better account for spillovers between

neighboring counties.[13] For a map of North Carolina counties and CZs, see figure A4. Additionally, aggregating from counties to CZs causes the effective number of observations within my clusters will be more similar across clusters, improving the quality of inference (MacKinnon and Webb, 2017). Performing the analysis at the CZ level also allows me to estimate subgroup populations by marital status, as discussed in the previous section; the data needed to produce those estimates is not available at the county level.

I collapse my data into cells based on the woman's race, age, CZ of residence, and the time period of conception. I model births using the following equation:

$$E[Y_{\rho t}] = exp(\beta Post_t * \ln(\overline{IR}^{9093})_\rho + \theta \mathbb{X}_{\rho t} + \alpha ln(pop)_{\rho t} + \lambda_\rho + \gamma_t) \quad (1)$$

where ρ is the woman's partner market and t is the time period of conception. I divide each year into two periods (January through June and July through December). I exclude the six-month period around the introduction of the law (July through December 1994) because I cannot precisely assign births that were conceived in that period to before or after the policy change.

$Y_{\rho t}$ is the number of births to women in partner market ρ, conceived in time period t. Because I am looking at precisely defined groups of women, I sometimes observe zero births in a period, especially when looking at subgroups. Since the natural log is not defined at zero, a log-linear specification, common in papers examining fertility at the state level, is not appropriate here. The main results are similar when using the natural log of the birth rate as the dependent variable and a linear functional form, as will be discussed in section 5.4.

$\overline{IR}_\rho^{9093}$ is the average proportion of men incarcerated per woman in a partner market, as defined above, from 1990-1993 (the years leading up to the passage of the NCSSA). β can be interpreted as an elasticity, similar to how one would interpret a linear regression on the natural log of the birth rate. Specifically it is the expected percent effect for a partner market with a pre-period incarceration exposure of 1%. The average pre-period male incarceration

[13] See Lindo (2015) for a discussion of the importance of accounting for these spillovers.

rate is just below that at 0.8%. I group women into five age groups: 15 to 19, 20 to 24, 25 to 29, 30 to 34, and 35 to 39. I pair women with men their age and slightly older (of their race who live in their commuting zone). For example, for women ages 20 to 24, $\overline{IR}^{9093}$ would be the pre-NCSSA incarceration rate of same race men ages 20 to 29 in their CZ of residence. This measure is then interacted with $Post_t$, which is an indicator variable equal to one when the period is after the enactment of the NCSSA.

λ_ρ is a fixed effect to capture time unvarying characteristics of the partner market. γ_t is a year fixed effect. All analyses allow standard errors to be be correlated within commuting zones overtime. Clustering the standard errors breaks the traditional link between mean and variance in Poisson specifications, so the data do not need to be equi-dispersed to satisfy the assumptions for consistency (Cameron and Trivedi, 2010). In my preferred specification, $\mathbb{X}_{\rho t}$ includes controls for the crime rate, clearance rate[14], unemployment rate, and local prison capacity. These covariates capture time varying characteristics of communities that could influence incarceration rates or family formation separately from the policy change. The results are similar without the inclusion of these additional regressors. I also include the natural log of the total female population for whom the outcome is measured as they are the population "at risk" of giving birth.

I also analyze how the NCSSA changed the composition of women entering in to motherhood. I focus on mothers' age, marital status, and educational attainment. Women who are older, who are married, and/or who have higher levels of education tend to have more resources available to invest in their children (McLanahan, 2004). In turn, these positive investments lead to improved child outcomes across a range of social and economic dimensions, such as health status, labor force participation, and criminal activity (Lundberg et al., 2016). Since average age is an outcome of interest here, I cannot define the cells at the age group level. I estimate:

[14]The clearance rate is the number of crimes for which a charge is laid divided by the total number of offenses known to police. It is used a measure of how many crimes are solved by police.

$$Y_{\rho' t} = \beta Post * \ln(\overline{IR}^{9093}_{\rho' t}) + \theta \mathbb{X}_{\rho' t} + \lambda_{\rho'} + \gamma^R_t + \varepsilon_{\rho' t} \tag{2}$$

where ρ' is a race-CZ group and t is the period of conception. The rest of the terms are as defined above. $\varepsilon_{\rho' t}$ is a random error term, clustered at the commuting zone level.

To understand the long-run effects of the NCSSA, I need to distinguish between a permanent reduction in the number of children to which women ever give birth (total fertility) versus a temporary reduction for younger women that they make up for at older ages. I follow a procedure similar to that used by Ananat et al. (2007) and Currie and Schwandt (2014) to estimate the effect of the NCSSA on total fertility. In the equation below, treatment is assigned to women based on their age in 1995, with κ corresponding to cohorts based on the age of women in 1995.

$$Y_{\kappa rc} = \beta \ln(\overline{IR}^{9093}_{\kappa rc}) + \omega_r + \omega^r_\kappa + \omega^r_c + \nu_{\kappa rc}, \tag{3}$$

where κ denotes the age cohort, r denotes race, and c denotes CZ. $Y_{\kappa rc}$ is either a measure of the portion of women who are childless or the total number of children born to women in a partner market. To capture the number of childless women, I add up all first births observed to women in a race and age cohort group in a commuting zone. This gives an estimate of the number of women who have ever had any children. Comparing this measure to the number of women in the cohort creates a measure of the fraction of women who are childless, the extensive margin of fertility. For the second measure, I add up all births observed to women from a cohort and divide that number by the number of women in the cohort to create an estimate of the number of children born per woman, the intensive margin. I calculate both of these measures when the women are age 35 and again at age 40. While it would be preferable to measure completed fertility at a later age, these are the oldest ages for which I can observe for women who were teenagers and young adults in 1995.

$\overline{IR}^{9093}_{\kappa rc}$ is the same measure of exposure used in previous specifications, but now the

treatment is assigned based on the woman's age in 1995. For example, a woman who was 16 in 1995 would be matched to her partner market's level of exposure to the NCSSA at age 16. ω_r is a race fixed effect, ω_κ^r is a race-specific age cohort fixed effect, and ω_c^r is a race-specific CZ fixed effect. $\nu_{\kappa rc}$ is a random error term, clustered at the CZ level.

I also examine how the change in incarceration policy changed the distribution of fathers. Becker predicts that a change in sex ratio will not only affect the number of unions that form, but it can also affect the quality of matches made. Unfortunately, birth certificates do not contain extensive information on fathers, but I am able to look at their age and education level. I also examine the probability of the father being missing from the birth record. For these regressions, I use a linear functional form:

$$Y_{\rho t} = \beta Post * \ln(\overline{IR}_{\rho t}^{9093}) + \theta \mathbb{X}_{\rho t} + \lambda_\rho + \gamma_t + \varepsilon_{\rho t}, \tag{4}$$

where ρ is the partner market and t is the time of conception. The rest of the elements of the equation are as described above.

Because the data on marital status are structured differently than the birth data previously discussed, I operationalize my empirical strategy differently to examine the effect of increased sentencing severity on the marital status of women in North Carolina. The intuition of the specification is the same. I estimate

$$\Delta Y_\rho = \beta \ln(\overline{IR}^{9093})_\rho + \theta \Delta \mathbb{X}_\rho + \mu_\rho, \tag{5}$$

a modified version of the preferred specification in Charles and Luoh (2010). ρ is the partner market. $\ln(\overline{IR}^{9093})_\rho$ is the same measure of an age-race-CZ group's exposure to increased incarceration as a result of the NCSSA. I continue to use the control variables for crime, police efficacy, unemployment, and local prison capacity discussed above. ΔY_ρ is the change in the portion of women in a partner market who report being married, divorced, never married, or cohabiting at the time of the census. μ_ρ is the error term, clustered at the

CZ level. ρ continues to denote the partner market, defined at the age, race, and CZ level.

My ability to identify the effect of an increase in the incarceration rate on family formation outcomes relies on the assumption that the changes in the incarceration rate are being driven by policy, not changes in the community that could lead to both more severe sentences and different family formation patterns. I discuss these potential confounders in more detail below.

4.1 Threats to identification

One may worry that an outside factor was driving the increase in incarceration which could also affect family formation and fertility in North Carolina. In this section I discuss several potential factors, including crime, enforcement, and labor markets. The first potential threat to identification is a change in crime. Figure 5 plots the North Carolina crime rate over my period of analysis. In figure 5a, the incarceration rate for prime aged men is also included for reference. Like the rest of the United States, North Carolina saw a crime rates plateau in the mid-1990s, followed by a decrease (Lofstrom and Raphael, 2016). Importantly, there is no spike around the implementation of the NCSSA that could explain the increases in incarceration here. To show that the state level crime rate is not concealing important heterogeneity, I divide CZs into high and low incarceration areas depending on if they are above or below the median pre-period incarceration rate. In figure 5b, I plot the crime rate over time for both high and low incarceration areas and the trends in crime are similar. Additionally, my primary specification controls for the local crime rate.

Alternatively, one might worry that even if the level of crime stayed the same, the composition of crimes or defendants changed in a way the led to increased incarceration. The incarceration data I use is conviction based. This is only a subset of crimes adjudicated by the court system and will not include any information on cases where the defendant is not convicted. A contemporary report commissioned to understand the effect of the NCSSA on state courts compared a sample of cases from January to June 1994 (before the law was

enacted) to a sample of cases from January to June 1996 (after the law was enacted). The report found no differences in the demographic composition of defendants or the fraction of cases that were felonies versus misdemeanors. The authors also report no effect on prosecutor charging behavior or in the percentage of cases going to trial. The only change noted in the report was an increase in the amount of time it took to fully adjudicate a case. This was attributed to the additional time judges and other court personal needed to become acquainted with the new law (Collins and Spencer, 1999).

Given that previous work has focused on variation caused by changes in enforcement, I also examine this pathway. Figure 6 displays offense-specific arrest rates with a vertical line to indicate passage of the NCSSA. Arrest rates for violent offenses and drug-related offenses are remarkably stable over the period, while the arrest rate for property crimes smoothly decreases. Assuming arrests reflect the composition of crimes committed, we can also turn to the arrest data for assurance that the observed increase in incarceration is not driven by a change in the composition of crimes. In figure 7, we see that the composition of arrests within major offense categories is relatively consistent over time, and there are no sharp changes around the enactment of the NCSSA. Interestingly, there is only a small increase in the portion of drug arrests relative total arrests, so the empirical strategy used by Charles and Luoh (2010) cannot be meaningfully applied in this study.

Another possibility is that my results reflect changes in labor market conditions. Figure 8 shoes that, like much of the country, North Carolina experienced decreasing unemployment throughout most of the 1990s. Theories of criminal activity predict a tight labor market with low unemployment will lead to a decrease in crime and incarceration, suggesting North Carolina's falling unemployment rate is not the cause of the increase in incarceration seen here. However, empirical work has not established a clear relationship between labor markets and crime (Mustard, 2010). Again, dividing CZs into high and low pre-period incarceration areas, I see the trends in unemployment are very similar across areas with relatively high or low incarceration rates in figure 8b. Additionally, the increase in prison capacity seen

over this time period might have its own positive labor market effects (Beale, 1993, 1996). In my preferred specification, I include the unemployment rate, the number of full time prison employees, the crime rate, and the clearance rate at the CZ level. My results are not dependent on the inclusion of these controls.

All of the potential confounders listed above are measured with error. To account for this, I also implement the left hand side balancing tests suggested in Pei et al. (2018). This takes advantage of the econometric fact that a regression is more robust to measurement error in the dependent variable than the independent variable. When included on the right hand side, a poorly measured confounder may not affect regression coefficients because measurement error attenuates the confounder's effect, not because there is no impact. To apply this test in my setting, I estimate an equation very similar to equation 4, but without any control variables. For the dependent variable, I use each of my four control variables. I present the results from these individual regressions as well as a joint test of significance in table A2. Both individually and jointly, the introduction of the NCSSA is not a significant predictor of changes in these potential confounders.

Finally, if women are migrating in response to the change in the composition of their partner market, this will bias my results. To ensure that migration patterns are not correlated with pre-period partner market incarceration rates, I use the information on 5-year migration status in the 2000 census to see whether groups of women differentially exposed to the NCSSA through their partner market are differentially likely to migrate. I classify a woman as a migrant if she reports moving across public use microdata areas between 1995 and 2000. I regress this indicator on her partner market's pre-NCSSA incarceration rate. The results, presented in table A3, show there is no observable relationship between women's migration patterns and partner-market incarceration rates.

5 Results

This section presents the effects of increased sentencing severity on fertility, partner choice, and marriage. I begin with the discussion of fertility as previous work on incarceration and family formation has largely ignored this important potential mechanism of adjustment to a change in the sex ratio. Circumstances in utero and around the time of a child's birth have strong effects on later life outcomes (Almond and Currie, 2011). Understanding if and how the NCSSA changed fertility patterns is an important step to understanding the long-term consequences of increased sentencing severity.

5.1 Fertility

Figure 9 presents the effects of the NCSSA on births overall and by maternal age. The first point in the figure (the black circle) is the polled effect. Each point after that in the figure represents the result of estimating equation 1 by age-race group. 95% confidence intervals are marked on the figure. The black dotted line also represents the pooled effect, for comparison. I find the NCSSA decreased fertility among women in partner markets with high levels of incarceration before the law was enacted. Specifically, the pooled coefficient on $Post_t * \ln(\overline{IR}_{\rho}^{9093})$ implies that a partner market with a pre-period incarceration rate of 1% would see the birthrate decrease 0.08%. Relative to a pre-period average birthrate of 7%, this is an absolute decline in the birthrate of 0.06 percentage points. Using the state-wide pre-period incarceration rate, this implies just over 650 fewer babies were born in the year after enactment. This is small relative to the total number of births in North Carolina, but large relative to the absolute increase in male incarceration of around 10,000 prime aged males. Figure 9 also shows this effect is larger for black women under age 25, consistent with the demographic composition of incarcerated men: since young, black men have the highest rates of incarceration, one would expect any fertility spillover effects to be strongest among young, black women. The point estimate for black teenagers implies that at their

average level of pre-period partner market incarceration (1.8%), teen births would decline .28%. While significant, this is still a small effect. For example, the size of the decline in teen births is around one-seventh of the effect of job loss to one percent of the population found by Ananat et al. (2013).

Figure 10 shows the same analysis when the sample is to restricted to unmarried mothers. This is an important subgroup for two reasons: first, most incarcerated men are unmarried (Western, 2006), so it is unmarried women who should be the most affected by the policy. Second, women who give birth while unmarried, even if they are cohabiting at the time of the birth, are more likely to raise their children alone or with a subsequent partner. Both the absence of a second parent (McLanahan et al., 2013) and the upheaval from a series of partners (Cherlin, 2009) are associated with negative long-term effects for children. However, Finlay and Neumark (2010) find that for women whose marriage decisions were affected by the same shift in incarceration policies leveraged by Charles and Luoh (2010), never-married motherhood does not lead to poorer outcomes. As incarcerated men are less than half as likely to be married than non-incarcerated men, unmarried women and their potential children are still particularly important for understanding the intergenerational effects of incarceration policies.

The decline in fertility resulting from the NCSSA is stronger and more consistently negative among unmarried women. The overall result suggests that a partner market with an average incarceration rate of 1% before the policy will observe a 0.24% decrease in the birth rate of unmarried women, relative to a mean birth rate of 3.6%. The effects are not exclusive to black women. There is an observable decrease in births to white women. Although incarceration affects a smaller percentage of white men, there is still a fertility spillover to white women. Table 2 shows that births to unmarried women comprise a small fraction of births to white mothers. This explains why the negative effect for unmarried white women was not observable in the overall effect on births. Full results in table form as well as results for married women are available in tables A4 through A6 in the Appendix.

Table 3 shows how the demographic composition of mothers changes in response to the NCSSA. Women who give birth after the enactment of the NCSSA are on average older and particularly less likely to be teens. In a CZ with the average level of pre-period incarceration for black men, the point estimates imply that black mothers are .025 years older and 1.4 percentage points less likely to be teens. Black mothers observed after the reform are also more likely to be married. Additionally, there is a shift away from mothers without a high school diploma, consistent with the educational profile of incarcerated men.

It is clear the fertility of young and unmarried women declined after the enactment of the NCSSA. The long-term ramifications of this change depend on whether the decline in fertility was temporary or permanent. Specifically, did affected women postpone their childbearing until more partners were available or did this policy generate a permanent decline in fertility? To answer this, I estimate equation 3 to understand the relationship between a cohort's exposure to increased sentencing severity and total fertility outcomes by ages 35 and 40.

Table 4 presents the estimated effect of the policy on two measures of completed fertility. The first two columns show the effect on the fraction of women with no children by ages 35 and 40. The second two columns show the effect on the total number of children born to women in a cohort by ages 35 and 40. There is no statistically significant relationship between a cohort's partner market's exposure to the NCSSA and their later fertility outcomes, either on the extensive or intensive margins. Taken at face value, the point estimates imply that women in partner market's most affected by the NCSSA had higher total fertility. However, the results are imprecise. Using the confidence intervals to bound the possible effect, I can reject an increase greater than .002 percentage points to the percent of women with no children at age 40 with 95% certainty. Looking at the intensive margin, I can reject a decrease in the number of children born per woman at age 40 larger than .005 fewer children per woman with 95% certainty. An important conclusion is that the observed decline in fertility generated by the NCSSA was likely temporary. The women whose partner markets

were most affected simply delayed their childbearing into the future. By having children later in their lives, these women have had more time to accumulate human capital and other resources which may contribute to an ability to make greater investments in their children (Bailey et al., 2014). However, women may face increased health risks by postponing their fertility. Having children at older ages can increase the probability of a low birth weight or preterm birth, particularly for black women (Love et al., 2010).

5.2 Partner choice

As discussed previously, a change in the male-female ratio may not just reduce the probability of finding a partner, it may also affect the types and quality of matches that form. Although there is limited information about fathers on the birth records, I can examine three dimensions of partner choice: relative age, relative education level, and if the father is listed on the birth record. Table 5 presents evidence that the NCSSA disrupted matching patterns for black women. In Panel B, column (1) shows that the policy caused black mothers to couple with relatively older men. Evaluated at the average pre-period incarceration rate for black men this implies that the average age difference between couples increased by .007 years, a 0.3% effect relative to the pre-period mean. The direction of this effect is unsurprising as younger men are more likely to enter prison and thus were more likely to be taken out of the partner market by the NCSSA. This may be interpreted as a negative effect of this policy, since prior work has shown that women are most likely to search for partners close to their own age (Hitsch et al., 2010) and that women with older partners not only start out less satisfied with their relationships but that their relationship satisfaction declines more quickly (Lee and McKinnish, 2018).

Women also prefer to partner with men of a similar education level (Hitsch et al., 2010). Column (2), however, shows that the NCSSA also increased black mother's probability of partnering with a man who had a relatively lower level of education 0.2% relative to the pre-period mean. In communities most affected by the NCSSA, therefore, black women who

continue to have children are more likely to match with lower quality partners. The NCSSA did not have an effect on the probability that the father was missing from the birth record from black mothers.

The effects on partner choice are less clear for white women. Panel C of table 5 shows that while there is no observable change in partner composition, there is an increase in the probability the father is missing from the birth record. Evaluated at the pre-period mean rate of white male incarceration, this implies a relative increase in the probability of the father being missing from the birth record of 0.1%. Regardless of their "quality", men who are not on the birth record are less likely to be involved in the child's life or provide financial support (Argys and Peters, 2001). This suggests that white women who continue to have children after enactment are having those children with less committed partners and that their children will have fewer resources available.

5.3 Marriage

Finally, I examine how increased sentencing severity affects women's marriage market outcomes, specifically her propensity to be married, divorced, never married, or cohabiting. These analyses include all women, not only mothers. Results for these outcomes are reported in table 6. White women in partner markets that were most effect by the NCSSA are less likely to be married after enactment. This decline in marriage is not a result of an increase in divorce, but instead it is due to an increase in the percentage of women who have never been married. The effect I find is about one-third of the size of the effect found by Charles and Luoh (2010) when using incarceration variation due to increases in the number of men entering prison for drug related offenses during the War on Drugs era. The variation I am leveraging here is driven purely by an incapacitation effect. The number and type of men entering prison is not changing, but the amount of time they spend behind bars is increasing. This implies that part of the effect previous work has observed is driven by the stigma effect – having a larger portion of men in the marriage market "marked" as an

ex-convict alters marriage market outcomes beyond the direct effect of removing these men from the community.

Interestingly, most of these women are still forming unions. As can be seen in column (4), these women have shifted away from marriage into cohabitation. Like the previous result on "missing" fathers, this is additional evidence that the NCSSA is changing commitment levels in white women's relationships. Previous work has not examined the effects on cohabitation, so I cannot compare the effect sizes for this outcome. My work shows this is an important potential margin of adjustment, particularly for white women.

There are no statistically significant effects on marriage or cohabitation for black women. To provide insight into why these effects differ by race, recall the disparity in incarceration rates for white and black men as shown in figure 4. While both groups experience large increases in incarceration after the enactment of the NCSSA, the magnitude of the changes are different. Throughout the decade, the incarceration rate for white men is well below that of black men. It is possible that the sex ratio in young black women's partner markets is already so skewed that there is little room for additional adjustment on this margin.

This null effect for black women is consistent with Wilson's marriageable men hypothesis: the idea that there is a basic quality threshold that men must meet before women will consider them marriageable. In a partner market where many men are unemployed or involved in criminal activity the market will function as if those unemployed or criminal men were not present. If a history of serving a prison sentence moves a man into the unmarriageable group, then a policy that increases the number of men ever serving time will have a larger effect on marriage outcomes than one that merely affects the time served. However, women may be willing to enter non-marital relationships and have children with men they would not marry, leading to effects on fertility due to the increased incapacitation effect of a longer sentence. Bridging the gap between my results and those of Charles and Luoh, Mechoulan (2011) uses an empirical strategy which draws from both types of variation and also finds no effect on marriage for black women.

In summary, the increase in sentencing severity that followed the enactment of the NCSSA had a defined effect on women's fertility and family formation patterns. This policy led to decreased fertility, particularly among young and unmarried women. Ultimately, the NCSSA had divergent effects for women who waited and women who continued to have children. There is no evidence that this policy changed completed fertility, implying that this decline was temporary for these women. By delaying their fertility after their teens and early twenties, these women may have had more resources to invest in the children they later had (Miller, 2011). However, for women who continued to give birth, they either partnered with observably worse men or were more likely to have no father listed on the birth record. For white women, the policy effects extended to marriage markets as well. White women in more exposed marriage markets are less likely to be married and more likely to be cohabiting at the end of the decade. I see no effects on marriage outcomes for black women, potentially consistent with a marriageable men hypothesis.

5.4 Sensitivity analysis

I perform a variety of checks to test the robustness of my chosen specification. The results of these analyses are presented in tables 7a through 8c. For reference, the first column of tables 7a and 8a show the baseline estimates. In column (2), I test whether my results are robust to the inclusion of a CZ-specific linear time trend. I also estimate the specification with and without my chosen control variables. In both cases, the estimates are robust to these changes.

I also try several alternative measures of a partner market's exposure to increased incarceration that resulted from the NCSSA. These results are presented in tables 7b and 8b. Instead of defining exposure using the average incarceration rate in the period just before the passage of the law, I defined exposure as the average entry rate.[15] Although this reduces the magnitude of the point estimate, the overall conclusion is unchanged. I also narrow

[15]The entry rate is the number of men who enter prison each year divided by the population.

the age band of men I match women to, defining the partner market incarceration rate based on men who are in the same age group as the women in question. Additionally, I run my specification in levels, using the incarceration exposure rate, instead of the natural log. While the magnitude of the point estimate changes when I define the variable differently, the qualitative conclusions are unchanged.

As discussed in section 4, regressions examining fertility often use the natural log of the birth rate as the dependent variable. While I chose to use a Poisson functional form in order to be able to better estimate results for smaller subgroups that included zeros, the overall results are not dependent on the choice of functional form. Column (5) of tables 7a and 8a displays the estimate using a more common linear specification. The linear specifications produce less precise estimates, but they are similar to estimates based on my preferred functional form.

Finally, I try dropping selected areas to ensure that my results are not being driven by any one geographic area in tables 7c and 8c. First, I exclude areas of the state considered to be part of Appalachia. This area is historically more rural and economic distressed that the rest of the state, which could contribute to different incarceration and family formation patterns. Then, I exclude the two CZs with a women's correctional facility, due to the concerns about measurement error discussed in section 3. Finally, I exclude the two most populous areas of the state one at a time: the Raleigh area and the Charlotte area. While I do lose precision as I exclude observations, particularly for white women, the effect is similar, particularly when focusing on unmarried mothers. The results for black women are especially robust.

6 Conclusion

Mass incarceration is a uniquely American experiment with potential spillover effects beyond those directly imprisoned. My work contributes to a growing literature on the unintended consequences of incarceration by presenting new evidence on the effect of male incarceration

on women's fertility, choice of partners, and marriage. In this paper, I leverage previously unexplored variation, the North Carolina Structured Sentencing Act, to identify the effects of increased incarceration rates on women's family formation outcomes. Between 1994 and 1995, the incarceration rate in North Carolina increased by one-third. This significant increase in the prison population was caused by an increase in the length of prison sentences, creating a natural experiment that allows me to isolate the effects of incapacitation due to incarceration.

I find that increased sentencing severity due to the NCSSA decreases the fertility of women in affected partner markets. The results are strongest for black women under after 25 and unmarried women of all races, consistent with the demographics of incarcerated men. Although the results on completed fertility are imprecise, I can reject substantial decreases to women's total fertility by ages 35 or 40, indicating these reductions are likely delays. Having children at older ages may allow women to increase their educational attainment and gain labor force experience, but this may also lead to increased health risks for women and their later children. This trade-off is especially sharp for black women. I am currently exploring the effects of the NCSSA on infant and maternal health in a follow up paper. I also find the composition of mothers shifts towards women of higher socioeconomic status.

However, the composition of fathers is negatively affected. Black women who have children after the NCSSA do so with relatively older men who have relatively less education. There is no observable change in fathers for white women, but the father is more likely to be completely missing from the birth record after the enactment of the NCSSA, indicating less committed partnerships and fewer parental resources for children.

Like the results for fathers, the effects of the NCSSA on marital status also differ by race. For white women, I again find evidence of less committed relationships. After the NCSSA, white women are less likely to be married and more likely to be cohabiting. I find no effects on marriage or cohabitation for black women, potentially consistent with a marriageable men hypothesis. These results are only partially consistent with previous work on male

incarceration and marriage. This discrepancy may be because the source of variation I used allows me to isolate the incapacitation effects of incarceration separate from selection or stigma effects.

This study provides new information on how communities respond to an increase in sentencing severity. In the late 1980s and 1990s, almost every state passed similar sentencing reforms with the goal of increasing the punitiveness of criminal sentences. While this project focuses on North Carolina, these effects are potentially more widespread. The Senate recently passed legislation moving the federal prison system in the opposite direction – lowering mandatory minimums for certain non-violent offenses among other reforms.[16] Similarly, every state legislature has considered or passed laws designed to reduce the prison population (Bragg, 2018). As these "tough on crime" sentencing policies receive renewed political attention from all sides, it is important that policymakers understand the full range of spillover effects.

References

Abramitzky, Ran, Adeline Delavande, and Luis Vasconcelos, "Marrying Up: The Role of Sex Ratio in Assortative Matching," *American Economic Journal: Applied Economics*, July 2011, *3* (3), 124–57.

Acemoglu, Daron and Simon Johnson, "Disease and development: the effect of life expectancy on economic growth," *Journal of political Economy*, 2007, *115* (6), 925–985.

Aizer, Anna, Paul J Devereux, and Kjell G Salvanes, "Grandparents, Moms, or Dads? Why Children of Teen Mothers Do Worse in Life," Working Paper 25165, National Bureau of Economic Research October 2018.

Almond, Douglas and Janet Currie, "Killing Me softly: The Fetal Origins Hypothesis," *The Journal of Economic Perspectives*, 2011, *25* (3), 153.

Ananat, Elizabeth Oltmans, Anna Gassman-Pines, and Christina Gibson-Davis, "Community-Wide Job Loss and Teenage Fertility: Evidence From North Carolina," *Demography*, 2013, *50* (6), 2151–2171.

_ , Jonathan Gruber, and Phillip Levine, "Abortion legalization and life-cycle fertility," *Journal of Human Resources*, 2007, *42* (2), 375–397.

[16] Senate Passes Bipartisan Criminal Justice Bill (December 18, 2017), *New York Times*. Retrieved from http://nytimes.com.

Angrist, Josh, "How do sex rratio affect marriage and labor markets? Evidence from America's second generation," *Quarterly Journal of Economics*, 2002, *117*, 997–1038.

Angrist, Joshua D. and William N. Evans, "Children and Their Parents' Labor Supply: Evidence from Exogenous Variation in Family Size," *The American Economic Review*, 1998, *88* (3), 450–477.

Argys, Laura M and H Elizabeth Peters, "Interactions between unmarried fathers and their children: The role of paternity establishment and child-support policies," *American Economic Review*, 2001, *91* (2), 125–129.

Autor, David, David Dorn, and Gordon Hanson, "When Work Disappears: Manufacturing Decline and the Falling Marriage-Market Value of Young Men," Working Paper 23173, National Bureau of Economic Research February 2018.

Bailey, Martha, Melanie Guldi, and Brad J. Hershbein, *Human Capital and History: The American Record*, Cambridge, MA: National Bureau of Economic Research,

Beale, Calvin, "Prisons, Population, and Jobs in Nonmetro America," *Rural Development Perspectives*, 1993, *8*, 16–19.

_ , "Rural Prisons: An Update," *Rural Development Perspectives*, 1996, *11*, 25–27.

Becker, Gary S., *A Treatise on the Family*, Cambridge, MA: Harvard University Press, 1981.

Bethmann, Dirk and Michael Kvasnicka, "World War II, Missing Men and Out of Wedlock Childbearing," *The Economic Journal*, 2012, *123* (567), 162–194.

Bhalotra, Sonia and Atheendar Venkataramani, "Shadows of the Captain of the Men of Death: Early Life Health Interventions, Human Capital Investments, and Institutions," August 2015.

Bitler, Marianne and Lucie Schmidt, "Marriage Markets and Family Formation: The Role of the Vietnam Draft," October 2011.

Bleakley, Hoyt, "Disease and Development: Evidence from Hookworm Eradication in the American South," *Quarterly Journal of Economics*, 2007, *122* (1), 73–117.

Bragg, Lucia, "LegisBrief," `http://www.ncsl.org/LinkClick.aspx?fileticket=pyN1H0_po7I%3d&tabid=32191&portalid=1` March 2018.

Brainerd, Elizabeth, "The Lasting Effect of Sex Ratio Imbalance on Marriage and Family: Evidence from World War II in Russia," *Review of Economics and Statistics*, May 2017, *99* (2), 229–242.

Braman, Donald, *Doing Time on the Outside: Incarceration and Family Life in Urban America*, University of Michigan Press, Ann Arbor, 2004.

Cameron, A. Colin and Pravin K Trivedi, *Microeconometrics using Stata*, Vol. 2, Stata press College Station, TX, 2010.

Center for Disease Control and Prevention, National Center for Health Statistics, "Vital Statistics Birth Data Files (1969-1988)."

Charles, Kerwin Kofi and Ming Ching Luoh, "Male Incarceration, the Marriage Mar-

ket, and Female Outcomes," *The Review of Economics and Statistics*, 2010, *92* (3), 614–627.

Cherlin, Andrew, *The Marriage-Go-Round: The State of Marriage and the Family in America Today*, New York: Alfred A. Knopf, 2009.

Chetty, Raj, Nathaniel Hendren, Patrick Kline, and Emmanuel Saez, "Where is the land of Opportunity? The Geography of Intergenerational Mobility in the United States *," *The Quarterly Journal of Economics*, 2014, *129* (4), 1553–1623.

Collins, James J and Donna L Spencer, "Evaluation of North Carolina's Structured Sentencing Law," Technical Report, Research Triange Institute 1999.

Currie, Janet and Hannes Schwandt, "Short- and long-term effects of unemployment on fertility," *PNAS*, 2014, *111* (41), 14734–14739.

Division of Prisons, North Carolina Department of Correction, "Handbook for Family and Friends of Inmates," https://www.doc.state.nc.us/Publications/2010Handbook.pdf 2010.

Dorn, David, "Essays on Inequality, Spatial Interaction, and the Demand for Skills." PhD dissertation, University of St. Gallen 2009.

Edin, Kathryn and Maria J. Kefalas, *Promises I Can Keep: Why Poor Women Put Motherhood Before Marriage*, University of California Press, 2011.

Ellwood, David T and Jonathan Crane, "Family Change Among Black Americans: What Do We Know?," *The Journal of Economic Perspectives*, 1990, pp. 65–84.

Finlay, Keith and David Neumark, "Is Marriage Always Good for Children? Evidence from Families Affected by Incarceration," *Journal of Human Resources*, 2010, *45* (4), 1046–1088.

Hitsch, Gunter J, Ali Hortaçsu, and Dan Ariely, "Matching and sorting in online dating," *American Economic Review*, 2010, *100* (1), 130–63.

Jacobsen, Joyce P., James Wishart Pearce, and Joshua L. Rosenbloom, "The Effects of Childbearing on Married Women's Labor Supply and Earnings: Using Twin Births as a Natural Experiment," *The Journal of Human Resources*, 1999, *34* (3), 449–474.

Kaeble, Danielle and Lauren E. Glaze, "Correctional Populations in the United States, 2015," *Bureau of Justice Statistics Report*, 2016.

Kearney, Melissa S and Riley Wilson, "Male Earnings, Marriageable Men, and Non-Marital Fertility: Evidence from the Fracking Boom," *Review of Economics and Statistics*, 2017, *100* (4), 678–690.

Lafortune, Jeanne, "Making Yourself Attractive: Pre-Marital Investments and the Returns to Education in the Marriage Market," *American Economic Journal: Applied Economics*, 2013, *5* (2), 151–178.

Lee, Wang-Sheng and Terra McKinnish, "The marital satisfaction of differently aged couples," *Journal of Population Economics*, Apr 2018, *31* (2), 337–362.

Lindo, Jason M., "Aggregation and the estimated effects of economic conditions on health," *Journal of Health Economics*, March 2015, *40*, 83–96.

Lofstrom, Magnus and Steven Raphael, "Crime, the Criminal Justice System, and Socioeconomic Inequality," *Journal of Economic Perspectives*, 2016, *30* (2), 103–126.

Love, Catherine, Richard J. David, Kristin M. Rankin, and James W. Collins Jr., "Exploring Weathering: Effects of Lifelong Economic Environment and Maternal Age on Low Birth Weight, Small for Gestational Age, and Preterm Birth in African-American and White Women," *American Journal of Epidemiology*, 2010, *172* (2), 127–134.

Lucas, Adrienne M, "Malaria eradication and educational attainment: evidence from Paraguay and Sri Lanka," *American Economic Journal: Applied Economics*, 2010, *2* (2), 46–71.

Lundberg, Shelly, Robert A. Pollak, and Jenna Stearns, "Family Inequality: Diverging Patterns in Marriage, Cohabitation, and Childbearing," *Journal of Economic Perspectives*, 2016, *30* (2), 79–102.

Lundborg, Petter, Erik Plug, and Astrid Würtz Rasmussen, "Can Women Have Children and a Career? IV Evidence from IVF Treatments," *American Economic Review*, June 2017, *107* (6), 1611–37.

MacKinnon, James and Matthew Webb, "Wild Bootstrap Inference for Wildly Different Cluster Sizes," *Journal of Applied Econometrics*, 2017, *32* (2), 233–254.

Markham, Jamie, "Fair Sentencing in a Nutshell," July 2014. Accessed December 1, 2017.

McCrary, Justin, "LEOKA and UCR Files," http://eml.berkeley.edu/ jmccrary/UCR/index.html 2013.

McLanahan, Sara, "Diverging Destinies: How Children Are Faring under the Second Demographic Transition," *Demography*, 2004, *41* (4), 607–627.

_ **, Laura Tach, and Daniel Schneider**, "The Causal Effects of Father Absence," *Annual Review of Sociology*, 2013, *39* (1), 399–427.

Mechoulan, Stéphane, "The External Effects of Black Male Incarceration on Black Females," *Journal of Labor Economics*, 2011, *29* (1), 1–35.

Miller, Amalia R., "The effects of motherhood timing on career path," *Journal of Population Economics*, 2011, *24*, 1071–1100.

Mustard, David B., *Handbook on the economics of crime*, Edward Elgar Publishing,

National Cancer Institute, SEER Program, "US Population Data – 1969–2015.," https://seer.cancer.gov/popdata/download.html December 2016.

Neal, Derek and Armin Rick, "The Prison Boom and Sentencing Policy," *The Journal of Legal Studies*, 2016, *45*, 1–203.

North Carolina Department of Public Safety, "Closed Prisons," February 2018.

_ , "Prison Facilities," February 2018.

_ , "Offender Public Information." Accessed October 2017.

North Carolina Department of Public Safety, Office of Research and Planning, "Research Bulletin," 1992-2000.

_ , "A.S.Q. Custom Offender Reports." Accessed June 2017.

North Carolina State Center for Health Statistics, "North Carolina Vital Statistics – 1989-2008 Birth Statistic Files," 1989-2008.

Oppenheimer, Valerie Kincade, Matthijs Kalmijn, and Nelson Lim, "Men's Career Development and Marriage Timig during a Period of Rising Inequality," *Demography*, 1997, *34* (3), 311–330.

Pager, Devah, *Marked: Race, Crime, and Finding Work in an Era of Mass Incarceration*, University of Chicago Press, 2008.

Pei, Zhuan, Jörn-Steffen Pischke, and Hannes Schwandt, "Poorly Measured Confounders are More Useful on the Left than on the Right," *Journal of Business & Economic Statistics*, 2018.

Rindfuss, Ronald R., "The Young Adult Years: Diversity, Structural Change, and Fertility," *Demography*, 1991, *28* (4), 493–512.

Ruggles, Steven, *Demography*, 2015, *52* (6), 1797–1823.

_ **, Katie Genadek, Ronald Goeken, Josiah Grover, and Matthew Sobek**, "Integrated Public Use Microdata Series: Version 6.0 [Machine-readable database]. Integrated Public Use Microdata Series: Version 6.0 [Machine-readable database]," Minneapolis: University of Minnesota 2015.

Travis, Jeremy, Bruce Western, and Steve Redburn, *The Growth of Incarceration in the United States*, Washington, DC: The National Academies Press, 2014.

United States Department of Agriculture, Economic Research Service, "Commuting Zones and Labor Market Areas," `https://www.ers.usda.gov/data-products/commuting-zones-and-labor-market-areas/` February 2012.

United States Department of Justice. Office of Justice Programs. Bureau of Justice Statistics, "Census of State and Federal Adult Correctional Facilities, 1990," 2001.

_ , "Census of State and Federal Adult Correctional Facilities, 1995," 2003.

_ , "Census of State and Federal Adult Correctional Facilities, 2000," 2005.

United States Department of Justice, Office of Justice Programs. Bureau of Justice Statistics, "National Prisoner Statistics, 1978-2013 (ICPSR 35608)," http://doi.org/10.3886/ICPSR35608.v1 January 2015. Inter-university Consortium for Political and Social Research [distributor].

United States Department of Labor, Bureau of Labor Statistics, "Employment status of the civilian noninstitutional population, 1976 to 2015 annual averages," https://www.bls.gov/lau/staadata.txt 2016.

Western, Bruce, *Punishment and Inequality in America*, New York: Russell Sage Foundation, 2006.

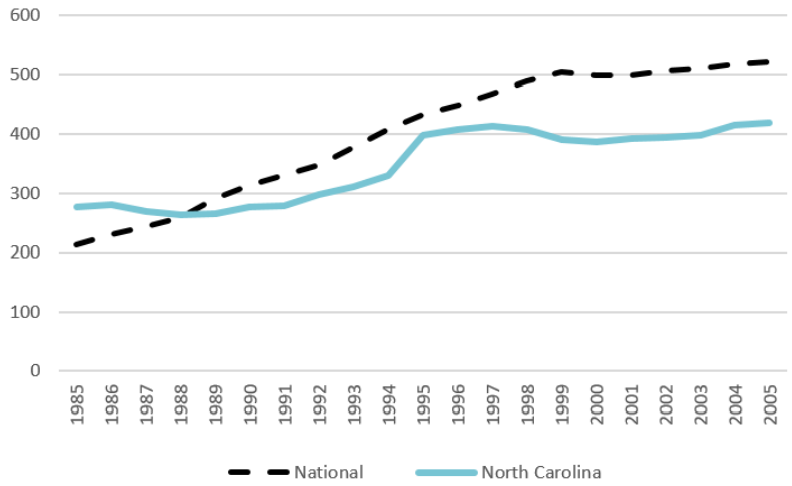
Wilson, William Julius, *The Truly Disadvantaged: The Inner City, the Underclass, and Public Policy*, University of Chicago Press, 1987.

Wright, Ronald F., "Counting the Cost of Sentencing in North Carolina, 1980–2000," *Crime and Justice*, 2002, *29*, 39–112.

_ **and Susan P. Ellis**, "A Progress Report on the North Carolina Sentencing and Policy Advisory Commission," *Wake Forest Law Review*, Summer 1993, *28*, 421–461.

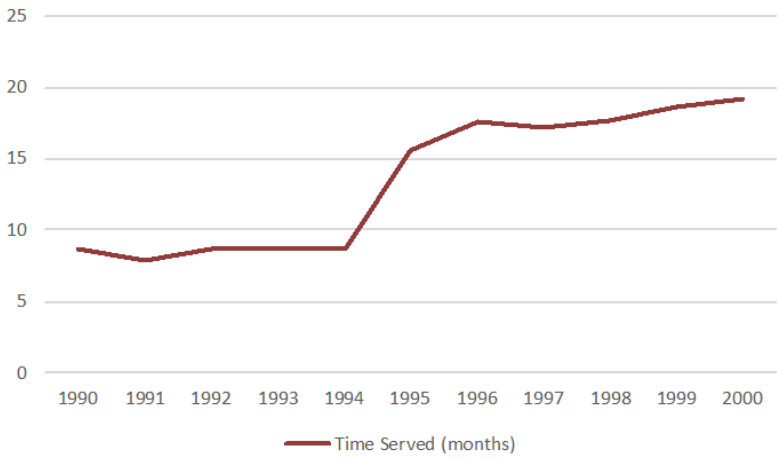
7 Figures

Figure 1: Prisoners per 100,000 population



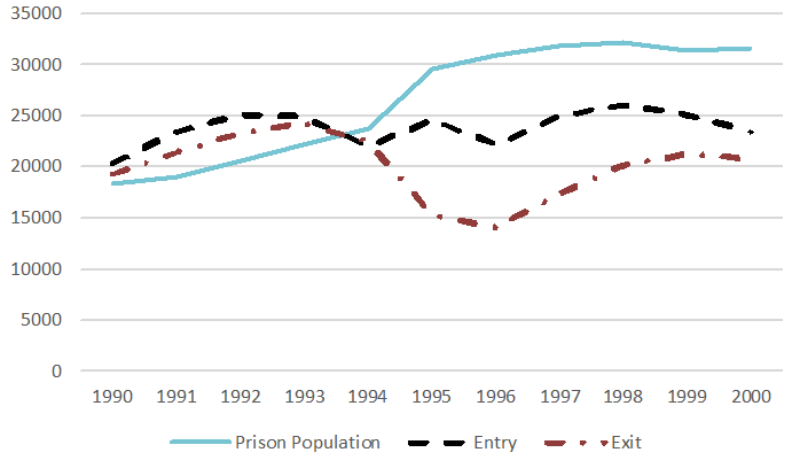
Source: Bureau of Justice Statistics, National Prisoner Statistics.

Figure 2: Average time served in months by year of entry for North Carolina prisoners, 1990 – 2000



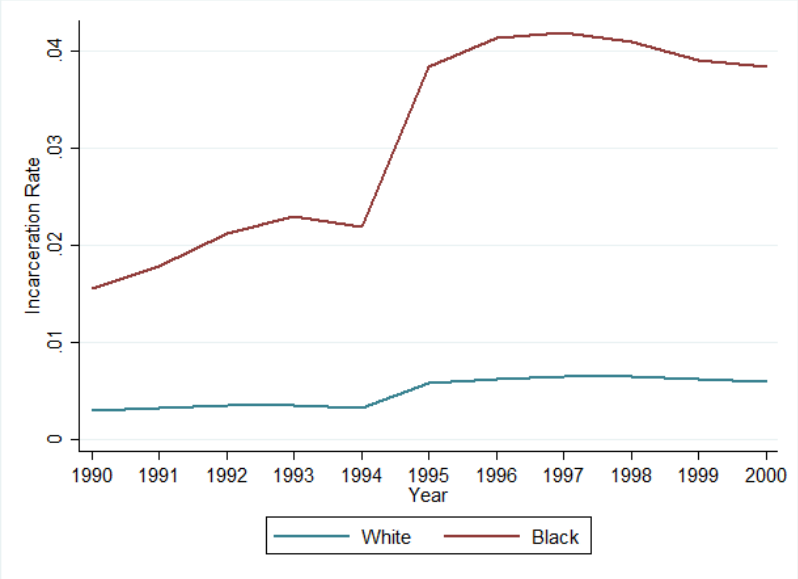
Source: North Carolina Department of Public Safety and author's calculations. Calculation of mean time served excludes prisoners serving life sentences.

Figure 3: North Carolina prison entry, exit, and population, 1990 – 2000



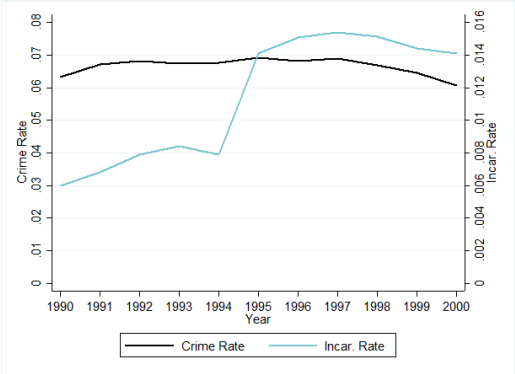
Source: North Carolina Department of Public Safety and author's calculations.

Figure 4: North Carolina adult male incarceration by race, 1990 – 2000

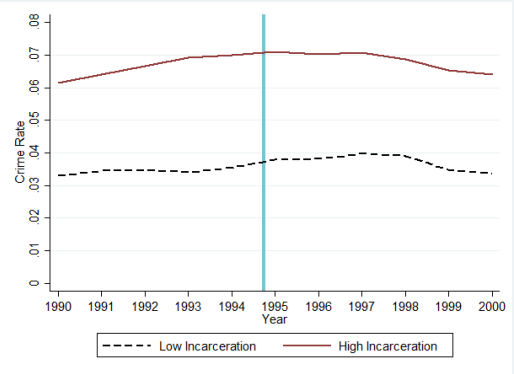


Includes men 15-44. Source: North Carolina Department of Public Safety and author's calculations.

Figure 5: Incarceration and crime rates, 1990 – 2000



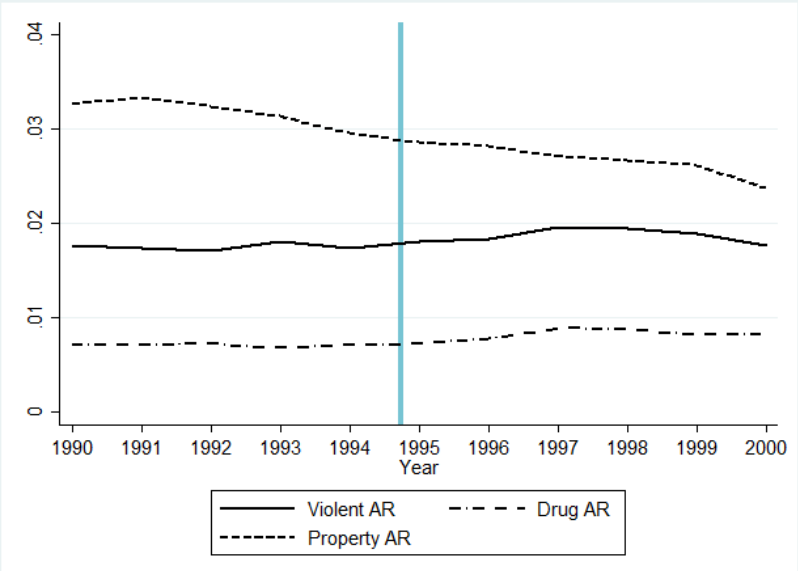
(a) Crime and male incarceration rates



(b) Crime in high and low incarceration CZs

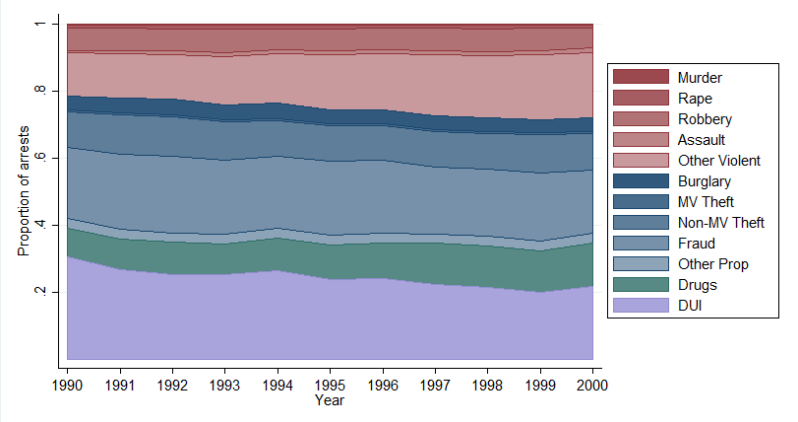
Source: North Carolina Department of Public Safety and the Federal Bureau of Investigation Unified Crime Reporting Program.

Figure 6: Incarceration and offense-specific arrest rates, 1990 – 2000



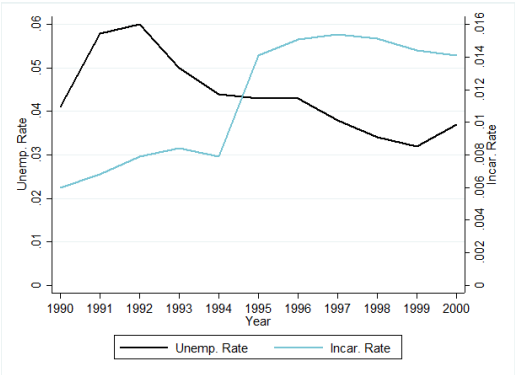
Source: North Carolina Department of Public Safety and the Federal Bureau of Investigation Unified Crime Reporting Program.

Figure 7: Offense composition of major arrests, 1990 – 2000

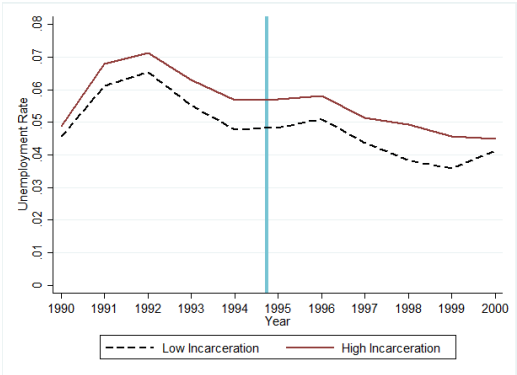


Source: North Carolina Department of Public Safety and the Federal Bureau of Investigation Unified Crime Reporting Program.

Figure 8: Incarceration and unemployment rates, 1990 – 2000



(a) Unemployment and male incarceration rates



(b) Unemployment in high and low incarceration CZs

Source: North Carolina Department of Public Safety and Bureau of Labor Statistics.

Figure 9: The effect of increased sentencing severity on total births, 1990 – 2000

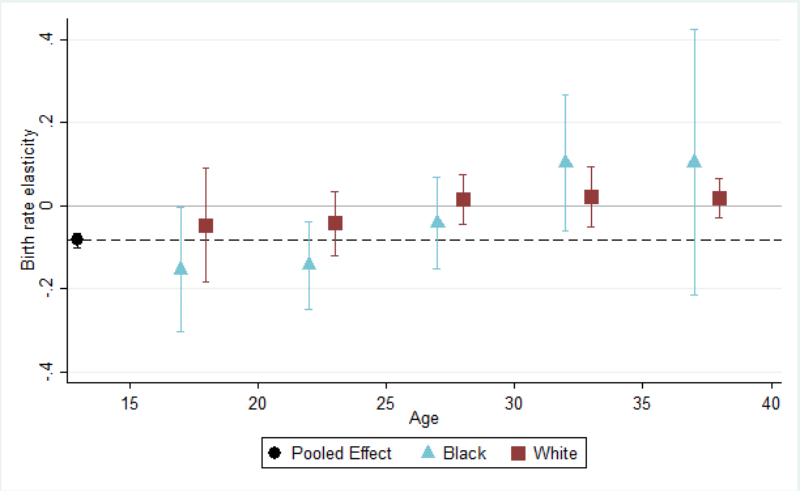
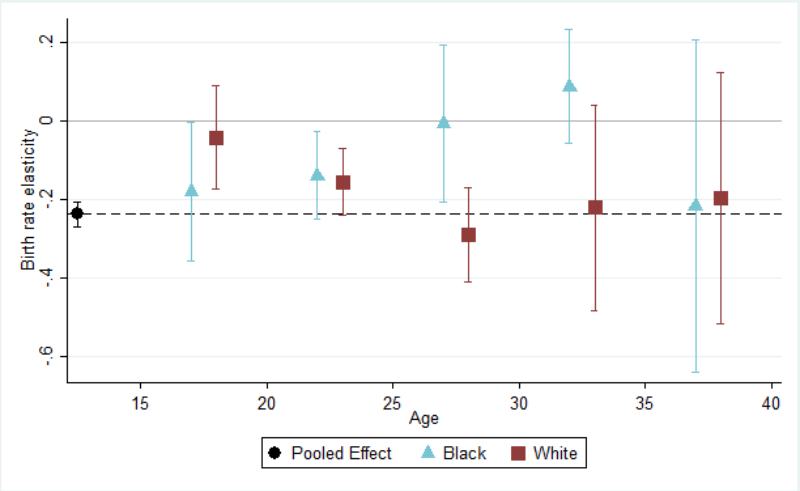


Figure 10: The effect of increased sentencing severity on births to unmarried women, 1990 – 2000



8 Tables

Table 1: Summary statistics

Variable	Mean	(Std. Dev.)	N
A. Mother's characteristics			
Black	0.279	0.449	1119
Married	0.676	0.22	1119
Teen	0.149	0.063	1119
Mother's age	25.885	1.472	1119
Less than HS	0.225	0.059	1119
HS or some college	0.554	0.092	1119
College or more	0.221	0.112	1119
B. Fertility outcomes			
Year of conception	1994.582	3.451	5760
Births	598.258	526.833	5760
Female population	16457.384	11954.708	5760
Birthrate	0.074	0.037	5760
Married birth rate	0.137	0.096	5580
Unmarried birth rate	0.036	0.032	5736
C. Partner market and CZ characteristics			
Pre-period incarceration rate	0.008	0.009	5760
Crime rate	0.068	0.019	5760
Unemployment rate	0.043	0.016	5280

Notes: Observations in panel A collapsed into race-CZ-half year cells with means weighted by the number of births in the cell. Observations in panels B and C collapsed into race-CZ-age-half year cells with means weighted by the female population for the cell.

Table 2: Summary statistics, by race

	White			Black		
Variable	Mean	(Std. Dev.)	N	Mean	(Std. Dev.)	N
A. Mother's characteristics						
Black	0	0	576	1	0	576
Married	0.810	0.046	576	0.331	0.053	576
Teen	0.117	0.033	576	0.233	0.039	576
Mother's age	26.547	1.116	576	24.179	0.711	576
Less than HS	0.212	0.054	576	0.261	0.039	576
HS or some college	0.525	0.088	576	0.633	0.043	576
College or more	0.262	0.098	576	0.106	0.048	576
B. Fertility outcomes						
Year of Conception	1994.578	3.454	2880	1994.596	3.443	2880
Births	703.063	559.66	2880	294.076	223.11	2880
Female population	19545	12184.818	2880	7490.245	4328.728	2880
Birthrate	0.072	0.034	2880	0.08	0.043	2880
Married birth rate	0.141	0.09	2880	0.126	0.113	2700
Unmarried birth rate	0.026	0.018	2880	0.067	0.043	2856
C. Partner market and CZ characteristics						
Pre-period incarceration rate	0.003	0.001	2880	0.021	0.009	2880
Crime rate	0.066	0.019	2880	0.076	0.019	2880
Unemployment rate	0.042	0.015	2640	0.046	0.017	2640

Notes: Observations in panel A collapsed into race-CZ-half year cells with means weighted by the number of births in the cell. Observations in panels B and C collapsed into race-CZ-age-half year cells with means weighted by the female population for the cell.

Table 3: The effect of increased severity on maternal composition, 1990 – 2000

	(1) Mean Age	(2) % Teens	(3) % Married	(4) Yrs Edu	(5) % Less than HS	(6) % HS/SC	(7) % Coll
A: All mothers							
Post*9093 IR	0.327**	-0.023***	0.013*	0.225*	-0.039**	0.030**	0.008
	(0.093)	(0.005)	(0.005)	(0.092)	(0.013)	(0.010)	(0.009)
R-Squared	0.978	0.956	0.995	0.951	0.883	0.946	0.985
Cells	980	980	980	980	980	980	980
B: Black mothers							
Post*9093 IR	1.172**	-0.068***	0.071*	0.287*	-0.041*	0.003	0.038
	(0.338)	(0.015)	(0.032)	(0.134)	(0.019)	(0.016)	(0.023)
R-Squared	0.853	0.786	0.815	0.909	0.738	0.740	0.902
Cells	476	476	476	476	476	476	476
C: White mothers							
Post*9093 IR	0.166	-0.015*	0.002	0.196	-0.036*	0.033**	0.002
	(0.126)	(0.006)	(0.005)	(0.121)	(0.016)	(0.011)	(0.013)
R-Squared	0.972	0.907	0.930	0.937	0.866	0.946	0.983
Cells	504	504	504	504	504	504	504

Notes: Observations collapsed into race-CZ-half year cells. Includes years 1990 – 2000. Column (1) dependent variable is the average age of women in the cell. Column (4) dependent variable is the cell-level average reported years of education. All other dependent variables are the cell-level mean of an indicator variable equal to one when the maternal characteristic listed at the top of the column is true. Regressions include controls for the area crime rate, clearance rate, local prison staffing, and the unemployment rate. Cells weighted by the number of births in the cell. Standard errors, in parenthesis, are clustered by CZ of residence. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 4: The effect of increased sentencing severity on long term fertility

	% No Children		Total Children	
	(1) At 35	(2) At 40	(3) At 35	(4) At 40
A: All women				
Post*9093 IR	-0.150	-0.118	0.368	0.253
	(0.161)	(0.180)	(0.349)	(0.395)
R-Squared	0.531	0.578	0.627	0.651
Cells	992	728	1123	889
B: Black women				
Post*9093 IR	-0.330	-0.262	0.732	0.569
	(0.163)	(0.147)	(0.360)	(0.350)
R-Squared	0.364	0.496	0.425	0.524
Cells	422	300	547	433
C: White women				
Post*9093 IR	-0.126	-0.104	0.313	0.218
	(0.178)	(0.193)	(0.390)	(0.426)
R-Squared	0.561	0.591	0.640	0.627
Cells	570	428	576	456

Notes: Observations collapsed into race-CZ-age group-cells. Includes births occurring 1968 to 2014 to women born in years 1955 to 1985. Dependent variables in columns (1) and (2) is the percentage of women in a cohort that are not observed having a first birth by the age denoted in the column header. Dependent variable in columns (3) and (4) is the total number of births observed to women in a cohort by the age denoted in the column header. Regressions are weighted by the size of the cohort. Standard errors clustered by CZ of residence. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 5: The effect of increased sentencing severity on father's characteristics, 1990 – 2000

	(1) Age diff	(2) Has less education	(3) Missing
A: All women			
Post*9093 IR	0.068*	0.004	0.019***
	(0.028)	(0.004)	(0.004)
R-Squared	0.839	0.727	0.973
Cells	4941	4940	5021
B: Black women			
Post*9093 IR	0.280*	0.023*	0.013
	(0.102)	(0.011)	(0.023)
R-Squared	0.587	0.730	0.906
Cells	2188	2187	2267
C: White women			
Post*9093 IR	0.023	-0.000	0.020***
	(0.019)	(0.004)	(0.004)
R-Squared	0.910	0.725	0.932
Cells	2753	2753	2754

Notes: Observations collapsed into race-CZ-age group-half year cells. Includes years 1990 – 2000. Dependent variable in column (1) is the cell average of the father's reported age minus the mother's reported age. Dependent variable in column (2) is the cell-level mean of an indicator equal to one if the reported education level of the father is less than the reported maternal education level. Dependent variable in column (3) is the cell-level mean of an indicator equal to one if all possible information about the father (age, race, and educational attainment) are missing from the birth record. Regressions include controls for the area crime rate, clearance rate, local prison staffing, and the unemployment rate. Regressions are weighted by cell-level number of births. Standard errors clustered by CZ of residence. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 6: The effect of increased sentencing severity on marriage, divorce, and cohabitation, 1990 to 2000

	(1) Married	(2) Divorced	(3) Never Married	(4) Cohabiting
A: All women				
Post*9093 IR	0.001	-0.003	0.014***	0.002
	(0.003)	(0.002)	(0.004)	(0.003)
R-Squared	0.006	0.032	0.107	0.031
Cells	234	234	234	234
B: Black women				
Post*9093 IR	0.001	0.004	-0.031	0.002
	(0.016)	(0.008)	(0.017)	(0.006)
R-Squared	0.022	0.038	0.130	0.158
Cells	114	114	114	114
C: White women				
Post*9093 IR	-0.014*	-0.002	0.027***	0.021***
	(0.005)	(0.004)	(0.005)	(0.004)
R-Squared	0.072	0.068	0.188	0.354
Cells	120	120	120	120

Notes: Observations collapsed into race-CZ-age group cells.. Dependent variable is the change in the percent of women in a cell that report the relationship status in the column header from 1990 and 2000. Regressions include controls for the area crime rate, clearance rate, local prison staffing, and the unemployment rate. Cells are weighted by the 1990 female population. Standard errors, in parenthesis, are clustered by CZ. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 7a: The effect of increased sentencing severity on births, robustness checks

	Specification					
	(1) Main	(2) + CZ Trend	(3) + Exp. Trend	(4) No Controls	(5) Linear	(6) Census Yrs
A: All women						
Post*9093 IR	-0.084***	-0.077***	-0.027***	-0.084***	-0.078**	-0.131***
	(0.008)	(0.007)	(0.007)	(0.009)	(0.026)	(0.011)
Cells	4935	4935	4935	4935	4588	916
B: Black women						
Post*9093 IR	-0.071	-0.057	-0.025	-0.092	-0.126*	-0.113
	(0.046)	(0.045)	(0.068)	(0.047)	(0.046)	(0.068)
Cells	2415	2415	2415	2415	2074	436
C: White women						
Post*9093 IR	-0.007	-0.001	0.023	-0.006	-0.067*	-0.059
	(0.034)	(0.032)	(0.016)	(0.036)	(0.029)	(0.060)
Cells	2520	2520	2520	2520	2514	480

Notes: Observations collapsed into race-CZ-age group-halfyear cells. Includes women aged 15-30 and years 1990 – 2000. Dependent variable in column (5) is the natural log of the birth rate. Dependent variable in all other columns is the number of births. Non-linear regressions include the natural log of the female population as a regressor. Linear regression is weighted by the applicable female population. Standard errors, in parenthesis, are clustered by CZ. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 7b: The effect of increased sentencing severity on births, robustness checks continued

	SSA Exposure			
	(1) Entry	(2) Same Age	(3) Level	(4)
A: All women				
Post*9093 IR	-0.090***	-0.080***	-7.815***	
	(0.009)	(0.009)	(0.805)	
Cells	4977	4788	5019	
B: Black women				
Post*9093 IR	-0.064*	-0.071	-3.090	
	(0.032)	(0.044)	(1.677)	
Cells	2457	2289	2499	
C: White women				
Post*9093 IR	-0.002	0.014	-1.909	
	(0.029)	(0.031)	(8.739)	
Cells	2520	2499	2520	

Notes: Observations collapsed into race-CZ-age group-halfyear cells. Includes women aged 15-30 and years 1990 – 2000. Dependent variable is the number of births. Non-linear regressions include the natural log of the female population as a regressor. Linear regression is weighted by the applicable female population. Standard errors, in parenthesis, are clustered by CZ. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 7c: The effect of increased sentencing severity on births, robustness checks continued

	Geography			
	(1) No Appalachia	(2) No W Prison	(3) No Raleigh	(4) No Charlotte
A: All women				
Post*9093 IR	-0.082***	-0.084***	-0.084***	-0.084***
	(0.007)	(0.012)	(0.012)	(0.012)
Cells	2940	4515	4725	4515
B: Black women				
Post*9093 IR	-0.071	-0.084	-0.070	-0.076
	(0.060)	(0.048)	(0.041)	(0.051)
Cells	1470	2205	2310	2205
C: White women				
Post*9093 IR	-0.009	0.037	0.013	-0.009
	(0.037)	(0.033)	(0.035)	(0.040)
Cells	1470	2310	2415	2310

Notes: Observations collapsed into race-CZ-age group-halfyear cells. Includes women aged 15-30 and years 1990 – 2000. Dependent variable is the number of births. Non-linear regressions include the natural log of the female population as a regressor. Linear regression is weighted by the applicable female population. Standard errors, in parenthesis, are clustered by CZ. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 8a: The effect of increased sentencing severity on births to unmarried women, robustness checks

	Specification					
	(1) Main	(2) + Trend	(3) Exp. Trend	(4) No Controls	(5) Linear	(6) Census Yrs
A: All women						
Post*9093 IR	-0.238***	-0.222***	-0.035**	-0.238***	-0.040	-0.396***
	(0.016)	(0.013)	(0.012)	(0.016)	(0.038)	(0.023)
Cells	4891	4891	4914	4891	4396	912
B: Black women						
Post*9093 IR	-0.115*	-0.098	-0.052	-0.162**	-0.078	-0.154
	(0.055)	(0.052)	(0.084)	(0.060)	(0.046)	(0.079)
Cells	2371	2371	2394	2371	1984	432
C: White women						
Post*9093 IR	-0.160**	-0.143**	-0.041	-0.172**	-0.023	-0.179
	(0.056)	(0.051)	(0.032)	(0.058)	(0.056)	(0.142)
Cells	2520	2520	2520	2520	2412	480

Notes: Observations collapsed into race-CZ-age group-halfyear cells. Includes women aged 15-30 and years 1990 – 2000. Dependent variable in column (5) is the natural log of the birth rate. Dependent variable in all other columns is the number of births to unmarried women. Non-linear regressions include the natural log of the female population as a regressor. Linear regression is weighted by the applicable female population. Standard errors, in parenthesis, are clustered by CZ. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 8b: The effect of increased sentencing severity on births to unmarried women, robustness checks continued

	SSA Exposure			
	(1) Entry	(2) Same Age	(3) Levels	(4)
A: All women				
Post*9093 IR -0.264***	-0.248***	-20.928***		
	(0.020)	(0.018)	(2.099)	
Cells	4933	4767	4998	
B: Black women				
Post*9093 IR	-0.121***	-0.101	-4.011	
	(0.036)	(0.054)	(2.360)	
Cells	2413	2268	2478	
C: White women				
Post*9093 IR	-0.166***	-0.078	-31.016*	
	(0.049)	(0.064)	(15.615)	
Cells	2520	2499	2520	

Notes: Observations collapsed into race-CZ-age group-halfyear cells. Includes women aged 15-30 and years 1990 – 2000. Dependent variable is the number of births to unmarried women. Non-linear regressions include the natural log of the female population as a regressor. Linear regression is weighted by the applicable female population. Standard errors, in parenthesis, are clustered by CZ. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 8c: The effect of increased sentencing severity on births to unmarried women, robustness checks continued

	Geography				
	(1) No Appalachia	(2) No W Prison	(3) No Raleigh	(4) No Charlotte	(5)
A: All women					
Post*9093 IR	-0.232***	-0.239***	-0.237***	-0.237***	
	(0.014)	(0.021)	(0.020)	(0.022)	
Cells	2940	4471	4681	4471	
B: Black women					
Post*9093 IR	-0.126*	-0.141**	-0.110*	-0.149*	
	(0.062)	(0.052)	(0.051)	(0.060)	
Cells	1470	2161	2266	2161	
C: White women					
Post*9093 IR	-0.160***	-0.076	-0.096	-0.161*	
	(0.046)	(0.057)	(0.059)	(0.069)	
Cells	1470	2310	2415	2310	

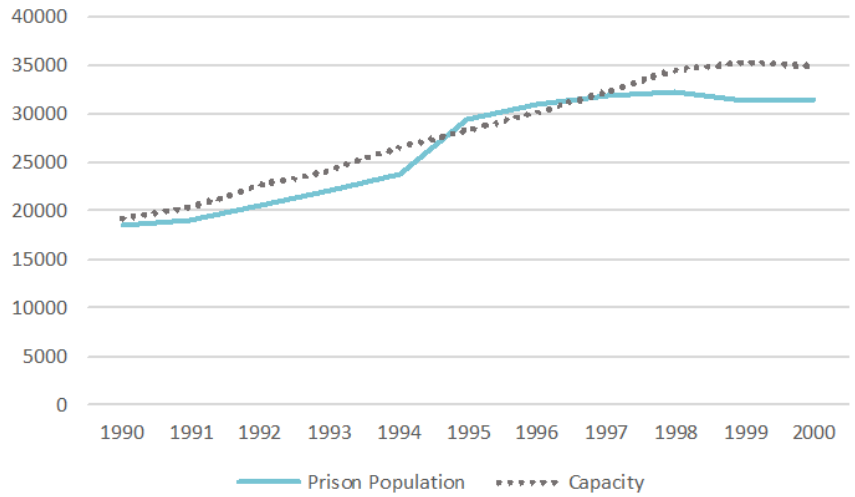
Notes: Observations collapsed into race-CZ-age group-halfyear cells. Includes women aged 15-30 and years 1990 – 2000. Dependent variable is the number of births to unmarried women. Non-linear regressions include the natural log of the female population as a regressor. Linear regression is weighted by the applicable female population. Standard errors, in parenthesis, are clustered by CZ. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Appendix

This section presents additional tables and figures not included in the main text.

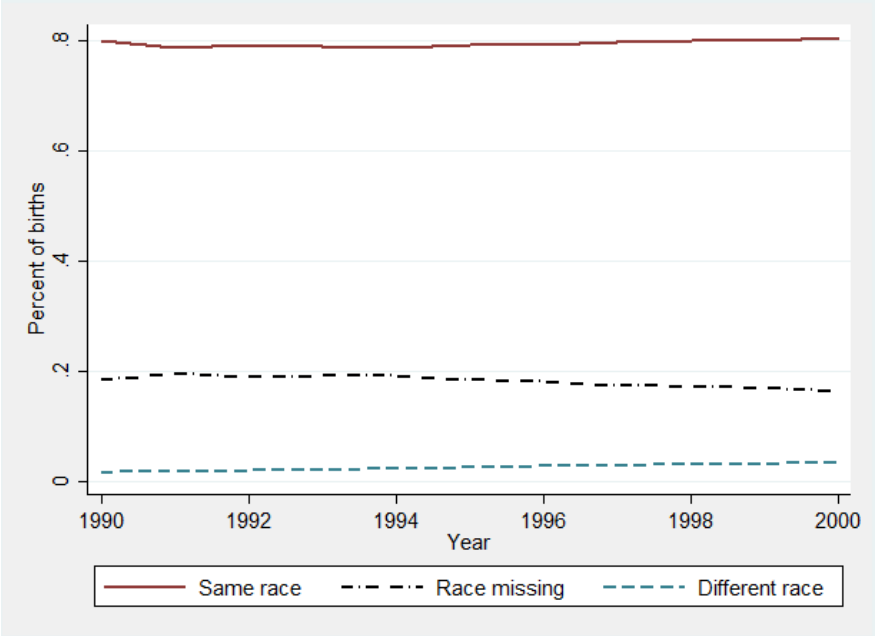
A1 Additional figures

Figure A1: North Carolina prison population and capacity, 1990 – 2000



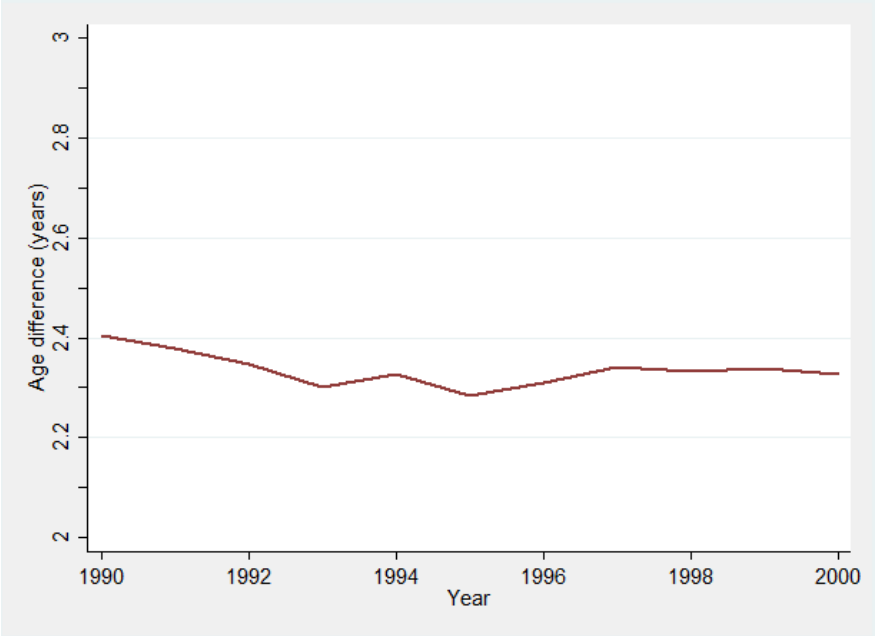
Source: North Carolina Department of Public Safety and the Census of State and Federal Adult Correctional Facilities.

Figure A2: Comparing mothers' and fathers' races as reported on the birth record, 1990 – 2000



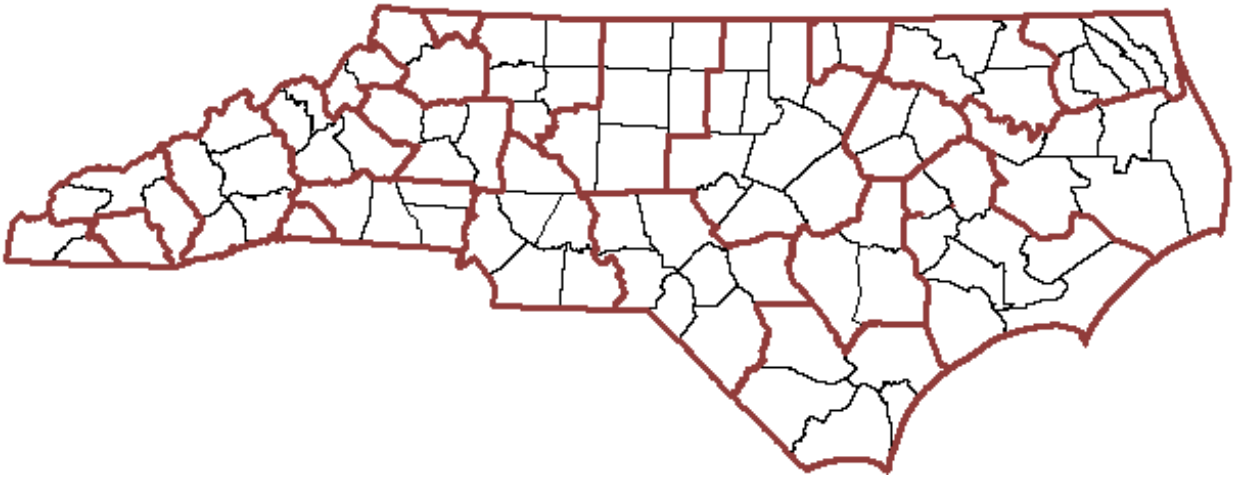
Source: North Carolina Detailed Birth Database.

Figure A3: Comparing mothers' and fathers' ages as reported on the birth record, 1990 – 2000



Source: North Carolina Detailed Birth Database.

Figure A4: North Carolina Counties and Commuting Zones



A2 Additional tables

Table A1: Using pre-period incarceration rates to predict current incarceration rates, 1995-2000

	Unweighted		Weighted	
	(1) No FX	(2) With FX	(3) No FX	(4) With FX
A: All men				
IR 9093	1.794***	1.297***	1.997***	1.686***
	(0.258)	(0.344)	(0.066)	(0.097)
F	48.44	14.19	925.17	300.20
Cells	1728	1728	1728	1728
B: Black men				
IR 9093	1.444***	1.069***	1.709***	0.990***
	(0.337)	(0.322)	(0.079)	(0.127)
F	18.42	11.00	462.48	61.16
Cells	864	864	864	864
C: White men				
IR 9093	1.431***	0.644***	1.497***	1.031***
	(0.120)	(0.176)	(0.096)	(0.119)
F	142.14	13.41	241.74	74.57
Cells	864	864	864	864

Notes: The dependent variable for each column is the age-race-CZ male incarceration rate. Each observation represents a race-CZ-age group-year. Regressions are weighted by the applicable female population were indicated. Where indicated, regressions include partner market and year fixed effects. Incarceration data are from the North Carolina DPS and population data are from SEER.Standard errors are clustered by CZ. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table A2: LHS Balance tests from Pei et al. (2018)

	(1) Crime Rate	(2) Clearance rate	(3) Unemp. Rate	(4) Prison staffing
A: Unweighted				
Post*9093 IR	-0.000	0.002	0.181	0.055
	(0.001)	(0.007)	(0.226)	(0.035)
LHS Joint balancing test				
p-value	0.478			
Cells	4956	4956	4956	4956
B: Weighted by population				
Post*9093 IR	0.003	-0.004	-0.080	0.011
	(0.002)	(0.009)	(0.138)	(0.010)
LHS Joint balancing test				
p-value	0.137			
Cells	4956	4956	4956	4956

Notes: Observations collapsed into race-CZ-age group-half year cells. Includes years 1990 – 2000. Dependent variable in column (1) is the CZ crime rate, in column (2) is the CZ clearance rate, in column (3) is the CZ unemployment rate, in column (4) is the CZ prison staffing. Regressions are weighted by cell female population in panel B. Standard errors clustered by CZ of residence. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table A3: The effect of increased sentencing severity on propensity to move between 1995 and 2000

	(1) All	(2) Black	(3) White
9093 IR	-0.022	-0.035	-0.020
	(0.014)	(0.033)	(0.016)
R-Squared	0.970	0.944	0.977
Cells	281	137	144

Notes: This table reports estimates of the associated between the pre-NCSSA partner market incarceration rate and women's migration status. Observations collapsed into race-CZ-age group-year cells. Dependent variable is the percent of women in a cell that report they migrated across public use microdata areas between 1995 and 2000. Cells are weighted by the 1990 female population. Standard errors, in parenthesis, are clustered by CZ. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table A4: The effect of increased sentencing severity on total births

	(1) All Ages	(2) 15-19	(3) 20-24	(4) 25-29	(5) 30-34	(6) 35-39
A: All women						
Post*9093 IR	-0.084***	-0.085	-0.064*	0.012	0.043	0.047
	(0.008)	(0.052)	(0.025)	(0.023)	(0.033)	(0.035)
Cells	4935	987	987	987	987	987
B: Black women						
Post*9093 IR	-0.071	-0.154*	-0.144**	-0.043	0.103	0.105
	(0.046)	(0.077)	(0.054)	(0.056)	(0.084)	(0.163)
Cells	2415	483	483	483	483	483
C: White women						
Post*9093 IR	-0.007	-0.048	-0.043	0.014	0.022	0.018
	(0.034)	(0.070)	(0.040)	(0.030)	(0.037)	(0.024)
Cells	2520	504	504	504	504	504

Notes: This table reports estimates of the interaction of the pre-NCSSA partner market incarceration rate and a post-NCSSA dummy as in equation **??**. Observations collapsed into race-CZ-age group-halfyear cells. Includes years 1990 – 2000. The dependent variable is the number of births. Regressions include the natural log of the female population as a regressor, as well as controls for the CZ crime rate, clearance rate, local prison staffing, and the unemployment rate. Standard errors, in parenthesis, are clustered by CZ. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table A5: The effect of increased sentencing severity on births to unmarried women

	(1) All Ages	(2) 15-19	(3) 20-24	(4) 25-29	(5) 30-34	(6) 35-39
A: All women						
Post*9093 IR	-0.238***	-0.101	-0.173***	-0.170**	-0.062	-0.146
	(0.016)	(0.052)	(0.045)	(0.058)	(0.080)	(0.146)
Cells	4891	987	968	985	987	964
B: Black women						
Post*9093 IR	-0.115*	-0.180*	-0.139*	-0.007	0.088	-0.217
	(0.055)	(0.090)	(0.057)	(0.102)	(0.074)	(0.216)
Cells	2371	483	464	481	483	460
C: White women						
Post*9093 IR	-0.160**	-0.042	-0.156***	-0.291***	-0.222	-0.198
	(0.056)	(0.067)	(0.043)	(0.062)	(0.134)	(0.164)
Cells	2520	504	504	504	504	504

Notes: This table reports estimates of the interaction of the pre-NCSSA partner market incarceration rate and a post-NCSSA dummy as in equation **??**. Observations collapsed into race-CZ-age group-halfyear cells. Includes years 1990 – 2000. The dependent variable is the number of births to unmarried women. Regressions include the natural log of the unmarried female population as a regressor, as well as controls for the CZ crime rate, clearance rate, local prison staffing, and the unemployment rate. Standard errors, in parenthesis, are clustered by CZ. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table A6: The effect of increased sentencing severity on births to married women

	(1) All Ages	(2) 20-24	(3) 25-29	(4) 30-34	(5) 35-39
A: All women					
Post*9093 IR	-0.053***	-0.055	0.008	0.050	0.095*
	(0.011)	(0.032)	(0.022)	(0.041)	(0.045)
Cells	3859	939	987	971	962
B: Black women					
Post*9093 IR	0.110	-0.173	0.001	0.302*	0.423*
	(0.115)	(0.119)	(0.130)	(0.123)	(0.207)
Cells	1843	435	483	467	458
C: White women					
Post*9093 IR	-0.004	-0.052	0.021	0.025	0.050
	(0.025)	(0.039)	(0.025)	(0.045)	(0.034)
Cells	2016	504	504	504	504

Notes: This table reports estimates of the interaction of the pre-NCSSA partner market incarceration rate and a post-NCSSA dummy as in equation **??**. Observations collapsed into race-CZ-age group-halfyear cells. Includes years 1990 – 2000. The dependent variable is the number of births to married women. Regressions include the natural log of the married female population as a regressor, as well as controls for the CZ crime rate, clearance rate, local prison staffing, and the unemployment rate. Standard errors, in parenthesis, are clustered by CZ. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.