Appendix A: Data

We use data from reports submitted to the IRS in 2014 as required by IRC 6116. This law required states and the Federal Bureau of Prisons to provide information regarding prisoners who were incarcerated as of August 31, 2012 or released during the prior two calendar years (and subsequently each year thereafter). If an inmate was incarcerated multiple times within this period, prison authorities were asked to record each period of incarceration.[13] Each authority is supposed to provide identifying information of the inmate, the dates of incarceration and release (or projected release), and information on the institution of incarceration. In practice, states responded a variety of ways, some states excluded key information, and states provided data corresponding to differing timeframes. We discuss these problems and how we address them below.

First, not all authorities report information for the same dates. The reporting frames range from 2009 to 2013, but some states only report information from 2010 and 2011, others only for a few months in 2013. Appendix Figure A1 details the duration of reporting by each state. The varying sample frame means both that some states include more individuals (because states with longer frames capture more releases or incarcerations), and also that the sample in those states is biased toward including inmates with shorter-duration sentences. We adjust for these sources of bias by weighting each observation by the likelihood of being observed on a single day (i.e., in proportion to the ratio of the sentence length to the sampling frame plus the sentence length). Some states failed to report release dates for some prisoners, in which case we assume the sentence ends in the year state reporting ends.

Second, the coverage and sample universe of the data appears to vary from state to state. Unfortunately, neither the IRS instructions nor the authorities' submissions describe key aspects of the sample universe including: (1) whether the population reflects sentenced inmates or includes inmates temporarily detained (such as those awaiting trial or sentencing), (2) whether the population represents inmates under the authorities' jurisdiction or their custody, (3) whether the population includes only state or both state and local inmates. Some states appear to report data for all individuals incarcerated for any period of time, including sentences of less than a year (and potentially individuals not sentenced at all). Many but not all states appear to define the universe as sentenced individuals serving sentences for at least a year and some states appear to report individuals in prison and jail (some states house all their incarcerated individuals in the state system). The universe of sentenced individuals serving at least one year is the same reporting convention used by the Bureau of Justice Statistics' (BJS) National Prisoner Survey (NCRP). In our primary estimates of employment outcomes, we exclude all individuals incarcerated for less than a year or who do not appear to be sentenced.

Third, Social Security Numbers (SSNs) or Tax Identification Numbers (TINs) are not available for all inmates, and the proportion for which they are available varies considerably by state. In many cases, states provided TINs, which turned out to be erroneous or invalid. Appendix Figure 3 shows the share of individuals with valid TINs reported by each state relative to that of the IRS population. We assume these TINs are missing at random and reweight the sample of prisoners with valid TINs based on the relative propensity to observe a valid TIN based on state of incarceration, age, sentence length, and gender. The intent of this step is to scale up the identified inmates to match the totals reported by the IRS. These steps result in a sample of individuals with valid TINs adjusted to reflect the probability of being observed on a single day in 2012.

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13. In practice, authorities appear sometimes to have recorded multiple concurrent or overlapping records, some of which appear to be transfers or concurrent sentences, some of which appear to be releases and re-incarcerations. Given the narrow time window of our analysis and focus on pre- and post-incarceration outcomes, our general approach was to assume that individuals were incarcerated over the period from their first incarceration date to their last release date.

Appendix Table A2 shows the initial result of this reweighting and adjustment. The first column shows the unweighted IRS state totals, which include 2.9 million individual prisoners. Adjusting for the likelihood of observing an individual on a single day, using information on sentence length and the duration of state reporting, yields the data in column 2, where the sum of the weights is 1.5 million—almost exactly the same as the BJS total prisoner population in 2012. The third column removes individuals sentenced less than one year, which reduces the sum of the weighted observations to 1.4 million. (Individuals with short sentence lengths have a low probability of being observed on a single day.) Individuals sentenced to more than a year of prison in DC are held in Federal prison.

With the exception of a few states, the above adjustments substantially narrow the difference between the raw totals and the point-in-time, prisoner totals in BJS. However, in several states differences remain. We suspect these differences arise because of incomplete reporting by some states. (For instance, we suspect Hawaii might report prisoners in its custody but not those under its jurisdiction but housed outside of Hawaii or in Vermont we cannot differentiate individuals sentenced or not.) We therefore form a final weight as the total 2012 BJS total state or federal prison population divided by the sum of the weighted IRS observations. For analysis at the national level, this ensures that each state's prisoners contribute to the estimates in proportion to their share of the BJS prison population.

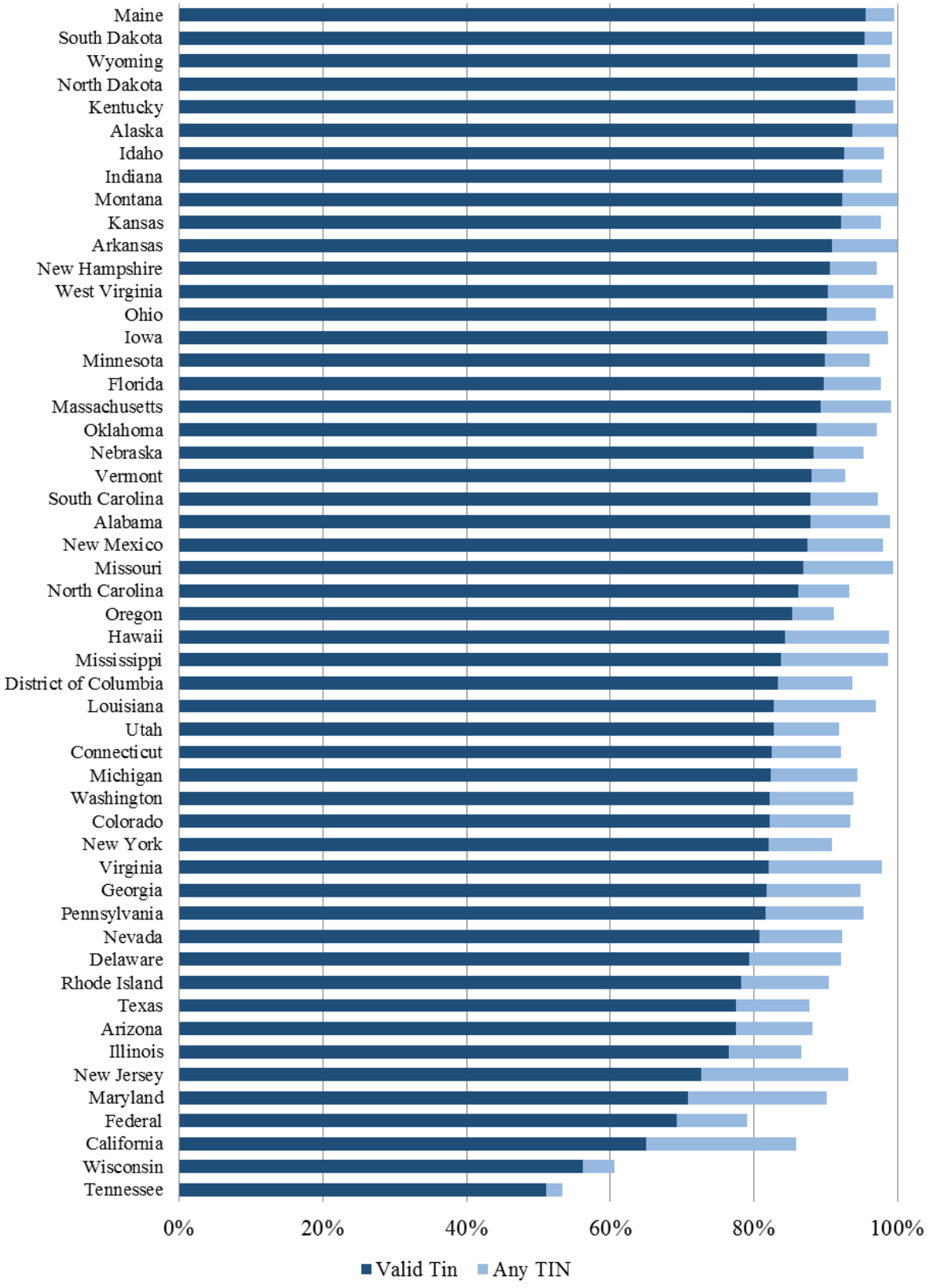
Appendix Table A2 provides summary statistics on the resulting sample. The sample is 92 percent male, the median age of prisoners is 36, and sentencing information is available for 82 percent of the sample. The gender and age distribution is very close to those estimated by BJS. The main employment and earnings outcomes are estimated directly from this sample.

For the results pertaining to family income percentile, we use the dataset constructed by Chetty et al. (2014) to identify parents and family income. To form estimates of incarceration rates within this sample, after matching incarcerated individuals to their parents' information we calibrate the average incarceration rate of the matched 1980-1986 IRS sample to two benchmarks. First, we scale the IRS measured rate to equal the average incarceration rate in adult correctional facilities recorded in the 2014 ACS (which includes data from 2010-2014) for the same cohorts of men and women born in 1980-1986. This estimate forms the primary data in the figures relating incarceration to parent income and includes individuals in either prison or in jail. Second, we benchmark the IRS estimates to the BJS incarceration rate of men and women age 30-34 as reported in Carson and Golinelli (2013). In short, each observation is weighted by the ratio of the average ACS (or BJS) incarceration rate of men or women to the IRS-reported average incarceration rate of men or women. (Because the IRS and BJS incarceration rates are so similar, this latter adjustment has little effect.)

For the results showing incarceration rates by childhood neighborhood, IRS-estimated incarceration rates for childhood residents of each state are benchmarked against the ACS incarceration rate in adult correctional facilities for the same 1980-1986 birth cohorts by state of birth or, for immigrants arriving prior to 1997, their state of residence. In short, the incarceration rates estimated for each state resident are inflated (or deflated) by the ratio of the ACS-estimated incarceration rate of individuals born in each state to the IRS-estimated incarceration rate of individuals by their state of childhood residence.

APPENDIX FIGURE A1: APPARENT DURATION OF REPORTING BY STATE

APPENDIX FIGURE A2: TINS PROVIDED AND VALIDATED, BY STATE



APPENDIX TABLE A1: IMPACT OF REWEIGHTING ON STATE TOTALS

Table A1: Impact of Reweighting on State Totals

	Unweighted IRS	Adjusted for Timing and Sentencing		BJS 2012	Ratio BJS/IRS	
	Total (ex. Duplicates)	All Incarcerated	Sentenced	Sentenced	All	Sentenced
Jurisdiction						
Alabama	39,742	29,892	29,806	31,437	0.95	0.95
Alaska	35,329	3,725	2,680	2,974	0.80	1.11
Arizona	77,485	37,239	34,478	38,402	1.03	1.11
Arkansas	16,322	12,495	12,409	14,615	1.17	1.18
California	144,379	130,067	130,067	134,211	1.03	1.03
Colorado	39,499	19,765	18,343	20,462	1.04	1.12
Connecticut	60,843	14,141	11,163	11,961	0.85	1.07
Delaware	29,579	5,030	4,229	4,129	0.82	0.98
District of Columbia	23,408	3,143				
Federal	429,972	228,841	214,963	196,574	0.86	0.91
Florida	182,680	102,770	97,081	101,930	0.99	1.05
Georgia	99,852	51,727	48,414	53,990	1.04	1.12
Hawaii	2,835	2,527		3,819	1.51	
Idaho	15,118	9,340	8,832	7,985	0.85	0.90
Illinois	105,431	43,471	37,227	49,348	1.14	1.33
Indiana	68,346	35,993	33,221	28,822	0.80	0.87
Iowa	18,602	7,758	6,745	8,686	1.12	1.29
Kansas	9,556	7,284	7,282	9,398	1.29	1.29
Kentucky	52,153	21,794	19,237	21,466	0.98	1.12
Louisiana	74,090	39,314	36,151	40,170	1.02	1.11
Maine	2,842	2,049	2,049	1,932	0.94	0.94
Maryland	35,926	23,706	23,704	21,281	0.90	0.90
Massachusetts	17,432	10,380	10,111	9,999	0.96	0.99
Michigan	71,343	47,269	46,549	43,594	0.92	0.94
Minnesota	21,910	7,892	6,611	9,938	1.26	1.50
Mississippi	42,015	20,430	18,411	21,426	1.05	1.16
Missouri	65,514	28,244	25,021	31,244	1.11	1.25
Montana	2,814	1,976	1,976	3,609	1.83	1.83
Nebraska	11,570	5,153	4,565	4,594	0.89	1.01
Nevada	25,406	13,945	13,474	12,761	0.92	0.95
New Hampshire	5,253	2,304	2,098	2,790	1.21	1.33
New Jersey	39,612	17,791	16,886	23,225	1.31	1.38
New Mexico	13,130	6,177	5,473	6,574	1.06	1.20
New York	101,137	50,164	45,823	54,073	1.08	1.18
North Carolina	92,713	40,049	34,594	34,983	0.87	1.01
North Dakota	3,588	1,321	1,089	1,512	1.14	1.39
Ohio	98,245	51,152	46,799	50,876	0.99	1.09
Oklahoma	39,770	29,897	29,896	24,830	0.83	0.83
Oregon	15,001	14,493	13,759	14,801	1.02	1.08
Pennsylvania	86,995	47,120	44,854	50,918	1.08	1.14
Rhode Island	6,626	2,211	1,834	1,999	0.90	1.09
South Carolina	44,792	23,807	22,048	21,725	0.91	0.99
South Dakota	4,234	3,078	3,067	3,644	1.18	1.19
Tennessee	33,541	21,102	20,755	28,411	1.35	1.37
Texas	326,914	148,801	131,364	157,900	1.06	1.20
Utah	10,204	4,787	4,482	6,960	1.45	1.55
Vermont	11,593	4,203	1,930	1,516	0.36	0.79
Virginia	49,267	29,466	28,296	37,044	1.26	1.31
Washington	29,451	15,050	13,775	17,254	1.15	1.25
West Virginia	13,413	7,229	6,848	7,027	0.97	1.03
Wisconsin	44,075	20,637	18,777	20,474	0.99	1.09
Wyoming	3,467	2,199	2,123	2,204	1.00	1.04
Total	2,895,014	1,510,401	1,401,370	1,511,497	1.00	1.08

APPENDIX TABLE A2: SUMMARY STATISTICS

Jurisdiction	Male	Age (Mean)	Age (Median)	Sentence Missing/Other
Alabama	92%	38	37	59%
Alaska	88%	38	36	28%
Arizona	89%	37	35	10%
Arkansas	92%	38	36	11%
California	94%	39	37	30%
Colorado	90%	38	36	20%
Connecticut	93%	35	33	24%
Delaware	92%	36	34	28%
District of Columbia	91%	35	33	32%
Federal	91%	39	37	17%
Florida	92%	38	36	19%
Georgia	92%	37	35	21%
Hawaii	90%	40	39	19%
Idaho	86%	36	34	13%
Illinois	92%	36	35	18%
Indiana	90%	36	34	10%
Iowa	92%	37	35	21%
Kansas	94%	37	35	1%
Kentucky	88%	36	34	15%
Louisiana	93%	38	36	25%
Maine	93%	36	34	2%
Maryland	95%	37	35	12%
Massachusetts	93%	39	38	21%
Michigan	95%	38	37	12%
Minnesota	92%	36	34	22%
Mississippi	91%	36	34	21%
Missouri	91%	37	36	22%
Montana	93%	40	39	5%
Nebraska	91%	36	34	18%
Nevada	90%	38	37	33%
New Hampshire	94%	40	38	72%
New Jersey	95%	36	34	16%
New Mexico	90%	38	36	28%
New York	95%	38	36	9%
North Carolina	92%	37	36	23%
North Dakota	89%	35	33	66%
Ohio	91%	36	34	10%
Oklahoma	89%	37	36	9%
Oregon	90%	39	37	13%
Pennsylvania	94%	38	36	15%
Rhode Island	94%	37	36	26%
South Carolina	93%	36	34	17%
South Dakota	88%	37	34	86%
Tennessee	95%	37	36	13%
Texas	91%	38	37	18%
Utah	91%	38	36	55%
Vermont	84%	36	33	60%
Virginia	91%	38	37	15%
Washington	91%	38	36	16%
West Virginia	88%	37	34	19%
Wisconsin	93%	37	35	13%
Wyoming	89%	36	34	14%
Total	92%	38	36	18%

Appendix B: Additional data on employment by of prisoners

Figure 1 and Table 1 in the main text provide raw means of employment, earnings, and tax filing status by year relative to employment. Because the panel is unbalanced (because the sampling frame differs by state and because of differences in sentence length), the pre- and post-incarceration outcomes do not refer to exactly the same individuals. In this appendix we estimates of earnings and employment by calendar year and year of incarceration, and pre- and post-employment outcomes for a balanced panel for each state.

Tables B1 (B2) provide the employment rate (defined as earnings>0) for prisoners by calendar and by year of incarceration (release). For instance, individuals who would be incarcerated in 2003 (row 3) had, in 2001 (column 1), a 50 percent employment rate; individuals incarcerated in 2007 had a 45 percent employment rate in 2005; and individuals incarcerated in 2011 had an employment rate of 36 percent in 2009 (a recession year; in 2008 their employment rate was 44 percent). In general, employment rates vary little across cohorts or across calendar year (with the exception of the recession, in which employment rates of future prisoners fell by roughly ten percentage points). Similarly, upon leaving prison (Table B2), different release cohorts fared similarly in subsequent years, with the pattern of employment largely the same one and two years after incarceration. In other words, the poor labor market outcomes before and after incarceration observed in the aggregate seem to apply generally to different cohorts and in different years.

Figure B1 shows the average employment rate of male prisoners in each state in the last full calendar year prior to their incarceration and in the calendar year of their release for individuals who are observed in both periods (a balanced sample). [14] Post-incarceration outcomes vary across states. A relatively high fraction were employed in Wyoming (94 percent) and North and South Dakota (78 and 73 percent). And employment rates are relatively high in Colorado (64 percent), Nebraska (63 percent), Iowa (63 percent), and Idaho (63 percent). Despite high rates of employment, however, typical earnings are relatively modest even conditional on employment, with most men earning far less than $10,000. At the other end of the employment spectrum, far fewer individuals are employed in California (33 percent), DC (33 percent), New York (34 percent), New Mexico (36 percent) or Ohio (36 percent).

While there are differences in employment rates across states, those differences are typically pre-existing—states with high rates of employment in their population before incarceration had relatively high rates thereafter. The first difference in employment within states is generally small. One exception is within the federal system, where lengthier pre-trial or pre-sentencing incarceration might mechanically have reduced employment in the year prior to the start of the recorded sentence.

As with the national data, there is generally little evidence of an employment penalty associated with incarceration in the comparison of pre- and post-incarceration outcomes. In almost all states, employment (and earnings) is higher in the year of release than two years prior to incarceration. While the absence of a decline in employment is surprising, there are several reasons why this simple comparison may understate the effects of incarceration on employment. First, our measure of employment is generated from administrative records which generally requires that individuals receive a W2 or file a tax return. Ex-prisoners may be encouraged or required to file a return as part of their reentry, which would boost measured employment but not necessarily their actual employment activities. Second, we have no information on whether these

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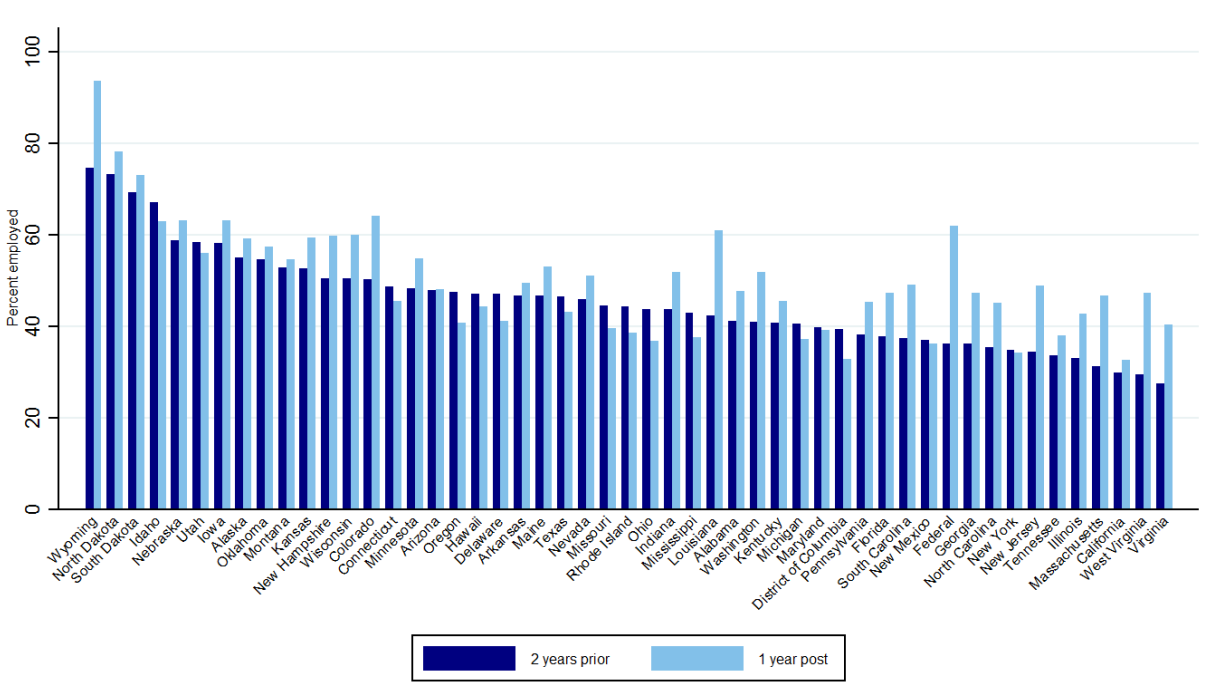
14. Compared to the figure above, the narrower timeframe, is intended to maximize the number of states and number of observations within each state available for the analysis. Because of differences in incarceration length or timing of reporting, the pre- and post-outcomes correspond to slightly different calendar years.

individuals had prior convictions or periods of incarceration, though some surely must have. For those individuals, the pre-existing periods of incarceration may have already reduced their employment mechanically (if they were incarcerated before) or because of labor market stigma (i.e., some may have already been "marked" with a criminal record).

FIGURE B1: EMPLOYMENT BY STATE, BEFORE AND AFTER INCARCERATION



Note: This figure plots the share of prisoners with positive wage income (reported on W2 or tax forms) the calendar year prior to starting a sentence and in the calendar year of release by jurisdiction of incarceration for prisoners observed both before and after incarceration.

TABLE B1: EMPLOYMENT OF MALE PRISONERS BY YEAR AND YEAR OF INCARCERATION

Employment	Calendar Year												
Year of Incarceration	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
2001	16%												
2002	42%	14%											
2003	50%	38%	14%										
2004	49%	46%	35%	13%									
2005	47%	46%	43%	35%	15%								
2006	46%	44%	43%	42%	37%	16%							
2007	44%	43%	42%	44%	45%	39%	17%						
2008	43%	42%	41%	43%	45%	46%	40%	18%					
2009	42%	41%	40%	42%	44%	46%	46%	39%	16%				
2010	40%	39%	38%	40%	42%	45%	46%	44%	32%	14%			
2011	38%	37%	37%	39%	41%	43%	44%	44%	36%	31%	15%		
2012	38%	37%	36%	38%	40%	43%	44%	43%	37%	36%	32%	15%	
2013	37%	36%	36%	38%	40%	42%	44%	43%	37%	38%	38%	32%	12%

Incarcerated

TABLE B2: EMPLOYMENT OF MALE PRISONERS BY YEAR BY RELEASE YEAR

Employment	Calendar Year				
Year of Release	2010	2011	2012	2013	2014
2010	39%	53%	50%	47%	46%
2011		42%	53%	50%	47%
2012			41%	51%	46%
2013		Incarcerated		42%	48%
2014					43%

Note: These tables provide average employment rates of prisoners before incarceration (table B1) and afterwards (B2), by year of incarceration (rows) and calendar year (columns) for individuals incarcerated at some point in 2009-2013.

Appendix C: Incarceration by Family Income Percentile

Figure C1 shows the incarceration rate (based on the ACS overall rate for the 1980-1986 cohort that is in prison or in jail) by parent income percentile and parent's marital status.

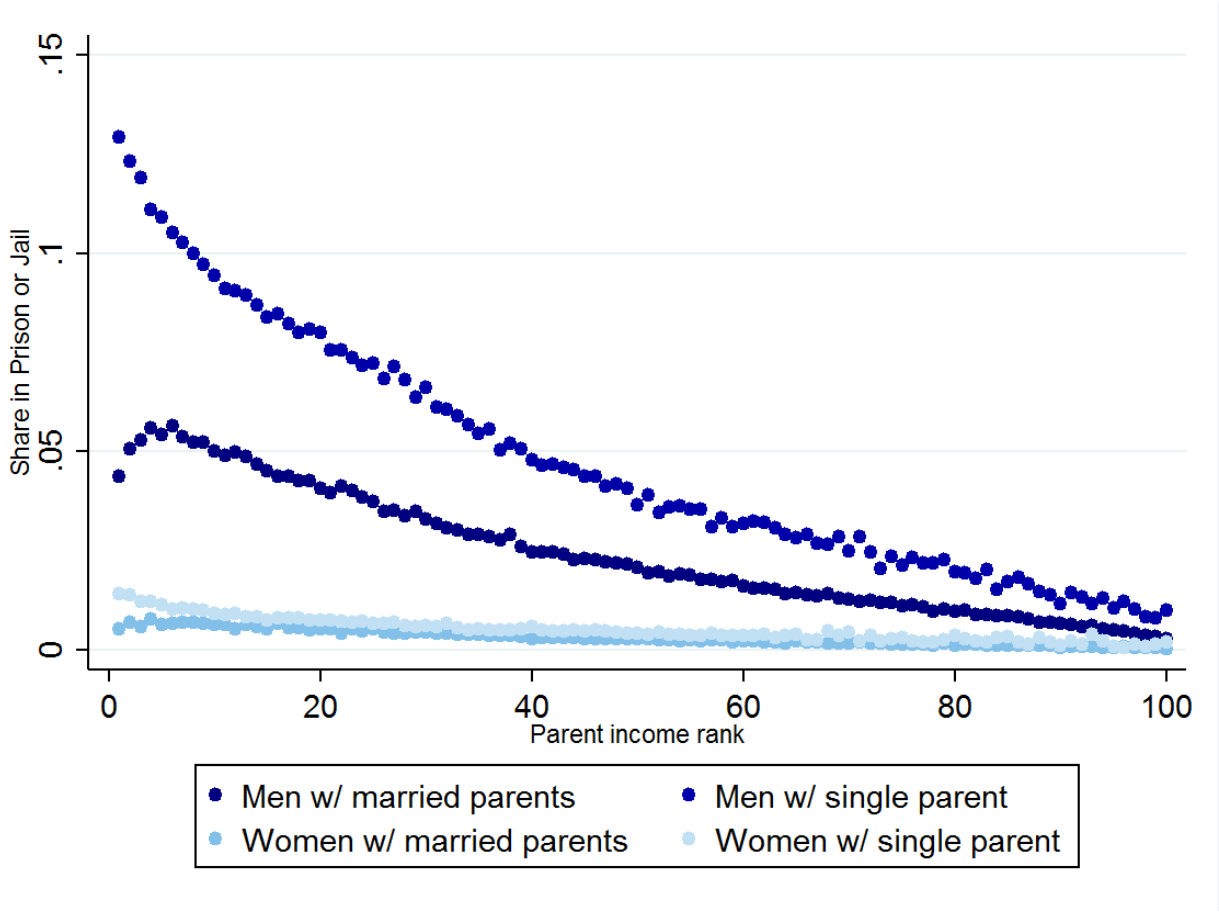
The lower-than-expected incarceration rate in the bottom 3 percent of married-couple families arises because income measured in tax records understates the real economic income of some households with business-related expenses and resulting tax losses. We were unable to exclude those households in our analysis. As a result, some higher-income households are effectively misclassified as low-income, reducing the reported incarceration rate in this group.

Figure C2 shows the fraction of men in prison at age 30-34 (where the average incarceration rate in the sample equals the BJS-reported prison incarceration rate on December 31, 2012), the fraction in prison or in jail (as measured for the 1980-1986 birth cohort in the ACS between 2010-2014 on the day of the sample), and the fraction in prison or in jail or a former prisoner (using the estimate from Bucknor and Barber 2016, which suggests that for each prisoner incarcerated at age 30-34 there are about 2.78 former prisoners in the labor force).

Figure C3 shows the share of the incarcerated population from the bottom 20 percent of the income distribution adjusted for the share of each state's population from the bottom 20 percent.

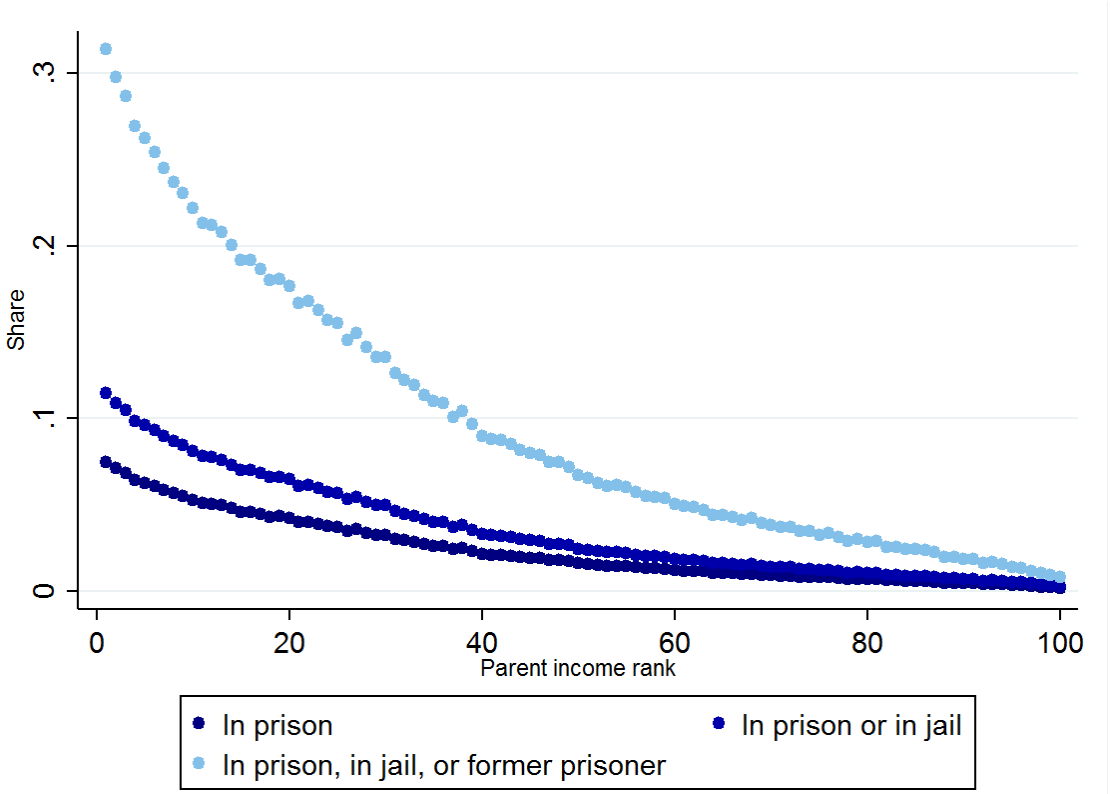
Despite substantial variation in the incarceration rate across states, the figure shows that the share of the incarcerated population from the bottom 20 percent of the income distribution is very similar across states. In just about any state, between 40 and 50 percent of the prison population grew up in families earning less than $23,000 per year. (Alaska, Hawaii, and DC are outliers because the income distribution in those states is high relative to the U.S. distribution—they have few low-income families.)

FIGURE C1: INCARCERATION BY FAMILY INCOME PERCENTILE AND PARENT'S MARITAL STATUS



Note: Figure shows the estimated incarceration rates of individuals born between 1980-1986 in 2012 based on the share of the 1980-1986 birth cohorts incarcerated in an adult correctional facility in the 2014 5-year American Community Survey.

FIGURE C2: FRACTION OF MEN IN PRISON, IN JAIL OR PRISON, OR IN PRISON, JAIL, OR A FORMER PRISONER, BY PARENT INCOME



Note: Figure shows the estimated share of individuals born between 1980-1986 who are in prison, in prison or jail, or in prison, jail, or a former prisoner. "In prison" is the share observed in prison serving a sentence of one year or greater in IRS records. "In prison or jail" is an estimate of the total incarceration rate (in prison or in jail) based on the share of the 1980-1986 birth cohorts incarcerated in an adult correctional facility in the 2014 5-year American Community Survey. "In prison, in jail, or former prisoner" is the sum of the ACS-estimated rate plus the number of former prisoners estimated by Bucknor and Barber 2016 and assigned in proportion to the number of individuals in prison observed in the IRS sample.

FIGURE C3: SHARE OF THE INCARCERATED POPULATION FROM THE BOTTOM 20 PERCENT OF THE INCOME DISTRIBUTION