Incarceration and Black–White inequality in Homeownership: A state-level analysis

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ARTICLE INFO

ABSTRACT

Rising incarceration rates in the United States, as well as the concentration of incarceration among already marginalized individuals, has led some scholars to suggest that incarceration increases economic inequality among American men. But little is known about the consequences of incarceration for wealth, about incarceration's contribution to Black–White disparities in wealth, or about the broader effects of incarceration on communities. In this article, we use state-level panel data (from 1985 to 2005) to examine the relationship between incarceration rates and the Black–White gap in homeownership, a distinct and important measure of wealth. Results, which are robust to an array of model specifications and robustness checks, show that incarceration rates diminish homeownership rates among Blacks and, in doing so, widen Black–White inequalities in homeownership. Therefore, the findings suggest that the consequences of incarceration extend beyond the offender and may increase inequality in household wealth.

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1. Introduction

The increasing scope of the penal system in the United States means that, for some population groups, incarceration has become both a normative and transformative life course event (Alexander, 2012; Pettit and Western, 2004; Western and Pettit, 2010). One of the most noteworthy – and consequential – features of incarceration in the United States is its concentration among already disadvantaged and marginalized populations (Western, 2006; Western and Pettit, 2010). These extreme racial inequalities in incarceration rates have led some to suggest that the U.S. criminal justice system serves as a modern form of legalized discrimination and racial control, especially further marginalizing already disadvantaged Black men (Alexander, 2012). The criminal justice system – and its attendant consequences – perpetuates a racial hierarchy in the United States that has parallels to slavery and Jim Crow segregation (Alexander, 2012).

More than 2.3 million individuals are currently confined in prisons, and an additional 4.8 million are under other forms of correctional supervision such as probation or parole (Glaze, 2011; Maruschak and Bonczar, 2012). This massive scale of the criminal justice system, as well as its unequal distribution across race/ethnic groups, has spurred substantial scholarly and public interest in the consequences of incarceration for the (mostly) men who are imprisoned, their families, and their communities. The economic consequences of incarceration are especially well known, as a large literature documents how incarceration – and the corresponding stigma of a criminal record – makes it difficult to find employment, impedes wage growth, and increases legal debt (e.g., Apel and Sweeten, 2010; Pager, 2003; Western, 2002, 2006). These well-documented

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deleterious economic effects of incarceration, in conjunction with the broad but unequal distribution of incarceration across the population, has lead some scholars to suggest that incarceration increases economic inequalities in American society (Alexander, 2012; Western, 2006).

Despite this large literature on the economic consequences of incarceration, much less is known about how incarceration affects personal wealth, a key and distinct indicator of economic wellbeing that may be especially important in both the short term (i.e., for weathering financial emergencies) and the long term (i.e., for mobility prospects). Additionally, though research has begun to detail how the negative effects of incarceration may extend beyond men experiencing imprisonment to their families (Geller et al., 2011; Schwartz-Soicher et al., 2011) and communities (Clear, 2007), no research examines how incarceration may have negative consequences for wealth or how incarceration could increase group-level inequalities in wealth. The lack of attention to the relationship between incarceration and wealth and the aggregate consequences of any such relationship for inequality is an especially important oversight given the large racial disparities in wealth, especially between Blacks and Whites found in the contemporary United States (Conley, 1999; Oliver and Shapiro, 2006; Sherraden, 1991) and especially in the domain of homeownership (Krivo and Kaufman, 2004; Shapiro et al., 2013).

Homeownership is a foundational aspect of household wealth portfolios in the United States (Bricker et al., 2012; Di, 2005). Home equity accounted for 31% of overall household wealth in 2010 and 67% of household wealth for those in the middle three quintiles of wealth holders (Wolff, 2014). Home ownership and equity also play a central role in explanations of broader Black–White wealth inequality. Home equity makes up a larger share of Black wealth than White wealth (Wolff, 2014). But, as Oliver and Shapiro (2006) have argued, home ownership gaps are also central to understanding broader dynamics of racial wealth inequality. Racial disadvantage is inherent at nearly every step of the homeownership process. Blacks are less likely to own homes than Whites and, among owners, Blacks transition to homeownership later than Whites, in part because of differences in the ability of extended family to provide inter-vivos transfers for down payment assistance (Shapiro et al., 2013). Blacks receive poorer quality mortgages than their White counterparts, manifest in higher fees and costs and a greater likelihood of receiving a subprime loan relative to similarly qualified White applicants (Reskin, 2012). Blacks' neighborhood choice is also constrained by historical and contemporary patterns of racial residential segregation and discrimination with the result that homes owned by Blacks appreciate much less than comparable homes owned by Whites (Oliver and Shapiro, 2006; Reskin, 2012). In sum, home equity is the most important component of family wealth for the vast majority of families but it is a site of profound racial inequality structured by historical and contemporary forms of discrimination and disadvantage. These inequalities in turn shape the intergenerational transmission of advantage (and disadvantage) both through wealth transfer and because homeownership is related to a large number of positive outcomes for families (i.e., Rohe et al., 2002; though see Green, 2013) and communities (i.e., McCabe, 2013).

In this manuscript, we use state-level panel data (from 1985 to 2005) to examine how incarceration rates are associated with homeownership rates among Blacks, homeownership rates among Whites, and the Black–White gap in homeownership, controlling for an array of time-varying state-level characteristics and state- and year-fixed fixed effects. By documenting how asset-depleting consequences of incarceration for men, their partners, and others in their communities may aggregate to group-level inequalities, this analysis contributes to two related – but rarely combined – literatures: the economic consequences of the punitive turn in criminal justice policy in the United States and the determinants of inequalities in household wealth. These findings also contribute to our understanding of how the criminal justice system in the United States can perpetuate racial hierarchies (Alexander, 2012).

1.1. Incarceration and homeownership

Theoretically, there are several pathways by which incarceration might reduce homeownership – either through asset loss, the inability to acquire new assets, or some combination of the two – among those who have been to prison. Incarcerated individuals accumulate legal debt and are often unable to make payments on mortgages, child support, and other debts while incarcerated (Harris et al., 2010). After incarceration, their loss of human capital and stigma makes finding and sustaining employment upon release difficult (Pager, 2003; Western, 2002, 2006). Although we know of no research that has tested this idea, it seems possible that similarly to finding a job, the "mark" of a criminal record would also make it difficult for formerly incarcerated men to qualify for a home loan, over and above any employment-related effects. Post-incarceration residence in disadvantaged neighborhoods (Massoglia et al., 2013), as well as the avoidance of social institutions (Brayne, 2014; Goffman, 2009), may also impede homeownership. Furthermore, there is evidence that romantic partners of the incarcerated experience economic challenges that could further impede a couple's ability to purchase or retain a home (Schwartz-Soicher et al., 2011).

Despite reasons to suspect a relationship between incarceration and homeownership, we are aware of only two studies that consider this relationship. Using data from National Longitudinal Survey of Youth 1979 (NLSY-79), Maroto (2014) finds that ex-offenders are less likely to own homes than the never-incarcerated. Using individual-level data from the Fragile Families and Child Wellbeing Study – a cohort study of mostly unmarried parents, many of whom experience incarceration – and an array of modeling strategies (e.g., lagged dependent variable models, propensity score matching models), Turney and Schneider (2014) consider incarceration's consequences for bank account, vehicle, and homeownership. They find that recently incarcerated men are less likely to have bank accounts or own vehicles than their comparable peers and that women in romantic relationships with these men are less likely to own vehicles and homes.

Though both of these recent articles find relatively large effects of incarceration, the analyses are only estimated for formerly incarcerated men themselves (and in the case of Turney and Schneider (2014), their romantic partners). Therefore, the authors are unable to consider how incarceration's effects might extend to more distant kin, friends, and communities or to aggregate these effects to examine the consequences of incarceration for group-level inequality, the two contributions of this manuscript.

1.2. Incarceration and aggregate Black–White homeownership inequality

Though theory and the limited evidence to date indicates that incarceration impedes the ownership of assets for the recently incarcerated and their romantic partners, it is also possible that incarceration, which is disproportionately experienced by Blacks, contributes to the well-known racial disparities between Blacks and Whites in homeownership in the United States. Recent estimates suggest that Blacks have, on average, only about one-fifth of the net worth of Whites (Wolff, 2010) and, compared to Whites, Blacks are much less likely to own homes (49% compared to 75%) (Taylor et al., 2011; Wolff, 2010). Further, the gap in Black–White median wealth has increased throughout the past two decades (Shapiro et al., 2013).

Incarceration, given its unequal distribution across the population and its attendant and steep economic consequences, especially for Blacks (Lyons and Pettit, 2011), may increase racial inequalities in wealth. To begin with, any individual-level effects of incarceration on wealth could translate to aggregate Black–White inequalities. Though incarceration rates have increased for both racial groups throughout the past four decades, incarceration is much more prevalent among Blacks than Whites. In 1980, 0.6% of White men aged 20–34 were incarcerated, compared to 1.8% of comparably aged White men in 2008. For Blacks, the proportional increase was smaller, rising from 5.2% in 1980 to 11.4% in 2008, but the share of Black men incarcerated in 2008, more than one in ten, was six times higher than that of their White counterparts and comprised a substantial share of the Black male population (Pettit, 2012). Cumulated over the life course, Pettit (2012) estimates that in 2009, 28% percent of Black men aged 30–34, compared to 5.4% percent of White men, had ever been imprisoned. This differential exposure to incarceration might exacerbate Black–White wealth inequality.

There is also substantial between-state variation in rates of incarceration and in the differential between White and Black incarceration rates. For example, in 2005 (the last year for which the Bureau of Justice Statistics published official race-specific incarceration rates at the state level), prison incarceration rates ranged from 153 per 100,000 in Maine to 1,138 per 100,000 in Louisiana. However, the incarceration rate for Blacks was higher than for Whites in every state. There was also substantial between-state variation in the Black incarceration rate, ranging from 851 per 100,000 in Hawaii to 4,416 per 100,000 in Wisconsin.

Additionally, though incarceration could increase aggregate levels of Black–White wealth inequality by reducing asset ownership only among formerly incarcerated men and their partners, we suspect that these effects extend more broadly. Prior research shows that having a poor family member is negatively associated with wealth among middle-class individuals (Chiteji and Hamilton, 2005; Heflin and Patillo, 2002; O'Brien, 2012), suggesting that the effects of incarceration may come to bear on extended family members.

Incarceration is also directly implicated in many familial processes—including social support (Turney et al., 2012), intergenerational relationships (Turney, 2014), and relationship quality (Turney, 2015)—all of which may be related to familial economic wellbeing and, therefore, the ability to secure homeownership (Schwartz-Soicher et al., 2011). The geographic concentration of incarceration could also broadly undermine the wealth of entire communities by destabilizing these neighborhoods along multiple dimensions (Clear, 2007; Pettit, 2012). In sum, the racially unequal nature of the incarceration experience – combined with the potential for broad negative effects on former prisoners, their partners, their families, and their communities – likely increases aggregate-level wealth inequality between Blacks and Whites.[1]

2. Methods

We utilize a panel of state-level data for a twenty-year period, approximately 1985–2005, constructed from a variety of governmental and administrative sources. Our basic strategy for estimating the aggregate-level consequences of the prison boom on the Black–White homeownership gap is to assess the relationship between state-level incarceration rates and state-level Black–White inequalities in homeownership controlling for a wide array of time-varying state-level characteristics and state and year fixed effects. We examine how, as the U.S. prison population rapidly increased over these decades, changes in state incarceration rates were related to changes in Black–White inequality in homeownership. Our approach follows a similar analytic strategy to that of Wildeman's (2012) investigation of state-level incarceration and infant mortality and to Beckett and Western's (2001) analysis of association between state-level incarceration rates and state welfare spending. Of course, it is possible that other measurable and unmeasurable characteristics of states and periods might bias our

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[1] Though these mechanisms seem likely to aggregate to contribute to Black–White inequalities in homeownership, we caution against any mono-causal interpretation of Black–White wealth inequality as, to the extent that incarceration is related to this inequality, it is likely to be one of many causes that include differences in family background characteristics (Conley, 1999; though see Killewald, 2013), income (Gittleman and Wolff, 2004), portfolio allocation (Chiteji and Stafford, 1999), and racial discrimination in credit and housing markets (Oliver and Shapiro, 2006).

estimate, but, as described in Section 2.2, our analyses account for spuriousness by adjusting for an array of covariates, including state and year fixed-effects, and conducting falsification tests.

2.1. Data

2.1.1. Homeownership

Our key outcome measure is the state-level Black–White homeownership gap. We construct this measure by aggregating individual-level reports of homeownership in the annual Current Population Survey (CPS) March supplements to the state level, following the general approach of using CPS data to construct sub-group state-level rates of homeownership that has been used in literature considering the relationship between homeownership and child outcomes (Aaronson, 2000). The CPS is designed to be representative of states in each year and, for each annual survey between 1977 and 2011, has harmonized data on the state of respondent's residence. We begin by pooling all individual-level CPS observations of heads-of-household for the available years – a total of 2,209,453 observations. For each observation, we code homeownership (1 = owns own home, 0 = does not own home) and race/ethnicity (mutually exclusive dummy variables indicating non-Hispanic White, non-Hispanic Black, and non-Hispanic other). We next collapse the data by year, by state, and by race/ethnicity to construct state-year rates of homeownership for non-Hispanic Blacks and Whites, weighting the averages using the CPS sample weights. We then calculate the Black–White homeownership gap as the Black rate as a share of the White rate: (homeownership Black/homeownership White).[2]

However, although the CPS is designed to be representative of states, the annual CPS estimates may be unstable for demographic sub-groups within states because of small sample sizes.[3] Consequently, Census recommends that, when making year-to-year comparisons within states, analysts use a two-year average by pooling across waves of the March CPS.[4] We construct this measure by pooling individual respondents across two consecutive waves of the CPS (year i and year $i + 1$) and collapse the data as described above. For example, the 1985 Black homeownership rate for a state s is constructed by calculating the share of Black respondents in state s surveyed in the March 1985 and March 1986 CPS who owned their own homes. Combining the two years increases the number of respondents we can use to calculate the homeownership rate for each subgroup. For states in our analysis sample (described in Section 2.2), there were an average of about 250 Black respondents in the paired years between 1985 and 2000 and about 450 Black respondents in the paired years from 2001 to 2005 (after the CPS increased their sample size). The number of White respondents is much larger, averaging approximately 1,500 per paired state-years before 2001 and 2,200 after 2001. Although our analysis is based on two-year pooled averages, we find that the results presented in Section 3.2 are robust to using either single years or three-year pooled averages. Coefficients from these tests of robustness are discussed and presented in Section 3.3.

We are not able to examine the relationship between incarceration rates and other forms of asset ownership, such as bank account possession, vehicle ownership, or measures of net worth or financial assets. These measures are not available at the state-level for Blacks and Whites. Although aggregate Black–White gaps in these measures can be calculated from such sources as the Survey of Consumer Finances, the National Longitudinal Survey of Youth, or the Panel Survey of Income Dynamics, none of these sources are representative of Black and White populations at the state-level.

However, the recently released Financial Capability Survey will allow researchers to examine state-level variation in Black–White inequality in the ownership of a much broader range of assets, the holding of various kinds of consumer debt, and even the use of alternative financial sources. However, because this survey was only first carried-out in 2009, these data cannot be used to assess how the rise of mass incarceration affected wealth inequality. This data could be very useful though for assessing if Black–White wealth gaps might narrow as prison populations decline, if indeed the recent modest declines in the incarceration rate continue and accelerate.

2.1.2. Incarceration

The Bureau of Justice Statistics releases data on the number of prisoners under state or federal jurisdiction in each state at year's end.[5] We take that figure as the numerator, and divide by the total state population, to construct a measure of the state incarceration rate per 1,000 individuals. To ensure temporal priority to homeownership and to allow time for incarceration-related home purchase and foreclosure processes to play out, we lag the incarceration rate by three years.

2.1.3. Control variables

We also construct measures of a number of time-varying state-level characteristics that might confound the relationship between incarceration and homeownership, including a set of economic variables (state minimum wage, state unemployment rate, per capita personal income, poverty rate), a set of variables capturing social welfare programs (maximum

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[2] The results are also substantively similar if we instead simply calculate the gap as the difference between the White and Black homeownership rates (homeownership White–homeownership Black).

[3] See http://www.census.gov/cps/about/faq.html.

[4] See http://www.census.gov/hhes/www/poverty/about/datasources/description.html.

[5] This figure includes the relatively small fraction of prisoners held in private facilities (6.5% in 2003). In Alaska, Connecticut, Delaware, Hawaii, Rhode Island, and Vermont, this figure includes both prison and jail inmates. Prisoners under the legal authority or jurisdiction of one state but who are housed in another state's prisons are attributed to the state of jurisdiction.

Table 1
Means and standard deviations of variables in the state-level analysis (pooled across states and years).

	Mean	S.D.
Black homeownership rate	43.0	(10.0)
White homeownership rate	71.0	(6.0)
Black/White homeownership	59.0	(12.0)
Imprisonment rate	3.5	(1.6)
Unemployment rate	6.0	(2.9)
Home price index	192.0	(82.0)
Median income/average home value ratio	42.0	(12.0)
Violent crime rate	565.0	(317.0)
Poverty rate	13.8	(4.3)
Contract interest rate	8.5	(2.2)
Percent elderly	12.4	(2.1)
Percent Black	11.0	(10.9)
Percent White	67.6	(22.0)
Per capita income ($)	5877.0	(1135.0)
EITC rate	2.9	(8.8)
Minimum wage ($/h)	4.2	(1.1)
Maximum AFDC/TANF and food stamps (family of four) ($)	772.0	(202.0)

AFDC/TANF and Food Stamps/SNAP benefit for a family of four and state EITC rate), a set of housing market variables (home price index, average contract mortgage interest rate, ratio of household income to home value), a measure of the violent crime rate, and a set of demographic variables (percent of the state population that is Black, percent of the state population that is White, and percent elderly).[6] Detailed descriptions of these measures are available in Appendix A and descriptive statistics are presented in Table 1. We also lag these measures by three years.

2.2. Analytic approach

Data on homeownership at the state level derived from the CPS micro-data is available from 1977 through 2011 and for all 50 states and Washington, D.C., for a total of 1,785 state-year observations. However, we limit the analytical sample based on two criteria, one temporal and one geographic.

First, the Great Recession was disruptive of homeownership patterns, especially for Blacks (Bayer et al., 2013). To separate these recession dynamics from those related to incarceration, we exclude state-year observations for the years 2006–2011. We also exclude state-year observations for the years before 1985. We left truncate because of data limitations and for substantive reasons. With a three-year lag on the predictors, the data on homeownership and incarceration would permit starting with imprisonment rates in 1974 to predict homeownership in 1977 (the first year of the CPS data). But, the data on state minimum wage laws, EITC rates, and social welfare generosity is not available until 1980. Therefore, it is possible to begin with predictors measured in 1980 and homeownership measured in 1983.

However, there is a substantive argument for starting later. Spelman (2009:35) notes that incarceration increased markedly from the low point in 1972 through 2005, but that "the 1977 to 2005 period accounts for 92% of the total rate increase, and 93% of the total prisoner increase [and that] the 1982–2005 period accounts for 80% of the rate increase and 84% of the prisoner increase." Therefore, we focus on this most concentrated period of mass incarceration from 1982 to 2005 (that is, incarceration first measured in 1982 estimating homeownership in 1985), which gives us good coverage on the covariates and allows for most of the "prison boom." This creates a somewhat longer window than the 1990–2003 period employed by Wildeman (2012) in his state-level analysis of incarceration and infant mortality, but these years are justified by data availability and context. This exclusion criteria results in an analysis sample of 1,071 state-year observations. The results described in Section 3.2 are robust to the use of alternative year ranges with the estimates varying little whether the ranges used are 1985–2005 or 1983–2010 (the earliest start and latest end), 1983–2005 (the earliest start and preferred end), or 1985–2010 (the preferred start and latest end). Results from these robustness tests are presented in Section 3.3.

Second, we exclude an additional 189 state-year observations for the nine states (ID, ME, MT, NH, ND, SD, UT, VT, WY) where fewer than 2% of the population was Black in 2010. Besides having small numbers of Black CPS respondents, these states are less substantively important than other states for examining the Black–White homeownership gap. We are also

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[6] Measures of the punitiveness of the state criminal justice system, such as the presence of "three strike" or "truth in sentencing" laws, are also available. However, adjusting for these measures risks over-controlling in that the presence of such laws is likely one pathway by which variation in imprisonment rates is generated. Measures of the partisan identification of state governors and legislatures may capture some of these effects indirectly as well as other potentially confounding processes. We tested the robustness of our models to include a dummy indicator for the state governor being democratic and continuous measures of the percent of the upper and lower bodies of the legislature that were democratic. The results are unaffected by the inclusion of these measures, but including them necessitates dropping observations for Washington, D.C. (which has no governor), and for Nebraska (which is unicameral and non-partisan). Consequently, to preserve sample size, we do not include these political variables in the main analysis.
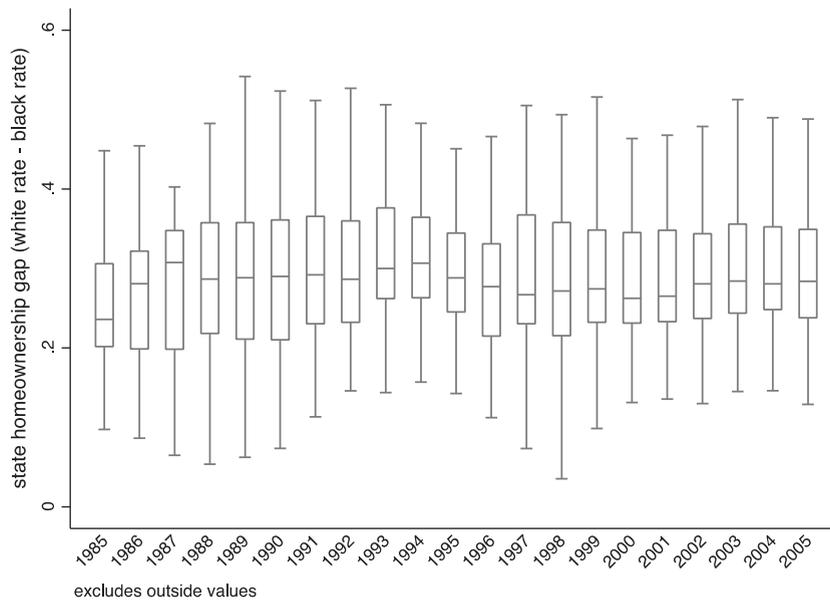
Fig. 1. Box plot of Black–White homeownership gap (1985–2005).

missing data on the imprisonment rate for two state-year observations, which leaves a final analysis sample of 880 state-year observations covering 42 states over 21 years. There is no other missing data.

We pool the 880 state-year observations and estimate OLS regression models of the relationship between incarceration and (1) the state-level rates of homeownership for Whites, (2) the state-level rates of homeownership for Blacks, and (3) the Black–White homeownership gap, weighting by average state population between 1985 and 2005. In addition to the time-varying controls discussed above, the models also include state and year fixed-effects. The results were also robust to including a state linear time trend (calculated as year x state). Tests suggest that the errors follow a first order autoregressive process (AR(1)). We present models that adjust for the AR(1) serial correlation, though the results were robust to a basic fixed-effects specification.[7] Results from these robustness tests are presented in Section 3.3.

3. Results

3.1. Descriptive statistics

We now turn to the state-level data to examine the association between incarceration rates and Black–White inequality in homeownership. Fig. 1 presents a box plot of the Black–White homeownership gap by year, using the simple difference as a measure of the homeownership gap. The dark horizontal band marks the median for each year. The top and bottom edges of each rectangle mark out the 75th and 25th percentiles. Pooling across all state-year observations in the analytic sample, an average of 42% of Blacks and 71% of Whites own their own homes, producing a mean Black–White homeownership gap of 29 percentage points and a median of 28 percentage points.

3.2. Multivariate analyses

Results from the multivariate analysis are presented in Table 2. Model 1 presents results from the OLS models with state- and year-fixed effects, the full set of controls, and the AR(1) correction. This model estimates the association between incarceration on the Black–White homeownership gap, now calculated using our preferred measure (Black homeownership rate/White homeownership rate).[8] This model shows a negative relationship between the state incarceration rate and the Black homeownership rate as a share of the White homeownership rate ($b = -0.023$, $p < .01$). That is, higher incarceration rates are associated with larger homeownership gaps between Whites and Blacks. Predicted values from Model 1 suggest that the Black homeownership rate is 62% of the White rate when the incarceration rate is 1/1,000 (the 10th percentile of the

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[7] We also tested whether the series on the Black–White homeownership gap and the incarceration rate were stationary in the 42 state panels using Fisher type unit root tests based on augmented Dickey–Fuller tests. The tests reject the null hypothesis that all panels contain a unit root. Further, estimates from a first differences model, commonly employed when dealing with non-stationary series, with state and year fixed-effects returns very similar results to the preferred model.

[8] The table shows 838 observations because the AR(1) corrected models drop the first year's worth of observations (n = 42).

Table 2
Black–White homeownership gap, Black homeownership rate, and White homeownership rate as a function of state incarceration.

	Model 1 Black–White gap	Model 2 Black rate	Model 3 White rate
Prisoners per thousand (lagged 3 years)	−0.023[**]	−0.014[*]	0.002
	(0.009)	(0.006)	(0.002)
Constant	0.706	0.624	0.877
Observations	838	838	838
Year fixed-effects	Yes	Yes	Yes
State fixed-effects	Yes	Yes	Yes
State controls	Yes	Yes	Yes
AR(1) correction	Yes	Yes	Yes

Note: In addition to the year and state fixed-effects, each model includes controls for the state minimum wage, the state unemployment rate, per capita personal income, the poverty rate, the maximum combined AFDC/TANF Food Stamps benefit for a family of four, the state EITC rate, the home price index value, the average contract mortgage interest rate, the ratio of median household income to home value, the violent crime rate, the percent Black, the percent White, and the percent elderly.

[***] $p < .001$.
[*] $p < .05$.
[**] $p < .01$.

distribution of incarceration rates), but falls to 51% of the White rate when the incarceration rate is 6/1,000 (the 90th percentile of the distribution of incarceration rates), a range of approximately 10 percentage points representing 17% of the mean Black–White gap in homeownership or two-thirds of a standard deviation.

Models 2 and 3 estimate the Black homeownership rate and the White homeownership rate, respectively, as a function of incarceration. There is a significant negative association between incarceration and the Black homeownership rate ($b = −0.014$, $p < 0.05$), but no significant association between incarceration and the White homeownership rate, indicating that the association between incarceration and the Black–White homeownership gap arises primarily by depressing rates of Black homeownership.[9] We also use a unique set of data on the count of non-Hispanic Black prisoners in each state in each year for the period 1981–2002 assembled by the Criminal Justice Institute. We divide these counts by annual counts of non-Hispanic Black residents of each state as reported in the intercensal population counts. Black rates of incarceration are substantially higher than the overall rate of incarceration, averaging 14 per thousand (SD = 5.7) in our analysis sample as compared with 3.5 per thousand (SD = 1.6) overall. Replacing the general incarceration rate with the Black incarceration rate shows the expected negative and significant relationship ($b = −0.003$, $p < .05$).

3.3. Robustness checks

We previously noted that these results are robust to variety of alternative measurement and modeling choices. The estimates from a set of alternative models are listed in Table 3, where each row shows the coefficient on the state-level incarceration rate for a model that differs from our preferred model (row 1) in the way stated in the left-hand column of the table.

First, as previously above, our results are robust to pooling the CPS micro-data over three years ($b = −0.019$) (row 2) or simply using single-year estimates ($b = −0.021$) (row 3), compared to pooling the data over two years.

Second, as noted above, the choice of analysis years does not substantively affect the results. The coefficients are very similar whether we use the preferred range of years 1985–2005 ($b = −0.023$) (row 1), the set of years from the earliest start-point of 1983 to the latest end point of 2010 ($b = −0.023$) (row 4), the shorter range of 1990–2005 ($b = −0.026$) (row 5), or the range 1983–2005 that takes the earliest start-point and the preferred end ($b = −0.022$) (row 6).

Third, estimating the model without a correction for AR(1) disturbances (row 7) returns a coefficient of a similar magnitude ($b = −0.017$) to the preferred estimate as does a model that includes a state-specific linear time trend ($b = −0.037$) (row 8). We also test the robustness of the results to excluding the 52 state-year observations with Black–White homeownership gaps in the bottom 3% (Black-homeownership rates less than 25% of White rates) and the top 3% (Black homeownership rates greater than 85% of White rates) of the distribution. This analysis, though essentially selecting on the dependent variable, provides a useful check on the robustness of the results to the exclusion of outliers. The results show that these observations do not substantively affect the results ($b = −0.021$) (row 9).

Fourth, we replace our independent variable with the log of the imprisonment rate per thousand, which produces a similarly positive and significant association with the Black–White homeownership gap (standardized $b = −0.374$) (row 10) as

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[9] This association could be attributable to fewer purchases, more foreclosures, or both. We attempted to gain insight into these mechanisms by directly examining the relationship between incarceration and foreclosure. We constructed a state-year measure of foreclosure starts based on data from the Mortgage Bankers Association (MBA) National Delinquency Survey on the percentage of residential mortgages that began the foreclosure process during a given year. On average, 1.3% of mortgages began the foreclosure process each year. We then estimated the state- and year-fixed effects models with the same controls as above and with the AR(1) correction, weighting by state population, and lagging the incarceration rate and the covariates by three years. The coefficient is in the expected direction, but the incarceration rate is not significantly associated with the foreclosure start rate ($p = .442$). In the period 1990–2005, the coefficients are also in the expected direction and here the relationship with the male incarceration rate is marginally significant ($p < .10$).

Table 3

Black–White homeownership gap as a function of state incarceration, results from robustness tests. Coefficient on state-level incarceration rate (SE).

	Coefficient on incarceration rate	Standardized coefficient on incarceration rate
1 Preferred estimate	−0.023[**]	−0.227[**]
	(0.009)	(0.086)
Pooling of CPS waves		
2 CPS pooled over 3 years	−0.019[**]	
	(0.007)	
3 CPS single-year	−0.021[*]	
	(0.009)	
Years included in analysis		
4 1983–2010	−0.023[**]	
	(0.008)	
5 1990–2005	−0.026[**]	
	(0.009)	
6 1983–2005	−0.022[**]	
	(0.008)	
Model specification		
7 No AR(1)	−0.017[*]	
	(0.008)	
8 Inclusion of state-specific linear time trend	−0.037[***]	
	(0.011)	
9 Excluding DV outliers	−0.021[**]	
	(0.008)	
Measurement of incarceration		
10 Log incarceration	−0.100[**]	−0.374[**]
	(0.037)	(0.139)
11 Male incarceration rate	−0.012[*]	−0.234[*]
	(0.005)	(0.097)

Note: Each row presents the results of a separate model. Each model includes year and state-fixed effects, as well as controls for the state minimum wage, the state unemployment rate, per capita personal income, the poverty rate, the maximum combined AFDC/TANF Food Stamps benefit for a family of four, the state EITC rate, the home price index value, the average contract mortgage interest rate, the ratio of median household income to home value, the violent crime rate, the percent Black, the percent White, and the percent elderly.

  [*] $p < .05$.
  [**] $p < .01$.
  [***] $p < .001$.

our preferred measure (standardized $b = −0.22$) (row 1). We also test the robustness of the results to using the male incarceration rate – the number of men incarcerated at year's end divided by the number of men in the state. The latter number, the denominator, is derived from intercensal estimates of state population. The results are again substantively similar, with the standardized coefficient on the total incarceration rate again equal to −0.227 (row 1) and the standardized coefficient on the male incarceration equal to −0.234 (row 11).

3.4. Falsification test

These analyses represent a fairly conservative test of the association between incarceration and homeownership. Though it is possible that unobservable characteristics could render the relationship spurious, we show the results are not explained by a set of reasonable confounders, withstand adjustment to time invariant state-level characteristics and to year-specific characteristics common across states, and are robust to a large set of alternative modeling choices. To subject our results to further rigor, we also conduct a falsification test that assesses if incarceration, measured after the homeownership gap, has an association with the dependent variable. Here, we expect to find no relationship and the presence of one might indicate reverse causality or spuriousness. In support of our results, we find no relationship between incarceration measured at $t + 3$ ($b = −0.005$, $p = 0.603$) (or $t + 2$) and the homeownership gap at time t or between incarceration measured at $t + 3$ ($b = −0.007$, $p = 0.421$) (or $t + 2$) entered along with incarceration measured at $t − 3$ ($b = −0.023$, $p = 0.009$) on the homeownership gap at time t.

3.5. Estimation with Census and ACS data

Additionally, we assessed the robustness of our results to using different individual-level data as the source of the homeownership measure: the 1980, 1990, and 2000 Censuses and the 2001–2005 American Community Surveys (ACS). Though these alternative sources cover many fewer state-years than the CPS, they include much larger samples within each state and, therefore, should be less susceptible to measurement error. Whereas the average number of Black respondents in

Table 4
Black–White homeownership gap, Black homeownership rate, and White homeownership rate as a function of state incarceration (with Census/ACS data).

	Model 1 Black–White gap	Model 2 Black rate	Model 3 White rate
Prisoners per thousand (lagged 3 years)	−0.012**	−0.006*	0.001
	(0.005)	(0.004)	(0.002)
Constant	0.471	0.285	0.624
Observations	838	838	838
Year fixed-effects	Yes	Yes	Yes
State fixed-effects	Yes	Yes	Yes
State controls	Yes	Yes	Yes
AR(1) correction	Yes	Yes	Yes

Note: In addition to the year and state-fixed effects, each model includes controls for the state unemployment rate, per capita personal income, the poverty rate, the home price index value, the ratio of median household income to home value, the violent crime rate, the percent Black, the percent White, and the percent elderly. Data on the state minimum wage, the contract interest rate, the maximum combined AFDC/TANF Food Stamps benefit for a family of four, and the state EITC rate are not available as of 1977 and so are excluded from the models to preserve the state-year observations derived from the 1980 Census.
* $p < .05$.

the CPS sample for each state paired year was 250 (through 2001) and 450 (after 2001), the average number of Black respondents in each state in the analysis sample is nearly 10,000 in Census years and 1,000 in ACS years.

We employed these data to construct parallel measures of homeownership to those we created from the CPS. Appendix B compares the year-specific means and standard deviations of the Black–White homeownership gap (Black homeownership rate/White homeownership rate) for the years in which there is both CPS data and Census/ACS data. Though the standard deviations are general smaller with the Census/ACS data than the CPS data, the means are quite close across both measures, suggesting the measures from the two different sources are quite similar.

We next merged the Census/ACS measures of the Black–White homeownership gap with the state-level data on incarceration. We estimated the relationship between the total incarceration rate (lagged three years) and the Black–White homeownership gap (measured as Black/White), adjusting for both state- and year-fixed effects. For comparability with the CPS models, we use data from the years 1980, 1990, 2000, and 2001–2005.

Table 4 replicates the analysis of CPS data presented in Table 2. The key differences from those earlier models is (1) the use of Census/ACS vs. CPS, (2) use of the years 1980, 1990, 2000–2005 vs. 1985–2005, and (3) omission of the control for the contract interest rate since it is not available until 1978 and so cannot be lagged three years from the first (1980) observation of the dependent variable. The models show evidence of effects of the incarceration rate on the Black–White home-ownership gap. Smaller coefficients signal a larger gap. Compared with the models presented in Table 2, the coefficients are somewhat reduced in magnitude but are still negative, significant, and substantial. For example, comparing the preferred model (Model 1) in Table 2 and in Table 4 the Beta is reduced from −0.023 to −0.012.

4. Discussion

Our analysis of the state-level relationship between incarceration and home ownership over two decades shows that incarceration rates depress rates of Black homeownership and, in doing so, widen the Black–White homeownership gap. Although this relationship could be driven by unobserved factors, our analysis adjusts for a full set of variables that might confound the relationship between state-level incarceration and state-level homeownership including the generosity of state social welfare programs, housing market conditions and economic conditions, demographic composition, and crime. In addition, we include state fixed-effects to net out unobserved but potentially confounding state characteristics that are stable over time and year fixed-effects to net out unobserved characteristics that vary over time but are found across states. Our results are robust to a wide range of modeling and measurement choices (e.g., including selecting alternative year ranges, including a state-specific time trend, calculating our dependent variable using Census/ACS data instead of CPS data) and to falsification tests that guard against spuriousness and reverse causality.

Given the sheer scale of incarceration among Black men, it is possible the association between incarceration and the Black–White homeownership gap is brought about simply through the direct negative consequences of incarceration on homeownership. The economic and social consequences of incarceration for the formerly incarcerated and their romantic partners are indeed steep (e.g., Schwartz-Soicher et al., 2011; Western, 2006), and these observed associations may directly result from asset loss, difficulty acquiring new assets, or some combination of the two. But we suspect that this ecological analysis also detects consequences of incarceration on others connected to recently incarcerated men and on the communities in which these men reside. This explanation implies that the consequences of incarceration reach a wider demographic than simply the formerly incarcerated, a result in accord with prior research on asset accumulation (O'Brien, 2012).

Despite the robustness of our findings, the analyses are subject to some important limitations. First, the CPS does not contain detailed information on household wealth and so we are limited to studying homeownership. Although the limited prior research on incarceration and asset holding (Turney and Schneider, 2014) finds a negative relationship between

incarceration and home ownership among women connected to recently incarcerated men, that work also suggests that, for the formerly incarcerated, incarceration is more strongly associated with bank account ownership and vehicle ownership, which we are unable to examine. Second, our analysis is, by design, conducted at the aggregate state-level. Although this approach can introduce problems of ecological inference were we to make inferences about the individual-level effects of incarceration on the probability of an individual's homeownership, in this case the purpose of the analysis is to show that the negative effects of incarceration extend widely (also see Wildeman, 2012). Further, we show that these negative effects are concentrated among Blacks, rather than Whites, which lends further confidence to the interpretation. Third, our aggregate-level approach is designed to capture the effects of incarceration on the homeownership of formerly incarcerated men, their close family members, and their communities. However, because there is no annual time series data available on incarceration rates at the sub-state level, we are limited to aggregating at the state-level, rather than at the MSA or even neighborhood level. Finally, although we show the broad-based effects of incarceration on homeownership, we are unable to detail the mechanisms by which incarceration affects homeownership patterns. We expect that these effects operate both directly on formerly incarcerated men through both asset loss and blocked opportunity for ownership after incarceration, but also via effects on the romantic partners and families of prisoners and ex-prisoners as well as more broadly on residents of communities experiencing concentrated incarceration. Future work might test this idea by joining individual-level data with contextual incarceration rates to examine if living in places with high levels of incarceration impedes homeownership among Blacks removed from the personal or familial experience of incarceration.

Limitations aside, these analyses contribute to a growing literature on the broad economic consequences of incarceration for former prisoners, their families, and their communities. Unlike prior research, which has mostly considered how the effects of incarceration extend to the romantic partners and children of the incarcerated, we show that these consequences aggregate and extend to the broader community. In this way, our work responds to recent calls to explore the consequences of incarceration for aggregate-level inequality (Alexander, 2012; Wildeman and Muller, 2012). By showing that incarceration increases Black–White inequalities in homeownership, these findings are in line with Alexander's (2012) work that suggests the criminal justice system is a system of racial control that perpetuates racial hierarchies in the United States. Additionally, these analyses contribute to the well-established literature on inequalities in household wealth. Our data shows that despite concerted efforts to promote homeownership and despite narrowing gaps in other markers of Black–White economic inequality, the Black–White homeownership gap remained stubbornly large over the period 1988–2004. Taken together, results suggest that the rising incarceration rates in the United States – a phenomenon that has especially affected poorly educated minority men – may have served to perpetuate and maintain these group-level inequalities in homeownership.

Acknowledgements

Appendix A. State-level control variables

1. Unemployment rates (1970–2013). We accessed annual unemployment rates for the states for the period 1976–2013 from the Bureau of Labor Statistics' Local Area Unemployment Statistics (LAUS) database. We then added unemployment data for the years 1970–1971 from the 1972 Statistical Abstract and for the years 1972–1975 from the 1976 Statistical Abstract.
2. Home Price Index (1975–2012). We accessed data from the Federal Housing Finance Agency's (FHFA). The Home Price Index (HPI) is a measure of single-family house prices that is constructed on a quarterly and annual basis for each of the 50 states and DC based on repeat transactions for properties involving mortgages securitized or purchased by Fannie Mae or Freddie Mac. It is estimated based on sale price data and on appraisal data and is normalized to be 100 in the first quarter of 1980. Since the HPI is updated each quarter, the values of all prior observations can change. We downloaded data ending in the fourth quarter of 2012.
3. Per Capita Personal Income (1970–2012). We accessed data from the Bureau of Economic Analysis (BEA) on per capita income, which is calculated as total personal income (from all sources) divided by mid-year state population. We used the CPI-U to put this in constant 1970 dollars.
4. Contract Interest Rate (1978–2011). We accessed data from the FHFA on the average contract interest rate on conventional single-family mortgages by state.
5. Poverty Rate (1977–2012). We calculated state poverty rates using the individual CPS data in the March supplements.
6. Percent Black (1970–2010). We combined information from Census's intercensal state- population estimates for the years 1970–1979, 1981–1989, 1990–1999, and 2000–2010 to construct a measure of the percent of the state population that was Black in each year for each state. Information on Hispanic ethnicity was not available for all years, so this is a measure of the percent Black non-Hispanic and Hispanic.

7. Percent White (1970–2010). We combined information from Census's intercensal state-population estimates for the years 1970–1979, 1981–1989, 1990–1999, and 2000–2010 to construct a measure of the percent of the state population that was Black in each year for each state. Information on Hispanic ethnicity was not available for all years, so this is a measure of the percent White non-Hispanic and Hispanic.

8. Percent Elderly (1970–2010). We combined information from Census's intercensal state-population estimates for the years 1970–1979, 1981–1989, 1990–1999, and 2000–2010 to construct a measure of the percent of the state population that was over the age of 65.

9. Violent Crime Rate (1970–2010). We accessed data from the FBI Uniform Crime Reports to construct a measure of the violent crime rate where violent crime includes murder, forcible rape, robbery, and aggravated assault.

10. State Minimum Wage (1980–2011). University of Kentucky's Center for Poverty Research. This variable records the state minimum wage if higher than the Federal and the Federal minimum wage otherwise. Details are available at http://www.ukcpr.org/AvailableData.aspx.

11. State EITC Rate (1980–2011). We accessed data from the University of Kentucky's Center for Poverty Research. Details are available at http://www.ukcpr.org/AvailableData.aspx.

12. State Maximum AFDC/TANF and Food Stamps Benefit for family of four (1980–2011). We accessed data from the University of Kentucky's Center for Poverty Research. Details are available at http://www.ukcpr.org/AvailableData.aspx.

13. Median Income to Home Value (1975–2005). We accessed data on the median income of four-person families (in current dollars) by state from the US Census Bureau's archive of tabulations used by HHS for LIHEAP. We divided that figure by the average home price (in current dollars) by state, available from the Lincoln Institute of Land Policy (LILP), averaging across the quarterly values to generate annual measures. These average home price values are estimated by LILP using data from the Decennial Census of Housing and the FHFA HPI. Detailed information is available the following: Davis, Morris A. and Jonathan Heathcote. 2007. "The Price and Quantity of Residential Land in the United States." *Journal of Monetary Economics* 54: 2595–2620.

Appendix B. Table of Black–White homeownership gap in CPS and Census/ACS

	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
1980	0.65	(0.17)	0.65	(0.11)	0.24	(0.11)	0.24	(0.06)
1990	0.58	(0.18)	0.60	(0.11)	0.29	(0.11)	0.27	(0.07)
2000	0.61	(0.14)	0.59	(0.10)	0.28	(0.10)	0.29	(0.06)
2001	0.61	(0.15)	0.59	(0.10)	0.28	(0.10)	0.29	(0.06)
2002	0.61	(0.14)	0.60	(0.10)	0.29	(0.10)	0.29	(0.06)
2003	0.61	(0.14)	0.59	(0.10)	0.29	(0.11)	0.29	(0.07)
2004	0.60	(0.14)	0.59	(0.10)	0.30	(0.09)	0.30	(0.07)
2005	0.60	(0.13)	0.58	(0.11)	0.30	(0.09)	0.31	(0.07)

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