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Racial Wage Disparity in US Cities

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Abstract This paper estimates the conditional wage gaps between black and white full-time male workers at the metropolitan statistical area (MSA) level using data from the 1990 and 2000 U.S. Censuses. The magnitudes of the wage gaps are found to vary substantially across location. As predicted in Becker's (The economics of discrimination, University of Chicago Press, Chicago, 1957) seminal theory on wage discrimination, we find that the wage gaps are greater in MSAs that have a larger proportion of black workers in the labor force. This is the most consistent result across all specifications and years. We also find the gaps to be greater where there is an overrepresented black population in jail and a more segregated population if the MSA is in the South. The proportion of workers covered by a collective bargaining agreement in the private sector is associated with greater relative black earnings. We find that although the relationship between race and wages has diminished over time as famously suggested in Wilson (The declining significance of race: Blacks and changing American institutions, University of Chicago Press, Chicago, 1978), the significance of race remains.

Keywords Discrimination · Racial wage differential · Wage inequality

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Introduction

Since the emancipation of black slaves in the South, black–white economic equality has been approached in many dimensions but never fully achieved. From a starting point of essentially no wealth, little skills, and no education, black workers have acquired better education, increased mobility, and greater access to all occupations.[1] Yet a significant difference still exists with his (or her) white counterpart. White workers still earn more, are more likely to be employed, work more hours, have better education, more work experience, and are less likely to work part-time or work in the public sector.

These differences themselves are, and have been, vastly different across time and geographic space. Careful and rigorous research has uncovered much in the way of explaining the differences across time in black–white economic status measured through wages, wealth, and employment. Little of this work, however, has been focused on the great variation in black–white differences across geographic space at a subnational scale.[2] We undertake a more detailed analysis using the 1990 and 2000 Census by estimating conditional racial wage gaps at the metropolitan statistical area (MSA) level.

The contributions of this paper are threefold. First, we estimate racial wage gaps conditional on observable factors such as age and education at the MSA level for the continental USA using the 1990 and 2000 Census. Second, we use the spatial variation in the gaps across MSAs to

[1] See Altonji and Blank (1999) for a review of the literature covering black and white economic inequality.

[2] Two notable exceptions cited here are Sundstrom (2007), who estimates wage gaps at the SEA level for the South, and Charles and Guryan (2008), who estimate wage gaps at the state level.

observe their correlation with some proposed determinants of the wage gap. Lastly, we show that the magnitude and significance of the wage gap determinants depend on being located in the North or the South and on the education attainment of the workers under consideration.

Potential Determinants of the Wage Gaps

In what follows, we investigate factors that have been identified as potential determinants of racial wage gaps in the literature to see whether they are correlated with the observed variation across space. The study most closely related to ours on a geographic scale is Sundstrom (2007), which estimates the racial wage gap at the state economic area (SEA) level in the South from 1940 to 1960. This author finds that the racial wage gap was substantially greater in local labor markets that had a greater supply of black workers, were more urbanized, were located in plantation districts, and/or were in locations where whites exhibited racist preferences by voting for Strom Thurman in the 1948 Presidential election.

Sundstrom (2007) suggests that the geographic distribution of wage gap magnitudes may be a legacy of the distribution of slaves. In particular, he finds the percentage of an SEA that was once enslaved to be a better predictor of its wage gap than the contemporaneous percentage of adult males in an SEA that are black. Similarly, we measure the relationship of current location-specific factors on our estimated wage gaps as well as the historic distribution of slaves. Using more recent data, we find, in contrast to Sundstrom (2007), that the distribution of wage gaps align more with the distribution of current black population rather than that of slaves in the nineteenth century.

In the seminal theoretical treatment of discrimination in the labor market, Becker (1957) predicts that the amount of wage discrimination in a labor market should be increasing with the percent of the labor force that is black. The intuition is that black workers will first sort to the least discriminating firms before obtaining a job with the relatively more discriminating firms. A labor force that has a greater proportion of black workers is predicted to have a higher number of black workers employed by discriminating firms, *ceteris paribus*, and thus a larger wage gap.

A second prediction of Becker's theory is that the wage gap should increase with the discriminatory preferences of the firms that employ black workers. If we could measure the distribution of discriminatory preferences toward black workers (where higher values indicated a greater distaste for hiring black workers), these firms will be in the lower tail of the distribution. As described in Charles and Guryan (2008), it is the marginal discriminator's preferences that influence the wage gap more so than the most discriminating firms, who likely do not employ black workers to begin with. Thus, we employ a measure of the marginal discriminator's racial preferences from their paper.

Charles and Guryan (2008) calculate the level of prejudice for each individual in the General Social Survey (GSS) according to their stated preferences on race relations. Separating individuals by state, the authors then take the pth percentile of the prejudice measure within each state as that state's level of relative prejudice where p is the percentage of the workforce that is black. For example, if California's workforce were 10 % black, the relative prejudice measure for that state would be the prejudice index value of the person whose value was greater than 10 % of all individuals in California. See Charles and Guryan (2008) for details.

In contrast to Becker's "racial tastes"-based theory, William Wilson's influential treatment of the subject states that much of the observed discrimination in labor markets was a result of white workers competing for jobs with lower-priced black workers (Wilson 1978). According to Wilson (1978), this competition steadily decreased as the federal government introduced regulations aimed at decreasing employers ability to exclude or underpay black workers. He concludes that as a result of such structural changes, race has become less important relative to social class in explaining the economic position of black workers.

Although both Becker (1957) and Wilson (1978) predict the absence or at least declining significance of discrimination in labor markets, the evidence strongly suggests that it still remains. In audit studies where matched black and white candidates are sent to apply for entry level jobs, black candidates are found to receive significantly less call backs (Pager 2003, 2007; Pager et al. 2009a, b) and are in fact found to be on equal footing to white felons (Pager et al. 2009a).

A critique of such studies is that the results are heavily based on the assumption that the only difference between matched candidates is their race. Clearly, this assumption is impossible to satisfy with actual candidates. The results are then biased if there exists any other factor that is correlated with race that would influence the results. For example, if black applicants are more likely to perceive discrimination where none exists, they may behave differently in interviews in a way that would decrease their likelihood of receiving a call back.

One study that is free of the above critique is Bertrand and Mullainathan (2004). The authors send out matched applications with "white-sounding" and "black-sounding" names. Applications sent with names that were more likely to be given to a black person received significantly less call backs. Since there are no actual applicants speaking with potential employers, only fictional names on resumes, one need not be concerned that outside factors correlated with race may be affecting the interviewees behavior and causing the results.

The audit studies mentioned above focus entirely on discrimination occurring at the employment stage. One factor that may limit an employer's ability to discriminate workers who are already employed is the presence of a collective bargaining unit or a union. Union contracts restrict employers' ability to pay different wages for the same position and thus should theoretically limit discrimination based on race.

There is empirical evidence that the presence of unions does in fact decrease wage dispersion overall (Freeman 1980). It has also been shown that union wages are less sensitive to worker characteristics (Bloch and Kuskin 1978; Duncan and Leigh 1980) and that unions are less able to statistically discriminate against immobile workers who have lower reservation wages (Raphael and Riker 1999). Lastly, Bound and Freeman (1992) find that the decrease in union rates for black workers contributed to a wider wage gap for workers without a college education.

Putting these results together, one may even expect to estimate a wage premium for black workers in unions. This may arise in the following scenario. Suppose, as is empirically the case, that the typical black worker in any location has less human capital (education, experience, etc.) than the typical white worker and a particular job employs workers whose human capital levels fall within a certain range. We would then expect the average black worker to have less human capital than his white counterpart working the same job and thus be paid less even absent any prejudice. However, if the job is covered by a union contract that restricts the variation in wages for the same job, then we may observe the black worker making the same wage as the white worker. A standard wage regression employing a black indicator to control for race would then credit the difference in race for the discrepancy in what would otherwise cause wages to differ. This would result in a positive coefficient on the black indicator or an estimated wage premium for black workers.

The above argument assumes that black workers are able to obtain union jobs to begin with. Although unions may pay the same wage to workers having the same job, they have historically excluded black workers from employment (Waldinger and Bailey 1991). Since our focus is on wage gaps, we are not able to comment on any discrimination that may occur at the employment stage. However, if such exclusion still exists in unions, it will bias our results in favor of finding an insignificant correlation between union presence and racial wage gaps.

The black population is and has historically been overrepresented in the US penal system (black males in particular). Only a single MSA in our sample (Des Moines, IA) had a greater percentage of white residents in its jails than black residents and only in the 1999 Jail Census.[3] The theoretical correlation of the black jail population and the local wage gap is not immediately clear.[4]

On the one hand, if black workers are overrepresented in jail, it may be due to local prejudice, which could also be reflected by a wider wage gap. The evidence of this being the case is somewhat mixed. Blumstein (1982) found that the vast majority of the overrepresentation of black prisoners is due to their increased rates of arrest. An estimated 20 % of the overrepresentation is left unexplained after controlling for the number of black arrests. If any of the overrepresentation is due to discriminatory treatment in sentencing or sentence length, it is likely only part of this 20 %. Using more recent arrest and admission data and controlling for Hispanic ethnicity, Harris et al. (2009) fail to find much disproportionate treatment of black arrests relative to whites. Blacks are only found to be disadvantaged in their likelihood of being admitted to prison and having longer sentences for aggravated assault or more violent crimes and actually have an advantage when arrested for rape compared to whites.

The methods used in Blumstein (1982) and Harris et al. (2009) assume that there is no differential treatment of arrestees of different races. If blacks are more likely than whites to be arrested under suspicion of committing a crime, then the differential treatment of black arrestees may be worse than what is described in the abovementioned studies. Using data on police decision to detain juvenile arrestees, Shook and Goodkind (2009) find that black juveniles are two to three times more likely to be detained controlling for type of offense, urban/rural residency, and other important factors. Given that their assessment was based on direct decisions made by police officers, we take this as evidence that the overrepresentation of blacks in jails is at least partially explained by differential treatment or attitudes on race.

In addition to the potential correlation with local levels of prejudice, workers in jail suffer an opportunity cost of lost job experience and the stigma of being incarcerated (Schwartz and Skolnick 1962; Waldfogel 1994). Both factors have the same effect of decreasing future wage offers for black workers.

On the other hand, the incarcerated workers are likely from the lower tail of the offered wage distribution (Western 2002; Western and Pettit 2005) and are less likely to be employed and show up in a sample of workers (Bound and Freeman 1992; Holzer et al. 2003, 2004; Pager

[3] The National Jail Census of 1999 surveyed all jails in the USA between 1989 and 1999.

[4] For a summary of the empirical evidence on the effects of incarceration on the subsequent employment an earnings on less-educated young prisoners, see Holzer (2007).

2007; Pager et al. 2009a, b). This truncation of the observed wage distribution for black workers may then increase their average observed wages in the Census data (Brown 1984; Chandra 2003). We will henceforth refer to this idea as the truncation hypothesis. Further obfuscating the issue, black workers who live in MSAs with overrepresented black jail populations may suffer statistical discrimination if the high jail population implies that black workers in the MSA have relatively lower ability (Holzer 1994; Holzer et al. 2004).

Lastly, an overrepresented black jail population may signal that local human capital levels of black workers are relatively lower than that of white workers. If this were the case, black workers would be less employable and more likely to engage in crime. Some of these human capital measures may not be picked up by variables available in the Census data. Thus, if larger black jail populations were found to be associated with wider wage gaps, it could possibly be from the correlation with unmeasured skills and human capital.

We construct a variable to measure how overrepresented the black population is in local jails. The variable is defined as

$$\text{jail}_{jt} = \frac{\text{jail population}^{B}_{jt}}{\text{population}^{B}_{jt}} - \frac{\text{jail population}^{W}_{jt}}{\text{population}^{W}_{jt}} \quad (1)$$

for MSA j in year t where B and W stand for black and white, respectively. As noted above, this value is positive for all but one MSA in our sample indicating that almost all MSAs in our sample have a greater proportion of their black residents incarcerated compared to their white residents.

The final potential determinant of local wage gaps considered is residential segregation. Residential segregation along the lines of race can occur as a result of individuals having a preference to live near same race neighbors or as a result of discrimination in the rental, home loan, or home buying process. Audit studies have shown that compared to white homebuyers, black homebuyers were less likely to have information requested, have follow-up contact, or receive coaching form mortgage loan officers, be informed of possible housing available, be invited to view or inspect an available house from real estate agents, and are more likely to be informed of fewer loan products and be encouraged to take an FHA loan (Turner et al. 2002; Yinger 1986).

The behavior of the real estate agents is shown to be consistent with the hypothesis that agents discriminate primarily to retain the business of their white customers (Yinger 1986). Thus, if both racial segregation and wage gaps are a result of prejudice, we may find a correlation between segregation and wage gaps independent of a direct channel through which one effects the other. In what follows, the relationship between segregation and wage gaps is estimated holding constant, somewhat, the level of prejudice.

Theoretically, segregated MSAs could generate higher or lower incomes for black workers. Black incomes could be lower if segregation restricted their employment opportunities by keeping them far from better paying jobs (Kain 1968; Wilson 1987). Using the natural experiment of a large company relocating from the city center to the suburbs, Zax and Kain (1996) find empirical evidence of this "spatial mismatch" theory while Boustan and Margo (2011) find that when employment opportunities left the cities in the 1960s, black workers in segregated areas were more likely to remain in their neighborhoods and be employed by local post offices rather than follow the jobs.[5]

On the other hand, segregation could improve black earnings through positive peer effects if it forced high-skilled blacks to remain in black neighborhoods (Wilson 1987; Handlin 1959; Glazer and Moynihan 1963). That is, the effect of having a high-skilled neighbor may influence ones decisions in a positive manner or allow access to a beneficial network of opportunities. This positive peer effect, however, may be diminished for black workers as they are less likely to benefit from their network through finding out about available jobs or having peers serve as professional references (Smith 2005, 2010). This in turn may hinder the potential wage benefits workers receive from networks (Braddock and McPartland 1987), particularly "high-status" black men (Smith 2000).

Cutler and Glaeser (1997) show that black workers in segregated MSAs are significantly more likely to receive lower incomes. The authors find that the relationship between segregation and black incomes remain even after controlling for the spatial mismatch hypothesis (distance from work), exposure to educated peers, and parental background. However, the authors also find segregation to be significantly related to other poor outcomes, which themselves may effect earnings such as not graduating high school, periods of idleness (not employed nor in school), and probability of becoming a single mother. The dependent variable used in our paper is the MSA-level wage gap that remains after controlling for individual characteristics. Therefore, we show how segregation relates to relative black earnings conditional on education, potential experience, etc.

We construct an index to measure local levels of residential segregation. The segregation index (also referred to as the dissimilarity index) can be interpreted as the fraction of either race that must relocate in order for the MSA to be perfectly integrated. It is calculated for each MSA as

[5] For additional examples of spatial mismatch, see Holzer (1991).

$$\text{segregation}_{jt} = \frac{1}{2}\sum_{c=1}^{C}\left|\frac{b_{cjt}}{b_{jt}} - \frac{w_{cjt}}{w_{jt}}\right| \quad (2)$$

where b is the number of blacks, w is the number of whites, and c is the Census tract of observation within MSA j and year t.

Estimating Local Wage Gaps

We measure the local conditional wage gaps by employing a wage regression on worker characteristics, indicators for metropolitan area of residence (MSA), and interactions of MSA residence with a black indicator. The coefficients on the MSA/black interaction terms serve as our measures of the local wage gaps. The estimation equation is

$$\begin{aligned}\ln(w_{ij}) = \alpha_1 + X_i'\gamma + \sum_{j=2}^{J}\alpha_j MSA_{ij} \\ + \beta_1 B_i + \sum_{j=2}^{J}\beta_j(MSA_{ij}\times B_i) + \epsilon_{ij},\end{aligned} \quad (3)$$

where $\ln(w_{ijt})$ is the natural log of worker i's wage, X_i includes categorical variables for age, potential experience, marital status, ability to speak English, citizenship, birth-state[6], industry-occupation group[7], education attainment, and work disabilities, $B_i = 1$ if individual i is black, and $MSA_{ij} = 1$ if individual i resides in location j. The wage gap for the base MSA is given by $\hat{\beta}_1$ and the wage gap for MSA j is given by $(\hat{\beta}_1 + \hat{\beta}_j)$.

Arcidiacono et al. (2010) provide evidence that black college-educated males are less likely to suffer statistical discrimination than those with only high school degrees. These authors claim that in earning a college degree, a worker of either race sends a signal to an employer about his ability and earns a wage that is correlated with this ability. This signal is not readily observed from a high school graduate and the employer must base initial wages on his expectations. Since the expected ability of black high school workers is lower according to the distribution of black Air Force Qualifying Tests (AFQT) scores, rational employers with no prejudice may initially pay black high school graduates less until they can fully observe the worker's ability over time.

It may then be appropriate for us to estimate a wage gap in each MSA that is specific to educational attainment. In a separate specification, we take the idea of an education-specific wage gap one step further and allow each MSA to have three different gaps denoting education level with subscript k. For each MSA, we estimate a wage gap for workers without a high school degree ($k = 1$), one for high school graduates ($k = 2$), and one for college graduates ($k = 3$). Since workers likely compete for jobs with other workers in their own education group, they may only care about a wage gap that is specific to their group.

The education-specific wage gaps are estimated from

$$\begin{aligned}\ln(w_{ijk}) = X_i'\gamma + \sum_{k=1}^{3}\alpha_{1k}\times E_{ik} \\ + \sum_{k=1}^{3}\beta_{1k}(E_{ik}\times B_i) \\ + \sum_{k=1}^{3}\sum_{j=2}^{J}\alpha_{jk}(MSA_{ij}\times E_{ik}) \\ \sum_{k=1}^{3}\sum_{j=2}^{J}\beta_{jk}(MSA_{ij}\times E_{ik}\times B_i) + \epsilon_{ijk},\end{aligned} \quad (4)$$

where $E_{ik} = 1$ if individual i has education level k. The "uneducated wage gap" is given by $\hat{\beta}_{11}$ for the base MSA and $(\hat{\beta}_{11} + \hat{\beta}_{j1})$ for MSA j. Likewise, the "high school wage gap" is given by $\hat{\beta}_{12}$ for the base MSA and $(\hat{\beta}_{12} + \hat{\beta}_{j2})$ for MSA j. Finally, the "college wage gap" is given by $\hat{\beta}_{13}$ for the base MSA and $(\hat{\beta}_{13} + \hat{\beta}_{j3})$ for MSA j. Equations 3 and 4 are estimated separately for each year.

The estimated wage gaps, denoted $\hat{\Gamma}_{jt}$, are then regressed on historic and current MSA factors to account for their spatial differences separately for each year

$$\hat{\Gamma}_{jt} = \phi_t' Z_{jt} + \epsilon_{jt}, \quad (5)$$

where Z_{jt} contains proportion of the population that was enslaved in 1859, proportion of the population and labor force that is black, a measure of racial preferences, proportion of workers covered by a collective bargaining agreement, a measure of black overrepresentation in local jails, and an index of residential segregation. Since $\hat{\Gamma}_{jt}$ is an

[6] Card and Krueger (1992) show that relative school quality across race accounts for 20 % of the narrowing of the wage gap between 1915 and 1966. Furthermore, the authors found that over 90 % of school-aged children in 1940 were living in their state of birth and 82 % of all blacks born in between 1990 and 1945 grew up in the state of their birth. Thus, these interaction variables are meant to control for school quality that may differ by race and state. However, Card and Krueger (1992) tabulations are from data sets much older than those used in our analysis, so it is possible that these percents are lower in our data if black school-aged children are more mobile in our sample than they were in the 1940s. We do not interact birth-state with race in this specification but do so when estimating a specification that mimics that of Sundstrom (2007) not reported here. Interacting birth-state with race in Eq. 3 leads to little difference in the estimated wage gaps.

[7] See the "Appendix" for list of industries, occupations. An example of a industry-occupation group that would have its own indicator would be all managerial and professional workers in the manufacturing industry.

estimate from a previous regression, ϵ_{jt} will be heteroskedastic. Thus, Eq. 5 is weighted by the inverse of the estimated standard errors of the $\hat{\Gamma}_{jt}$'s. Lastly, we estimate Eq. 5 once for the whole sample and then separately for each education group.

Our empirical strategy uses spatial variation in the estimated wage gaps and potential correlates to identify statistically significant relationships between the two. However, we are unable to claim causality, even with significant results. For instance, if we find that local wage gaps are significantly larger in locations that have segregated neighborhoods, we cannot say whether segregation is causing larger wage gaps or larger wage gaps are causing segregated neighborhoods.

To identify causality, we would require an estimation strategy that holds constant individual's response to the wage gap to ensure that the relationship measured was segregation's effect on wage gaps and not vice versa. For example, a natural experiment (such as a sudden unexpected change in segregation patterns due to displacement from a natural disaster) could be used as random variation of segregation patterns across time that is not due to workers responding to wage gaps. Given the scale of this study and the number of correlates investigated, such an approach is not feasible. The results described below are then taken as descriptive in nature and point to potential areas of focus that could also benefit from using variation in wage gaps across locations.

Finally, note that we could utilize a hierarchical linear model approach to estimate the same relationships. We choose instead to pursue the methodology described above so that our results can be directly compared to previous economics literature (Sundstrom 2007; Charles and Guryan 2008).

Data

Data for this study come primarily from the U.S. Census 1990 and 2000 5 % microdata samples (Ruggles et al. 2009). The unit of observation for Eqs. 3 and 4 is any full-time employed male between the ages of 18 and 64 who is classified as white or black and non-hispanic according to the US Census and who was neither a student nor enlisted in the military.[8] We drop all observations that worked in MSAs that had less than 30 black males satisfying the above restrictions. The unit of observation for Eq. 5 is any MSA-year that had at least 30 black workers in our sample.

The historic percentage of population enslaved in each MSA is calculated using the 1860 Slave Census (Menard et al. 2004)[9], and the percentage of workers covered by collective bargaining agreements are obtained from Hirsch and Macpherson (2003). The proportion of the labor force that is black and the segregation indexes are constructed from data derived from the 100 % Census samples (Center 2011).[10] Finally, we use a measure of the relative prejudice in each state from Charles and Guryan (2008).[11]

Descriptive statistics of the sample are depicted in Table 1 separated by race. In the top panel, which summarizes the data from the 1990 Census, white workers in the sample are shown to have been more likely to have a spouse present and slightly more likely to be a citizen. They also had, on average, a year more of education and age. Both races were most likely to work in the manufacturing industry but white workers were most likely to be management, whereas black workers were most likely to be operatives and laborers.[12] Over 10 % of white workers were born in New York, whereas black workers were mostly born in the South with the most common state being Georgia.

In the 2000 sample, the percent of black workers that were citizens decreased and the percent that were disabled increased significantly. White workers were less concentrated in the manufacturing industry but more concentrated in managerial and professional occupations, and the typical black worker was more likely to be an operative or laborer in the manufacturing industry. The average number of years in school, age, and experience increased for both races, but the difference between the two remained largely unchanged. The typical black worker in the 2000 sample was still born in the south but most likely from Texas rather than Georgia.

Results

Variation in the Wage Gaps Across MSA

The kernel density estimates of the wage gaps estimated when using the entire sample of workers are displayed in Fig. 1.[13] The estimated gaps from the 1990 Census are slightly skewed right with an average value of −0.11 and

[8] A worker is designated full-time if he reported working at least 30 h a week and 27 weeks a year.

[9] Available at http://www.usa.ipums.org/usa/slavepums.

[10] Available at https://www.nhgis.org.

[11] We would like to thank the authors for providing this measure.

[12] When looking at the most common industry-occupation pairs rather than considering the two variables separately, white men were most likely to be employed as management in the professional and related services industry. This held true for both years. The list of occupations and industries are displayed in Tables 2 and 3, respectively.

[13] Kernel density estimates for the individual education groups are, for the most part, qualitatively the same as the full sample and are displayed in Figs. 2, 3, and 4.

Table 1 Descriptive statistics by race

	White		Black	
Variable	Mean or mode	Percent	Mean or mode	Percent
1990				
Marital status	Married, Spouse present	71.0	Married, Spouse present	55.0
English	Speaks only English	95.0	Speaks only English	94.5
Citizen	Citizen	95.6	Citizen	93.2
Birth-state	New York	9.5	Georgia	7.4
Disabled	Not disabled	96.5	Not disabled	96.5
Occupation	Managerial and professional	30.3	Operatives and laborers	31.2
Industry	Manufacturing	25.7	Manufacturing	23.3
Years in school	14.5		13.4	
age	39.4		38.7	
experience	19.7		19.9	
2000				
Marital status	Married, spouse present	66.5	Married, spouse present	50.5
English	Speaks only English	93.8	Speaks only English	92.0
Citizen	Citizen	94.4	Citizen	88.4
Birth-state	New York	9.8	Texas	5.8
Disabled	Not disabled	91.4	Not disabled	83.1
Occupation	Managerial and professional	32.7	Operatives and laborers	27.3
Industry	Manufacturing	21.1	Manufacturing	18.5
Years in school	13.9		13.9	
Age	41.1		39.9	
Experience	21.2		20.9	

Table 2 Occupation counts of sample

Occupation	Freq.	Percent
Managerial and professional	359,329	29.01
Technical, sales, and administrative	283,647	22.9
Precision production, craft, and repair	250,241	20.2
Operatives and laborers	236,897	19.13
Service	93,198	7.52
Farming, forestry and fishing	15,344	1.24
Total	1,238,656	100

Table 3 Industry counts of sample

Industry	Freq.	Percent
Manufacturing	315,829	25.5
Professional and related services	158,034	12.76
Retail trade	148,807	12.01
Transportation, communication, and other	137,088	11.07
Construction	127,841	10.32
Wholesale trade	82,716	6.68
Public administration	79,835	6.45
Finance, insurance, and real estate	66,676	5.38
Business and repair services	66,090	5.34
Agriculture, forestry, and fisheries	16,235	1.31
Personal services	15,436	1.25
Entertainment	14,302	1.15
Mining	9,767	0.79
Total	1,238,656	100

range from −0.24 to 0.11, implying as much as an 11 % premium or a 24 % penalty on black wages depending on location. The estimated gaps from the 2000 Census also have an average value of −0.11 and a similar range from −0.29 to 0.11. However, the distribution of gaps using 2000 data is much tighter around the mean.

A portion of the estimated wage gap will be attributable to unobservable characteristics that are correlated with race. For example, if the school quality that black workers received was lower than that of white workers, part of the gap will be due to this unmeasured difference since the model assumes a year of education is rewarded the same across both races. If the unobserved characteristics became more similar across race from the 1990 Census to the 2000 Census, then we would expect to see the distribution of the wage gaps tighten and have less extreme values far from zero as they do in Fig. 1. However, according to the characteristics that we can observe in Table 1, black and white workers differed more in 2000. Therefore, there is no

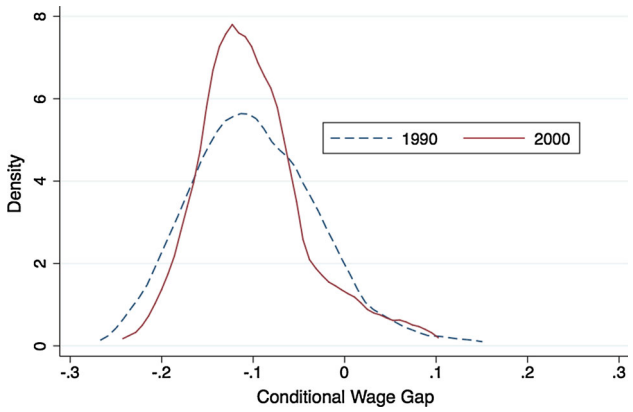

Fig. 1 Kernel density of conditional wage gaps

Fig. 2 Kernel density of NHS conditional wage gaps

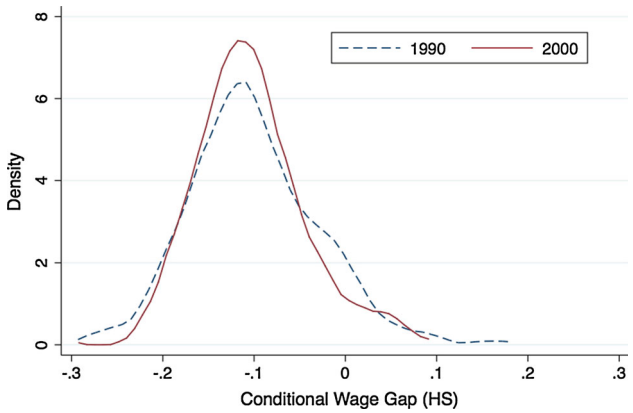

Fig. 3 Kernel density of HS conditional wage gaps

prima facie evidence that would suggest this change in distribution is due to unobservables although we cannot be certain since such characteristics are, by definition, unobservable.

Fig. 4 Kernel density of college conditional wage gaps

The tightening of the wage gap densities is consistent with a Becker (1957) styled model where mobile black workers sort to MSAs where the wage gap is smaller. If black workers were migrating from MSAs, where the wage gap was relatively high to MSAs and where the wage gap was low, we may expect to see the distribution of estimated gaps tighten as we do in Fig. 1. Assuming that the distribution of discriminatory employers was held fixed in each MSA and that black workers migrated in this manner, the most discriminatory employers in MSAs where black workers were leaving would lose employees, decreasing that MSA's estimated wage gap.

Likewise, MSAs that black workers would migrate to would have more workers sort to employers that discriminated relatively more as the least discriminating firms filled all vacancies. This would cause an increase in the estimated wage gap for these MSAs. Testing this hypothesis is beyond the scope of this paper but is the topic of current research.

The geographic distributions of all wage gaps estimated from the full samples are displayed in Figs. 5 and 6.[14] As one might expect, the MSAs with the greatest conditional wage gaps are predominantly located in the South. Those with the smallest wage gaps or small wage premiums are mostly contained within the "rust belt." The geographic concentration of MSAs with black premiums may be in part due to the presence of unions for reasons discussed in the introduction. The MSAs with estimated wage premiums are more dispersed in 2000 (Fig. 6) than in 1990 (Fig. 5), whereas the MSAs with the highest estimated wage gaps are fewer and more concentrated in the South than they were 10 years prior.

What possible explanations exist for the differences across space and time in the estimated wage gaps? To

[14] Maps for the education-specific samples are displayed in Figs. 7, 8, 9, 10, 11, and 12.

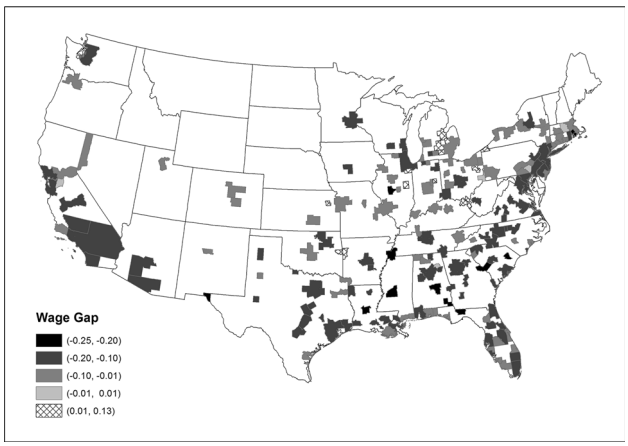

Fig. 5 1990 conditional wage gaps

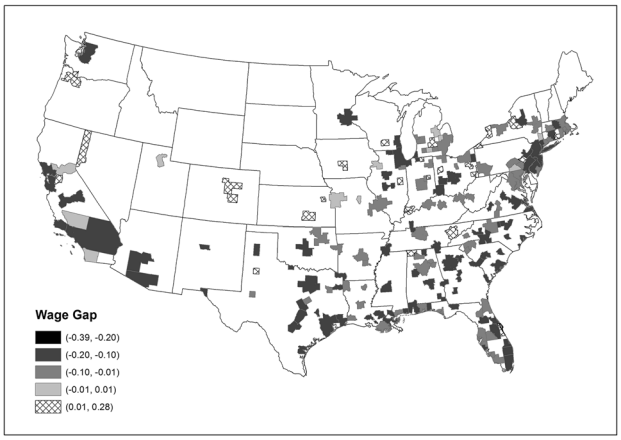

Fig. 7 1990 NHS conditional wage gaps

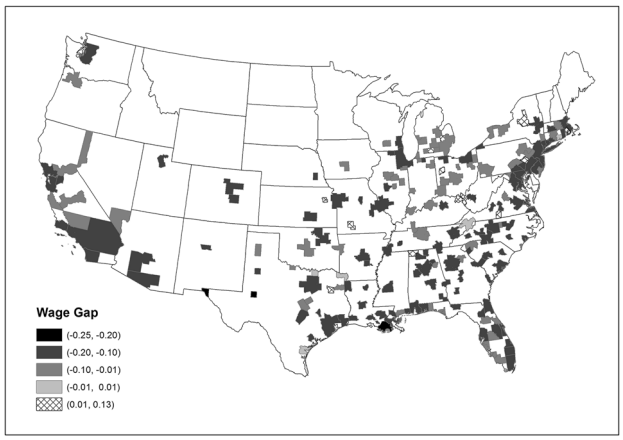

Fig. 6 2000 conditional wage gaps

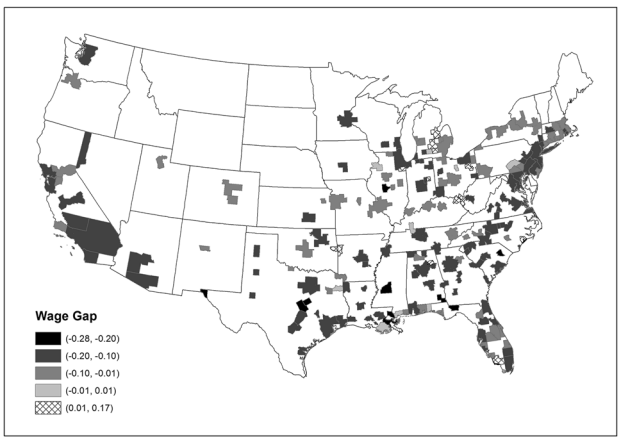

Fig. 8 1990 HS conditional wage gaps

address this question, we investigate factors that may be correlated with the local wage gap.

Correlates of the Wage Gaps

Looking exclusively at SEAs in the South, Sundstrom (2007) finds that the proportion of the population that was enslaved is a better predictor of the local wage gap in the time period between 1940 and 1960 than the 1940 proportion black among adult males.[15] Table 4 shows that using the current fraction of the population that is black results in a higher *R*-squared value and a coefficient with more than double the magnitude indicating that the current population that is black is more strongly associated with local wage gaps in 1990 compared to the historic concentration of slaves. The magnitude of the coefficient and the *R*-squared increase even more when using the fraction of the labor force that is black as observed in the third column. This is to be expected as Becker's theory pertained to the labor force and not the overall population. Thus, the historic geographic distribution of blacks is not as strong a predictor of wage gaps as the current distribution of the black labor force.

The same coefficients are estimated using 2000 Census data in Table 5. Compared to Table 4, all coefficients decrease in magnitude and the *R*-squared terms are almost halved, but the pattern remains the same. The contemporaneous fraction of the labor force that is black is still significantly associated with a larger gap and remains the best predictor compared to the fraction of slaves and fraction of the population that is black.

The variable *prejudice* reflects the prejudice of the marginal discriminator in each state. The relative levels of prejudice are measured by aggregating responses on racial issues from the General Social Survey (GSS) across time (1972–2004) within each state. Due to data limitations in

[15] Sundstrom (2007) used the proportion black among adult males (age 21 and older) as a proxy for the proportion black in the labor force.

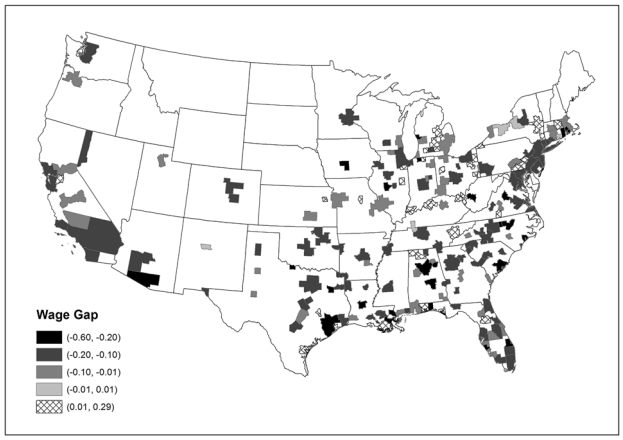

Fig. 9 1990 college conditional wage gaps

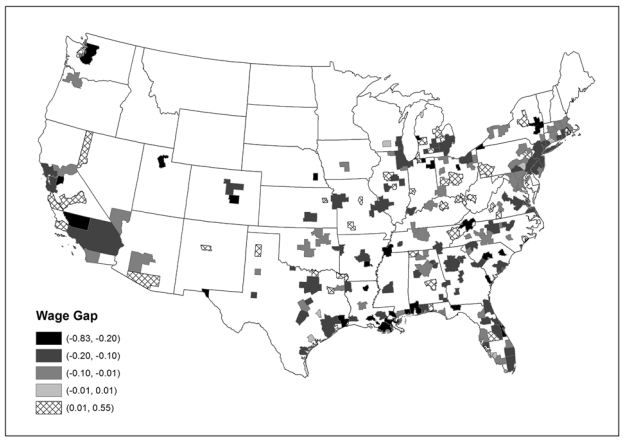

Fig. 10 2000 NHS conditional wage gaps

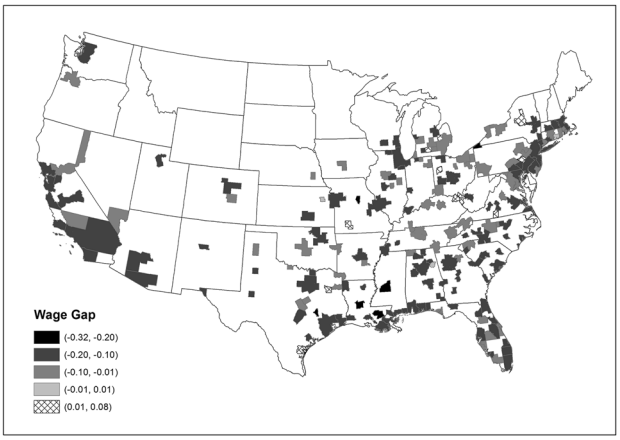

Fig. 11 2000 HS conditional wage gaps

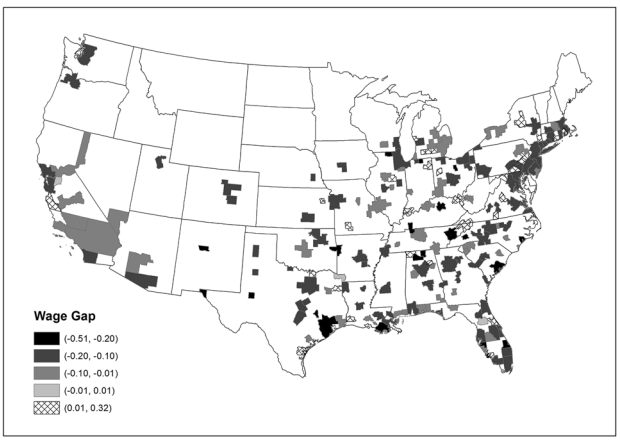

Fig. 12 2000 college conditional wage gaps

the GSS, it is not feasible to measure the marginal prejudice of each MSA or even of each state in every year. Therefore, *prejudice* is an aggregate measure of prejudice that only varies at the state level and not across time.[16]

Given the lack of variation, it is not surprising that *prejudice* does not significantly decrease the wage gap as one would otherwise expect. It may be worth noting that the coefficient is negative and significant when *prejudice* is the only variable.[17] We also substituted the 10th, 50th, and 90th percentile of the prejudice index in for *prejudice* in the main regressions but found mostly insignificant negative effects. These results are not included with the main regression results since the prediction is that an increase in the prejudice of the marginal discriminator will widen the gap, *holding the percent of the labor force that is black constant*.[18]

In the fourth column of Tables 4 and 5, we investigate how the distributions of residential segregation, collective bargaining agreements, and relative jail populations relate to the local wage gap. As discussed in the introduction, we expect a greater presence of union workers to be associated with a lower wage gap as union contracts tend to decrease wage variation within job. This is precisely what is found in the fourth column of Table 4.

The percentage of workers covered by a collective bargaining agreement is associated with greater relative earnings of black workers in 1990 but has no statistically significant effect in 2000. The loss of significance may be

[16] For MSAs that cross state boundaries, *prejudice* is taken to be the average across the respective states.

[17] See Table 6

[18] We would only expect to find significant results perhaps with the 10th or 50th percentile as the most discriminating firms in the upper tail of the distribution should have little to no effect on the wage gap. Although the coefficients were all insignificant, they did tend to be more negative when using the lower end of the distribution.

Table 4 Dependent variable—1990 conditional wage gap

Fraction slave	−0.145***				
	(0.032)				
Fraction black		−0.318***			
		(0.037)			
Fraction labor force black			−0.358***	−0.365***	−0.357***
			(0.041)	(0.055)	(0.056)
Prejudice				0.001	−0.002
				(0.038)	(0.038)
Segregation				0.022	0.003
				(0.034)	(0.036)
Fraction covered				0.103**	
				(0.043)	
Jail				−2.736**	
				(1.369)	
Fraction public					−0.103
					(0.117)
Fraction private					0.239***
					(0.084)
$Jail^{black}$					−2.043
					(1.595)
$Jail^{white}$					2.138
					(11.267)
Constant	−0.075***	−0.063***	−0.063***	−0.076***	−0.069**
	(0.007)	(0.007)	(0.007)	(0.028)	(0.030)
R-squared	0.213	0.286	0.293	0.339	0.352
N	77	186	186	179	179

* $p < .1$, ** $p < .05$, *** $p < .01$

due to the overall decrease in percentage of jobs covered by collective bargaining agreement (down to 15.3 from 18.6 % for the nation as a whole) or a possible decrease in black workers' ability to obtain such jobs. Unfortunately, the issue cannot be addressed in this paper due to data limitations.

The data do, however, allow us to separate covered workers into the private and public sectors. Surprisingly, it is not the public jobs that are associated with smaller wage gaps as has been historically presumed but the private covered jobs, which have historically been known to discriminate against black workers at the hiring stage (Waldinger and Bailey 1991; Farber 1983).[19] In fact, when both variables are included in the fifth column of Table 4, the insignificant coefficient on the percent of covered workers in the public sector is negative and the positive coefficient on the percent of private covered workers is greater in magnitude compared to when the two are combined. Lastly, note that the significance of the coefficient on covered workers in the private sector diminishes in 2000 and is estimated with less significance.

The variable *jail* in the fourth column of Table 4 measures how overrepresented the black male population in jail was in 1990. The estimated coefficient on *jail* is negative and significant indicating that MSAs with jails that are disproportionately black also have larger wage gaps. This suggests that local jail populations may be controlling for unmeasured skills, prejudice, statistical discrimination or may be directly lowering black workers' employment opportunities and wages through the stigma associated with being incarcerated. Furthermore, when using the percent of each population in jail by race separately in place of *jail* in the fifth column of Table 4, the estimated coefficients on the percent of black population incarcerated remain negative while that on the white population is positive. However, both are insignificant.

Pager (2003) shows that workers with criminal records, particularly black workers, face increased difficulties obtaining jobs and are therefore more likely to not appear in our wage sample. Furthermore, Western and Pettit (2005) estimate a selectivity effect of removing the lower end of the black workers' wage distribution via incarceration that increases

[19] When simultaneously modeling worker demand for union jobs and unionized firms demand for workers, Farber (1983) finds that non-whites were more likely to be in unions almost entirely due to their relatively greater desire to be in a union and not from any demand of the firm.

Table 5 Dependent variable—2000 conditional wage gap

Fraction slave	−0.092***				
	(0.030)				
Fraction black		−0.182***			
		(0.029)			
Fraction labor force black			−0.205***	−0.175***	−0.162***
			(0.033)	(0.046)	(0.047)
Prejudice				−0.030	−0.026
				(0.034)	(0.034)
Segregation				−0.026	−0.037
				(0.031)	(0.031)
Fraction covered				0.033	
				(0.040)	
Jail				0.042	
				(0.764)	
Fraction public					−0.132
					(0.101)
Fraction private					0.168*
					(0.091)
$Jail^{black}$					0.653
					(0.982)
$Jail^{white}$					−6.811
					(6.512)
Constant	−0.088***	−0.083***	−0.083***	−0.092***	−0.082***
	(0.007)	(0.006)	(0.006)	(0.026)	(0.026)
R-squared	0.112	0.168	0.174	0.186	0.204
N	76	190	190	181	181

* $p < .1$, ** $p < .05$, *** $p < .01$

over the time period studied here, especially for younger workers. That is to say, the observed wage gaps were increasingly biased toward being less negative (less of a wage penalty) due to the removal of black workers that would have otherwise earned relatively less than white workers. The loss of significance and the positive estimate of the coefficient on *jail* in Table 5 are consistent with the findings in Pager (2003) and the trend estimated in Western and Pettit (2005).

Although not significant, when we replace *jail* with the percentage of incarcerated adults by race in Table 5, the estimated coefficients on the black and white percentages were positive and negative, respectively. The signs on these estimated coefficients are consistent with the truncation hypothesis. More evidence that this may be the cause of the reversal in the signs of the coefficients is the fact that approximately 77 % of the MSAs in our sample increased the proportion of black residence that were incarcerated between 1990 and 2000. If the majority of these inmates were from the bottom of the wage distribution, then the positive effect of removing black workers from the labor force on the observed wage gap should be larger in 2000. In conclusion, our estimates are consistent with the case where the jail populations control for local unobserved skills and human capital, prejudice, and/or statistical discrimination in 1990 and are weakly consistent with the truncation hypothesis in 2000.

The segregation index is constructed for each MSA using Census tracts as the geographic unit of observation in 1990 and 2000. Regardless of the year, we find no evidence of a direct affect of segregation on the local wage gap controlling for other factors as the estimated coefficients in Tables 4 and 5 very small and insignificant.[20]

North and South

The geographic distribution in the wage gaps displayed in Figs. 5 and 6 suggest a fundamental difference still remains between the former Confederate States in the South and the Northern states. This observation is consistent with the discussion in Wilson (1978), which describes the historic differences in the relationship between blacks and whites across the Mason-Dixon line. The differences, argues Wilson, are tied to the historic systems of production. In

[20] Census block level data are available for the year 1990, but using this as the geographic unit of observation does not alter the results.

Table 6 Dependent variable: conditional wage gap

1990				
Marginal	−0.166***			
	(0.031)			
10th percentile		−0.243***		
		(0.086)		
50th percentile			−0.049**	
			(0.019)	
90th percentile				−0.045***
				(0.011)
Constant	−0.203***	−0.249***	−0.119***	−0.064***
	(0.017)	(0.047)	(0.004)	(0.014)
Observations	184	184	184	184
R-squared	0.136	0.042	0.033	0.08
2000				
Marginal	−0.111***			
	(0.026)			
10th percentile		−0.157**		
		(0.070)		
50th percentile			−0.028**	
			(0.016)	
90th percentile				−0.027***
				(0.009)
Constant	−0.173***	−0.201***	−0.117***	−0.083***
	(0.014)	(0.038)	(0.004)	(0.011)
Observations	186	186	186	186
R-squared	0.091	0.027	0.017	0.046

* $p < .1$, ** $p < .05$, *** $p < .01$

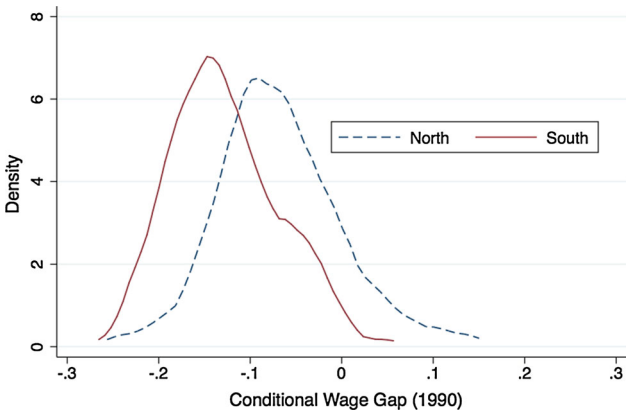

Fig. 13 Kernel density of conditional wage gaps in the South (1990)

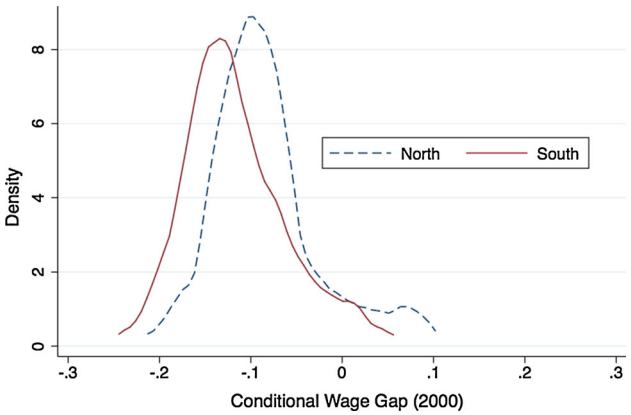

Fig. 14 Kernel density of conditional wage gaps in the South (2000)

the South, freed slaves became low wage workers while the concentrated economic power remained in the plantation owners' hands. In the North, black workers initially competed as cheap labor with organized white workers for manufacturing jobs. With the eventual inclusion of black workers into trade unions and the passing of anti-discrimination laws, black workers were more able to achieve economic success in the North, which had greater opportunity for the working class and less historic prejudice.

When observing the kernel densities of wage gaps in the North and South separately, we see a clear difference in the distribution of gaps in Figs. 13 and 14. Between 1990 and 2000, the distribution shifted slightly to the right and tightened around the mean in the South, whereas the North's distribution experienced a tightening around the mean at a cost of the smaller wage gaps and wage premiums. While the issue is not pursued here, the shifts in distributions are consistent with black migration from the MSAs with large wage gaps in the South to MSAs with relatively smaller gaps in the North. Holding all else constant, such migration would decrease wage gaps in the South while increasing those in the North.

If some of the factors considered above are relatively more important in the South or the North, then we will observe differences when introducing interaction terms for southern location. Table 7 displays results when all independent variables are interacted with an indicator for being located in a former Confederate state. Holding all else constant, the South has wider gaps then the North as evidenced by the negative coefficient on *south*.

The fraction of the labor force that is black is associated with even wider wage gaps in the South across both specifications and years. A likely conclusion is that the South is more prejudiced than the North. However, according to Becker's theory, we would arrive at this result even if the distribution of prejudice was the same in all MSAs, but there were a greater percentage of black workers in the South. Indeed, in both years, the percent of black workers in the labor force in the South is more than double that in the North. That being said, given the lack of intrastate variability in the prejudice variable *prejudice*, the

Table 7 South interaction term regression results

	Gap^{1990}	Gap^{1990}	Gap^{2000}	Gap^{2000}
Constant	0.176**	0.202**	0.046	0.073
	(0.081)	(0.083)	(0.083)	(0.084)
South	−0.222**	−0.247***	−0.090	−0.110
	(0.089)	(0.090)	(0.090)	(0.091)
Fraction labor force black	−0.619***	−0.579***	−0.250*	−0.225
	(0.146)	(0.148)	(0.140)	(0.141)
×South	−0.282***	−0.284***	−0.152***	−0.149***
	(0.062)	(0.062)	(0.051)	(0.051)
Prejudice	0.372***	0.406***	0.224*	0.267**
	(0.111)	(0.111)	(0.115)	(0.116)
×South	0.014	0.007	−0.029	−0.034
	(0.046)	(0.046)	(0.041)	(0.041)
Segregation	0.074	0.045	0.034	0.023
	(0.064)	(0.069)	(0.054)	(0.056)
×South	−0.091*	−0.112**	−0.135***	−0.149***
	(0.051)	(0.053)	(0.049)	(0.051)
Fraction covered	0.039		−0.034	
	(0.052)		(0.055)	
×South	0.155*		0.086	
	(0.084)		(0.086)	
Jail	−6.139***		0.508	
	(2.348)		(1.084)	
×South	1.355		0.413	
	(1.866)		(1.159)	
Fraction public		−0.270*		−0.282**
		(0.154)		(0.133)
×South		−0.013		−0.079
		(0.175)		(0.164)
Fraction private		0.224**		0.153
		(0.099)		(0.107)
×South		0.293*		0.304
		(0.172)		(0.206)
$Jail^{black}$		−6.022**		−0.066
		(2.749)		(1.344)
×South		1.499		1.281
		(2.031)		(1.584)
$Jail^{white}$		22.856		10.655
		(20.721)		(14.371)
×South		5.882		−7.752
		(13.708)		(8.710)
R-squared	0.420	0.442	0.245	0.273
N	179	179	181	181

* $p < .1$, ** $p < .05$, *** $p < .01$

larger coefficient on the fraction of the labor force that is black in the South may still be at least partially due to preferences that are more prejudiced.

When controlling for southern location, the coefficient on *prejudice* is estimated to be significantly positive in both specifications and years. Since the prejudice index made available to us is a state-level measure that is averaged across years that span our sample, the positive coefficient means that MSAs in states with more expressed prejudice *on average* from 1972 to 2004 have, in

1990 and 2000, greater relative black earnings. A more narrowly defined version of our variable *prejudice* is clearly needed to correlate local prejudice with the local conditional wage gaps.

The coefficient on *jail* is significantly negative in 1990. The South interaction term is not significant at the standard levels but is positive. Similar to Table 5, the coefficients are positive and insignificant in 2000. When separating jail population by race, the proportion of incarcerated black males is associated with a wider wage gap in 1990. This is consistent with the social stigma of incarceration and gaps in employment. In 2000, neither $jail^{white}$ nor $jail^{black}$ is significant in the North or the South. However, the signs for the North are still consistent with the stigma/gaps in employment hypothesis while the effect of $jail^{black}$ in the South is consistent with the truncation hypothesis. Although the coefficient on the interaction term with $jail^{white}$ is negative, the overall effect of the white jail population in the south is the summation of this coefficient and that on $jail^{white}$, which is still positive overall.

We now have a significant coefficient on segregation for MSAs in the South. The negative interaction term on the segregation index in both specifications and years implies that a more segregated MSA will have a wider wage gap but only in the South. Although it is not immediately clear why segregation should only significantly effect wage gaps in the South, the literature has shown before that segregation effects black earnings differentially across location. Collins and Margo (2000) recreate the results from Cutler and Glaeser (1997) and also find that the strength of segregation's relationship to relative black earnings is dependent on the choice of MSAs to include in the sample. In particular, the authors find that the negative effect of segregation on relative black earnings diminishes when the full sample of MSAs is included compared to when only the 42 MSAs which were large enough in 1940 to be included in that year's specification.

Education-Specific Wage Gaps

The estimated wage gaps discussed up to this point are specific to location but not to type of worker. It may be more plausible to assume that workers of similar levels of education compete in separate job markets, each with its own racial wage gap. As mentioned above, Bound and Freeman (1992) and Arcidiacono et al. (2010) find that factors that effect the wage gap do so differentially for college-educated and non-college-educated workers.

We repeat the analysis up to this point on three education-specific samples: workers that did not graduate high school (NHS), high school graduates (HS), and college graduates (C). Table 8 displays only the most flexible specification analogous to the fifth columns in Tables 4 and 5 for each group and year.[21] The main result holds across all regressions: The percent of the labor force that is black is associated with a wider wage gap and is significant for all specifications save college graduates in 2000. Furthermore, this relationship weakens in the year 2000 across all samples.

The fraction of workers that are covered by a collective bargaining agreement in the private sector is associated with significantly higher relative black earnings for high school and college graduates in 1990 and the uneducated in 2000. In addition, the results indicate that in MSAs where there are more covered workers in the public sector in 1990, the high school wage gap is actually wider. The larger coefficient on the fraction of covered workers in the college-educated sample in 1990 differs from what Bound and Freeman (1992) find using wage data from the 1970s and 1980s. The authors show that the percent of the widening nation-wide wage gap in the 1970s and 1980s that was due to the decline in unionism was greatest for those workers with a high school degree or less. This change in the groups affected by collective bargaining agreement suggests a change in the types of workers covered by such agreements over time.

When separating observations by educational attainment, we see that the only group for which the black population in jail is significantly negative is the uneducated group and only in 1990. The fact that this sample is also the most likely to be incarcerated is consistent with the claim that black workers may be statistically discriminated in MSAs with larger black jail populations as well as the hypothesis that incarceration lowers wages through stigma and gaps in employment in 1990. The results are also, however, consistent with the claim that the variable is controlling for unobserved skills. That is, MSAs with wider uneducated wage gaps may have more uneducated black workers choosing crime in favor of the job markets.

Although not significant, the signs of coefficients on the *jail* variables in the college graduate sample for 2000 are consistent with the truncation hypothesis similarly to the full sample results reported in Table 5. While it is not surprising that this hypothesis has some support in 2000 when incarceration rates were at historic highs, it is surprising to only find correlation with the college-educated wage gaps.

One hypothesis on the benefits of segregation which found support in Cutler and Glaeser (1997) is that segregated neighborhoods may benefit lower income and uneducated blacks by forcing high income and educated blacks to remain in close proximity. The argument is that this arrangement exposes the lower income and uneducated blacks to positive peer effects that they would otherwise

[21] Full results are reported in Tables 9, 10, 11, 12, 13, and 14.

Table 8 Education-specific regressions

Dependent variable	1990			2000		
	Gap^{NHS}	Gap^{HS}	Gap^{C}	Gap^{NHS}	Gap^{HS}	Gap^{C}
Fraction labor force black	−0.378***	−0.364***	−0.264***	−0.252**	−0.190***	−0.107
	(0.088)	(0.063)	(0.102)	(0.109)	(0.054)	(0.084)
Prejudice	0.001	0.071	−0.019	−0.008	0.016	−0.047
	(0.061)	(0.043)	(0.070)	(0.079)	(0.040)	(0.061)
Segregation	0.004	−0.005	−0.060	−0.104	−0.027	−0.044
	(0.057)	(0.039)	(0.065)	(0.075)	(0.035)	(0.055)
Fraction public	0.140	−0.294**	−0.231	−0.350	−0.086	−0.065
	(0.195)	(0.135)	(0.207)	(0.246)	(0.113)	(0.172)
Fraction private	0.176	0.172*	0.560***	0.523**	0.043	0.146
	(0.139)	(0.092)	(0.152)	(0.223)	(0.101)	(0.157)
$Jail^{black}$	−4.252*	0.307	−0.869	−0.477	−0.325	2.418
	(2.412)	(1.494)	(3.099)	(2.350)	(1.079)	(1.749)
$Jail^{white}$	12.164	−4.536	5.086	−3.225	−1.952	−10.205
	(17.684)	(11.607)	(20.932)	(15.396)	(7.303)	(11.736)
Constant	−0.054	−0.016	−0.072	−0.010	−0.053*	−0.108**
	(0.047)	(0.034)	(0.055)	(0.061)	(0.030)	(0.047)
R-squared	0.153	0.200	0.143	0.105	0.115	0.081
N	179	179	179	181	181	181

* $p < .1$, ** $p < .05$, *** $p < .01$

Table 9 Dependent variable: 1990 NHS conditional wage gap

Fraction slave	−0.149***				
	(0.051)				
Fraction black		−0.318***			
		(0.059)			
Fraction labor force black			−0.360***	−0.374***	−0.378***
			(0.065)	(0.087)	(0.088)
Prejudice				0.004	0.001
				(0.060)	(0.061)
Segregation				0.002	0.004
				(0.055)	(0.057)
Fraction covered				0.161**	
				(0.071)	
Jail				−3.809*	
				(2.093)	
Fraction public					0.140
					(0.195)
Fraction private					0.176
					(0.139)
$Jail^{black}$					−4.252*
					(2.412)
$Jail^{white}$					12.164
					(17.684)
Constant	−0.063***	−0.049***	−0.049***	−0.048	−0.054
	(0.012)	(0.012)	(0.012)	(0.045)	(0.047)
R-squared	0.090	0.132	0.137	0.161	0.153
N	77	186	186	179	179

* $p < .1$, ** $p < .05$, *** $p < .01$

Table 10 Dependent variable: 1990 HS conditional wage gap

Fraction slave	−0.133***				
	(0.035)				
Fraction black		−0.264***			
		(0.040)			
Fraction labor force black			−0.300***	−0.376***	−0.364***
			(0.045)	(0.063)	(0.063)
Prejudice				0.072*	0.071
				(0.043)	(0.043)
Segregation				0.019	−0.005
				(0.038)	(0.039)
Fraction covered				−0.007	
				(0.048)	
Jail				−0.660	
				(1.365)	
Fraction public					−0.294**
					(0.135)
Fraction private					0.172*
					(0.092)
$Jail^{black}$					0.307
					(1.494)
$Jail^{white}$					−4.536
					(11.607)
Constant	−0.085***	−0.069***	−0.069***	−0.029	−0.016
	(0.008)	(0.008)	(0.008)	(0.032)	(0.034)
R-squared	0.153	0.185	0.188	0.185	0.200
N	77	186	186	179	179

* $p < .1$, ** $p < .05$, *** $p < .01$

not experience. Evidence of this hypothesis would be expressed here with a positive effect of segregation for the wage gaps of uneducated and high school graduates and a negative effect for the college-educated wage gaps.

The coefficient on the segregation index is only positive for the uneducated sample in 1990 but is very close to zero and none of the coefficients are significant. Therefore, while using spatial variation in wages gaps conditional on individual characteristics, we do not find any credible evidence to suggest a peer effect of segregation. Our results are more in line with Smith (2000), which shows that black workers do not benefit as much as white workers from their networks.

Discussion

The conditional wage gap between black and white full-time workers is shown to vary substantially across location. We estimate from the 1990 and 2000 Census that relative black earnings on average were 11 % less than their white counterparts and ranged anywhere from 29 less to 11 % more. In 1990, the geographic pattern of wage gaps was relatively clear with the extremely large gaps located in the South and the MSAs with premiums clustered in the Midwest around the "rust belt." This pattern became more dispersed in 2000, and the distribution of gaps became tighter around the mean.

Consistent with Becker's (1957) theory and previous empirical evidence, we find that the conditional wage gaps were wider in locations where black workers made up a greater portion of the labor force, especially in the South. This is the most robust result of our findings and is significant across all specifications.

The proportion of workers covered by a collective bargaining agreement has been empirically shown to tighten wage distributions as employers are less able to pay different wages for the same job. We find here that covered workers in the private sector narrow our estimated wage gaps. This is especially true in the South and for workers with either a high school or college degree in 1990 and the uneducated in 2000.

All but a single MSA in our sample has a jail population that overrepresents the local black population. This

Table 11 Dependent variable: 1990 college conditional wage gap

Fraction slave	−0.124**				
	(0.061)				
Fraction black		−0.273***			
		(0.067)			
Fraction labor force black			−0.317***	−0.282***	−0.264***
			(0.073)	(0.102)	(0.102)
Prejudice				−0.008	−0.019
				(0.070)	(0.070)
Segregation				−0.012	−0.060
				(0.062)	(0.065)
Fraction covered				0.238***	
				(0.076)	
Jail				−2.235	
				(2.602)	
Fraction public					−0.231
					(0.207)
Fraction private					0.560***
					(0.152)
$Jail^{black}$					−0.869
					(3.099)
$Jail^{white}$					5.086
					(20.932)
Constant	−0.067***	−0.067***	−0.066***	−0.087	−0.072
	(0.013)	(0.013)	(0.012)	(0.053)	(0.055)
R-squared	0.040	0.079	0.087	0.123	0.143
N	77	186	186	179	179

* $p < .10$, ** $p < .05$, *** $p < .01$

overrepresentation is associated with a wider estimated wage gap in 1990, especially for workers without a high school degree who are the most likely to be incarcerated. The result is consistent with the hypothesis that incarcerated workers earn lower wages due to the stigma of being incarcerated and the gap in their employment history (Schwartz and Skolnick 1962; Waldfogel 1994).

In 2000, the overrepresentation of black males in jail is no longer associated with wider wage gaps. The estimated coefficients are even positive for the full sample. When considering the jail population separately by race, the coefficients, while not significant, are positive on the proportion of black inmates and negative on the proportion of white inmates for both the full sample and college graduates. Combined with the fact that 77 % of the MSAs in our sample increased the relative black jail population between 1990 and 2000, these observations are weakly consistent with the truncation hypothesis (Western 2002; Western and Pettit 2005; Bound and Freeman 1992; Holzer et al. 2003, 2004; Pager 2007; Pager et al. 2009a, b; Brown 1984; Chandra 2003).

Residential segregation could theoretically increase or decrease the wage gap depending on if it is more likely to keep black workers from better jobs (Kain 1968; Wilson 1987; Zax and Kain 1996; Boustan and Margo 2011; Holzer 1991) or keep high-skilled black residents close to the low-skilled black residents (Wilson 1987; Handlin 1959; Glazer and Moynihan 1963; Cutler, Glaeser, and Vigdor 2008). In most specifications, we estimate an insignificant negative effect. Segregation only appears to be significantly related to a wider wage gap in the South. Consistent with the literature on misanthropy, use of networks, and race, no evidence is found in support of positive peer effects for black workers (Smith 2005, 2010; Braddock and McPartland 1987; Smith 2000).

With a mobile workforce that can learn about other locations relatively easily, we would expect black workers residing in MSAs where they were paid less to migrate to those where the gap is less or where they earn a premium (we may also expect a reverse pattern for white workers). Workers migrating in this manner would decrease the black

Table 12 Dependent variable: 2000 NHS conditional wage gap

Fraction slave	−0.052				
	(0.072)				
Fraction black		−0.272***			
		(0.071)			
Fraction labor force black			−0.295***	−0.267**	−0.252**
			(0.079)	(0.108)	(0.109)
Prejudice				−0.019	−0.008
				(0.080)	(0.079)
Segregation				−0.082	−0.104
				(0.075)	(0.075)
Fraction covered				0.114	
				(0.098)	
Jail				−0.764	
				(1.814)	
Fraction public					−0.350
					(0.246)
Fraction private					0.523**
					(0.223)
$Jail^{black}$					−0.477
					(2.350)
$Jail^{white}$					−3.225
					(15.396)
Constant	−0.073***	−0.054***	−0.056***	−0.028	−0.010
	(0.017)	(0.015)	(0.014)	(0.060)	(0.061)
R-squared	0.007	0.072	0.069	0.083	0.105
N	76	190	190	181	181

* $p < .10$, ** $p < .05$, *** $p < .01$

workforce in MSAs with large gaps and increase the black workforce in locations with premiums or small to no gaps. Given the robust findings that the proportion of the labor force that is black is correlated with a wider gap, this sort of migration would cause a tightening around the mean of the wage gap distribution as we see in 2000. Testing whether or not this selective migration is the cause of changes observed between 1990 and 2000 is beyond the scope of this paper but is the topic of current research.

Limitations

The analysis above describes the spatial variation in racial wage gaps and indicates likely candidates for the cause in such variation. Although we estimate significant relationships between local unexplained racial wage gaps and the size of the local black working population, the prevalence of collective bargaining, the overrepresented jail population, and segregation in the South, we cannot say at this point that any of these factors are causing a wider or narrower wage gap.

For example, we cannot say whether the segregated MSAs in the South are causing wage gaps to be larger or whether the segregation is a result of large wage gaps. Furthermore, since these relationships were estimated using MSA-level variation, they are descriptive of how MSA-level factors relate to MSA-level racial wage gaps. It is not appropriate to use them to predict the effect of any factor on an individual's wage. That is, we would not conclude that if a black worker moves to a more segregated MSA, that specific worker should expect a lower wage.

Therefore, the policy implications from our results are somewhat limited. What we can say at this point is that Southern MSAs with larger wage gaps also have significantly more segregation. We take from this finding an indication that the relationship between segregation and wages in the South appears to differ from the North and is associated with racial inequality at the wage level. This should be used as motivation to further investigate what is unique about segregation in the South and its effect on wages of black and white workers.

One issue that prevents a causal interpretation of our results is the potential that the MSA-level wage gap is a

Table 13 Dependent variable: 2000 HS conditional wage gap

Fraction slave	−0.043				
	(0.039)				
Fraction black		−0.161***			
		(0.034)			
Fraction labor force black			−0.179***	−0.197***	−0.190***
			(0.037)	(0.052)	(0.054)
Prejudice				0.014	0.016
				(0.040)	(0.040)
Segregation				−0.022	−0.027
				(0.035)	(0.035)
Fraction covered				−0.015	
				(0.044)	
Jail				−0.541	
				(0.836)	
Fraction public					−0.086
					(0.113)
Fraction private					0.043
					(0.101)
$Jail^{black}$					−0.325
					(1.079)
$Jail^{white}$					−1.952
					(7.303)
Constant	−0.092***	−0.085***	−0.085***	−0.057*	−0.053*
	(0.008)	(0.007)	(0.007)	(0.030)	(0.030)
R-squared	0.016	0.109	0.109	0.113	0.115
N	76	190	190	181	181

* $p < .10$, ** $p < .05$, *** $p < .01$

function of group-level unobservables. For example, Card and Krueger (1992) show that relative school quality for black students has historically been very poor, especially in the South. Estimated wage gaps that give equal weight to a year of schooling regardless of where it took place will then falsely attribute lower black wages to the fact that they are black and not to the fact that they attended a poor quality black school.

We partially control for this particular location-specific unobservable by using birth-state indicators.[22] However, if any other group-level unobservable exists for black or white workers in a particular MSA, it may be partially driving that particular MSAs difference in wage levels across race. We may also be concerned that since workers are free to locate wherever they choose, those with relatively high (or relatively low) unobserved ability may be self-selecting into particular MSAs. Note that these unobservables would only bias our estimated coefficients if they were simultaneously correlated with the unexplained wage gap at the MSA level and our dependent variables simultaneously.

In sum, our results should be taken as a description of the differences that exist in racial wage disparity across MSAs in the USA. The racial wage disparity in New Orleans is very different in magnitude from that in San Francisco and likely exists for different reasons. Our results point to the potential causes or correlates of the spatial variation; the relative size of the local black population, segregation in the South, the prevalence of collective bargaining, and a jail population that is disproportionately black.

Furthermore, the results suggest that policy that aims to diminish racial inequality should be geographically targeted. For example, the federal minimum wage is used to decrease overall wage inequality but also reduces racial wage inequality for workers at the bottom tail of the wage distribution. Our results suggest that local- or state-specific minimum wage laws would be more efficient at serving this purpose as some locations have more unexplained wage differences across race than others. Future research

[22] We also used birth-state-race indicators and did not find a significant difference in estimated wage gaps. See footnote 6.

Table 14 Dependent variable: 2000 college conditional wage gap

Fraction slave	−0.149***				
	(0.052)				
Fraction black		−0.148***			
		(0.052)			
Fraction labor force black			−0.176***	−0.120	−0.107
			(0.057)	(0.083)	(0.084)
Prejudice				−0.050	−0.047
				(0.061)	(0.061)
Segregation				−0.034	−0.044
				(0.054)	(0.055)
Fraction covered				0.053	
				(0.068)	
Jail				1.651	
				(1.362)	
Fraction public					−0.065
					(0.172)
Fraction private					0.146
					(0.157)
$\text{Jail}^{\text{black}}$					2.418
					(1.749)
$\text{Jail}^{\text{white}}$					−10.205
					(11.736)
Constant	−0.090***	−0.090***	−0.089***	−0.118**	−0.108**
	(0.011)	(0.010)	(0.010)	(0.046)	(0.047)
R-squared	0.098	0.041	0.048	0.076	0.081
N	76	190	190	181	181

* $p < .10$, ** $p < .05$, *** $p < .01$

should utilize the observed difference across space in racial wage disparity and focus on uncovering the structure through which it relates to the factors listed above.

Appendix

Metropolitan Areas

One problem with using Census data is that the public use micro-areas in which our individuals resided (PUMAs) do not always identify the MSA in which they resided. That is, some PUMAs cross MSA boundaries and so if an individual resides in such a PUMA, we cannot be certain whether or not he resides within the MSA. We are, however, able to identify the percentage of each race (black or white) within each PUMA that lived in each MSA using aggregated Census data. We then assigned any questionable individual to the location that most of his race belonged to. We also assigned the MSA in which each individual worked to the MSA for which the majority of his race resided in the same manner.

In earlier versions of this paper, we randomly assigned each individual to any of his possible locations with probability $p =$ percent of own race in that location. Although this preserves the total population of each race in each MSA, assigning the individuals to the MSA for which the majority of their race resides in can be shown in expectation to be a better predictor for where any individual resided.

Lastly, in 2000, the place of work variable in the publicly available Census data, which gives the public use micro-area (PUMA) of work, does not identify the MSA where individuals work for 8 PUMAs. So an additional 10 MSAs were taken out of the sample in 2000. However, only seven of these had estimated wage gaps in 1990. These were Davenport-Rock Island-Moline, IA-IN, Anderson, IN, Indianapolis, IN, Minneapolis-St. Paul, MN, Omaha, NE, Syracuse, NY, and San Antonio, TX.

See Tables 2, 3, 8, 9, 10, 11, 12, 13, and 14.

See Figures 2, 3, 4, 7, 8, 9, 10, 11, and 12.

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