Residential Segregation and Black-White Intermarriage

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Abstract
Spatial separation of racial and ethnic groups may reduce the probability that mutually acceptable singles of different races meet each other in the marriage market, or it may have no effect if market participants segments themselves. I find that people in more segregated cities are significantly less likely to end up in a racially mixed marriage. I control for reverse causality and endogenous migration using instruments based on characteristics of local government. The decrease in segregation in the typical city between 1980 and 2000 can explain from 3 to 29 percent of the observed increase in black-white intermarriage, with the effect being smallest among white men and highest among black men. Much of the effect of segregation on black-white intermarriage operates through segregation’s impact on black-white differences in educational attainment and employment outcomes, however. Thus, evidence for spatial mismatch is weak at best.
1 Introduction

The incidence of black-white intermarriage is considered a benchmark of race relations, and improving race relations is viewed as a desirable social goal.\(^1\) Though still rare, these marriages are becoming more common. Among young and married whites and blacks, 0.6 percent were in black-white marriages in 1980, but by 2000 this had increased to 2.0 percent.\(^2\) Over the same time period, black-white residential segregation in the typical metropolitan area (city) fell by about 13 percent.

This paper investigates the relationship between residential segregation and racial intermarriage. Such a relationship could exist for several reasons. Mutually acceptable singles of different races may rarely meet each other in a highly segregated city. Segregation may also affect the race-specific distribution of characteristics other than race that are valued in the marriage market, like educational and labor market outcomes. If so, this would change the set of mutually acceptable matches between different race singles. More interracial marriage may change the segregation within a city as partners move within the city to live together and start families. Finally, there may be more social acceptance of racial intermarriage in integrated cities, and life in an integrated city may make one more open to different race partners. This effect would increase the likelihood that a lifelong resident marries across racial lines, but may also cause more open individuals and racially intermarried couples to move to more integrated cities. With the possible exception of within city migration by racially mixed couples, all of these proposed links between residential segregation and racial intermarriage imply a negative relationship between the two.

The goal of this paper is to investigate whether a causal relationship exists between residential segregation and racial intermarriage, and then to quantify as much as possible the pathways through which segregation has an influence. I focus on marriages between nonhispanic whites and nonhispanic blacks. As Figure 1 illustrates, a strong negative correlation exists across cities in 2000 between the percent of blacks and whites in black-white marriages and the dissimilarity index, which is a measure of residential segregation. This index ranges between zero and one where

\(^1\)See Kalmijn (1993) or Fryer (2007), for example.

\(^2\)Based on a the 5 % metro sample of the 2000 Census. The sample is women aged 20-29 and men aged 22-31 living in metropolitan areas with at least 100,000 people, at least three percent of which are nonhispanic black.
Figure 1: Percent of black and white individuals in a black-white marriage and the dissimilarity index, among 20-29 year old women and 22-31 year old men. The sample is the 213 metropolitan areas in the 2000 Census with at least 100,000 people and at least 10,000 blacks. The fitted line obtained from an OLS regression is weighted by population. The coefficients of the line is -0.0072 with a standard error of 0.0015.

There are several hurdles involved in identifying the causal effect. The basic strategy is to use variation in residential segregation to explain the probability that a person is married to someone of a different race using the 1980, 1990, and 2000 Censuses. Using the individual as the unit of observation permits me to control for personal characteristics (age, education, mobility, etc.) and city-level data to control for local labor and marriage market characteristics (race and sex specific means and standard deviations of household income and educational attainment, sex ratios, etc.) However, racial intermarriage is rare and the key independent variable varies at the city level, so precisely estimating the parameter of interest is difficult. To deal with this I use three years of census data.

Residential segregation and rates of racial intermarriage could be related to omitted city characteristics, and more racial intermarriage could cause more segregation. I deal with this in two ways. Following Cutler and Glaeser (1997), I use the structure of local government finance as an instrument to generate plausibly exogenous

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3 More detail about the dissimilarity index will be provided later in the paper.
4 Higher rates of racial intermarriage might mechanically lead to less segregation since married persons live together. As explained later, this effect is expected to be rather small and insignificant.
variation in segregation. I also use a panel of cities which allows me to control for unobserved and time invariant heterogeneity across cities. To address endogenous migration, I focus on a sample of young individuals and run robustness checks where the probability of a black-white marriage depends on the city of residence five years in the past.

Using a variety of controls and alternative estimation techniques, I find strong, consistent evidence that black-white intermarriage less common in metropolitan areas with a higher degree of residential segregation. The impact is strongest among young blacks, and especially young black men. For black men, the 13 percent decrease in segregation between 1980 and 2000 can explain up to 29 percent of the observed rates of black-white intermarriage over the same time period.

After documenting the relationship between residential segregation and black-white intermarriage, I investigate the vehicle through which segregation affects intermarriage. Two possibilities are that segregation influences the race-specific distribution of traits valued on the marriage market, and that segregation contributes to spatial mismatch. It is well-known that segregation in neighborhoods and schools contributes to black-white inequality in education and labor market outcomes. These attributes are valued on the marriage market. When I control for black-white differences is educational attainment, wages, and unemployment, the effect of segregation on black-white intermarriage disappears for all groups except black men. Thus the evidence that residential segregation is a form of spatial mismatch in marriage markets is weak.

This paper is related to two main strands of literature. Economists have been interested in who marries whom since Becker’s (1973) seminal contribution. A couple of papers in the economics literature have focused explicitly on racial intermarriage (Wong, 2003 and Fryer, 2007). The labor search literature has also devoted considerable energy to finding evidence of spatial mismatch in labor markets (see Petrongolo and Pissarides, 2001). At least one example investigates the contribution of residential segregation to spatial mismatch in labor markets (Boustan and Margo, 2009). This is the first paper to suggest and empirically investigate a relationship between residential segregation and black-white intermarriage.

The rest of this paper is organized as follows. The next section outlines in more detail...
detail the proposed linkages between segregation and racial intermarriage. Section 3 describes the empirical methodology. The empirical results for black men are presented in Sections 4 and 5. Section 6 summarizes the results for black women, white men, and white women. Section 7 concludes.

2 More on the relationship between segregation and intermarriage

[Incomplete.]

2.1 Spatial mismatch

A typical marriage market model with search frictions consists of single men and women of various types (race, education level, etc.) searching for a marriage partner. Frictions are typically summarized by a matching function which gives the number of matches between a man and women of a particular type during some unit of time. In simple models the matching function depends only on the number of men and women of each type. Thus, two cities with the same number of men and women of each type would have the same matching function even if one city were considerably more racially segregated than the other. But one might expect singles of different races would meet each other less often in the more segregated city. This physical separation, or spatial mismatch, should lead to fewer marriages across racial lines.

The extent of spatial mismatch due to residential segregation might be limited for several reasons, however. Men and women meet each other through school, work, church, bars, the Internet, friends, etc.\footnote{Using French data, Bozon and Heran (1989) show that the most common places people meet their spouse is at work, but meetings took place outside of work 85\% of cases.} While residential segregation impacts workplace and school segregation, there is likely little correlation between residential segregation and some meeting places like the Internet. More generally, spatial mismatch problem is limited by the extent to which individuals are able to segment themselves in the marriage market, as in Jacquet and Tan (2007). The incentive to segment the marriage market comes from the fact that meeting incompatible singles is a form of congestion. In fact, Jacquet and Tan show that under ideal conditions the marriage market may fully segment itself so that every person a single meets is
an acceptable marriage partner. However, real world conditions are not ideal so we
would not expect the extreme version of this result to hold empirically.

I test for spatial mismatch by using an instrument to generate exogenous variation
in residential segregation, by including controls to dampen omitted variable bias, and
by using a sample of young individuals to minimize selection bias. Any remaining
impact of residential segregation on racial intermarriage is interpreted as plausible
evidence of spatial mismatch.

2.2 Segregation, human capital, and employment

A marriage must be mutually acceptable to both parties. Several characteristics in
addition to race are valued in marriage markets. The distribution of characteristics
influences whom a person is willing to match with and who is willing to match with
him or her. It is well-known that blacks on average earn lower wages and have lower
levels of educational attainment than whites. Such a condition can be shown to lead
to low rates of racial intermarriage even if there is no mating taboo. In any case, a
change in the relationship between race and characteristics valued on the marriage
market will affect the prevalence of interracial marriage, and segregation is known to
affect this relationship.

2.3 Segregation and Migration

Geographically mobile individuals are more likely to be in interracial marriages, and
this correlation is stronger the farther away one moves from one’s state of birth
(Rosenfeld and Kim, 2005). This could give rise to spurious correlation if geograph-
ically mobile individuals systematically move to more or less segregated cities. I
test for this type of bias by regressing the probability of a black-white marriage on
segregation in the city of residence five years previous to the year of observation.

Racial intermarriage could affect the measure of segregation if most mixed mar-
riages require one or both partners to move across census tracts to live together. In
theory, more segregation could result if, for example, one partner moves from a tract
where he or she is in the minority to a tract where he or she is in the majority. Less
segregation may result if the movement is in the opposite direction. This is a reverse

\footnote{See Gould and Paserman (2003) for a city-level analysis of the impact of wage distributions on
marriage rates.}
causality issue that is expected to be minor. Nevertheless, I address this issue with instrumental variables estimation.

3 Empirical Methodology and Data

I use variation in segregation across cities and over time to establish the link between segregation and racial intermarriage. The data are from the 1% 1980 metro sample, the 1% 1990 metro sample, and the 5% 2000 metro samples of the Census. A basic assumptions is that each city-year is an independent marriage market. I concentrate on intermarriage between nonhispanic whites and nonhispanic blacks. The propensity to marry across racial lines depends on the market one faces, so separate regressions are run for black men, black women, white men and white women, all nonhispanic.

The econometric specification for a sample of black men or black women is

\[ \text{White spouse}_{ict} = \alpha (\text{Segregation}_{ct}) + \beta' X_{ct} + \gamma' Z_{ict} + \eta_{ct} + \varepsilon_{ict}, \]  

where the binary dependent variable equals one if the respondent is married to a non-hispanic white person, \( \text{Segregation}_{ct} \) is a citywide measure of the spatial separation of blacks relative to whites, \( X_{ct} \) is a vector of citywide controls which capture labor and marriage market characteristics, \( Z_{ict} \) is a vector of individual level controls, \( \eta_{ct} \) is a city-year specific effect that captures unobserved heterogeneity across time and space, and \( \varepsilon_{ict} \) is an error term. The primary coefficient of interest is \( \alpha \), which is expected to be negative. The specification for a sample of white men or white women is analogous to (1), with “Black” replacing “White.”

3.1 A measure of segregation

Following Cutler and Glaeser (1997), I use the dissimilarity index as the main measure of residential segregation. The dissimilarity index when measuring the extent to

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8In the future, I plan to investigate other types of racial intermarriage.

9Segregation has been a subject of study for a long time, and many indices have been developed to measure it. See Massey and Denton (1988) for an in-depth look at the dissimilarity index and several other measures of segregation. They conclude that the dissimilarity index is the superior choice in most applications.
which nonhispanic blacks and nonhispanic whites are spatially segregated is

\[
\text{Residential Segregation} = \frac{1}{2} \sum_{i=1}^{n} \left| \frac{\text{Black}_i}{\text{Black}} - \frac{\text{White}_i}{\text{White}} \right|
\]

where \( \text{Black}_i \) is the number of nonhispanic blacks in tract \( i \), \( \text{Black} \) is the number of nonhispanic blacks in the MSA, \( \text{White}_i \) is the number of nonhispanic whites in tract \( i \), and \( \text{White} \) is the number of nonhispanic whites in the MSA. I use census calculations for residential segregation that I downloaded from the Census website.\(^{10}\)

The dissimilarity index ranges from zero to one. When blacks are evenly distributed across the MSA, each term in absolute value brackets equals zero. If blacks never reside in a tract with whites the index equals one. The index can be interpreted as the share of the black population that would need to change census tracts so that blacks are evenly distributed across the MSA relative to whites.

To reduce measurement error in the segregation index, only MSAs with at least 100,000 people where at least three percent of the population is nonhispanic black. Among these, a few are missing the dissimilarity index or the fiscal variable described below, so they are dropped as well. The regressions are based on 164 cities in 1980, 178 cities in 1990, and 178 cities in 2000.

Table 1 shows summary statistics for black residential segregation. The average measure of segregation is .652 in 1980, .600 in 1990, and .566 in 2000, and .605 across all three decades. Segregation varies considerably between city-years; the standard deviation is .126.

\[\text{3.2 Outcome and control variables}\]

Only women aged 20 to 29 and men 22 to 31 are included to minimize bias due to location selection. The age range for men is older since women tend to marry men older than themselves. The propensity for blacks in this group to marry whites, and whites to marry blacks, is shown in Table 2. This propensity has been increasing over time for each group, but note that black men are the most likely to be in a

\(^{10}\)The data are located at http://www.census.gov/hhes/www/housing/housing_patterns/housing_patterns.html (accessed 4/26/2009).
black-white marriage. Given that black-white marriages are rare, I do a full analysis for the subsample of black men and then summarize the results for the other groups.

The standard two-sided matching function depends only on the number of singles of each type, and the main characteristic by which people differ in this study is race. Thus, I proxy for the marriage market with the log number of singles in each race-sex cell, and control for congestion externalities using the log of the total MSA population. I also include race specific sex ratios (single men divided by single women), as these may influence the incentive to marry across racial lines. Since the sample includes all men and women in the specified age ranges, I include within sample marriage rates by race to ensure that the estimates for the coefficient on segregation are not picking up variation in marriage rates across space and time. Finally, I include the percent black in an MSA and its square since Kalmijn (1993) has shown that the probability blacks marry whites is related to the percent black in a nonlinear way.\footnote{The unweighted correlation between the dissimilarity index and percent black is -.049.} I refer to this set of control variables as \textit{demographic controls}.

Summary statistics for demographic controls are displayed in Table 1. The correlation between the measure of segregation and the log number of singles in each race-sex cell ranges from .30 to .39. These correlations are far from one so it is plausible that segregation provides a source of variation in the matching function that is

\begin{table}[h]
\centering
\caption{Segregation and within sample demographics at the city-year level.}
\begin{tabular}{lcccccc}
\hline
Variable & Mean & St. Dev. & Minimum & Maximum & \(N\) \\
\hline
Residential segregation & .605 & .126 & .23 & .91 & 520 \\
\ln(total MSA population) & 13.1 & 1.0 & 11.5 & 16.1 & 520 \\
Log of the number of single... & & & & & \\
black men & 8.0 & 1.2 & 5.3 & 11.7 & 520 \\
black women & 8.2 & 1.2 & 5.0 & 11.9 & 519 \\
white men & 9.6 & 1.1 & 7.2 & 12.5 & 520 \\
white women & 9.5 & 1.1 & 7.2 & 12.5 & 520 \\
Sex ratios & & & & & \\
(Black men)/(Black women) & .91 & .84 & .24 & 12.63 & 519 \\
(White men)/(White women) & 1.07 & .28 & .54 & 4.00 & 520 \\
Marriage rate among blacks & .30 & .11 & .05 & .71 & 520 \\
Marriage rate among whites & .49 & .10 & .21 & .75 & 520 \\
Percent black & .15 & .10 & .01 & .51 & 520 \\
Number of governments in 1962 & 42 & 58 & 1 & 339 & 520 \\
Intergov. rev. share in 1962 & .29 & .08 & .12 & .49 & 520 \\
\hline
\end{tabular}
\end{table}
Table 2: Percent in a black-white marriage, by group and year.

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Percent</td>
<td>N</td>
<td>Percent</td>
<td>N</td>
</tr>
<tr>
<td>Black men (ages 22-31)</td>
<td>1.7%</td>
<td>15,960</td>
<td>1.7%</td>
<td>13,819</td>
</tr>
<tr>
<td>Black women (ages 20-29)</td>
<td>0.4%</td>
<td>19,820</td>
<td>0.8%</td>
<td>16,252</td>
</tr>
<tr>
<td>White men (ages 22-31)</td>
<td>0.07%</td>
<td>89,340</td>
<td>0.1%</td>
<td>80,465</td>
</tr>
<tr>
<td>White women (ages 20-29)</td>
<td>0.3%</td>
<td>91,196</td>
<td>0.3%</td>
<td>76,654</td>
</tr>
</tbody>
</table>

Marriage is voluntary so it must be acceptable to both sides of a match. Whether an individual is acceptable depends on one’s position relative to his or her competitors and the distribution of traits among potential mates. Thus, I include a set of *individual controls* which include a person’s age and dummy variables for whether an individual has at most a high school education and whether or not he or she is unemployed.\(^{12}\) I also compute wage distributions, unemployment rates, and average educational attainment for each sex-race cell within a city-year. These statistics are based on samples with a wider age range because data constraints make it difficult to construct accurate estimates within finely defined cells. Thus, one should interpret these statistics as the permanent components of the distributions of education and labor market outcomes.

Specifically, the average and standard deviation of log weekly earnings (in 2000 dollars) are estimated among persons aged 16 to 64 who were not in school and who worked at least one week in the calendar year prior to the census year. To capture the permanent component of the educational attainment distribution, I use the percentage of the population over 30 that has at most a high school education. Most people have completed their education by this age. Unemployment rates are

\(^{12}\)Including a full set of dummies for age does not change the results, so I simply include age as a variable for simplicity. For similar reasons, I use a simple measure of education rather than a full set of education dummies. Finally, I do not include log weekly wages as an individual control since many individuals would be missing this variable. Future specifications will include this control using predicted log weekly wages in cases where this variable is missing.
Table 3: Unweighted labor market and educational distributions within city-years.

<table>
<thead>
<tr>
<th>Average of log weekly wages (ages 16-64)</th>
<th>Group</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black men</td>
<td>5.86</td>
<td>.44</td>
<td>4.58</td>
<td>6.78</td>
<td>520</td>
<td></td>
</tr>
<tr>
<td>White men</td>
<td>6.25</td>
<td>.43</td>
<td>5.05</td>
<td>7.33</td>
<td>520</td>
<td></td>
</tr>
<tr>
<td>Black women</td>
<td>5.57</td>
<td>.50</td>
<td>4.30</td>
<td>6.43</td>
<td>520</td>
<td></td>
</tr>
<tr>
<td>White women</td>
<td>5.68</td>
<td>.49</td>
<td>4.7</td>
<td>6.64</td>
<td>520</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Standard deviation of log weekly wages (ages 16-64)</th>
<th>Group</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black men</td>
<td>.80</td>
<td>.14</td>
<td>.35</td>
<td>1.66</td>
<td>520</td>
<td></td>
</tr>
<tr>
<td>White men</td>
<td>.76</td>
<td>.06</td>
<td>.59</td>
<td>1.05</td>
<td>520</td>
<td></td>
</tr>
<tr>
<td>Black women</td>
<td>.80</td>
<td>.14</td>
<td>.38</td>
<td>1.60</td>
<td>520</td>
<td></td>
</tr>
<tr>
<td>White women</td>
<td>.76</td>
<td>.06</td>
<td>.57</td>
<td>1.04</td>
<td>520</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Unemployment rates (ages 16-64)</th>
<th>Group</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black men</td>
<td>.12</td>
<td>.06</td>
<td>0</td>
<td>.43</td>
<td>520</td>
<td></td>
</tr>
<tr>
<td>White men</td>
<td>.05</td>
<td>.02</td>
<td>.01</td>
<td>.12</td>
<td>520</td>
<td></td>
</tr>
<tr>
<td>Black women</td>
<td>.12</td>
<td>.05</td>
<td>0</td>
<td>.44</td>
<td>520</td>
<td></td>
</tr>
<tr>
<td>White women</td>
<td>.05</td>
<td>.02</td>
<td>.01</td>
<td>.14</td>
<td>520</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Percent of population over 30 with at most a HS education</th>
<th>Group</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black men</td>
<td>.58</td>
<td>.16</td>
<td>.14</td>
<td>1</td>
<td>520</td>
<td></td>
</tr>
<tr>
<td>White men</td>
<td>.48</td>
<td>.13</td>
<td>.22</td>
<td>.89</td>
<td>520</td>
<td></td>
</tr>
<tr>
<td>Black women</td>
<td>.57</td>
<td>.17</td>
<td>.05</td>
<td>1</td>
<td>520</td>
<td></td>
</tr>
<tr>
<td>White women</td>
<td>.50</td>
<td>.15</td>
<td>.19</td>
<td>.86</td>
<td>520</td>
<td></td>
</tr>
</tbody>
</table>

calculated directly from the Census among persons aged 16 to 64. I refer to this set of control variables as economic controls.

Summary statistics for education and labor market at the city-year level (unweighted) are shown in Table 3. Within sexes, whites have higher average wages and more education while blacks have higher variance in wages and experience higher unemployment rates. Within races, men have higher average wages but the other outcomes are roughly the same.
4 Preliminary evidence for the effect of segregation

Table 4 reports ordinary least squares estimates of equation (1) using individual and demographic controls for the subsample of black men. The columns in Table 4 differ in the type of fixed effects assumed. The standard errors in all of the regressions are corrected for heteroskedasticity and are clustered at the city-year level.

Across all four columns in Table 4, the estimated effect of segregation on the probability a black man is married to a white woman is negative and statistically significant. Column 1 is based on estimates that pool the data without year or city fixed effects ($\eta_{ct} = 0$). In this case a one standard deviation increase in segregation, as measured by the dissimilarity index, is associated with a .005 percentage point decrease in the probability a black man is married to a white woman ($-.040 \times .126$).

Estimates in column 2 include year dummies ($\eta_{ct} = \pi_t$) that capture national trends in the tastes for black-white intermarriage that may also be correlated with segregation: evolving race relations, other social norms, changes in fertility control technology, divorce laws, etc.

To account for unobserved city characteristics that are constant over time and correlated with the propensity to marry across racial lines, column 3 reports estimates that also include dummies for each metropolitan statistical area ($\eta_{ct} = \pi_t + \kappa_c$). In this case, the parameter of interest is being identified only by variation in the city-level time series. By throwing away variation across cities the standard error of the estimate to increase. Importantly, though, the point estimate increases in magnitude, suggesting that unobserved city characteristics are important.

Looking ahead to instrumental variables estimation, including a dummy for every metropolitan area creates problems for GMM estimation since in some metropolitan areas too few black men are married to white women. Therefore, column 4 shows the unobserved heterogeneity across cities is largely captured by unobserved heterogeneity at the state level. Using state dummies controls for this heterogeneity while still allowing us to identify the parameter of interest using time series variation as well as cross sectional variation within states. This additional variation reduces the

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13 I go through a full analysis for black men to focus the discussion and then summarize the results for black women, white men, and white women.

14 Alaska, Utah, and West Virginia are grouped together since too few black men are married to white women in these states to form a valid IV estimate with GMM.
standard error while leaving the point estimate very close to its column 3 value. Thus, all subsequent regressions use only state dummies when controlling for unobserved heterogeneity across space.

Finally, column 5 includes state and year dummies as well as their interaction to account for regional trends in unobserved variables. This is a highly conservative estimation strategy which increases the standard error of the estimates while having little effect on the point estimates.

The estimates are quite large. From Table 2, the percent of black men married to white women was 1.7 in 1980 and 3.1 in 2000, or an increase of .014 percentage points. Over the same time period, the average measure of segregation fell from .652 to .566, for a total decrease of .086 percentage points. Using column 4 estimates, my preferred model, the decrease in segregation could explain a .004 percentage point increase in the percent of black men married to white women if the effect were causal (.047 * .086). This is a full 29 percent of the observed increase (.004/.014). However, a causal interpretation may be premature despite controlling for year and region fixed effects.

5 Correcting for Endogeneity

The causal interpretation of segregation would be erroneous if the ordinary least squares regression were biased. There are two possibilities for such a bias. First, more interracial marriage could change the segregation patterns in a city. Second, those who are more inclined to marry someone of a different race could be more likely to move to a less segregated city, and interracial couples may move away from more segregated cities. I address these issues in this section.

5.1 Instrumental variables regressions

As in Cutler and Glaeser (1997), I address the reverse causality issue by instrumenting for segregation with two characteristics of local government in the metropolitan statistical area that might change the incentives for segregation. One is the number of municipal and township governments within the MSA and the other is the share of local revenue that comes from intergovernmental sources. These data are taken from Cutler and Glaeser. There is likely no direct relationship between these governmental
Figure 2: The relationship between intergovernmental revenue share and segregation for all 520 city-years, weighted by population. The fitted line is estimated using OLS. The coefficient is -.627, standard error of the coefficient estimate is .085, and the $R^2$ is .09.

variables and who marries whom within a metropolitan statistical area.

A larger number of local governments (municipalities and townships only) increases the variance in tax rates and service provision within an area, and a smaller share of revenue coming from nonlocal governments (e.g., the state and federal governments) places a higher tax burden on local residents for the same level of service. Thus, the incentive for Tiebout sorting should increase with more local government and decrease in the share of local government revenue coming from outside sources. To minimize concerns for endogeneity the values of the instrumental variables are 1962 values. Summary statistics are reported in Table 1. The average number of governments is 42 with a minimum of 1 (Fort Myers, Florida and Honolulu, Hawaii) and a maximum of 339 (Philadelphia, PA). The average city in 1962 had 28.6 percent of its revenues from intergovernmental transfers. The range is 12 percent (Omaha, Nebraska) to 49 percent (Albuquerque, New Mexico).

Figures 2 and 3 show that the relationships between the 1962 values of the instrumental variables and segregation across all three decades are strong and go in the expected direction. I refer the reader to the original Cutler and Glaeser paper for more details on the variable construction and original data sources.

The instrumental variables estimates of the effect of segregation on the probability
Figure 3: The relationship between the log number of governments within a metropolitan statistical area and segregation for all 520 city-years, weighted by population. The fitted line is estimated using OLS. The coefficient is .067, standard error of the coefficient estimate is .004, and the $R^2$ is .37.

A black man is married to a white women is displayed in Panel A of Table 5. The IV estimates are quite close to the OLS estimates. For example, the IV estimate when no fixed effects are included is -.032 while the analogous OLS estimate is -.040. When state and year fixed effects are included, the point estimate on segregation in column 3 is negative and large in magnitude (relative to the frequency of racial intermarriage). However, the standard error jumps nearly three-fold from the previous two columns, so the estimate is not statistically significant. This is likely due to the relatively weak explanatory power of the instruments once state effects are included in the first stage regression. But note that the $F$-test is still above 10, which is typically taken as the cutoff between instruments that are weak and those that are not weak. Also notice that the instruments pass the Hansen over-identification test. That is, the test does not reject the null hypothesis that the instruments are jointly exogenous. Taken as a whole, these IV estimates reinforce the OLS estimates, and I conclude that reverse causality is not a major issue.
5.2 Endogenous migration

The bias that arises from individuals who are more open to racial intermarriage and interracial couples moving to less segregated cities is potentially significant. Rosenfeld and Kim (2005) observe a striking positive correlation between individual mobility and the probability of being in a mixed marriage. They argue that mobility is a proxy for independence and willingness to break taboos. However, this is an issue in the current study only if mobile individuals systematically move to less (or more) segregated cities. There is no issue if location choices are independent of a city’s level of segregation.

I take the following approach as a first pass toward investigating whether endogenous migration is biasing the results. The census asks people where they were living five years to the census year. I estimate an IV model of the probability a black man is married to a white woman in the census year as a function of segregation in the city of residence five years previously. My sample is currently restricted to black men who were in the original regressions and lived in a metropolitan area five years previously.  

Panel B of Table 5 shows these results. The point estimates are remarkably similar to the OLS estimates and the IV estimates based on current residence. Moreover, all three point estimates are statistically significant, the instruments are not weak, the instruments pass the overidentification test. I conclude that endogenous migration among young adults is not important for the current study.

6 How Does Residential Segregation Influence Black-White Intermarriage?

Having determined that residential segregation affects outcomes, I now turn to tracking down the pathways through which segregation may affect the marital outcomes of black men. The main hypothesis I consider is that segregation affects labor market and educational outcomes in ways that increase the chances of a black man-white woman marriage. I test this hypothesis by including the economic controls summarized in Table 3. Wages, education, and employability are clearly traits valued on the marriage market. Moreover, several studies have shown that segregation causes

15 Ideally, the sample would be all black men who lived in a metropolitan area five years previously.
greater inequality between blacks and whites on these outcomes (Cutler and Glaeser, 1997; Guryan, 2004; Card and Rothstein, 2007).

A second hypothesis is that residential segregation is a proxy for other types of segregation that are salient in the marriage market. In particular, residential segregation likely is related to school segregation, and it is plausible that a significant share of people first meet a future marriage partner in high school, even if they were not romantically involved while in school. In future versions of this paper I will control for average school segregation within city-year cells.

Table 6 displays the results from OLS and IV estimations that include economic controls. All estimates control for demographic and individual variables as before, but I list estimates for only the newly included variables for simplicity. The OLS point estimates are lower than their counterparts in columns 2 and 4 from Table 4. The estimate with state and year fixed effects (column 2 in Table 6) is statistically significant and the one with only year effects (column 1) is nearly so. This suggests that a substantial portion of the effect segregation has on black-white intermarriage operates through segregation’s impact on black-white economic inequality.\(^{16}\)

The IV estimates tell roughly the same story. The point estimates are negative, suggesting a role for segregation even once we control for differences in black-white economic outcomes. However the standard errors are too large to have much confidence in the point estimates.\(^{17}\)

7 Summary of Results for Other Groups

Having fully characterized the results for black men, I now summarize the results for white women, white men, and black women. Table 7 presents these results and is structured as follows. The estimates in the first four columns show OLS estimates while the last four show IV estimates. The specifications differ by whether state fixed effects are included (year fixed effects are always included) and whether the set of economic control variables is included. Every specification includes individual and

\(^{16}\)For both of the OLS regressions, I conducted \(F\)-tests to test the joint significance of each of the four groups of new control variables. Average log wages and educational attainment were jointly significant while the standard deviation of log wages and unemployment rates were not. Excluding the variables that were not jointly significant has little effect on the point estimates for segregation while slightly reducing their standard error.

\(^{17}\)The \(F\)-test for the joint significance of the instruments in the first-stage regression also suggests at a weak instruments problem once we include state fixed effects in addition to year fixed effects.
demographic controls. Panel A displays the results for white women, panel B for white men, and panel C for black women.

A quick glance at the table confirms that the negative relationship between living in a segregated metropolitan area and the chance of being in a black-white marriage is robust to subsample selection. Notice also that the point estimate increases when we include economic controls in every model and for every subsample in the table. This provides further confirmation that segregation plays an important role in black-white intermarriage through its impact on black-white differences in economic outcomes.\(^\text{18}\)

The point estimates for white subsamples tend not to be statistically significant, probably because the chance of being in a black-white marriage is so low for these groups. In contrast, the estimates for black women are statistically significant when economic controls are excluded.\(^\text{19}\) These results are qualitatively identical to those for black men. Once economic controls are included, however, we lose statistical and economic significance.

Broadly speaking, the results from the three subsamples Table 7 reinforce the results for black men. The effect of segregation on black male marriage outcomes is much more pronounced, however. And only among black men is there a statistically and economically significant residual effect of segregation after controlling for economic variables at the city-year level. On the whole, therefore, there is little evidence of spatial mismatch.

8 Conclusion

While the results are at this time preliminary, this study reaches three main conclusions. First, the evidence overwhelmingly indicates that black-white intermarriage is more common in less segregated cities than it is in more segregated cities. The decrease in the average measure of segregation from 1980 to 2000 can explain from 3.4 percent (among white men) to 29 percent (among black men) of the observed rates of black-white intermarriage. The instrumental variables results suggest that less segregation leads to more black-white marriages, and not the other way around.

\(^{18}\)In general, the standard error of the point estimates jumps significantly when state and year fixed effects are included in an IV estimation, which casts doubt on the validity of the point estimates in the last two columns of the table.

\(^{19}\)The exception here is the IV estimates when state and year fixed effects are included, but these estimates are suspect. See the previous footnote.
Second, most of the effect of segregation on black-white intermarriage operates through the impact segregation has on reducing black-white economic inequality. In theory, more racial intermarriage should follow if racial inequality is lessened since there would be more mutually acceptable matches between different race singles. This hypothesis finds support in the data.

Finally, the results suggest that spatial mismatch in the form of residential segregation is not a large factor affecting who marries whom, but the evidence is mixed on this point. Only among black men does a statistically and economically significant effect of segregation remain after controlling for economic outcomes; no remaining effect is found for black women, white men, or white women. Some explanations for this finding are that residential segregation is not a good proxy for spatial mismatch between the races, or more likely that marriage market participants self-segment to increase the chances of meeting acceptable mates.

These results may have important policy implications. Racial intermarriage is often used as a measure of social progress in race relations. Marriage rates among black men in particular are quite low, and it is well-known that marriage is associated with better economic and health outcomes. The results imply that neighborhood segregation may be an important factor contributing to the incidence of racial intermarriage, and this may increase marriage rates in some segments of the population.
References


Table 4: Ordinary Least Squares Estimates of the Effect of Segregation on the Probability a Black Man is Married to a White Woman.

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Summary statistics

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Table 5: Instrumental Variables GMM Estimates of the Effect of Segregation on the Probability a Black Man is Married to a White Woman.

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Table 6: Alternative Explanations for the Effect of Segregation on the Probability a Black Man is Married to a White Woman.

Dependent variable $= 1$ if married to a white woman

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Summary statistics

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Table 7: The Effect of Segregation on the Probability of a Black-White Marriage Among Different Groups.

Dependent variable = 1 if in a black-white marriage

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A. White women ($N = 483,093$)

| Segregation          | -.002     | .000      |
|                      | (.002)    | (.002)    |
|                      | -.003     | -.002     |
|                      | (.002)    | (.002)    |

Summary Stats

| $R^2$                | .002      | .002      |
|                      | .002      | .002      |

First stage $F$-stat

|                      | 79.4      | .01       |
|                      | 7.05      | 13.8      |

J-statistic

|                      | .093      | 1.13      |
|                      | .39       | 1.1       |

$p$-value

|                      | .761      | .569      |
|                      | .53       | .29       |

B. White Men ($N = 495,219$)

| Segregation          | -.001     | .000      |
|                      | (.001)    | (.001)    |
|                      | -.000     | .001      |
|                      | (.001)    | (.001)    |

Summary Stats

| $R^2$                | .001      | .001      |
|                      | .001      | .001      |

First stage $F$-stat

|                      | 79.5      | 0         |
|                      | 7.34      | 13.3      |

J-statistic

|                      | .295      | .389      |
|                      | 3.9       | .63       |

$p$-value

|                      | .587      | .823      |
|                      | .05       | .43       |

Black Women ($N = 124,755$)

| Segregation          | -.007     | -.000     |
|                      | (.004)    | (.004)    |
|                      | -.006     | .001      |
|                      | (.005)    | (.005)    |

Summary Stats

| $R^2$                | .006      | .006      |
|                      | .007      | .007      |

First stage $F$-stat

|                      | 46.5      | 4.75      |
|                      | 10.3      | 7.35      |

J-statistic

|                      | .223      | .185      |
|                      | 4.0       | 1.57      |

$p$-value

|                      | .637      | .912      |
|                      | .05       | .210      |