Does segregation matter for Latinos?

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Abstract: We use a novel instrumental variable to estimate the effects of residential racial segregation on socio-economic outcomes for native-born Latino young adults over the past three decades. Using individual public use micro-data samples from the Census, we find that higher levels of metropolitan area segregation are associated with negative effects on Latino young adults' likelihood of being either employed or in school, on the likelihood of working in a professional occupation, and on earnings. The negative effects of segregation are somewhat larger for Latinos than for African Americans and have increased over the past three decades. Controlling for Latino and white exposure to neighborhood poverty, neighbors working in professional occupations, and high-wage growth industries explains between one third and one half of the association between Latino-white segregation and Latino-white gaps in outcomes.

Key words: racial segregation, Hispanics/Latinos, spatial inequality
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1. Introduction

Between 1990 and 2010, the Latino population in the United States more than doubled, from 22 million to 50 million. As the Latino population has grown, levels of Latino-white residential segregation (as measured by the dissimilarity index) have remained relatively steady (at around 0.50), while levels of Latino isolation have risen (from 0.43 in 1990 to 0.46 in 2010) (De la Roca, Ellen, and O'Regan, 2014).[1] Despite this durable residential segregation, there has been little exploration of how that segregation affects the socioeconomic outcomes of Latinos.

While existing research has found that black-white segregation negatively affects socioeconomic outcomes for African Americans (e.g. Cutler and Glaeser, 1997, Ellen, 2000, Card and Rothstein, 2007), there are reasons to expect that segregation may not have the same negative consequences for Latinos. For instance, research on ethnic enclaves has suggested that ethnic concentration, in some conditions, can improve employment outcomes by creating a market for ethnic goods and access to co-ethnic sources of capital at favorable rates (Wilson and Portes, 1980, Portes and Sensenbrenner, 1993). Indeed, several studies have found that ethnic concentration improves employment outcomes for Latinos overall or for particular Latino subgroups (von Lockette and Johnson, 2010, Portes and Truelove, 1987). Residential segregation may still undermine the socioeconomic outcomes of Latinos, however, through the same mechanisms that have been suggested to limit opportunities for blacks, by constraining Latinos to live in neighborhoods with lower levels of human capital, less public investment, or limited access to particular jobs and job networks (Kain, 1968, Loury, 1977, Ihlanfeldt, 1993, Borjas, 1995).

Thus, we examine how levels of residential segregation affect the educational and labor market outcomes of Latino young adults and how those effects differ from the effects of segregation on the outcomes of black young adults. One challenge in accurately measuring the effects of segregation is addressing the possibility that Latinos with lower levels of education or earnings may end up living in neighborhoods with greater concentrations of Latinos. We address such within-city sorting by examining the effects of metropolitan-level segregation on the outcomes of individuals living anywhere in the metropolitan area. But sorting across cities is also a concern if less economically successful Latinos end up in more segregated metropolitan areas. Further, preexisting socioeconomic differences across ethnic groups in a city could lead to greater ethnic segregation. Thus any simple associations between segregation in a city and the outcomes of residents cannot be interpreted as independent, causal effects. We address this challenge by restricting our sample to native-born young adults who lived in the same metropolitan area five years earlier and are thus more likely to be living in the same metropolitan area where they grew up, through

[1] Levels of black-white segregation over the same period declined somewhat (from a dissimilarity score of 0.68 to 0.59) but remained high. Levels of black residential isolation also declined, but remained high (declining from 0.55 to 0.46). The dissimilarity index measures the evenness with which two different groups are distributed across neighborhoods within a metropolitan area. The index computes the proportion of one group (between 0 and 1) that would need to exchange neighborhoods in order to achieve a uniform distribution of the groups across the city. Thus, it provides a sense of how spatially concentrated one population group is in relation to the other. It has the benefit of being unaffected by the relative number of individuals in each population group. The isolation index captures the proportion of the neighborhood population that belongs to a single group and is thus influenced both by the relative size of the group and the evenness with which the group is distributed across neighborhoods. It can be conceptualized as a measure of the extent to which the average member of a group is likely to be exposed to members of that same group within his or her neighborhood in the city.

lagging segregation by ten years, by estimating longitudinal models with metropolitan area fixed effects, and by focusing on differences in effects between Latino and white residents of the same metropolitan area, differencing out any residual unobserved attributes of the metropolitan area that may be related to segregation and affect outcomes.[2] Finally, we also employ instrumental variables.

Multiple instrumental variables have been developed to predict levels of black-white metropolitan area segregation, including rivers (Hoxby, 2000) and railroad tracks (Ananat, 2011). While these historical indicators of metropolitan fragmentation and neighborhood division correlate strongly with the black-white segregation that became entrenched through the rise of Jim Crow, the Great Migration, and post-war suburbanization, they are less closely correlated with the Latino-white segregation patterns that have emerged with the rapid growth of the US Latino population since 1980.

We use two existing instruments that are related to both black-white and Latino-white segregation: the number of local governments in a metropolitan area in 1962 and the share of local revenue from state and federal transfers in 1962 to predict both black-white and Latino-segregation. We add a new instrument to predict Latino-white segregation, which captures the evenness of the distribution of single-family detached houses in relation to other types of housing in the metropolitan housing stock in 1970. The assumption is that the historical separation of single-family detached homes from other types of dwellings, such as attached homes or multi-family buildings, contributes to contemporary levels of Latino metropolitan area segregation because Latinos are less likely to live in detached, single-family homes than other types of housing (Weicher and Thibodeau, 1988, Brueckner and Rosenthal, 2009).

Using public-use decennial census data for 1990 and 2000 and data from the American Community Survey for 2007-2011, we examine how metropolitan area levels of segregation affect college graduation rates, employment rates, the likelihood of being in a professional occupation, and earnings for native-born Latino and African-American young adults between the ages of 25 and 30. The estimates from longitudinal models with metropolitan area fixed effects indicate that segregation is negatively associated with the socio-economic outcomes of both Latino and African-American young adults relative to whites. For instance, a one standard deviation increase in the metropolitan area level of segregation is associated with a decrease for Latinos relative to whites of 4.8 percentage points in college graduation rates and 10 percent in earnings. These associations are large, as they can explain between 30 and 55 percent of overall differences in socio-economic outcomes between Latinos and whites. Notably, the magnitude of the associations between segregation and racial gaps in outcomes is actually somewhat larger for Latinos than for blacks.

These results, however, mask substantial heterogeneity in the link between segregation and outcomes for Latino groups of different ancestry and class status (Logan and Turner, 2013). Reasons for potential divergence may include differences in the initial socio-economic composition

[2] In the 2007-2011 American Community Survey data, the question about residence in the same Public Use Microdata Area (PUMA) five years prior was replaced by a question asking about residence one year prior, so the 2010 sample is limited to those who lived in the same PUMA in the prior year. See appendix A for details on how we link PUMAS to metropolitan areas or Core Based Statistical Areas (CBSAS).

of the group overall and attitudinal differences among whites towards different sub-groups of Latinos, on the basis of race or other characteristics. To understand the extent to which the effects of segregation may differ by subgroup, we also interact the metropolitan area Latino-white dissimilarity index score with available measures of Latino ancestry. Controlling for the heterogeneous experiences of different Latino ancestry groups, we find that segregation still has a significant negative association with socioeconomic outcomes for all groups of Latino young adults, but that the association is considerably more negative for young adults of Puerto Rican and Dominican ancestry than others, and less negative for young adults of Cuban ancestry and those who identify their ancestry as 'other' when compared to the remaining Latino ancestry groups. These results are consistent with research that has identified the significance of mean group human capital in shaping the effects of segregation (Edin, Fredriksson, and Åslund, 2003, Cutler, Glaeser, and Vigdor, 2008).

The instrumental variable estimates confirm that the gaps between Latino and white outcomes generally widen in more segregated metropolitan areas. Indeed, the instrumental variable results indicate that segregation has had a consistent negative effect on Latino young adults' likelihood of being employed or in school, on their likelihood of working in a professional occupation, and their earnings over the past two to three decades. Once instrumental variables are included, the negative effects of segregation over the past three decades are even more consistent for Latino young adults than their African-American peers. The instrumental variable results also indicate that wider gaps in college graduation and earnings in more segregated metropolitan areas are driven in part by the fact that whites in those areas fare better than those in less segregated areas.

To understand why segregation has these effects, we examine potential mechanisms. We find that the exposure of white and Latino residents to neighborhood poverty, neighbors in professional occupations, and high-wage growth industries between 1990 and 2010 together explain between one third and one half of the association between segregation and white-Latino gaps in outcomes.

2. Theoretical framework and hypotheses

The effects of group concentration are theoretically ambiguous and have been found to vary significantly across groups and contexts. Group concentration in place may matter because places have different levels of resources, such as school expenditures, primary care physicians, public parks, bank branches, or remunerative jobs. Or group concentration may matter because of social networks and peer effects, in other words, because one's own performance in school is affected by the performance of one's classmates (Epple and Romano, 2011), or one's ability to access a job is shaped by information received from one's neighbors (Bayer, Ross, and Topa, 2008). In either case, residential segregation shapes access to neighborhoods, which in turn shape access to institutions, peers, and social networks, as well as exposure to crime and environmental benefits and hazards (Durlauf, 2004, Ludwig, Sanbonmatsu, Gennetian, Adam, Duncan, Katz, Kessler, Kling, Lindau, Whitaker, and McDade, 2011, Sampson, 2012, Graham, 2016). But the resources and opportunities that racially or ethnically homogenous neighborhoods provide are likely to vary depending on the socio-economic attributes of the group. In general, groups with more resources may benefit from segregation while those with lesser resources may be harmed.

Several studies have found that for immigrant groups with higher mean levels of human capital, ethnic concentration is associated with better outcomes in employment and earnings, while for those groups with lower mean levels of human capital, segregation is linked to lesser benefits or negative effects (Borjas, 1995, Edin, Fredriksson, and Åslund, 2003, Cutler, Glaeser, and Vigdor, 2008). Human capital levels have been found to shape the effects of segregation on native-born blacks as well. For instance, increases in the proportion of college-educated African Americans in the metropolitan area appear to significantly reduce the negative effects of segregation on black youths' educational attainment (Bayer, Fang, and McMillan, 2014).

The average financial and political capital of a group also matters. Racial and ethnic groups with lower levels of political and financial capital may be less able to demand equal access to crucial municipal services, like local schools and policing, to non-profit institutions that provide crucial services and networks, and to private businesses that meet daily needs like child-care (Collins and Williams, 1999). Groups with lower incomes and less political clout may also be less able to fight the placement of environmental hazards such as polluting plants and highways. Perhaps even more critically, violence tends to be disproportionately concentrated in low-income neighborhoods. Research shows that even indirect exposure to neighborhood violence diminishes academic performance (Sharkey, Schwartz, Ellen, and Lacoe, 2014).

Given that Latinos in the U.S. have lower than average levels of education, largely Latino neighborhoods are likely to house less educated residents. Latinos also have lower incomes on average, and arguably less political clout given lower citizenship rates, than whites, which may translate into inferior neighborhood services and environmental amenities. Indeed, available measures of differences in neighborhood characteristics find that Latinos in more segregated metropolitan areas are exposed to fewer college educated neighbors, lower performing schools, and higher levels of violent crime than Latinos in less segregated cities (Steil, De la Roca, and Ellen, 2015).

There is of course, considerable variation in the socioeconomic backgrounds of different Latino sub-groups in the United States. In 2010, nearly two thirds (63 percent) of the U.S. Latino population identified as having Mexican ancestry, while 9 percent reported Puerto Rican, 8 percent Central American, 6 percent South American, 4 percent Cuban, 3 percent Dominican, and 8 percent 'other Hispanic' origins. Mean educational attainment varies significantly by self-identified group of origin. For instance, 32 percent of Latinos in the US who were 25 years and over and identified as having South American ancestry had a college degree or higher in 2012 while only 10 percent of those identifying Central American origins and 11 percent of those identifying Mexican origins had college degrees. Of those identifying Cuban origins, 27 percent had a BA or higher, while 18 percent of those identifying Puerto Rican origins and 23 percent of those identifying as 'other Hispanic' had graduated from college. There is similar heterogeneity with regard to childhood poverty. In 2011, more than a third of those under 18 years of age with Puerto Rican (40 percent), Mexican (36 percent), and Central American (35 percent) origins lived below the poverty line compared to 23 percent of those of Cuban descent, and 13 percent of those of South American descent. This heterogeneity of Latino experiences by ancestry is likely to contribute to variation in the effects of segregation.

While segregation's effects may vary across groups, they are also likely to vary over time. For

example, the negative effects of black-white residential segregation on black educational attainment and employment rates that studies have documented did not emerge until the economic restructuring and dramatic neighborhood change of the 1970s (Collins and Margo, 2000). There are many reasons to believe that the effects of segregation on Latinos may differ over time as well. For instance, as the Latino population has grown in the United States and Latinos have settled across a larger set of smaller metropolitan areas, the differences in neighborhood environments enjoyed by Latinos in high and low segregation areas may have diminished.

3. Data and methods

To examine how metropolitan area segregation affects individual socio-economic outcomes, we use public-use micro data gathered by the US Census and provided by IPUMS–USA of the University of Minnesota Population Center. We focus our analysis on data from the Decennial Censuses in 1990 and 2000 and from the American Community Survey ACS 5-year estimates (2007–2011) to study the relationship between residential segregation and socio-economic outcomes of native-born Latinos between the ages of 25 and 30. We consider educational outcomes such as the probability of college graduation and labor market outcomes such as the probability of working in a professional occupation, earnings and the likelihood of being employed or in school. We focus on young adults because their metropolitan area of residence is more likely to be affected by parental location choices than that of older adults. In order to further make certain that we include only those who have lived in the metropolitan area for a substantial period of time and thus been exposed to that areas level of segregation, we exclude individuals from the 1990 and 2000 samples who lived in another CBSA five years prior and exclude from the 2010 sample those who lived in another CBSA in the prior year.

We exclude the foreign born because the data do not provide precise information on their year of arrival and, hence, we cannot tell how long they have experienced segregation. By looking at a sample of native-born Latinos we are also less likely to capture any effects of segregation that can be attributed to differences in Latino adaptation in the United States.

Our sample includes individuals living in 207 Core Based Statistical Areas (CBSAs) across the United States with a total population greater than 100,000 residents and a Latino population of at least 5,000 residents in 2010 (see the appendix for a detailed explanation on the assignment of individuals in IPUMS to CBSAs in each decade). Throughout the study, we use the metropolitan area dissimilarity index as our primary measure of Latino-white residential segregation. The segregation data cover 1980 through 2010 and are provided by US2010, a joint project between the Russell Sage Foundation and Brown University.

Table 1 presents raw differences in socioeconomic outcomes, pooled across 1990, 2000, and 2010, by quartile of metropolitan area segregation. The upper panel shows segregation quartiles based on the 2010 Latino-white dissimilarity index and the lower panel shows quartiles based on the 2010 black-white dissimilarity index. Whites exhibit better outcomes than blacks and Latinos across the board: whites are more likely to graduate from college, to be employed, to be employed in a professional occupation, and to have higher earnings. Further, higher levels of segregation

are consistently associated with larger gaps in outcomes between whites and blacks and between whites and Latinos. For African Americans, differences in outcomes relative to whites are consistently larger in 'very high' segregation metropolitan areas than in 'low' segregation metropolitan areas, but the pattern is weaker for the middle quartiles. Differences between white and Latino outcomes are more monotonic, systematically increasing with the level of segregation for almost every outcome. Notably, the link between segregation and racial differences in outcomes appears to be driven more by variation in white outcomes than by variation in black or Latino outcomes. In the most segregated metropolitan areas, young white adults exhibit particularly better outcomes.

Although these raw means by segregation quartile suggest a relationship between segregation and outcomes, determining how the level of segregation shapes individual socio-economic outcomes is intrinsically difficult because people sort into cities and neighborhoods based on their tastes, preferences, and unobserved resources. To address sorting across neighborhoods, we measure segregation at the level of the metropolitan area rather than at the level of the neighborhood, as sorting of individuals across metropolitan areas is a lesser concern (Cutler and Glaeser, 1997). A metropolitan area level analysis has the added strength of capturing metropolitan area wide restrictions on choice and of measuring how all members of a racial or ethnic group in a metropolitan area may be affected by levels of segregation that operate at a higher spatial level, even those who do not live in a racially or ethnically homogenous neighborhood themselves (Chetty, Hendren, Kline, and Saez, 2014). We focus on variation in effects across racial groups to difference out any unobserved characteristics of a metropolitan area that shape economic outcomes and are correlated with segregation. To learn how metropolitan area segregation affects Latinos, we regress an individual outcome such as the probability of college graduation or the likelihood of being employed or in school on a measure of Latino metropolitan area residential segregation (e.g. Latino-white dissimilarity index). Specifically we estimate the following specification:

$$Y_{ijt} = \alpha_1 + \beta_1 \, \text{Seg}_{j,t-1} + \beta_2 \, \text{Seg}_{j,t-1} \times \text{Latino} + \beta_3 \, X_{it} + \beta_4 \, Z_{jt} + T_t + \varepsilon_{ijt} \tag{1}$$

where Y_{ijt} represents a socioeconomic outcome for individual i in metropolitan area j in decade t, $\text{Seg}_{j,t-1}$ is the dissimilarity index between Latinos and whites for metropolitan area j in the previos decade $t-1$, X_{it} is a vector of individual level characteristics, Z_{jt} is a vector of metropolitan level characteristics described below, and T_t is a decade time control. We let the coefficient on metropolitan area level of segregation—β_2 in equation (1)—differ for whites and Latinos ($\text{Seg}_{j,t-1} \times \text{Latino}$). Therefore, we test whether segregation has a differential effect on Latinos relative to its effect on whites.[3] We lag segregation to help address concerns about reverse causality and to better capture the segregation levels present when young adults were growing up.

We include several individual variables as controls, including age indicator variables, gender, and a set of indicator variables for Latino groups of different origin (Mexicans, Puerto Ricans, Dominicans, Cubans, Central Americans, and South Americans). These ancestry groups exhibit substantial differences in levels of educational attainment, earnings, other demographics and presumably unobserved traits that could explain differences in outcomes within the Latino ethnicity.

[3]One might be more interested in the sum of the coefficient on segregation and the interaction of segregation with the Latino indicator variable to capture the total effect of segregation on Latinos.

Table 1: Preliminary evidence on the relationship between segregation and outcomes, 1990–2010

	College graduation	Not idle	Professional occupation	Log earnings
	(1)	(2)	(3)	(4)
Whites				
All metropolitan areas	30.6%	88.6%	27.6%	9.89
Low segregation	23.2%	86.6%	21.9%	9.73
Moderate segregation	25.7%	87.0%	24.0%	9.78
High segregation	27.7%	88.6%	25.8%	9.84
Very high segregation	35.2%	89.4%	30.8%	9.98
Latinos				
All metropolitan areas	14.9%	83.7%	17.9%	9.72
Low segregation	15.3%	85.2%	17.1%	9.69
Moderate segregation	12.3%	83.8%	15.4%	9.60
High segregation	13.7%	83.7%	17.2%	9.63
Very high segregation	15.9%	83.6%	18.7%	9.77
White-Latino gap				
All metropolitan areas	15.7%	4.9%	9.6%	0.17
Low segregation	7.9%	1.4%	4.8%	0.04
Moderate segregation	13.5%	3.2%	8.6%	0.18
High segregation	14.0%	4.9%	8.6%	0.21
Very high segregation	19.3%	5.9%	12.1%	0.20
Whites				
All metropolitan areas	30.5%	88.5%	27.5%	9.89
Low segregation	25.5%	87.6%	24.5%	9.83
Moderate segregation	24.8%	87.5%	23.4%	9.79
High segregation	26.8%	88.1%	25.1%	9.82
Very high segregation	35.5%	89.3%	30.8%	9.97
Blacks				
All metropolitan areas	14.6%	82.9%	15.8%	9.50
Low segregation	13.0%	84.5%	14.3%	9.49
Moderate segregation	12.7%	83.9%	13.9%	9.44
High segregation	14.8%	84.2%	15.2%	9.48
Very high segregation	15.0%	82.0%	16.5%	9.51
White-black gap				
All metropolitan areas	15.9%	5.6%	11.7%	0.39
Low segregation	12.5%	3.1%	10.2%	0.34
Moderate segregation	12.1%	3.6%	9.5%	0.35
High segregation	12.0%	3.9%	9.9%	0.34
Very high segregation	20.5%	7.2%	14.3%	0.45

Notes: In the top (bottom) panel, Core Based Statistical Areas are classified into quartiles—low, moderate, high and very high—based on their 2010 Latino-white (black-white) dissimilarity index. Sample in the top (bottom) panel is restricted to native-born whites and Latinos (blacks) between 25 and 30 years old living in one of the 207 (204) metropolitan areas with population above 100,000 residents and more than 5,000 Latinos (blacks) in 2010. 'Not idle' takes value one if the individual is working or enrolled in school. Log earnings include total annual income for the previous calendar year and available only for individuals who report positive income.

Therefore, by including these ancestry-group indicator variables we can capture a share of the variance in outcomes that can be attributed to the fact that Latinos of specific subgroups, who may be concentrated in different metropolitan areas, bring different backgrounds and may experience different treatment. In all of the Latino estimates, we also control for the lagged black-white dissimilarity index in order to capture historical levels of racial discrimination in a metropolitan area and related factors that change slowly over time, such as the social, political, or educational institutions shaped by segregated norms. We also include a large set of time-varying metropolitan area level controls, specifically metropolitan area population and median household income, the fraction of the metropolitan area population that is Latino, black, Asian, foreign born, over 65 years, under 15 years, and unemployed, as well as the share of the metropolitan area workers employed in the manufacturing sector and working in professional occupations, the share of residents with a college degree, and the share of residents in poverty status. We interact these metropolitan area controls with a Latino indicator variable to let the effects of metro area characteristics differ for Latinos as compared to whites. Again, by including all of these metropolitan area level variables and interacting segregation with a Latino indicator variable, we test whether the level of segregation in a metropolitan area has a significantly different, independent effect on socioeconomic outcomes for Latinos than it does for whites.

Earlier work exploring the impacts of metropolitan segregation on individual outcomes has only examined a single year of data (e.g. Cutler and Glaeser, 1997). Using multiple years of data allows us to introduce metropolitan area level fixed effects to examine how changes over time in the level of Latino segregation in a metropolitan area are associated with changes in outcomes while controlling for other unobserved metropolitan area-level factors. We also separately explore the effects of segregation on outcomes in 1990, 2000 and in 2010.

To address both potential endogeneity and the reverse causality that could come from the gap in socioeconomic outcomes between Latinos and whites itself contributing to metropolitan area levels of segregation, we estimate two-stage least squares models, employing a novel instrumental variable. Multiple instrumental variables have been developed to predict levels of black-white metropolitan area segregation including rivers (Hoxby, 2000) and railroad tracks (Ananat, 2011), all features of the natural or built environment that enabled residential segregation by race. These instruments, however, do not necessarily make sense for the more recent Latino-white segregation given the different historical context. Far less attention has been dedicated to developing instrumental variables attuned to the recent growth of the Latino population and that can predict Latino-white segregation.

To instrument for levels of Latino-white dissimilarity from 1990 to 2010, we rely on an instrument that captures features of the historical built environment that allowed for more segregation. Specifically, we create a variable measuring the dissimilarity index between single-family detached housing and other housing types in 1970. We hypothesize that when different types of housing are ex-ante placed in different parts of the city, more segregation is likely to result, as Latinos are likely to be disproportionately located in multi-family and single-family attached housing because of their lower homeownership rates and lower average incomes (see Weicher and Thibodeau,

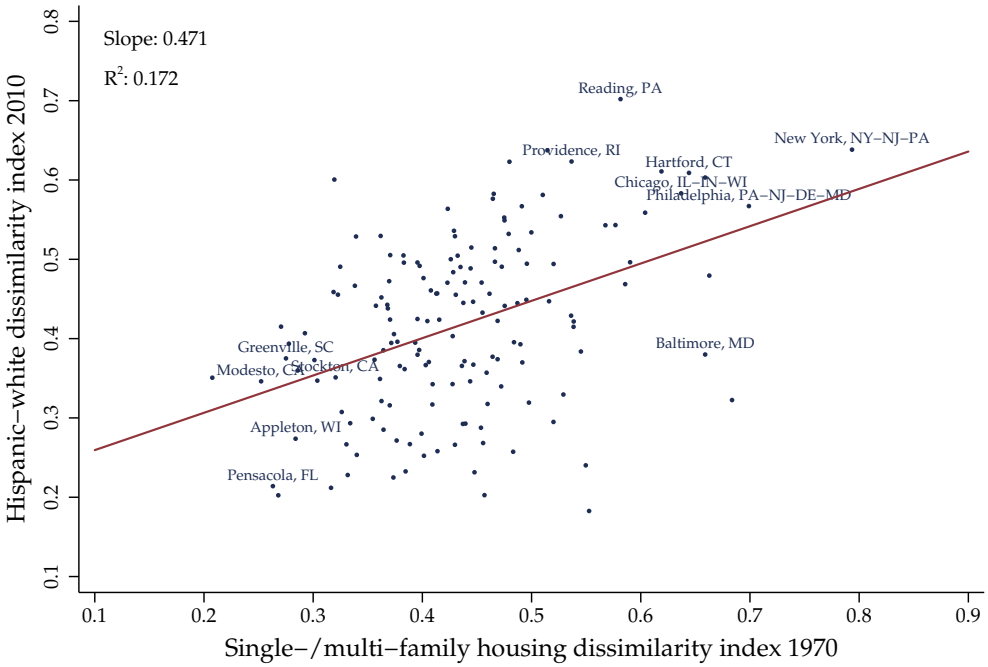

Figure 1: 2010 segregation and 1970 single-/multi-family dissimilarity index

1988 and Brueckner and Rosenthal, 2009, for a related measure of the age of the housing stock).[4] Figure 1 shows a scatterplot of the strong positive relationship between the 2010 Latino-white segregation and the 1970 dissimilarity index between single-family detached housing and all other housing types. For example, the New York NY-NJ-PA metropolitan area has simultaneously the highest level of single/multi-family housing dissimilarity index (0.793) and a high score on the Latino-white dissimilarity index (0.619). At the other extreme, Modesto, CA has a very low housing type dissimilarity score (0.252) and also a low score on the Latino-white dissimilarity index (0.342).

We combine this measure of the dissimilarity of residential housing typology with two existing measures of the jurisdictional or fiscal environments that enable segregation—the number of local governments and the share of local revenue from federal or state transfers (Cutler and Glaeser, 1997), all from 1962, before the passage of the 1965 Hart-Cellar Immigration Act and the rapid increase of the US Latino population from the 1970s to the present. Following Tiebout (1956), a larger number of different municipalities within a given metropolitan area encourages greater levels of sorting on the basis of municipal tax rates, service provision, or other characteristics, thus facilitating higher levels of segregation. Also related to Tiebout's theory of local expenditures is the share of local revenue derived from state or federal revenue transfers. The larger the share of local revenue from state or local sources, the lower the variation in municipal tax rates and the greater the equality of resources available for public goods, and therefore presumably the lower

[4]To construct this instrument, we use the 1970 Neighborhood Change Database (NCDB) to calculate the dissimilarity index in 1970 between single-family detached housing and all other types of housing units (single-family attached dwellings, as well as all multi-family dwellings) for each Standard Metropolitan Statistical Area (SMSA), the 1970 definition of metropolitan areas. We have data on instruments for 129 out of the 207 CBSAs in the initial sample. Those CBSAs missing from the instrumental sample are generally smaller and more recently recognized CBSAs.

the incentive for sorting or segregation by jurisdiction. Like Cutler and Glaeser (1997), we measure the share of intergovernmental transfers for the localities in a state as a whole in order to avoid including local endogenous factors in the variable and to better capture the relevant state political characteristics. The data for both measures come from the 1962 Census of Governments Survey and are made available by the Inter-university Consortium for Political and Social Research at the University of Michigan.[5]

The first stage estimation of the 2000 Latino-white dissimilarity index is presented in table 2. (We find substantially similar results for 1990 and 2010 as shown in appendix tables B.7 and B.8.) Each instrument considered independently has the expected relationship with segregation, even after including the metropolitan area black-white lagged segregation level as a control and other usual determinants of metropolitan area Latino-white segregation such as the share of workers in manufacturing activities or the share of population over 65 years old. In 2000, higher levels of 1970 dissimilarity between single-family detached dwellings and other dwellings are associated with higher levels of Latino-white segregation and a larger share of municipal revenues from state and federal sources is negatively associated with segregation. The log of the number of local governments is positively associated with segregation but below standard levels of statistical significance. The results in column (4) indicate that the coefficient on the 1970 dissimilarity index between single-family detached housing and other housing types remains highly significant and does not experience a large change in its magnitude in the presence of the other instruments. We take this as evidence that our proposed instrument is strong and further validate this claim by noting that the F-statistic reported on the weak instruments identification test exceeds all thresholds proposed by Stock and Yogo (2005) for the maximal relative bias and maximal size in 1990 and 2000, though not in 2010.[6] The number of local governments and percentage of revenue from governmental transfers also strongly predict black-white segregation in the hypothesized direction, as shown in columns (5) through (7).

4. Results

OLS results on the relation between segregation and individual outcomes

In table 3, we estimate ordinary least squares regressions of each individual outcome on metropolitan area levels of segregation, as well as individual and metropolitan area controls. We show results with contemporaneous and lagged segregation levels (in which 1990 outcomes are linked to 1980 segregation levels, etc.). We also show results for a regression with CBSA fixed effects with lagged segregation levels.[7] In each pair of rows in the first panel, the first reports the coefficients on the metropolitan area Latino-white dissimilarity index and the second the interaction between this index and a Latino indicator variable. The sample consists only of whites and Latinos, so the coefficient on the dissimilarity index can be interpreted as the association between Latino-white

[5]U.S. Department of Commerce (2001), `http://www.icpsr.umich.edu/icpsrweb/ICPSR/series/12`.

[6]The *F*-statistic (or Kleinberger-Papp rk Wald statistic) exceeds 16 in 1990, 14 in 2000 and 5 in 2010. Only in 2010, it falls slightly below the critical value for the 10% maximal IV size.

[7]Results for CBSA fixed effects models are similar whether or not segregation is lagged.

Table 2: First-stage estimation of dissimilarity indices, 2000

Dependent variable:	2000 Latino-white lagged dissimilarity index				2000 black-white lagged dissimilarity index		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Single/multifamily housing DI 1970	.493 (.100)***			.460 (.108)***			
Log of local governments 1962		.013 (.012)		-.006 (.013)	.038 (.009)***		.027 (.009)***
% of revenue from transfers 1962			-.341 (.104)***	-.218 (.116)*		-.374 (.086)***	-.246 (.086)***
Black-white lagged DI	.350 (.092)***	.422 (.110)***	.360 (.099)***	.310 (.102)***			
Log population	-.020 (.013)	-.011 (.015)	-.00004 (.014)	-.013 (.014)	.044 (.012)***	.075 (.006)***	.050 (.012)***
% black population	-.003 (.124)	.062 (.130)	.104 (.123)	.035 (.114)	.252 (.091)***	.202 (.086)**	.274 (.088)***
% Latino population	.831 (.106)***	.778 (.124)***	.692 (.118)***	.779 (.105)***	-.081 (.092)	-.287 (.081)***	-.137 (.091)
% Asian population	-.426 (.174)**	-.279 (.231)	-.321 (.205)	-.433 (.185)**	-.026 (.144)	-.227 (.139)	-.052 (.145)
% population over 65	1.874 (.628)***	2.569 (.636)***	2.252 (.600)***	1.715 (.613)***	1.676 (.447)***	1.376 (.444)***	1.398 (.435)***
% population under 15	1.163 (.704)*	1.655 (.819)**	1.383 (.759)*	1.008 (.699)	.487 (.691)	.413 (.694)	.308 (.665)
% unemployed	.704 (1.043)	1.840 (1.148)	1.845 (1.086)*	.773 (1.026)	.665 (.783)	1.068 (.758)	.701 (.727)
% working in manufacturing	.623 (.191)***	.329 (.235)	.582 (.213)***	.757 (.227)***	.384 (.204)*	.752 (.187)***	.526 (.204)***
% in poverty status	-.032 (.427)	-.275 (.515)	.091 (.504)	.180 (.473)	-.176 (.380)	.218 (.370)	.026 (.377)
% with bachelor's degree	.776 (.266)***	1.220 (.328)***	1.258 (.291)***	.824 (.263)***	.007 (.159)	.108 (.157)	.018 (.152)
Log median household income	.071 (.044)	.076 (.054)	.080 (.052)	.073 (.041)*	-.052 (.024)**	-.033 (.022)	-.046 (.023)**
Observations	412,201	412,201	412,201	412,201	455,379	455,379	455,379
Number of CBSAs	156	156	156	156	201	201	201
R^2	.774	.719	.734	.780	.697	.694	.710

Notes: Coefficients are reported with robust standard errors in parenthesis, which are clustered by Core Based Statistical Area (CBSA). ***, **, and * indicate significance at the 1, 5, and 10 percent levels. All specifications include a constant term, a female indicator variable and age indicator variables. Columns (1) through (4) include Latino ancestry-group indicator variables and columns (5) through (7) include a black indicator variable. CBSA controls are interacted with a Latino or black indicator variable accordingly. DI stands for dissimilarity index.

segregation and white outcomes, while the coefficient on the interaction between the dissimilarity index and the Latino indicator variable shows any difference in the association between segregation and outcomes for Latinos as compared to whites. Standard errors are clustered at the metropolitan area level.

Results reveal significant associations between metropolitan area segregation levels and individual outcomes. Starting with the probability of having completed college for Latinos aged 25–30 in column (1), we find that the interaction coefficient is negative and statistically significant, indicating that, in more segregated metropolitan areas, Latinos are less likely to complete college relative to their white counterparts. The coefficient on the Latino-white dissimilarity index alone is small and not statistically significant, suggesting that segregation is not associated with a higher likelihood of completing college for whites. The results are similar whether the dissimilarity index is lagged or not (in panels 1 and 2). When metropolitan area fixed effects are included in panel 3, the interaction coefficient remains significant and increases in magnitude. In terms of magnitudes of the effects, a one standard deviation increase in the Latino-white dissimilarity index is related to a decline in the probability of finishing college of 4.8 percentage points for Latinos relative to white graduation rates. The overall difference in the means in college graduation rates for whites and Latinos is 15.7 percentage points.

Looking at the incidence of being employed or in school again reveals that higher levels of segregation are consistently associated with a lower likelihood of being employed or in school for Latino young adults relative to whites. Results are similar whether or not the measure of dissimilarity is lagged and once metropolitan area fixed effects are added. We see some evidence here that white young adults are more likely to be employed or in school in more segregated areas, though the association disappears once we control for CBSA fixed effects. As for magnitudes, a one standard deviation increase in the level of segregation is associated with a decrease in the likelihood of being either employed or in school for Latino 25-30 year olds relative to whites of 2.1 percentage points. (The mean difference between whites and Latinos in this age range is 4.9 percentage points).

As would be expected, the results with regard to professional occupations parallel the results with regard to college attainment. The coefficient on the Latino-white dissimilarity index alone is again not statistically significant, but higher levels of segregation are associated with a decreased likelihood of employment in professional occupations for Latino young adults relative to whites. The results are similar whether the dissimilarity index is lagged or not. When metropolitan area fixed effects are included, the interaction coefficient remains significant and again increases in magnitude. A one standard deviation increase in the Latino-white dissimilarity index is related to a decline in the probability of professional employment of 2.9 percentage points for Latinos relative to white graduation rates. The overall difference in the means in professional employment rates for whites and Latinos is approximately 9.6 percentage points.

As for earnings among young adults, segregation is also associated with significantly larger Latino-white gaps. The results are consistent across all specifications and the magnitude is large. Here, we see evidence that young white adults earn more in more segregated metropolitan areas,

Table 3: Estimation of the effect of segregation on individual outcomes, 1990–2010

Dependent variable:	College graduation	Not idle	Professional occupation	Log earnings
	(1)	(2)	(3)	(4)
Pooled OLS				
Latino-white lagged dissimilarity index	-.028	.035	-.016	.200
	(.037)	(.013)***	(.025)	(.077)***
Latino-white lagged DI × Latino	-.219	-.148	-.159	-.679
	(.042)***	(.019)***	(.027)***	(.098)***
Pooled OLS				
Latino-white dissimilarity index	-.001	.044	.001	.242
	(.039)	(.014)***	(.025)	(.079)***
Latino-white DI × Latino	-.267	-.161	-.183	-.633
	(.046)***	(.023)***	(.030)***	(.115)***
CBSA fixed-effects				
Latino-white lagged dissimilarity index	.017	.003	.010	.166
	(.033)	(.014)	(.026)	(.076)**
Latino-white lagged DI × Latino	-.334	-.145	-.205	-.683
	(.043)***	(.018)***	(.029)***	(.074)***
Observations	1,522,096	1,522,096	1,522,096	1,402,104
Number of CBSAs	207	207	207	207
Pooled OLS				
Black-white lagged dissimilarity index	0.081	0.019	0.054	0.003
	(0.037)**	(0.017)	(0.027)**	(0.085)
Black-white lagged DI × black	-0.186	-0.150	-0.084	-0.392
	(0.048)***	(0.026)***	(0.033)**	(0.100)***
Pooled OLS				
Black-white dissimilarity index	0.111	0.023	0.072	0.0009
	(0.036)***	(0.018)	(0.028)***	(0.091)
Black-white DI × black	-0.202	-0.174	-0.076	-0.404
	(0.047)***	(0.031)***	(0.031)**	(0.106)***
CBSA fixed-effects				
Black-white lagged dissimilarity index	0.173	0.053	0.115	0.206
	(0.053)***	(0.019)***	(0.032)***	(0.097)**
Black-white lagged DI × black	-0.191	-0.135	-0.104	-0.461
	(0.054)***	(0.024)***	(0.032)***	(0.085)***
Observations	1,557,427	1,557,427	1,557,427	1,433,767
Number of CBSAs	204	204	204	204

Notes: Coefficients are reported with robust standard errors in parenthesis, which are clustered by Core Based Statistical Area (CBSA). ***, **, and * indicate significance at the 1, 5, and 10 percent levels. In the top (bottom) panel, the sample is restricted to native-born whites and Latinos (blacks) between 25 and 30 years of age. Individuals who lived in another CBSA five years ago (or one year ago in 2010) are excluded. All specifications have a constant term, a female indicator variable, age and census region-year indicator variables. The top panel includes as controls the black-white dissimilarity index and Latino ancestry-group indicator variables, while the lower panel includes a black indicator variable. Additional CBSA controls include log population, log median household income and shares of population that are black, Latino, Asian, over 65 years, under 15 years, unemployed, working in manufacturing, in poverty status and with college degree. These CBSA controls are also interacted with a Latino or black indicator variable accordingly. DI stands for dissimilarity index.

while young Latinos earn less. A one standard deviation increase in Latino-white segregation is associated with a 10.3 percent increase in the gap between Latino earnings relative to whites. In the sample, annual earnings for whites exceed those for Latinos by 18.7 percent.

As shown in the second panel, the relationship between metropolitan area segregation and outcomes among African American young adults is generally similar to that for Latinos. For college graduation, black young adults in more segregated metropolitan areas are less likely to graduate from college relative to whites, and the magnitude of the association is close to that for Latinos. Higher levels of black-white segregation are also associated with a lower likelihood of being either employed or in school for black young adults relative to whites, and the results are robust to lagged dissimilarity and metropolitan area fixed effects, and again similar in magnitude to the comparable results for Latinos. As for earnings, black earnings relative to white earnings are consistently negatively associated with segregation. The magnitude of the effects is somewhat smaller than for Latinos.

Finally, the relationship between segregation and black professional employment is more mixed. White-black segregation is associated with wider black-white gaps in professional employment, but the coefficient on the black-white dissimilarity index is similar in magnitude to that on the interaction coefficient, suggesting that on net, black outcomes are similar in more and less segregated metropolitan areas. In other words, young black adults in more segregated metropolitan areas are no less likely to work in professional occupations than their counterparts in less segregated metropolitan areas, but young black adults in more segregated metropolitan areas are significantly less likely to work in professional occupations than their white counterparts in the same metropolitan area.

We carried out several alternative estimations that use the isolation index as the measure of metropolitan area segregation. We also estimated the same specifications in table 3 for a younger sample of adults between the ages of 20 and 24. Results, available upon request, are remarkably similar both in terms of significance and magnitude of the effects. In sum, our findings indicate that segregation has consistent negative correlations with socio-economic outcomes for Latino young adults relative to whites.

The link between segregation and individual outcomes by ancestry

Breaking down the association between segregation and individual outcomes by ancestry in 2010 reveals considerable heterogeneity across groups. In table 4, we further include interactions between the dissimilarity index and six ancestry groups (Cuban, Puerto Rican/Dominican Republican, South American, Central American, Mexican and other self-identified Latinos).[8] Thus, the total effect of segregation in each of these groups is the sum of the general Latino interaction coefficient and the ancestry group of interest. The association between segregation and outcomes is by far the largest for Latinos who self-report having a Puerto Rican or Dominican ancestry. In

[8]Sample sizes do not allow us to construct more narrow ancestry groups within Central and South America. The total sample size for the Latino-white analyses in 2010 is 515,501 native born young adults, of which 435,568 (84.5%) are whites. Of the Latinos in the sample, 53,387 (66.7%) identify their ancestry as Mexican, 13,886 (17.37%) as Puerto Rican or Dominican, 2,581 (3.23%) as Cuban, 2,995 (3.75%) as Central American, 2,599 (3.25%) as South American, and 4,485 (5.6%) as Other.

Table 4: Estimation of the effect of segregation by Latino ancestry, 2010

Dependent variable:	College graduation	Not idle	Professional occupation	Log earnings
	(1)	(2)	(3)	(4)
Latino-white lagged dissimilarity index	.081	.084	.061	.251
	(.076)	(.019)***	(.052)	(.076)***
Latino-white lagged DI × other Latino	-.087	-.091	-.024	-.401
	(.088)	(.060)	(.085)	(.176)**
Latino-white lagged DI × Cuban	-.247	-.055	-.047	.025
	(.155)	(.059)	(.096)	(.192)
Latino-white lagged DI × Mexican	-.347	-.116	-.220	-.493
	(.078)***	(.032)***	(.054)***	(.107)***
Latino-white lagged DI × South American	-.481	-.121	-.322	-.701
	(.132)***	(.042)***	(.097)***	(.204)***
Latino-white lagged DI × Central American	-.544	-.145	-.312	-.934
	(.118)***	(.058)**	(.080)***	(.192)***
Latino-white lagged DI × PR, DR	-.554	-.249	-.376	-.863
	(.079)***	(.037)***	(.053)***	(.113)***
Observations	515,501	515,501	515,501	475,852
R^2	.083	.051	.043	.135

Notes: Coefficients are reported with robust standard errors in parenthesis, which are clustered by Core Based Statistical Area (CBSA). ***, **, and * indicate significance at the 1, 5, and 10 percent levels. Sample is restricted to native-born whites and Latinos between 25 and 30 years of age in 2010. Individuals who lived in another CBSA one year ago are excluded. All specifications have a constant term, the black-white (lagged) dissimilarity index, a female indicator variable, Latino ancestry-group, age and census region-year indicator variables. Additional CBSA controls include log population, log median household income and shares of population that are black, Latino, Asian, over 65 years, under 15 years, unemployed, working in manufacturing, in poverty status and with college degree. These CBSA controls are also interacted with a Latino indicator variable. DI stands for dissimilarity index.

2010, a one standard deviation increase in the dissimilarity index is associated for Puerto Ricans and Dominicans with a 9.1 percentage point decrease in the likelihood of attending college relative to whites, a 4.8 percentage point decrease in the likelihood of being employed or in school relative to whites, and a 17.3 percentage reduction in earnings relative to whites. This stronger association may reflect the larger share of Puerto Ricans and Dominicans who are poor and identify as black.

We see roughly similar associations for those who self-identified as having Central American ancestry in terms of college graduation and earnings, but smaller associations between segregation and professional occupation as well as the likelihood of being simultaneously out of work and out of school. Segregation has a more modest association with outcomes for Mexicans and South Americans. Segregation is least associated with negative labor market outcomes for those who identified Cuban ancestry and those who identified their ethnicity as Hispanic, but their ancestry as 'other.' For instance, a one standard deviation increase in the dissimilarity index is associated for Cubans with only a 2.0 percentage point decrease in the odds of being either employed or in school relative to whites and a 3.3 percentage increase in earnings relative to whites. The high average levels of education of Cubans may explain the difference.

Instrumental variable results

Table 5 presents the IV estimation of the effect of the Latino-white dissimilarity index on socio-economic outcomes in 1990, 2000, and 2010. The first two columns show results for 1990, with the first column repeating the OLS estimation for the 156 CBSAs included in the sample and the second column showing IV estimates using all three instrumental variables for Latino-white segregation. The two subsequent rows within each panel show analogous results for blacks for a subset of 201 CBSAs and IV estimates that use the two instrumental variables discussed above for black-white segregation (number of local governments and intergovernmental revenue transfers in 1962). IV estimations use the Wooldridge IV adjustment given that the same instruments are used to predict the coefficient on segregation and the interaction with the minority indicator variable (see table note). Columns 3 and 4 show results for 2000, and columns 5 and 6 for 2010, all following the same pattern of OLS estimations followed by IV estimations.

Instrumental variable estimates of the causal effect of segregation on college graduation and racial gaps in college graduation are mixed. In 1990, the IV estimates for the effect of segregation on blacks and Latinos are not significant. In 2000, the IV results indicate net negative effects of segregation on both black and Latino college graduation rates. In 2010, segregation has a significant negative effect on the black graduation rate while segregation is associated with a wider gap in the Latino-white graduation rates, even as both white and Latino graduation rates rise in more segregated cities.

Regarding the likelihood of being either employed or in school, the IV results are significant and negative for Latinos in both 2000 and 2010 (as well as slightly larger than the OLS results) but not significant for blacks in either year. In other words, segregation widens Latino-white gaps in being out of school and out of work but not black-white gaps.[9]

Segregation also widens racial gaps in the likelihood that young adults work in professional occupations and in earnings. For both blacks and Latinos, the IV results for professional occupation are significant and negative in 2000 and 2010. Further, when looking at point estimates it appears that the effects of segregation on gaps in access to professional occupations between minorities and whites widened in 2010. The magnitudes of the IV results are again larger than the OLS estimates.

Finally, with regard to earnings, the IV results are negative and significant for Latinos in 1990, 2000, and in 2010. For blacks, the IV results are significant only in 2010. The magnitudes of the effects on earnings for Latino young adults in all three decades and for black young adults in 2010 are large. In fact, IV estimates indicate that a one standard deviation increase in the Latino-white dissimilarity index in 2010 almost doubles the earnings gap between Latinos and whites compared to OLS estimates, from 8.3 to 15.7 percent. This causal effect of segregation accounts for 61 percent of the total gap in earnings between Latinos and whites in 2010 (25.7 percent). These earnings gaps have been remarkably persistent along the three decades as suggested by IV estimates.

[9]Although the interaction between segregation and the black indicator variable is not far from being significant in 2010, the total effect of segregation on blacks is close to zero in 2000 and much smaller than the overall effect of segregation on Latinos for 2010.

Table 5: Instrumental variable estimation of the effect of segregation on individual outcomes

	1990		2000		2010	
	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)
College graduation						
Latino-white lagged DI	.037 (.041)	.225 (.078)***	.009 (.054)	.225 (.122)*	.058 (.073)	.678 (.284)**
Latino-white lagged DI × Latino	-.179 (.045)***	-.149 (.105)	-.308 (.056)***	-.439 (.106)***	-.399 (.076)***	-.451 (.171)***
Black-white lagged DI	.002 (.042)	.172 (.147)	.125 (.042)***	.324 (.170)*	.204 (.062)***	.324 (.139)**
Black-white lagged DI × black	-.043 (.047)	-.168 (.138)	-.197 (.052)***	-.393 (.177)**	-.304 (.079)***	-.668 (.195)***
Not idle						
Latino-white lagged DI	.027 (.014)*	.031 (.028)	.024 (.015)	.023 (.036)	.050 (.021)**	.054 (.082)
Latino-white lagged DI × Latino	-.128 (.040)***	.114 (.115)	-.191 (.032)***	-.251 (.063)***	-.147 (.029)***	-.210 (.051)***
Black-white lagged DI	.050 (.022)**	.143 (.057)**	.030 (.016)*	.116 (.058)**	.064 (.019)***	.124 (.046)***
Black-white lagged DI × black	-.074 (.037)**	.039 (.174)	-.142 (.034)***	-.126 (.097)	-.123 (.043)***	-.175 (.108)
Professional occupation						
Latino-white lagged DI	-.025 (.026)	.085 (.042)**	-.007 (.031)	.092 (.064)	.035 (.048)	.166 (.152)
Latino-white lagged DI × Latino	-.112 (.049)**	-.033 (.097)	-.231 (.037)***	-.389 (.087)***	-.260 (.047)***	-.390 (.093)***
Black-white lagged DI	.017 (.026)	.027 (.086)	.071 (.027)***	.139 (.099)	.099 (.042)**	.132 (.089)
Black-white lagged DI × black	-.040 (.034)	.045 (.122)	-.100 (.033)***	-.236 (.130)*	-.139 (.053)***	-.310 (.117)***
Log earnings						
Latino-white lagged DI	.249 (.088)***	.548 (.146)***	.214 (.097)**	.585 (.194)***	.222 (.083)***	.687 (.341)**
Latino-white lagged DI × Latino	-.986 (.176)***	-1.108 (.523)**	-.829 (.133)***	-1.305 (.314)***	-.672 (.104)***	-1.227 (.225)***
Black-white lagged DI	-.067 (.101)	.307 (.303)	.144 (.084)*	.353 (.277)	.206 (.083)**	.547 (.225)**
Black-white lagged DI × black	-.336 (.136)**	-.379 (.632)	-.560 (.116)***	-.589 (.410)	-.532 (.125)***	-1.027 (.310)***

Notes: Coefficients are reported with robust standard errors in parenthesis, which are clustered by Core Based Statistical Area (CBSA). ***, **, and * indicate significance at the 1, 5, and 10 percent levels. All specifications include a constant term, a female indicator variable and age indicator variables. Controls included for CBSAs and their interactions with a Latino or black indicator variable are the ones listed in table 2. The IV specification for Latino-white DI is the one in column (4) and the IV specification for black-white DI is the one in column (7). Regressions follow the Wooldrige IV estimation adjustment (see Wooldridge, 2002) that uses as 'instruments' the interactions between the predicted value obtained for Latino(black)-white DI from the first-stage regressions listed in table 2 and a Latino (black) indicator variable. DI stands for dissimilarity index.

The IV results present a relatively consistent story of negative effects of metropolitan area segregation on socio-economic outcomes for both Latino and black young adults. Somewhat surprisingly, the magnitude of the effects of segregation on the likelihood of being simultaneously out of work and out of school, professional occupation, and earnings are larger for Latinos than for African-Americans. Also surprisingly, the negative effects of segregation for black and Latino young adults are most consistently negative and largest in 2010. In other words, the effects of segregation appear to be getting worse over the past three decades, not better.

The results also suggest some apparent benefit to whites of segregated metropolitan areas in terms of college graduation and earnings, which grow larger in 2010. These findings are consistent with Cutler and Glaeser (1997), who found that young white adults benefited from segregation in 1990, at least with respect to educational outcomes. Also, our results are in line with increasing recent evidence of growing inequality and resource hoarding (Kahn, 2011, Reardon and Bischoff, 2011, Rury and Saaticioglu, 2011). Segregation, by generating inequality in public goods and in social networks, is likely to both reinforce advantage and cumulate disadvantage (Durlauf, 2004, Graham, 2016).

Mechanisms

Table 6 examines mechanisms that can help explain how residential segregation translates into unequal individual outcomes. We rely on the Neighborhood Change Database developed by GeoLytics and the Urban Institute, which provides rich data at the census tract level to construct weighted averages of neighborhood socio-economic characteristics. These weighted averages are generally known as exposure rates because they show the extent to which the average person of a specific race/ethnicity is exposed to a neighborhood characteristic. More specifically, we construct a measure of exposure to poverty and exposure to neighbors working in professional occupations. We also use IPUMS worker-level data to calculate the average wage growth by three-digit industry in the nation as a whole between 1990 and 2010.[10] We then calculate how exposed where workers of different races/ethnicities in each CBSA to subsequent growing or declining industries back in 1990. We subtract from all our exposure measures the overall mean in the metropolitan area (calculated for all workers regardless of race) to avoid capturing differences in levels across metropolitan areas.

The exposure of Latino young adults to other individuals in poverty is significantly associated with lower earnings, and to some extent to lower college graduation rates and a lower likelihood of being employed or in school, although standard errors are large. White exposure to poverty, however, does not appear as damaging, as it is associated only with a decline in the odds of being employed or in school. By contrast, white exposure to industries with higher than average wage growth rates between 1990 and 2010 is associated with higher college graduation rates, a greater likelihood of working in a professional occupation, and higher earnings. Latinos, also benefit in all outcomes from being exposed to sectors that experienced notable wage growth, however, the

[10]We construct time-consistent three-digit industry codes using the crosswalk provided in Autor and Dorn (2013).

Table 6: Potential mechanisms for the effects of Latino-white segregation, 2010

Dependent variable:	College graduation	Not idle	Professional occupation	Log earnings
	(1)	(2)	(3)	(4)
OLS				
Latino-white lagged dissimilarity index	.029	.073	.036	.199
	(.066)	(.018)***	(.045)	(.074)***
Latino-white lagged DI × Latino	-.362	-.145	-.234	-.585
	(.068)***	(.027)***	(.043)***	(.097)***
OLS including mechanisms				
Latino-white lagged dissimilarity index	.062	.062	.053	.216
	(.078)	(.019)***	(.052)	(.083)***
Latino-white lagged DI × Latino	-.205	-.091	-.146	-.325
	(.104)**	(.046)**	(.071)**	(.175)*
White exposure to poverty × white	1.544	-.489	.842	-.106
	(.851)*	(.200)**	(.623)	(1.093)
Latino exposure to poverty × Latino	-.409	-.245	-.159	-1.631
	(.259)	(.184)	(.206)	(.500)***
White exposure to professionals × white	.824	-.105	.510	-.255
	(.391)**	(.119)	(.294)*	(.439)
Latino exposure to professionals × Latino	.388	-.120	.223	-.371
	(.286)	(.132)	(.202)	(.426)
White exposure to 1990-2010 growth × white	.985	-.021	.570	.879
	(.424)**	(.092)	(.254)**	(.415)**
Latino exposure to 1990-2010 growth × Latino	.215	.091	.186	.218
	(.065)***	(.029)***	(.052)***	(.124)*
Reduction in DI coefficient for whites	0%	15%	0%	0%
Reduction in DI coefficient for Latinos	43%	37%	38%	44%

Notes: Coefficients are reported with robust standard errors in parenthesis, which are clustered by Core Based Statistical Area (CBSA). ***, **, and * indicate significance at the 1, 5, and 10 percent levels. Sample is restricted to native-born whites and Latinos between 25 and 30 years of age. Individuals who lived in another CBSA five years ago (or one year ago in 2010) are excluded. All specifications have a constant term, the black-white (lagged) dissimilarity index, a female indicator variable, age and Latino ancestry-group indicator variables. Additional CBSA controls include log population, log median household income and shares of population that are black, Latino, Asian, over 65 years, under 15 years, unemployed, working in manufacturing, in poverty status and with college degree. These CBSA controls are also interacted with a Latino indicator variable. DI stands for dissimilarity index.

intensity of the effects is substantially smaller than for whites. Furthermore, only whites seem to benefit from exposure to neighbors in professional occupations as such exposure is related to higher odds of completing college and working in professional occupations.

The greater effects of exposure to poverty for Latinos than whites are consistent with recent work on differences in white and black exposure to poverty over time (Sharkey, 2013) as well as prior work on negative effects of exposure to concentrated poverty (e.g. Wilson, 1997). White exposure to high-wage growth sectors seems to have benefits for whites that are not matched for Latinos. Research on the relationship between location of residence and work may help explain this finding. For instance, Bayer, Ross, and Topa (2008) find that individuals who reside on the same block are more likely to work together than those residing on nearby blocks, likely because of the roles that informal social networks and referrals play in hiring. Thus residential segregation may translate into unequal access to jobs not only through physical distance from jobs but also through physical and social distance in referral networks. Particularly relevant here, Bayer, Ross, and Topa (2008) find that this referral effect is even stronger when individuals share socio-demographic characteristics such as race or ethnicity. Hellerstein, Neumark, and McInerney (2008) have similarly found that the benefit to an individual of nearby jobs depends on whether workers of that individual's same race are employed there. Research on race specific agglomeration economies has also found that African-Americans receive smaller wage benefits from employment density and human capital concentration than whites and suggested that the weakness of cross-race interpersonal interactions may explain these disparities (Ananat, Elizabeth, and Ross, 2013). The findings here suggest that similar dynamics may occur for Latinos.

Once we control for these exposures, the coefficient on Latino-white segregation interacted with a Latino indicator variable falls by between 37 and 44 percent, depending on the outcome. We are not able to explain the association between segregation and white outcomes given that coefficients remain unaltered or change slightly.

5. Discussion and conclusion

In summary, in our models with metropolitan-area fixed effects, segregation has only a weak association with the outcomes of whites, but it has a strong, negative association with the educational and labor market outcomes of Latinos. The magnitudes of the associations are similar to those for blacks, though black-white segregation is more positively associated with white outcomes. As the segregation in a metropolitan area increases, the socio-economic outcomes of Latino young adults living in that metropolitan area deteriorate both absolutely and relative to whites. Segregation has a particularly negative association with the outcomes of young adults of Puerto Rican and Dominican ancestry.

The instrumental variables results generally confirm the negative effects of segregation on Latino young adults' employment outcomes in 2000 and 2010 and indicate that, if anything, the OLS results understate the negative effects of segregation. These findings suggest that Latinos in more segregated metropolitan areas have developed some means to mitigate the negative consequences of segregation, yet despite this attenuation segregation's effects remain large. For

black young adults, the instrumental variables results confirm the negative effects of segregation on college graduation and professional occupation in 2000 and 2010 as well as negative effects on earnings in 2010.

The instrumental variables results also suggest that whites in metropolitan areas with higher levels of segregation are more likely to graduate from college and enjoy higher incomes. These positive effects of segregation on whites are most apparent in 2010, while the effects of segregation on Latinos exhibit little variation between 2000 and 2010. On the one hand, whites may benefit from segregation through the opportunity it affords to hoard resources, such as access to high-performing schools or neighborhoods with more highly educated peers. On the other hand, economic opportunities may happen to be greater and labor markets more robust in areas with greater levels of segregation, but Latinos and blacks may be unable to access those benefits because of the physical and social isolation that residential segregation creates.

As for mechanisms, we are able to explain between one third and one half of the association between Latino-white segregation and Latino-white gaps in outcomes when we control for Latino and white exposure to neighborhood poverty, neighbors working in professional occupations, and high-wage growth industries. Our work makes clear that segregation heightens inequality between whites and Latinos; future work should more fully examine the precise mechanisms.

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Appendix A. Assigning individuals in IPUMS to a Core Based Statistical Area (CBSA)

Barriers to using PUMAs

The smallest level of geography that can be identified in the Integrated Public Use Microdata Sample (IPUMS) is the Public Use Microdata Area (PUMA). PUMAs contain no fewer than 100,000 residents, are nested within state boundaries, and cover the entire United States. The Census Bureau oversees the delineation of PUMAs, which are redrawn for every decennial census. Because PUMAs are not stable across decennial censuses, they cannot be used to consistently identify location through time.

Barriers to using MSAs or CBSAs

The definition and borders of Metropolitan Statistical Areas (MSAs) or Core Based Statistical Areas (CBSAs) have changed through time. We need to construct geographic units that generally correspond to metropolitan areas and are identical across the 1990, and 2000 Decennial Censuses, as well as the 2007–2011 American Community Survey's 5-year estimates. Although IPUMS assigns observations to a 'metropolitan area,' boundaries of any particular metropolitan area change between censuses (generally becoming larger as the region grows). Simply using metropolitan area identifiers could therefore bias results across decades.

Consistent PUMAs

We use publicly available IPUMS 5 percent unweighted samples. IPUMS-USA assigns every individual observation to a PUMA and a 'Consistent PUMA.' Consistent PUMAs are the smallest time-consistent geographic units for the decennial censuses and ACS sample used in this study. They contain no fewer than 400,000 residents, making them a significantly larger unit of geography than PUMAs. 464 Consistent PUMAs encompass some portion of a CBSA.

The Missouri Census Data Center provides a crosswalk from 2000 PUMA delineations to 2008 CBSAs. The crosswalk generates allocation factors for each PUMA, indicating what percentage of the PUMA population falls within a particular CBSA. We assign an entire PUMA to a CBSA if at least 33% of the PUMA's population lies within that CBSA. We then obtain a crosswalk that assigns each 2000 PUMA to a single CBSA or non-metropolitan area.

As discussed, PUMAs cannot be used across years due to their boundaries being redrawn for each census. However, since all 2000 PUMAs also have a Consistent PUMA identifier, we can create a crosswalk that can link Consistent PUMAs to CBSAs. Using this crosswalk we can assign individual observations in the 1990 Census and the 2007–2011 ACS data to a CBSA through their Consistent PUMA identifier.

Assigning Consistent PUMAs to CBSAs requires an additional level of assumptions. Using our crosswalk of 2000 PUMAs to 2008 CBSAs and the population of each PUMA in 2000, we can calculate the share of population for each Consistent PUMA that lives in a particular CBSA. Of the 464 Consistent PUMAs that encompass some portion of a CBSA, in 25 Consistent PUMAs less than 33 percent of the population lives in a single CBSA. We exclude these Consistent PUMAs where a

large share of the population lives in non-metropolitan areas. At this stage we are left with 439 Consistent PUMAs that overlap 305 CBSAs.

While some Consistent PUMAs are fully contained in large metropolitan areas, other Consistent PUMAs overlap several metropolitan areas. Since we do not have smaller geographic identifiers for 1990 or 2007–2011, we need to create a unique crosswalk between Consistent PUMAs and CBSAs. When a Consistent PUMA overlaps multiple CBSAs, we assign the whole population of the Consistent PUMA to the CBSA with the highest population share (as long as this share exceeds 33 percent of the Consistent PUMA's population). As a result we end up with 439 Consistent PUMAs and 245 CBSAs. Most of the CBSAs that we lose have small populations.

The assignment of individuals to CBSAs through Consistent PUMA identifiers results in geographic areas that are comparable over time. However, the CBSA boundaries we obtain do not correspond exactly to census CBSA boundaries. For example, a Consistent PUMA may have 51% of its population within a CBSA but 49% within a non-metropolitan area; our method would essentially redraw the CBSA boundary to include this non-metropolitan area. Likewise, if a Consistent PUMA overlaps two CBSAs, then our method would entirely allocate this Consistent PUMA to a single CBSA as long as the share of its population in this CBSA exceeds the other share (and the minimum threshold of 33%).

One potential concern is that the use of Consistent PUMAs may result in improper assignment of observations to CBSAs due to the large size of Consistent PUMAs. We can examine the extent of this problem for the year 2000. As already mentioned, the crosswalk provided by the Missouri Census Data Center links 2000 IPUMS data to CBSAs. We estimate our specifications for 2000 using both PUMA to CBSA assignment and the coarser Consistent PUMA to CBSA assignment. The two methods give generally consistent results.

Appendix B. First stage estimations, 1990 and 2010

Table B.7: First-stage estimation of dissimilarity indices, 1990

Dependent variable:	1990 Latino-white lagged dissimilarity index				1990 black-white lagged dissimilarity index		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Single/multifamily housing DI 1970	.561 (.107)***			.502 (.109)***			
Log of local governments 1962		.022 (.012)*		-.007 (.013)	.024 (.010)**		.008 (.011)
% of revenue from transfers 1962			-.494 (.141)***	-.338 (.133)**		-.399 (.080)***	-.361 (.089)***
Black-white lagged DI	.358 (.095)***	.293 (.122)**	.177 (.128)	.261 (.111)**			
Log population	-.021 (.016)	-.012 (.020)	.011 (.019)	-.009 (.018)	.052 (.012)***	.070 (.009)***	.062 (.011)***
% black population	.106 (.203)	.397 (.227)*	.423 (.200)**	.175 (.192)	.194 (.090)**	.188 (.081)**	.211 (.086)**
% Latino population	1.020 (.130)***	1.070 (.169)***	.920 (.152)***	.946 (.134)***	-.085 (.103)	-.217 (.085)**	-.173 (.096)*
% Asian population	-.537 (.285)*	-.346 (.390)	-.405 (.339)	-.521 (.292)*	-.150 (.155)	-.216 (.139)	-.164 (.155)
% population over 65	1.712 (.620)***	2.440 (.642)***	2.220 (.605)***	1.600 (.591)***	.684 (.395)*	.471 (.374)	.451 (.374)
% population under 15	1.012 (.585)*	1.258 (.619)**	1.144 (.577)**	.893 (.560)	.229 (.507)	.212 (.456)	.141 (.472)
% unemployed	1.438 (.923)	2.616 (1.033)**	2.058 (.961)**	1.254 (.955)	1.135 (.720)	.612 (.698)	.717 (.703)
% working in manufacturing	.518 (.236)**	.259 (.282)	.634 (.267)**	.728 (.238)***	.116 (.198)	.380 (.186)**	.331 (.203)
% in poverty status	-.929 (.476)*	-1.672 (.609)***	-.959 (.542)*	-.564 (.489)	-.163 (.385)	.387 (.377)	.286 (.384)
% with bachelor's degree	.585 (.397)	1.015 (.440)**	1.039 (.408)**	.638 (.374)*	-.290 (.215)	-.271 (.206)	-.277 (.205)
Log median household income	.026 (.037)	.048 (.048)	.050 (.044)	.025 (.036)	-.020 (.022)	-.010 (.020)	-.016 (.020)
Observations	535,150	535,150	535,150	535,150	595,685	595,685	595,685
Number of CBSAs	156	156	156	156	196	196	196
R^2	.753	.69	.715	.766	.645	.672	.674

Notes: Coefficients are reported with robust standard errors in parenthesis, which are clustered by Core Based Statistical Area (CBSA). ***, **, and * indicate significance at the 1, 5, and 10 percent levels. All specifications include a constant term, a female indicator variable and age indicator variables. Columns (1) through (4) include Latino ancestry-group indicator variables and columns (5) through (7) include a black indicator variable. CBSA controls are interacted with a Latino or black indicator variable accordingly. DI stands for dissimilarity index.

Table B.8: First-stage estimation of dissimilarity indices, 2010

Dependent variable:	2010 Latino-white lagged dissimilarity index				2010 black-white lagged dissimilarity index		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Single/multifamily housing DI 1970	.268 (.089)***			.234 (.100)**			
Log of local governments 1962		.020 (.010)*		.011 (.013)	.051 (.010)***		.039 (.009)***
% of revenue from transfers 1962			-.099 (.122)	-.0007 (.126)		-.432 (.090)***	-.253 (.080)***
Black-white lagged DI	.308 (.074)***	.312 (.087)***	.358 (.075)***	.275 (.087)***			
Log population	-.002 (.012)	-.013 (.014)	.003 (.012)	-.010 (.014)	.025 (.013)**	.070 (.007)***	.031 (.012)**
% black population	.016 (.128)	.074 (.127)	.054 (.129)	.050 (.132)	.428 (.106)***	.464 (.115)***	.483 (.108)***
% Latino population	.522 (.096)***	.497 (.103)***	.431 (.092)***	.544 (.107)***	.009 (.094)	-.199 (.079)**	-.039 (.089)
% Asian population	-.346 (.173)**	-.305 (.209)	-.357 (.191)*	-.311 (.186)*	-.032 (.146)	-.152 (.144)	-.014 (.147)
% population over 65	1.139 (.619)*	1.664 (.619)***	1.675 (.600)***	1.202 (.648)*	1.525 (.498)***	1.439 (.567)**	1.416 (.474)***
% population under 15	.935 (.678)	1.089 (.706)	1.188 (.680)*	.916 (.698)	.103 (.685)	.151 (.790)	.122 (.661)
% unemployed	-.498 (.601)	-.739 (.615)	-1.001 (.641)	-.429 (.623)	.312 (.593)	-.364 (.570)	.139 (.574)
% working in manufacturing	.825 (.191)***	.599 (.222)***	.776 (.214)***	.738 (.231)***	.397 (.201)**	.902 (.206)***	.504 (.198)**
% in poverty status	.356 (.584)	1.006 (.573)*	1.086 (.620)*	.441 (.599)	.814 (.551)	1.186 (.619)*	.968 (.533)*
% with bachelor's degree	.349 (.268)	.204 (.281)	.276 (.286)	.307 (.260)	-.074 (.215)	.024 (.219)	-.053 (.208)
Log median household income	.202 (.167)	.442 (.164)***	.419 (.168)**	.243 (.161)	.144 (.123)	.115 (.127)	.142 (.118)
Observations	483,789	483,789	483,789	483,789	500,793	500,793	500,793
Number of CBSAs	156	156	156	156	201	201	201
R^2	.670	.659	.652	.673	.707	.686	.721

Notes: Coefficients are reported with robust standard errors in parenthesis, which are clustered by Core Based Statistical Area (CBSA). ***, **, and * indicate significance at the 1, 5, and 10 percent levels. All specifications include a constant term, a female indicator variable and age indicator variables. Columns (1) through (4) include Latino ancestry-group indicator variables and columns (5) through (7) include a black indicator variable. CBSA controls are interacted with a Latino or black indicator variable accordingly. DI stands for dissimilarity index.