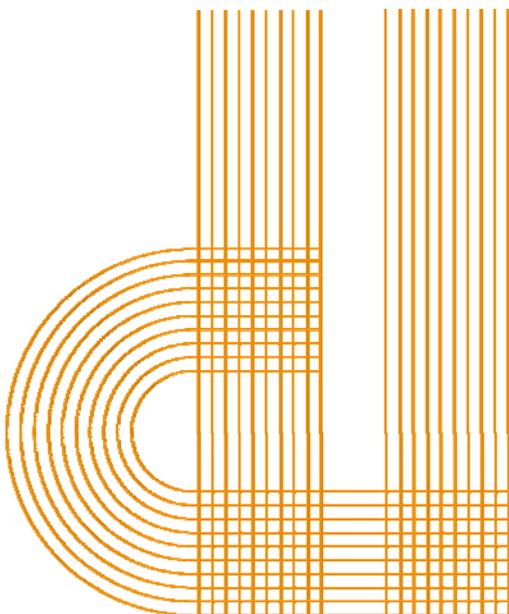# Universida_{de}Vigo

The Occupational Segregation of Black Women in the United States: A Look at its Evolution from 1940 to 2010

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The Occupational Segregation of Black Women in the United States: A Look at its Evolution from 1940 to 2010[*]

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Abstract

Based on detailed occupation titles and making use of measures that do not require pair-wise comparisons among demographic groups, this paper shows that the occupational segregation of Black women declined dramatically in 1940-1980, decreased slightly in 1980-2000, and remained stagnant in 2000-2010. An important contribution of this paper is the quantification of the well-being losses that these women derive from their occupational sorting. The segregation reduction was indeed accompanied by well-being improvements, especially in the 1960s and 1970s. Regarding the role that education has played, this study highlights that, only from 1990 onward, Black women with either some college or university degrees had lower segregation (as compared with their peers) than those with lower education. Nevertheless, the well-being loss that Black women with university degrees derived in 2010 for being segregated from their peers in education was not too different from that of Black women with lower education.

JEL Classification: J15; J16; J71

Keywords: occupational segregation measurement, race, gender, Black women, wages, United States

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1. Introduction

Most studies agree that few changes occurred in sex occupational segregation in the first half of the 20th century (Jerry Jacobs 1989). It was in the second half of this century, mainly in the 1970s, that segregation declined (Andrea Beller 1985; Suzanne Bianchi and Nancy Rytina 1986; Asaf Levanon, Paula England, and Paul Allison 2009), though the process halted in the first decade of the 21st century (Francine Blau, Peter Brummund, and Albert Yung-Hsu Liu 2013).

The intersection of gender and race has been, however, less explored in the literature on occupational segregation (Randy Albelda, 1986; Mary King 1992; Martin Watts 1995). Nevertheless, enough evidence exists that these two social categories are "mutually constructed to produce and maintain social hierarchy" (Irene Browne and Joya Misra 2003: 489), a point that is central to understanding the generating process of labor market inequalities, as multiracial feminist theorists have shown (Patricia Hill Collins 1999; Evelyn Nakano Glenn 1999).

In a multi-group context, the study of the occupational segregation of a particular gender-race group has usually involved comparisons between the distribution of that group across occupations and the distribution of other groups. Black women (the group on which this paper focuses) are typically compared with White women, Black men, and White men. For cross-time analyses, however, these comparisons become cumbersome and make it difficult to have a clear picture of the situation of the target group. Thus, for example, Robert Kaufman (2010) found that segregation between Black and White women decreased between 1980 and 1990, while segregation between Black women and White men increased. In such a situation, it does not seem possible to conclude whether Black women in 1990 were more or less segregated than they were in 1980. On the other hand, one should keep in mind that the documented trends in the occupational segregation between Black and White women in the second half of the 20th century—an extraordinary reduction from 1960 to 1980, followed by small declines from 1980 to 2000 (King 1992; Kaufman 2010; Beth Mintz and Daniel Krymkowski 2011)—was the result of changes that both Black and White women experienced in the labor market.

An alternative approach to studying occupational segregation in a multiracial society is to quantify the extent to which the employment distribution of Black women across

occupations departs from the occupational structure of the economy (Hazel Moir and Joy Shelby Smith 1979; Olga Alonso-Villar and Coral del Río 2010; Olga Alonso-Villar, Coral del Río, and Carlos Gradín 2012). This is the methodological approach that this study follows. Black women are considered to be segregated not only when they are underrepresented in occupations dominated by White women but also when they are underrepresented in occupations dominated by other minority women, White men, or minority men. If we compared, for example, the occupational sorting of Black women with that of the most advantaged gender-race group of the economy, White men, zero segregation could only be achieved if the share of Black women in each occupation were equal to the share of White men, which would involve ignoring the real size of occupations mainly filled by women and minority men. Similar problems would arise by comparing Black women with either White women or other groups, because each group would bring its own advantages/disadvantages. By using occupational structure as the benchmark, the underrepresentation/overrepresentation of a group in an occupation is measured in terms of the real size of that occupation. Whether this overrepresentation/underrepresentation is something good or bad for the group cannot be ascertained with segregation measures but with well-being measures, as we discuss below.

The aim of this paper is to analyze the national trends in occupational segregation for Black women for the period 1940-2010 using detailed and harmonized occupational data (Integrated Public Use Microdata Series). Black women are an interesting group for study. On the one hand, the way gender and race shape social relations—and, therefore, labor settings—seems to have an especial impact on these women. Some scholars argue that Black women do not fit the cultural construction of either "women," implicitly corresponding to the image of White women, or "Blacks," generally associated with Black men, which brings the group more binds than freedoms (Cecilia Ridgeway and Tamar Kricheli-Katz 2013). Black women do not enjoy the racial privilege of White women or the gender advantage of Black men (Enobong Branch 2007). On the other hand, black women represent a demographic group with a unique historical experience in the US labor market. In 1940, they were strongly concentrated into a small number of occupations, mainly related to domestic service and farm labor, which had the lowest wages in the economy. Although it is important to know how the situation of this group has evolved, not many scholars have quantified the long path of

these women toward better occupations. As far as we know, this is the first time that a study provides estimates of the occupational segregation of Black women over a seventy-year period.

Our approach has several advantages. First, as mentioned above, the distribution of Black women across occupations is compared here with the occupational structure of the economy rather than with the distribution of particular demographic groups, which makes cross-time comparisons easier and provides a global picture of the situation of these women. For this purpose, this paper uses several segregation measures proposed in Alonso-Villar and Del Río (2010), where the properties of these tools are also displayed. Our findings suggest that there was a dramatic decrease in the segregation of this group up to 1980, a small reduction in the 1980s and 90s, and stagnation since 2000. Consequently, the use of this approach allows us to give a clear answer to the question we posed above: Black women were less segregated in 1990 than they were in 1980 despite the segregation increase between this group and White men.

Second, these measures can be decomposed so as to isolate changes in segregation due to variations in the occupational distribution of the group from changes in the occupational structure of the economy. Our results suggest that the segregation reduction between 1940 and 2000 was mainly a consequence of changes in the distribution of Black women. There was a decline in the representation of this group in occupations in which they were overrepresented and a rise in occupations in which the group had a low representation. However, between 1980 and 2000, the representation of Black women also increased in some occupations in which they were already overrepresented, which contributed to halt the segregation reduction.

Third, this paper goes a step further by assessing the well-being loss that the group experiences as a consequence of its segregation, i.e., for being overrepresented in low-paid occupations and underrepresented in the highly paid. This is an important contribution of the paper, because the literature has traditionally focused on quantifying how uneven the occupational distribution of a group is but the consequences of that unevenness in terms of well-being have been barely explored. For that purpose, this paper uses indices recently developed in the literature (Coral del Río and Olga Alonso-Villar 2015) and shows that the strong segregation reduction of the 1960s and 1970s was accompanied by important well-being improvements (i.e., occupational upgrading), the advancement was indeed much smaller in the 1980s and 1990s, and stopped in

2000. This general pattern hides, however, the different evolution of subgroups of Black women depending on their educational levels, as this paper explores.

2. Measuring Segregation: Methodology

The segregation of Black women is usually measured by considering several pair-wise comparisons (Black women versus White women, Black women versus Black men, etc.) and calculating a segregation index (mainly the index of dissimilarity) for each of these cases (Albelda 1986; King 1992; Reskin 1999; Kaufman 2010; Mintz and Krymkowski 2011; Gradín 2013).[1] However, when many groups are involved, these comparisons become cumbersome, and the situation of a target group is difficult to summarize.

The local segregation measures proposed by Alonso-Villar and Del Río (2010) facilitate this analysis because the distribution of a target group across J occupations, $c \equiv \left(c_1, c_2, ..., c_J\right)$, is compared with the distribution of total employment across these occupations, $t \equiv \left(t_1, t_2, ..., t_J\right)$, where $C = \sum_j c_j$ is the total number of Black women workers in the economy and $T = \sum_j t_j$ is the total number of workers. This means that

Black women are segregated, so long as they are overrepresented in some jobs and underrepresented in others (whether the latter are filled by White women, White men, Black men, or by another demographic group). These measures are labeled local to distinguish them from overall or aggregate segregation measures. In a multi-group context, local segregation is nothing but the segregation of a group while overall segregation results from differences in the occupational sorting of all the groups into which the whole population is being partitioned (additional information is given in the appendix).

To measure the segregation of a group, these authors propose the use of the local segregation curve, S. To build this curve, firstly, occupations have to be ranked in ascending order of the ratio $\dfrac{c_j}{t_j}$ (i.e., from those in which the group has the lowest

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[1] Based on the index of dissimilarity and making use of logit analysis, William Spriggs and Ronda Williams (1996) developed an index that allows determining the impact of covariates (e.g., education) on segregation. Their study of the 1970s and 1980s was updated for the 1990s (Valery Rawlston and William Spriggs, 2002).

representation to those with the highest representation). By denoting by $\tau_j \equiv \sum_{i \leq j} \frac{t_i}{T}$ the

proportion of employment represented by the first j occupations, the value of the curve at this point is given by the share of Black women working in those occupations,

$S(\tau_j) = \sum_{i \leq j} \frac{c_i}{C}$. Therefore, this curve shows the underrepresentation of the group with

respect to the occupations' size, percentile by percentile (Figure 1). For example, the value of this curve at point 0.1 shows the proportion of Black women who work in occupations that jointly represent 10% of total employment and in which this group has the lowest representation. The curve at point 0.2 shows the proportion of Black women who work in occupations that jointly represent 20% of total employment and in which this minority has the lowest representation, and so on.[2]
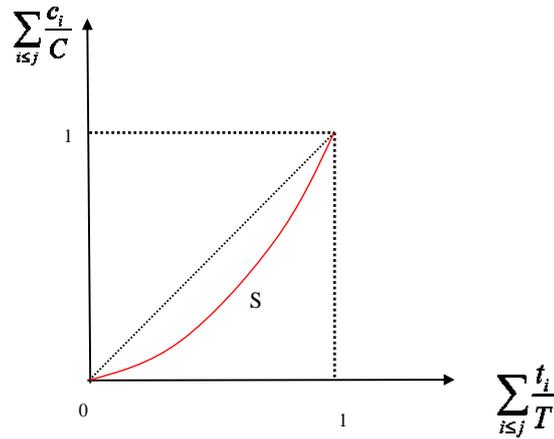

Figure 1. Example of a local segregation curve, S

If Black women were distributed across occupations in the same manner as the distribution of total employment (i.e., if the share of Black women in each occupation,

$\frac{c_j}{C}$, equals the weight of that occupation in the economy, $\frac{t_j}{T}$, or equivalently, if

$\frac{c_j}{t_j} = \frac{C}{T}$), the curve would be equal to the 45º line, and no segregation would exist for this group. The more distant the curve is from this line, the higher is the segregation of Black women.

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[2] The local segregation curve is related to the Lorenz curve used in the literature on income distribution and also to the segregation curve (Otis Duncan and Beverly Duncan, 1955).
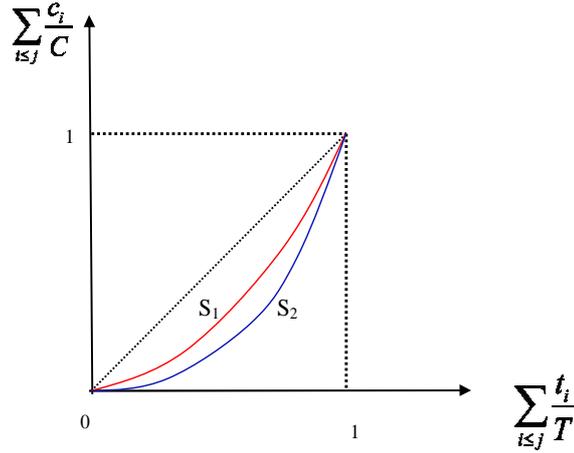
Figure 2. Example of local segregation curves in two years

Therefore, when comparing the distribution of Black women in two years, if the curve in year 1 (S_1) lies at no point below that of year 2 (S_2) and at some point above (i.e., if the curve of year 1 dominates that of year 2), we can say that segregation is higher in year 2 (as in Figure 2).

Apart from these curves, Alonso-Villar and Del Río (2010) propose several local segregation indices that quantify the extent to which curve S departs from the 45º line:

$$G(c;t) = \frac{\sum_{i,j} \frac{t_i}{T} \frac{t_j}{T} \left| \frac{c_i}{t_i} - \frac{c_j}{t_j} \right|}{2\frac{C}{T}}, \tag{1}$$

$$\Phi_a(c;t) = \begin{cases} \frac{1}{a(a-1)} \sum_j \frac{t_j}{T} \left[\left(\frac{c_j/C}{t_j/T} \right)^a - 1 \right] & \text{if } a \neq 0,1 \\ \sum_j \frac{c_j}{C} \ln\left(\frac{c_j/C}{t_j/T} \right) & \text{if } a = 1 \end{cases}, \tag{2}$$

$$D(c;t) = \frac{1}{2} \sum_j \left| \frac{c_j}{C} - \frac{t_j}{T} \right|. \tag{3}$$

The first measure is a variation of the classic Gini index, the second represents a family of indices related to the generalized entropy family, and the third measure is a variation of the index of dissimilarity (see the appendix for further details). The higher the value of these indices, the larger is the segregation of Black women. Both G and D take values within the interval $[0,1)$, while Φ_a is unbounded. Φ_a is a family of indexes that

is parameterized by a segregation sensitivity parameter, *a*. The lower the value of this parameter, the more affected the index is by what happens at the bottom end of the curve (i.e., in those occupations where the group has the lowest representation). For example, if parameter *a* is equal to 0.5, and one Black women moves from an occupation in which the group is highly represented to another in which the group has a very low representation, the index decreases more than it will do if the parameter is equal to 2.[3]

The above indices measure how much the local segregation curve departs from the 45° line, although each of them quantifies that "distance" in a different way. Thus, index *D* represents the highest vertical distance between the curve and the line while *G* is twice the area between the curve and the line (see Figure 3).
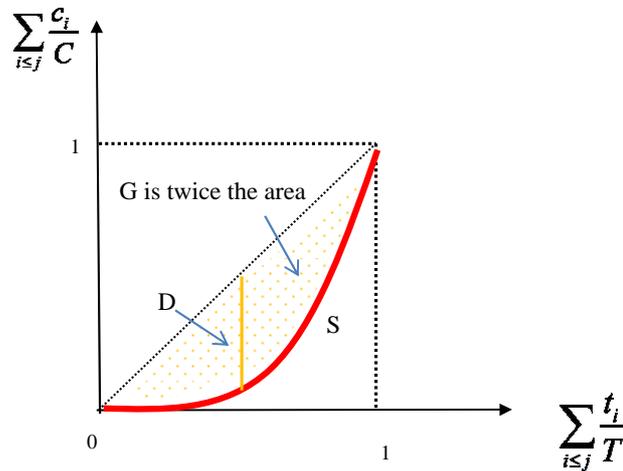

Figure 3. Relationship between local segregation curve S and indices *D* and *G*

The family of indices Φ_a is also related to the *S* curve, although its graphical interpretation is less clear. In any case, if a curve dominates another, both index *G* and the family of indices Φ_a—and also other indices satisfying some basic properties— would lead to the same conclusion: segregation is higher for the curve that is below (Alonso-Villar and the Río 2010).[4] This makes the use of these curves a robust procedure because, when segregation curves do not cross, a powerful conclusion can be

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[3] In the literature on income inequality, from which this family is derived, the values of the parameter often used are -1, 0, 1, and 2. To measure segregation rather than inequality, the values -1 and 0 would bring some problems if there were no Black women in some occupations. This is why in our empirical analysis we chose the values 0.5, which is close to zero, 1 and 2.

[4] Although *D* is also related to the *S* curve, this index is not consistent with the dominance criterion given by these curves. A distribution of Black women could have a local segregation curve dominating that of another distribution while having an equal value of *D*.

reached without using several indices. However, if curves cross or if one is interested in quantifying the extent of segregation, the use of the indices becomes necessary.

Apart from its graphic interpretation, index D has a very intuitive interpretation: it represents the percentage of Black women who would have to change occupations to achieve zero segregation while keeping the occupational structure of the economy unaltered (Olga Alonso-Villar and Coral Del Río 2015). The empirical section will focus on this index for its easy interpretation although other indices will be also shown to check whether the evolution of segregation for Black women is robust against the formulation of the index.

3. Occupational Segregation Trends of Black Women

Our data come from the IPUMS (Integrated Public Use Microdata Series), which are drawn from the US decennial census for the period 1940-2000 and the 2005-2007 and 2008-2010 American Community Surveys (ACS) and are homogenized by the Minnesota Population Center of the University of Minnesota (Steven Ruggles, J. Trent Alexander, Katie Genadek, Ronald Goeken, Matthew B. Schroeder, and Matthew Sobek 2010).[5] This dataset offers harmonized information that assigns uniform codes to variables.

Along this period, the census bureau reorganized its occupational classification system several times, but this dataset offers two consistent long-term classifications: the 1950 classification, available for the entire period, and a modified version of the 1990 classification, available from 1950 onward. For the period 1940-1980, we calculate segregation using the codes of the 1950 classification system, which accounts for 269 occupations. For the period 1980-2010, we instead use the modified version of the 1990 classification, which accounts for 387 occupations, as although 1950 is available for the entire period, the Minnesota Population Center recommends the 1990-based classification from 1980 onward. Consequently, for each sub-period, we calculate segregation using a common classification of occupations, based on either that of 1950 or 1990, which allows us to minimize the effect that changes in the occupations' titles

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[5] We use these two ACS samples rather than that of 2005-2010 to find out possible effects derived from the recession that began in 2007.

has on segregation.[6] Our analysis allows us to provide estimates of the occupational segregation of Black women during a seventy-year period (1940-2010) using consistent data.[7] Based on self-reported identity, Black women are those who identify themselves as Blacks and do not have a Hispanic origin.

3.1 Segregation trends

Despite their sharing of gender roles, Black and White women are exposed to different cultural stereotypes and occupy different economic and social positions (Branch 2007; Ridgeway and Kricheli-Katz 2013). On the one hand, Black women had greater incentives to incorporate into the labor market earlier than White women did (lower incomes, high Black male unemployment, and paid work less socially stigmatized), especially among married women. In fact, the participation rates of Black women were higher than those of White women up to 1990 (Amy Wharton 2005). On the other hand, the educational level of Black women was traditionally lower than that of White women and has not kept pace with the strong educational advances of White women from 1980 onwards (Anne McDaniel, Thomas DiPrete, Claudia Buchmann, and Uri Shwed 2011).

King (1992) found that segregation between Black and White women decreased between 1960 and 1988, but not between 1940 and 1960 while segregation between Black women and men did decrease between 1940 and 1960. The approach followed in this paper allows us to give a broad picture of the evolution of the segregation of Black women without making pair-wise comparisons. Figure 4 shows that the local segregation of Black women dropped sharply from 1940 to 1980 (especially in the 1960s and 1970s), experienced a slight reduction during the next two decades and remained unaltered from 2000 onward.[8]

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[6] In any case, the harmonization process involved several adjustments, which implies that both classifications have some empty employment occupations in several years. Consequently, the number of occupations with positive employment is not exactly the same every year. The "real" number of occupations in 1940, 1970, and 1980 are, respectively, 213, 258, and 220, according to the 1950 classification. In the 1990-based classification, the numbers in 1980, 1990, 2000, 2005-07, and 2008-10 are, respectively, 382, 384, 337, 333, and 333. Fortunately, the majority of the empty occupations have low employment in the years in which they appear.

[7] An alternative would be to build gender/race-specific crosswalks to bridge changes in the census occupational coding systems along the entire period, as done by Blau, Brummund, and Yung-Hsu Liu (2013) in the case of sex segregation. However, this paper has not followed that approach due to the complexity that this would imply when crossing gender and race.

[8] The dramatic decrease in segregation between 1940 and 1980 seems to have played an important role in reducing the wage gap between Black and White women in that period (James Cunningham and Nadja Zalokar 1992).
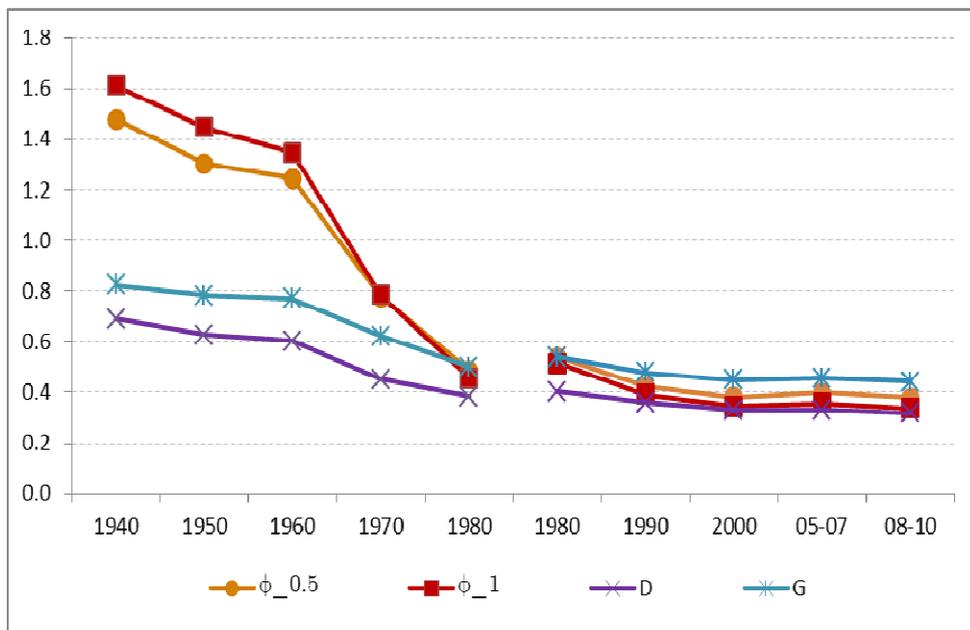
Figure 4. Local segregation of Black women according to indices G, D, $\Phi_{0.5}$, and Φ_1
(1940-1980: 1950 classification; 1980-2010: 1990-based classification)
Sources: Authors' calculations based on the IPUMS samples.
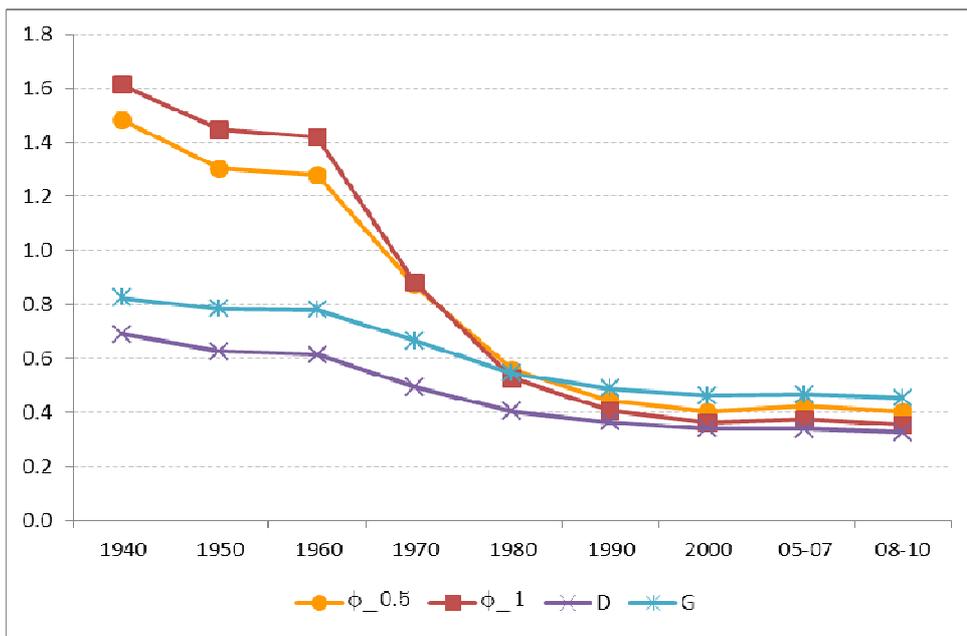
Figure 5. Local Segregation of Black women according to indices G, D, $\Phi_{0.5}$, and Φ_1
(classification of each year)
Sources: Authors' calculations based on the IPUMS samples.

Note that segregation in 1980 increases when using the 1990-based classification rather than the 1950 classification, since it has more occupational titles (Figure 4). Despite this, the trends in segregation are quite robust against changes in the classification of occupations given that the indices provide similar patterns when we instead use the original occupational classification of each year (Figure 5). From now on, this paper

focuses on the common coding schemes, as they seem to be more appropriate for cross-time comparisons.

As shown in Figure 4, the local segregation of Black women was 0.69 in 1940 and 0.32 in 2008-2010 according to index *D* (the precise figures of the indices are given in the appendix). This means that while 69% of Black women would have had to change occupations in 1940 to achieve zero segregation, this percentage fell to 32% in the past decade. In other words, segregation along this period was reduced to a half. Note, however, that most of this reduction occurred in the 1960s and 1970s—*D* was equal to 0.6 and 0.38, respectively, in 1960 and 1980.[9]

Figure 6 (left side) plots the local segregation curves from 1940 to 1980. Focusing on the values of the curves in the first quintile of employment (i.e. at point 0.2), we see that the curves took very small values and that almost no change occurred across time. In fact, between 1940 and 1970, the curves took values below 0.009 at point 0.2. This means that 20% of jobs existed where the share of Black women who worked there was at most 0.9% (while, if there were no differences between Black women and other groups, one should find 20% of Black women working there). This percentage rose to 1.9% in 1980, although it was still very low. Figure 6 (right side) also shows that almost no change occurred in the first quintile between 1980 and 2010. The values of the curves at 0.2 moved from 1.6 to 2.2. On the contrary, we do see remarkable changes along time in the top end of the curves. Thus, the value of the 1940 curve at point 0.8 was 0.12, while that of the 1980 curve was 0.51. This means that 88% of Black women (100%-12%) worked in occupations that accounted for 20% of total employment in 1940,[10] while this percentage decreased to 49% (100%-51%) in 1980 (from 1980 to 2010, the reduction was much lower). In other words, occupations in which Black women were highly concentrated in 1940 were not so "black-feminized" in 1980.

In fact, in 1940, as much as 77.3% of Black women worked in occupations that accounted for only 10% of total employment (among these occupations, three related to

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[9] The drop in segregation between 1960 and 1980 is much more intense with Φ_2 (see the appendix) due to the lower representation of Black women in occupations in which they tended to be highly concentrated, a situation to which this index pays special attention.

[10] Note that the curve represents cumulative proportions so that to obtain the percentage of Black women who work in occupations where the group has the highest presence while accounting for 20% of total employment, we have to calculate the difference between the curve at point 1 and the curve at point 0.8.

service in private households alone accounted for 57.5% of Black women,[11] and in two of them, this minority represented between 44.8% and 77.7% of their workers). In 1980, the list of occupations in which Black women had a high representation almost doubled (including clerical and professional/technical works and additional non domestic service jobs). Moreover, the percentage of Black women who worked in the 10% of jobs with the highest representation of the group dropped in 1980 to 32.7% (almost 45 points less than in 1940), and by then, no occupation had a representation of Black women above 40% of workers.
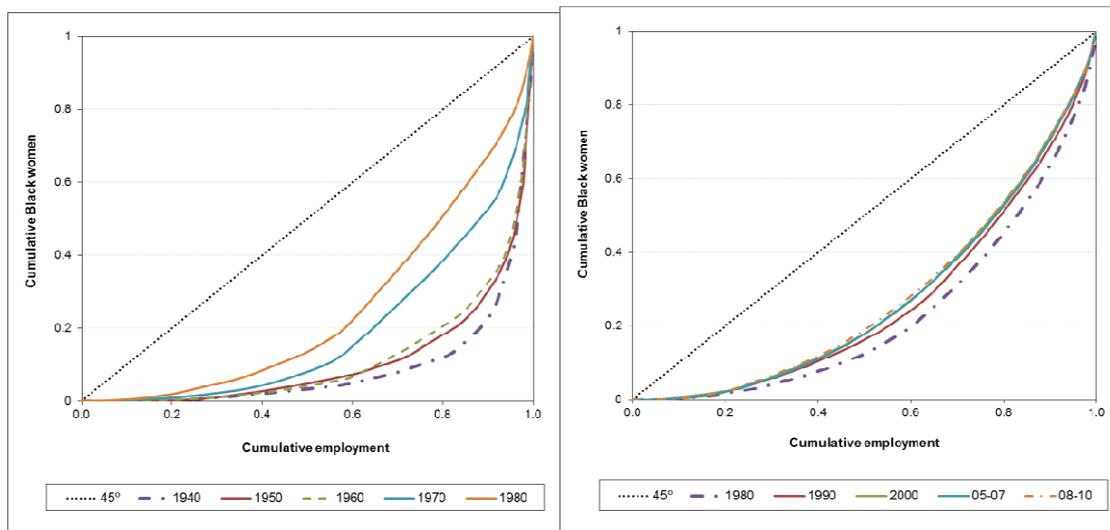

Figure 6. Local segregation curves of Black women (*S*): 1940-1980 (1950 classification) and 1980-2010 (1990-based classification)
Sources: Authors' calculations based on the IPUMS samples.

Figure 6 also reveals that except for 1950, from 1940 to 1990, the curves get closer and closer to the 45° line without crossing, which allows us to make use of the dominance criterion of these curves. Therefore, we can conclude that segregation decreased between the corresponding years not only according to the indices used in this paper, but also according to any local segregation index that satisfies some basic properties (Alonso-Villar and Del Río 2010), including Φ_a for any other *a*. In other words, the reductions from 1940 to 1960 and for the following decades until 1990 seem to be robust against changes in the indices used. The curves for 1950 and 1960 cross and, therefore, we cannot make use of the dominance criterion. In other words, we can find indices according to which segregation would have increased in this decade. However,

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[11] The share of Black women who worked as farm laborers (unpaid family workers) was also remarkable (9%).

given that the curve of the 1960s tends to be above of that of the 1950s for most of the points and that when it is below the 1950s curve, differences between both curves are barely existent, most indices are expected to exhibit a reduction in segregation even in this decade (as happens with the indices shown in Figure 4). Something similar occurs between the curves for 1990 and 2000. From 2000 to 2010, the curves are almost undistinguishable, which suggests no further integration of Black women in the past decade.

3.2 Decomposing Segregation Changes

During these seventy years, the structure of production in the US experienced important changes. In the 1940s, the country continued the transformation started in previous decades from an industrial economy to a service economy. At the same time, the agricultural sector evolved from a labor intensive sector that employed an important share of workers to a mechanized sector that now only accommodates a small proportion of workers. These changes, together with other technological changes that affected dwellings and companies, generated new occupations and made others disappear, substantially altering the occupational structure. This section discusses whether this transformation created the opportunity for these new occupations to become delinked from racial and gender stereotypes in regards to work.

For that purpose, we explore the role that changes in the occupational structure of the economy played in explaining the segregation reduction shown in Section 3.1, so as to separate it from changes in the distribution of the group across occupations. This is important because, for example, an employment increase in occupations in which Black women tend to concentrate that did not alter the share of Black women in any occupation, would imply a segregation reduction. However, this reduction would not imply a better integration of Black women into the labor market but only a lower concentration in those occupations.

To do this analysis, we use counterfactual distributions which are nothing but artificial intermediate distributions that allow us to decompose the segregation change in two components. One component permits us to measure the effect of changes in the distribution of the group across occupations, while the other allows us to quantify the effect of changes in the occupational structure of the economy. We focus on three

periods of segregation reduction: 1940-1960, 1960-1980, and 1980-2000.[12] To decompose the segregation reduction we may follow two different paths. The first path consists of initially determining the effect of a change in the occupational structure while keeping the distribution of the group unaltered and later on finding out the effect of a change in the distribution of the group. The second path involves first calculating the effect of a change in the distribution of the group and later the effect of a change in the occupational structure. The details of this analysis are given in the appendix but the main findings are shown here.

1940-1960 Period

Following either a path or the other, the reduction in segregation between 1940 and 1960 was mainly due to changes in the distribution of Black women across occupations. In fact, employment fell in occupations in which this group had a high representation— e.g., the number of *service workers in private households* diminished by 22%, mainly *laundresses*—which would have caused, *ceteris paribus*, a rise rather than a decrease in segregation. However, segregation did not really increase, because the share of Black women working in private households decreased substantially. This was not, however, the result of a strong decline in the number of Black women working in private households (they only decreased by 2.2%), but rather, it was the result of employment growth for this minority in other kinds of occupations, as we discuss below. On the other hand, occupations related to *farm laborers*, in which Black women were also highly concentrated in 1940, faced a reduction in employment as well. The novelty of these occupations (especially, that of *unpaid family workers*) is that Black women strongly decreased there, which contributed to reduce segregation.

On the contrary, some occupations in which Black women had low representation in 1940 exhibited employment growth (*office machine operators*; *stenographers, typists and secretaries*; *telephone operators*; and *unclassified clerical workers*). Because the presence of Black women in these occupations experienced an even higher rise, the combination of the two effects led to a decline in segregation. Other occupations in which Black women increased their representation include the large occupation of *unclassified operatives* and *unclassified (not household) service workers*, where 9% of

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[12] These three periods are chosen based on the differences in the intensity of the segregation reduction shown in Figure 4.

the employment surplus was filled by Black women. Smaller occupations in which Black women also increased their representation comprise *attendants, hospital and other institution*; *(not household) cooks*; *laundry and dry cleaning operatives*; and *(professional) nurses*.

Although the causes of these changes are beyond the scope of this paper, our results suggest that the shifts that took place in the employment structure along this period (derived from, on the one hand, reorganizing and mechanizing agriculture and, on the other hand, the development of activities more closely related to urban societies) opened new employment opportunities for Black women, opportunities of which they took advantage.[13] The "Great Migration" from Southern states to Northern cities brought not only profound demographic and cultural changes in the US but also shifts in the employment patterns of Blacks (Stewart Tolnay 2003). As we have shown, the range of occupations to which Black women had access enlarged substantially along these two decades. However, these changes did not spread uniformly across the country. Figure 7 reveals that in was in the Northeast, Midwest, and West Regions where the segregation of Black women, who more than doubled its size between 1940 and 1960, decreased in this period. The reduction in the share of Black women in the South did not result in better jobs for them; in 1960 this was the region where they had the highest segregation.

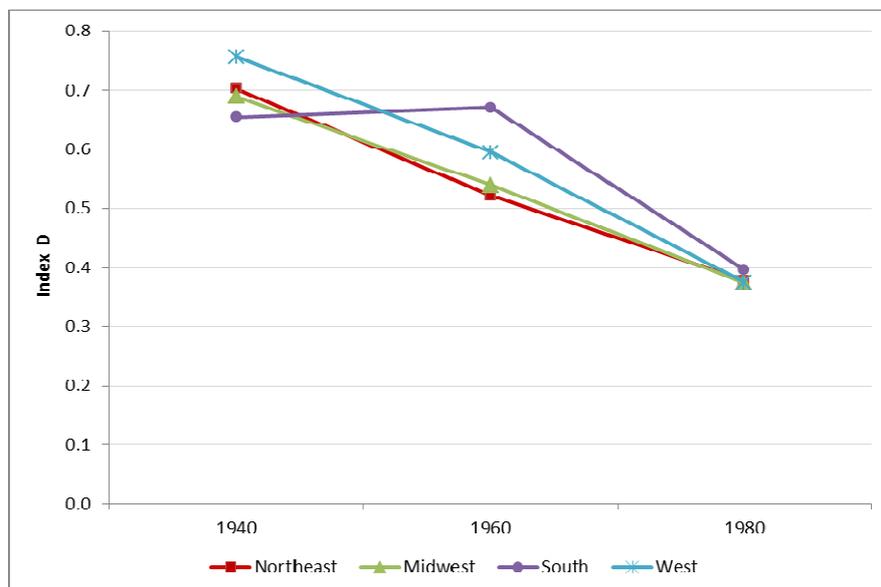Figure 7. Local segregation of Black women by region, index *D* (1950 classification)
Sources: Authors' calculations based on the IPUMS samples.

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[13] According to the estimates by McDaniel et al. (2011), the proportion of African American women in the age range of 22-28 years old with a bachelor's degree who were employed increased from 60% to 80% in this period (although this group was small).

1960-1980 Period

The reduction in segregation between 1960 and 1980 was also mainly a consequence of changes in the distribution of Black women, although with some differences with respect to the previous period. There was a remarkable employment reduction in some occupations in which Black women had an important concentration in 1960 (e.g., *service workers in private households*) but the share of Black women decreased to a higher extent (even further than in the period 1940-1960), leading to an important reduction in the representation of Black women in these kinds of occupations—although still remaining among those with the highest representation. *Paid farm laborers* also lose employment and, especially, Black women workers. This led to the underrepresentation of this minority, who had traditionally been highly concentrated there.

On the other hand, some clerical occupations (*attendants, physician's and dentist's office*; *bank tellers*; *bookkeepers*; *cashiers*; *office machine operators*; *stenographers, typists and secretaries*; *unclassified clerical workers*) experienced important growth. In most of these occupations, Black women had already increased their representation in the previous period, but it is now that they start to be overrepresented with respect to their weight in the labor market. We, therefore, observe that the changes initiated in the previous decades were more intense in this period, favoring a reduction in segregation.

In any case, the distinctive finding in this period is that the representation of Black women notably rose in many other occupations. Some of them were already important in previous decades (*attendants, hospital and other institution*; *practical nurses; professional nurses*; *unclassified teachers*; *charwomen and cleaners*). Other occupations witnessed in this period an increase in the representation of this minority (*musicians and music teachers*; *unclassified managers, officials, and proprietors*; *unclassified salespersons and sales clerks*; *unclassified forepersons*; *unclassified laborers*).[14]

This distinctive finding has often been associated with the set of regulatory actions approved by the federal government in the "civil rights era" to outlaw race

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[14] In other occupations Black women started then to be overrepresented (*librarians*; *personnel and labor relations workers*; *social and welfare workers*; *technicians, medical and dental*; *unclassified technical workers*; *unclassified operative workers*; *janitors and sextons*).

discrimination in employment and labor unions, education, credit, public accommodation, etc. (King 1992; Donald Tomaskovic-Devey and Kevin Stainback 2007; Reskin, 2012). In a recent paper, Fidan Kurtulus (2012) also claims that affirmative action played an important role in the advancement of black women into management, professional, and technical occupations during the 1970s.

Figure 7 seems to corroborate the push of the federal government for labor equality given that it was in this period when the segregation of Black women fell throughout the country. In 1980 the segregation levels of the four large regions were similar (around 0.39 according to the D index), this convergence arising from the segregation reduction that all regions, but especially the South, experienced.

1980-2000 Period

In this period, despite the increase in the proportion of Black women in the labor market and the rise in the educational level of its younger members (McDaniel et al. 2011), the segregation reduction was much smaller than in the previous period. The reduction was both a consequence of:

a) A fall in the representation of Black women in occupations in which they were overrepresented. This was the case of *private household occupations*, where, as opposed to previous periods, the number of jobs barely changed, but the novelty here was that Black women were replaced by Hispanic women. Other occupations with reductions in the representation of this minority included: *data entry keyers*; *health aides, except nursing*; *file clerks*; *cooks*; *kitchen workers*; *miscellaneous food preparation workers*; *unclassified health technologists and technicians*; *packers and packages by hand*; *janitors; textile, apparel, and furnishings machine operators*; and other operators (*unclassified machine operators*; *assemblers of electrical equipment*; *graders and sorters in manufacturing*).

b) An increase in the representation of Black women in occupations where they had a low representation. This was especially the case of many managerial and professional specialty occupations (*managers and specialists in marketing, advertising, and public relations*; *accountants and auditors*; *other financial specialists*; *computer systems analysts and computer scientists*; *lawyers*; *judges*), most of which experienced a remarkable employment growth in the period.

Something similar happened in some sales occupations (*supervisors and proprietors of sales jobs*; *insurance sales occupations*; *real estate sales occupations*; *financial services sales occupations*; and *advertising and related sales jobs*).[15] Most protective service occupations (*supervisors of guards*; *police, detectives, and private investigators*; *sheriffs, bailiffs, correctional institutions officers*; *guards, watchmen, doorkeepers*; and *unclassified protective services*) also saw an increase both in total employment and in their initially low representation of Black women, although the final effect is unclear because some of these occupations ended the period with an overrepresentation of Black women. The representation increase of this minority in another "occupation," *military*, which witnessed a reduction in total employment, was also remarkable.

However, not all changes in the period halted the segregation of Black women. This was the case of administrative support occupations. Many of them experienced an increase in the overrepresentation of Black women, for example, *office supervisors*; *receptionists*; *insurance adjusters, examiners, and investigators*; and *customer service representatives, investigators, and adjusters* (except insurance). Something similar happened to *cashiers*; *hairdressers and cosmetologists*; and *bus drivers*. A different pattern was observed in *chief executives and public administrators*, where the representation of this minority dramatically fell. It is worth mentioning that large occupations related to nursing,[16] social work, child caring, and non-postsecondary teaching do not seem to have played a significant role in the evolution of segregation in this period because the high overrepresentation of Black women in these kinds of occupations barely changed.

As Barbara Reskin (2012: 25) points out, "Although hundreds of thousands of blacks benefited from the regulatory actions during the civil rights era, by the end of the 1970s black progress stalled, and gains in some domains were lost. These reversals occurred in part because the attack on race discrimination had been too piecemeal. [...] By the 1980s complainants faced an increasingly conservative judiciary that limited the efficacy of discrimination laws and affirmative action plans." Focusing on the case of

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[15] However, as noted by Katrinell Davis (2013: 71), who explored the career opportunities of low-skilled Black women who worked in department store sales from 1970 to 2000, "the organization of work within department stores changed in ways that dried up opportunities for African-American women to sell products and move up in the workplace."

[16] In 2000, Black women accounted for 25 percent of *nursing aides, orderlies and attendants* (although they are only 5.3 percent of workers in the economy).

Black women, Agustin Kwasi Fosu (1997) also claims that the occupational gains of this group were episodic rather than long-term while Kurtulus (2012) finds that the role played by affirmative action in their occupational advancement was smaller in the 1990s than in the 1970s.

Our results are consistent with these findings. The push of the 1960s and 1970s—that had made it possible for Black women to enter occupations to which they had barely had any access in earlier decades—lost strength in the 1990s and 2000s, which did not allow these women to advance further on the economic ladder. Some of the occupations that had helped to reduce segregation in previous decades became the highest rungs in the ladder that most Black women could reach.

4. Assessing the Consequences of Segregation

As documented by Ariane Hegewisch, Hannah Liepmann, Jeffrey Hayes, and Heidi Hartmann (2010), nowadays there is still a negative relation between the percentage of women in an occupation and the level of earnings in that occupation: the weekly median earnings in 2009 were higher for male-dominated low-, medium-, or high-skilled occupations than they were for female-dominated occupations in those same classes. Since Black women are penalized by both gender and racial issues (Branch 2007; Ridgeway and Kricheli-Katz 2013), the situation just described may be even more intense for this group.

In the previous section, we showed how uneven the distribution of Black women across occupations is. This analysis does not, however, permit us to assess the position of this group in the labor market, because it depends not only on whether the group has access to any type of occupations but also on the "quality" of the occupations that the group tends to fill or not to fill. In this section, we go a step further by measuring the well-being loss that Black women experience for being underrepresented in some occupations and overrepresented in others, taking into account occupational wages.

For this purpose, we use a family of indices recently proposed in the literature, which is parameterized by an inequality aversion parameter $\varepsilon > 0$ (Coral del Río and Olga Alonso-Villar 2015):

$$\Psi_\varepsilon(c;t;w) = \begin{cases} \displaystyle\sum_j\left(\frac{c_j}{C}-\frac{t_j}{T}\right)\frac{\left(\dfrac{w_j}{\overline{w}}\right)^{1-\varepsilon}-1}{1-\varepsilon} & \varepsilon \neq 1 \\[4ex] \displaystyle\sum_j\left(\frac{c_j}{C}-\frac{t_j}{T}\right)\ln\frac{w_j}{\overline{w}} & \varepsilon = 1 \end{cases} \qquad (4)$$

where w_j is the wage of occupation j, $\overline{w} = \sum_j \dfrac{t_j w_j}{T}$ the weighted average wage, $\dfrac{c_j}{C}$ is

the share of Black women who work in occupation j, and $\dfrac{t_j}{T}$ is the employment share

accounted by that occupation.

These indices quantify the differential between the well-being the group derives from its distribution across occupations and the well-being the group would derive if it did not have any segregation. In other words, they measure the disadvantage (advantage) that a group derives from its occupational sorting. These indexes are positive when the group tends to fill highly paid occupations, negative when the opposite holds, and are equal to zero when the group has no segregation, all occupations have the same wage, or the advantages of some members of the group offset the disadvantages of the others. In addition, these indices increase when Black women move into occupations that have higher wages than those left behind. Ceteris paribus, a) the occupational advances of those who work in bad occupations have a larger effect in these indices than the advances of those working in good occupations; and b) a small occupational upgrading for many Black women have a larger effect in these indices than a large upgrading for only a few. These two effects are more intense, the higher the value of parameter ε.

To assess the consequences of segregation for Black women in terms of well-being, we use $\Psi_\varepsilon(c;t;w)$ for $\varepsilon = 0.5$, 1, and 2 (which are values used by Del Río and Alonso-Villar, 2015). For 1980, 1990, 2000, 2005-07, and 2008-2010, the proxy of the wage of each occupation is determined by the average wage per hour. Because of data limitations, for 1940, 1960, 1970, and 1980 (according to 1950 classification), we instead use the average wage per week (for 1960 and 1970, we have estimated the

number of worked weeks using a variable coded in intervals). This makes the two series less comparable than in the previous analysis.[17]
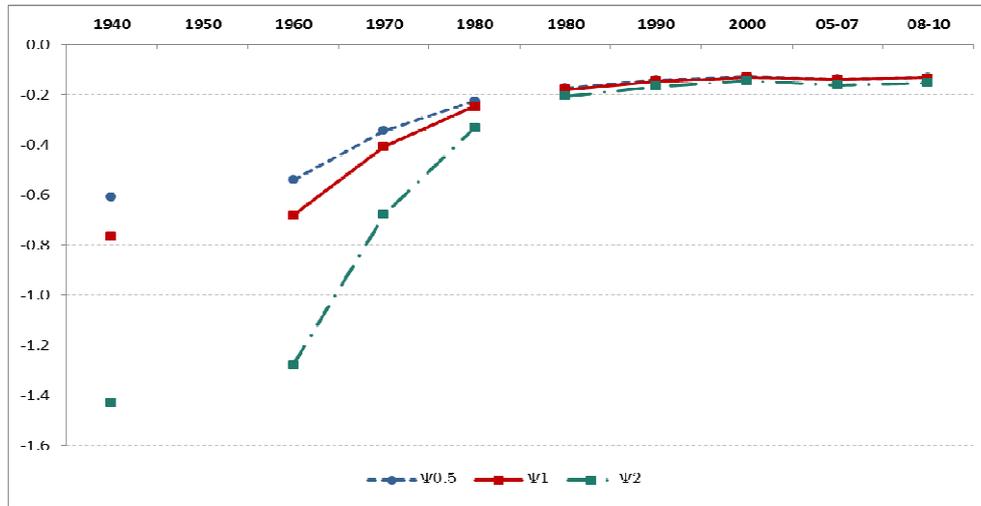

Figure 8. Well-being losses of Black women derived from their segregation (Ψ_ε with $a = 0.5$, 1, and 2) in 1940-2010 (1940-1980: 1950 classification; 1980-2010: 1990-based classification)
Sources: Authors' calculations based on the IPUMS samples.

Figure 8 reveals that the well-being indices are always negative, which reflects the persistent disadvantage of Black women: the high concentration of many of them in low-paid occupations was never offset by the good position of some of them in the labor market. Black women notably improved up until 1980, but the process was much slower between 1980 and 2000 and slightly worsened after 2000, which is consistent with the evolution of their earnings.[18] The 1960s and 1970s involved access to occupations with higher wages and accounted for around three quarters of the improvement experienced in the whole period. This improvement is more notorious with Ψ_2, which shows a higher aversion to inequality (i.e., it pays more attention to the presence of Black women in the lower-paid occupations). The stagnation in the segregation of the 2000s together with the increase in occupational wage inequality—a process that had begun in

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[17] Due to lack of information, we cannot calculate occupational wages for 1950. For 1980, we calculate both wages per hour and per week and find that the well-being losses are less strong with the hourly wages (perhaps due to the existence of more part-time jobs among women). This effect partially offsets the fall in well-being that arises from using a more detailed classification of occupations in the period 1980-2010.

[18] Median earnings of Black women, expressed as a proportion of that of White men, significantly increased between 1965 and 1975, slightly increased between 1985 and 1995, and decreased afterwards (Wharton 2005). Blau and Beller (1992) also documented earning increases, with respect to White men, in the 1970s and 1980s.

1980—can explain the trend change of the past decade.[19] It is worth mentioning that other women did improve in the past decade. Del Río and Alonso-Villar (2015) show that the well-being indexes increased during the 2000s for White and Asian women (they decreased, however, for Hispanic women).

5. Differences in Segregation by Education

We now explore whether education plays a role in the segregation of Black women. We consider four levels of education: less than high school, high school, some college, and bachelor's degree. Because we want to measure the extent to which each group departs from their peers, each category of Black women is compared with the population that has the same educational achievement rather than with the whole population. In other words, Black women with college degrees are compared with workers with college degrees, while high school Black women are compared with high school workers. This implies that the occupations considered in the analysis of high-skilled Black women do not necessarily coincide with those used in the analysis of the low-skilled because each analysis considers only the occupations in which individuals with a given educational level work.
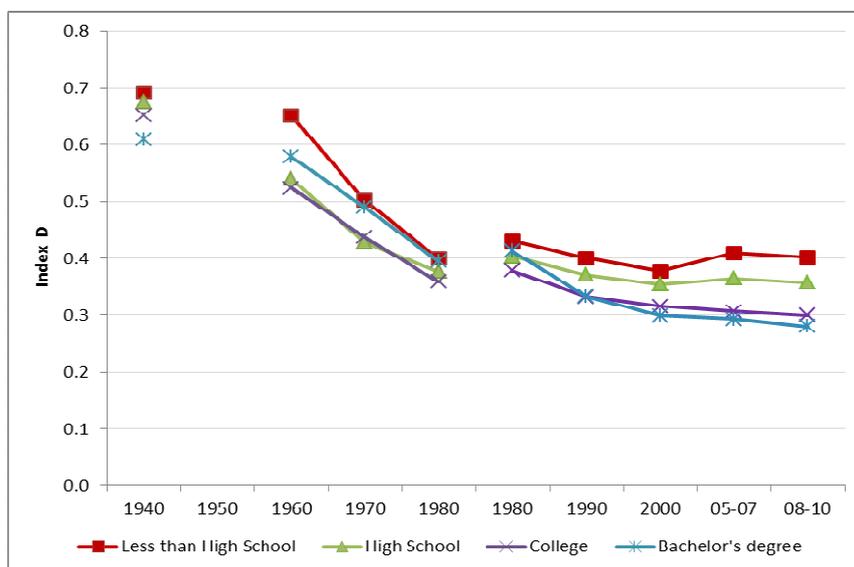

Figure 9. Local segregation of Black women (index *D*) by educational level (1940-1980: 1950 classification; 1980-2010: 1990-based classification)
Sources: Authors' calculations based on the IPUMS samples.

23

We find that Black women of any educational group experienced a reduction in segregation from 1940 to 2000, while not all groups improved in the past decade (see Figure 9). Those who have either less than a high school education or high school diplomas, especially the former, increased their segregation from 2000 to 2010. The segregation of those with some college remained almost unaltered during the past decade, while Black women with bachelor's degrees experienced a low reduction in segregation.

The analysis also reveals that for each census between 1940 and 1970, the segregation curves of the four education groups cross (as an example, see Figure 10, which shows the corresponding curves for 1960). This implies that along this period segregation was not lower for the more educated.

Figure 10. Local segregation curves (S) by educational achievements in 1960 (1950 classification)
Sources: Authors' calculations based on the IPUMS samples.

Things started to change in 1980 because Black women with less than a high school education constituted the group with the highest segregation (the curve is below that of the other groups). From 1990 to 2010, clearer patterns emerge because the higher the educational level of Black women, the lower the segregation they experience (except in the case of "some college," whose curve crosses some years the curve of those who have a bachelor's degree). Figure 11 shows the corresponding curves for 2008-2010. In 2008-2010, 20% of jobs filled with workers with less than a high school education had

24

almost no Black women with the same education. In addition, almost 56% of Black women with that education were concentrated in occupations that accounted for 20% of employment (0.56 is the distance between the curve at point 0.8 and the curve at point 1). Something similar happened to those who had high school diplomas. The pattern was less intense for Black women with some college or with bachelor's degrees, perhaps because the segregation by gender affects more low- than high-skilled workers, as we discuss below.
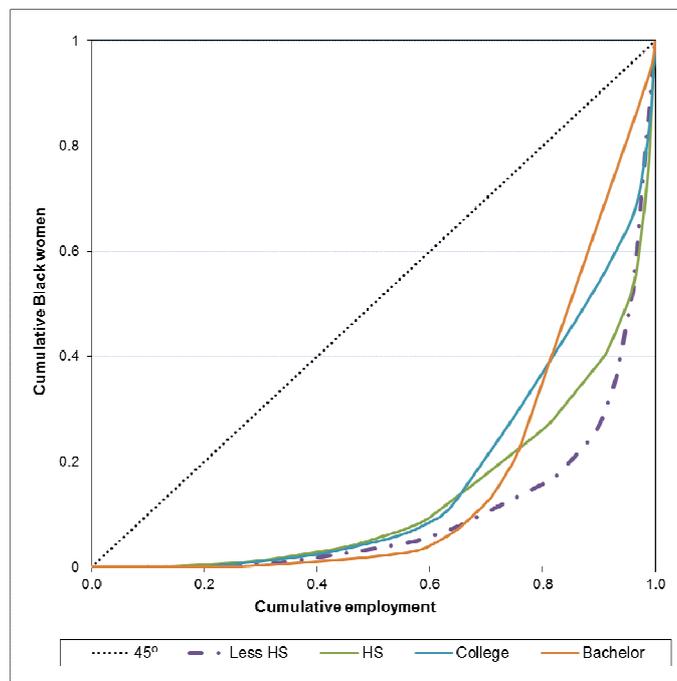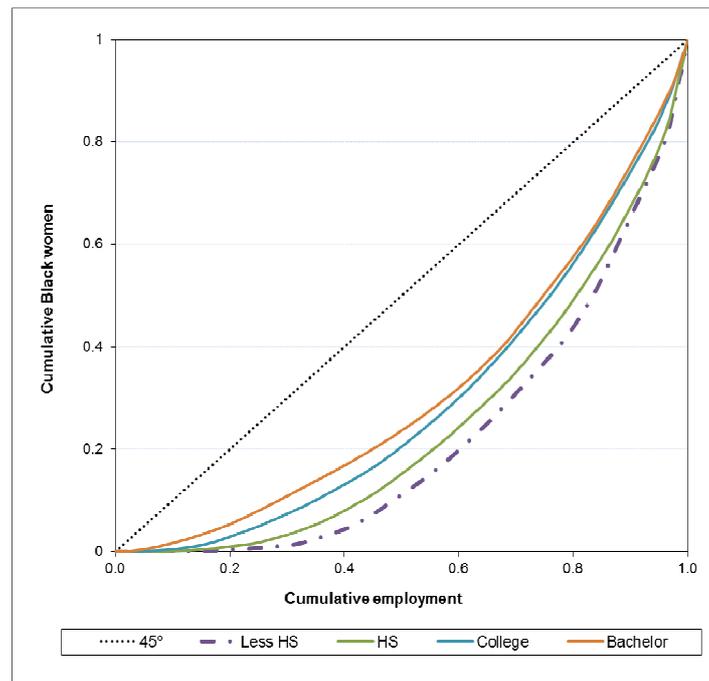

Figure 11. Local segregation curves (S) by educational achievement in 2008-2010 (1990-based classification)
Sources: Authors' calculations based on the IPUMS samples.

Among occupations of a certain size in which Black women with less than a high school education have a high presence, we find: *health aides*; *nursing aides; child care workers; housekeepers*; and *cashiers*. These occupations, which account for 42% of Black women with less than a high school education, have wages below the average wage of occupations in which workers with similar educational achievements are employed and are also highly feminized (the female ratio of these occupations ranges from 84% to 94% in most of them and is never below 74%).[20] To find these women in occupations with wages around the average one has to look at occupations in which they have lower representation—some kind of *teachers*; *supervisors of cleaning and*

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[20] As mentioned above, for 2008-2010 the wage of each occupation is proxied by the average wage per hour in the whole population.

building service; *bus drivers*; *guards, watchmen and doorkeepers;* and *secretaries*.[21] At this second stage of representation we also find occupations with low wages, as is the case of *laundry workers* and *kitchen workers*, where wages are below 75% of the average occupational wage. As expected, when looking at occupations in which this group has low representation (below 0.5% of workers), we find highly masculinized jobs (with male rates above 95%) in which wages are above the average (except in those with a high presence of Hispanic workers, as is the case of *gardeners and groundskeepers* and *farm workers*).

If we compare the characteristics of the above jobs with those that Black women with bachelor's degrees fill, we find a few differences but also similarities. Thus, as shown in Figure 11, only 5.4% (respectively, 23.6%) of Black women who have bachelor's degrees work in occupations that account for 20% (respectively, 50%) of highly skilled employment, while 42.4% (respectively, 24.5%) of them are concentrated in occupations that represent 20% (respectively, 10%) of jobs. This reveals a remarkable segregation level for highly-educated Black women although lower than that of the low-skilled.

In any case, the wages of occupations in which Black women with university degrees concentrate also tend to be below the average wage of occupations in which graduates work. Thus, when focusing on the 10% of jobs in which these women are more highly concentrated, the occupational wages are between 0.35 and 1.09 times the average wage. Among occupations with the highest representation of this group we can only identify one occupation with a wage slightly above the average—*registered nurses*. Most of the remaining occupations are clearly below the average—*child care workers*; *social workers*; *nursing aides; customer service reps, investigators and adjusters; kindergarten and earlier school teachers; general office clerks; secretaries*; *vocational and educational counselors*; *insurance adjusters, examiners, and investigators;* and *welfare service aides*. As one would expect and despite some of them being strongly feminized, the feminization rate of most occupations in which college Black women concentrate is lower than that of Black women with less than a high school education.

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[21] In these occupations, these women represent between 8% and 12% of workers, while in the occupations listed above, the values were between 12% and 26%. The weight of these women within the group of workers with the same educational level is 5%.

We also find that highly paid occupations, such as *chief executives and public administrators*, *engineers*, *architects*, *actuaries*, *health diagnosing occupations*, and *lawyers*, have a low presence of Black women with university degrees. In none of them, the representation of this group is above 2.6% of workers. Taking into account that these women are 4.4% of workers with bachelor's degrees, the group is clearly underrepresented. Certainly, some of these occupations are strongly masculinized (as is the case of *engineering*, where the male rate is above 80%), but in others, the presence of White women is already relatively important, as is the case of *actuaries*, several *health diagnosing occupations*, especially *veterinarians*, and *lawyers*).
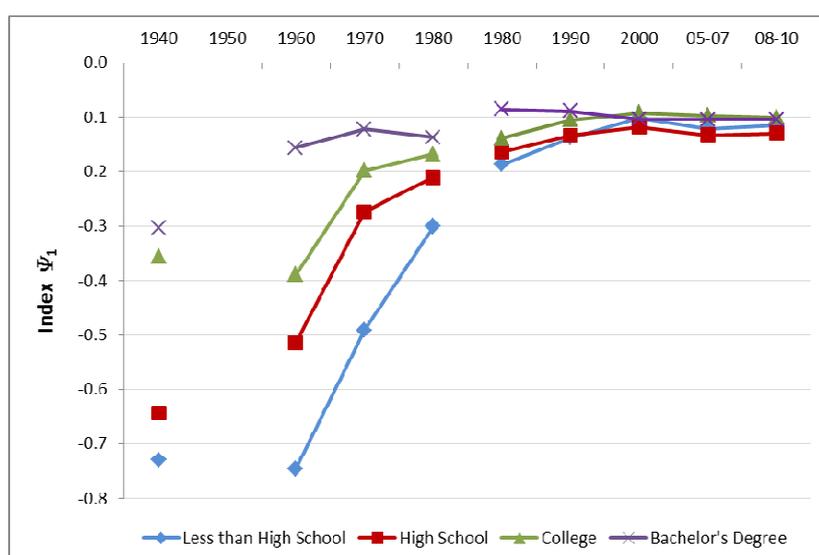
Figure 12. Well-being losses of Black women derived from their segregation (Ψ_1) in 1940-2010 by educational level (1940-1980: 1950 classification; 1980-2010: 1990-based classification)
Sources: Authors' calculations based on the IPUMS samples.

When taking into account not only the distribution of Black women across occupations but also occupational wages, we find that the position of Black women with bachelor's degrees has worsened since the 1970s while the other groups improved up to the 2000s (see Figure 12, which shows the well-being losses of each educational group derived from their occupational sorting).[22] Moreover, in the last decade, the position of Black women was similar for the four groups. In other words, when compared with their peers in education, highly-educated Black women seem to be as disadvantaged as those with lower educational credentials. This suggests that although those with bachelor's degrees

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[22] The wage of each occupation is the same used in the previous section.

are more evenly distributed across occupations, this is not particularly beneficial for them if we compare them with their peers in education.

6. Conclusions

Based on harmonized and detailed occupation titles (269 for the period 1940-1980 and 387 for 1980-2010), this paper has shown that the occupational segregation of Black women declined dramatically from 1940 to 1980 (especially in the 1960s and 1970s), decreased slightly from 1980 to 2000, and remained stagnant in the first decade of the 21st century. Thus, while 69% of Black women would have had to switch occupations to achieve zero segregation in 1940, this percentage fell to around 40% in 1980, 36% in 1990, and 33% in 2000, remaining almost unaltered since then.

The deep structural changes that took placed in the US along these seventy years seem to have brought different labor opportunities to Black women depending on the subperiod analyzed. Thus, whereas in some occupations that emerged in 1940-1980, mainly associated with the appearance of a more urban and service-oriented society, gender and race appear to have been more delinked from work than in occupations belonging to more traditional sectors, technological changes that occurred in more recent decades have not permitted much further advancement. Explaining why this was so goes beyond the empirical findings of this paper. However, it does not seem too far-fetched to relate the improvements of the 1940s and 1950s to the strong demand of labor from Northeast and Midwest cities, and the advances of the 1960s and 1970s to institutional changes oriented to remove discrimination by race and gender from schools and work. Political pressures for enforcement lost strength from 1980 onward, and they do not seem to have been replaced by other pushing factors.

As for the role that education has played, this study has shown that, up to 1980, the segregation of Black women who had bachelor's degrees was not lower than the segregation of Black women with a lower education level. From 1990 to 2010, however, a clear and distinctive pattern emerged. Black women with either some college or university degrees had lower segregation (as compared with their peers) than did those with lower levels of education. However, the occupations in which high-skilled Black women tended to work had wages substantially below the average wage of occupations filled by their peers. Almost a quarter of these women were concentrated in occupations that only accounted for 10 percent of high-skilled workers, and these

occupations had (average) wages that ranged between 0.35 and 1.09 times the average wage of high-skilled occupations.

Using well-being measures that allow the assessment of the occupational segregation faced by Black women, this paper has revealed that the strong segregation reduction in the 1960s and 1970s was accompanied by important well-being improvements due to the higher presence of Black women in occupations with (relative) wages higher than those they had in 1940. This occupational upgrading may help to explain the increasing earnings of this group, as compared to those of White men, of the 1960s and 1970s. From 1990 onward, however, the increasing wage inequality across occupations and the low improvement in segregation gave rise to small advances in the integration of Black women. Moreover, when comparing them with their peers in education, the well-being loss of Black women with bachelor's degrees derived from their segregation increased since the 1970s, converging in the 2000s with the well-being losses of those with lower education, which suggests that educational credentials alone do not explain the low position of Black women in the labor market.

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Appendix

A) Differences between Local and Overall Segregation

The index of dissimilarity popularized by Duncan and Duncan (1955) is a measure of the discrepancy between the occupational distributions of two groups and, therefore, can be thought of as an overall segregation index in a binary context. In the case of segregation by gender, this index is:

$$I_D = \frac{1}{2} \sum_j \left| \frac{f_j}{F} - \frac{m_j}{M} \right|,$$

where f_j and m_j are the number of women and men, respectively, in occupation j while F and M denote the total number of women and men in the economy, respectively. This index has been generalized to a multigroup context, where it is called the I_p index, which becomes the index of dissimilarity when there are only two groups of individuals.

The dissimilarity index has been interpreted as the percentage of women that would have to switch occupations to ensure that they have the same distribution as men. However, one should be aware that if the occupational sorting of women had to be equal to that of men, the occupational structure of the economy would necessarily change, because feminized occupations would have to shrink while masculinized occupations would have to expand. In other words, when using the above interpretation, one should keep in mind that the occupational structure does not remain constant.

Index $D(c;t)$, which was proposed by Moir and Shelby Smith (1979) in a binary context and explored by Alonso-Villar and Del Río (2010) in a multigroup context, has a resemblance to the index of dissimilarity but it substantially differs from it. This index quantifies not overall or aggregate segregation but the segregation of a group. It is important to note that the way the segregation of a group (i.e., local segregation) is measured is consistent with overall segregation measures. In fact, the I_p index can be written as the weighted average of the local segregation of each of the mutually exclusive groups into which the economy is partitioned (e.g., White women, Black women, other minority women, White men, Black men, and other minority men) according to index D with weights equal to the population share of the groups (Alonso-

Villar and Del Río 2010). In other words, $I_p = \sum_g \dfrac{C^g}{T} D\!\left(c^g, t\right)$, where C^g is the number

of individuals of group g (e.g., Black women), T is the total number of workers, c^g is the distribution of group g across occupations, and t is the distribution of workers across occupations.[23] In the case of two groups, the I_p index and, therefore, the index of dissimilarity can be written as the weighted sum of the local segregation of women and the local segregation of men, which explains why this index can be considered an overall segregation measure in a binary context.

Note that in our study, $D(c; t)$ measures the percentage of Black women that would have to change occupations to ensure this group is evenly distributed across occupations while keeping the occupational structure of the economy unaltered, which is different from the interpretation of the index of dissimilarity given above.[24]

B) Local Segregation indexes

		$\phi_{0.5}$	ϕ_1	ϕ_2	D	G
1950 Classification	**1940**	1.478	1.612	4.196	0.690	0.824
	1950	1.303	1.447	4.040	0.627	0.784
	1960	1.244	1.347	3.363	0.602	0.770
	1970	0.778	0.786	1.496	0.451	0.623
	1980	0.485	0.456	0.594	0.383	0.501
1990 Classification	**1980**	0.539	0.514	0.705	0.403	0.539
	1990	0.422	0.391	0.453	0.359	0.479
	2000	0.381	0.344	0.373	0.331	0.450
	05-07	0.399	0.357	0.391	0.330	0.456
	08-10	0.380	0.338	0.367	0.319	0.443

Table A1. Local segregation according to indices G, D, and Φ_a (a=0.5, 1, and 2)
Sources: Authors' calculations based on the IPUMS samples.

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[23] Likewise, other local segregation indexes used in this paper are consistent with other overall segregation measures (Alonso-Villar and Del Río, 2010).
[24] For that to be the case, the distribution of other groups would have to be changed so as to accommodate these changes.

Less than High School	$\phi_{0.5}$	ϕ_1	ϕ_2	D	G	College	$\phi_{0.5}$	ϕ_1	ϕ_2	D	G
1940	1.478	1.563	3.653	0.693	0.821	1940	1.380	1.361	3.521	0.651	0.777
1950						1950					
1960	1.355	1.406	3.052	0.652	0.795	1960	1.018	0.933	1.878	0.524	0.665
1970	0.894	0.912	1.684	0.502	0.674	1970	0.667	0.555	0.640	0.437	0.546
1980	0.603	0.588	0.860	0.399	0.564	1980	0.413	0.364	0.367	0.359	0.465
1980	0.661	0.642	0.970	0.431	0.591	1980	0.470	0.427	0.476	0.379	0.504
1990	0.568	0.525	0.660	0.401	0.545	1990	0.370	0.333	0.350	0.333	0.447
2000	0.556	0.492	0.571	0.378	0.529	2000	0.344	0.301	0.300	0.316	0.424
05-07	0.686	0.576	0.662	0.409	0.566	05-07	0.346	0.300	0.300	0.307	0.421
08-10	0.678	0.561	0.637	0.402	0.557	08-10	0.333	0.290	0.291	0.300	0.413
High School	$\phi_{0.5}$	ϕ_1	ϕ_2	D	G	Bachelor's degree	$\phi_{0.5}$	ϕ_1	ϕ_2	D	G
1940	1.499	1.705	5.389	0.676	0.812	1940	1.409	1.190	2.978	0.610	0.729
1950						1950					
1960	1.114	1.208	3.261	0.540	0.727	1960	1.149	0.889	0.986	0.579	0.668
1970	0.683	0.634	0.941	0.428	0.581	1970	0.827	0.643	0.644	0.490	0.584
1980	0.488	0.447	0.541	0.377	0.503	1980	0.448	0.400	0.404	0.395	0.484
1980	0.556	0.516	0.658	0.403	0.545	1980	0.487	0.443	0.474	0.413	0.513
1990	0.494	0.446	0.518	0.371	0.509	1990	0.322	0.301	0.322	0.333	0.427
2000	0.477	0.422	0.474	0.355	0.493	2000	0.262	0.246	0.261	0.300	0.387
05-07	0.517	0.454	0.518	0.365	0.509	05-07	0.261	0.244	0.260	0.294	0.385
08-10	0.520	0.448	0.506	0.357	0.503	08-10	0.242	0.228	0.245	0.280	0.373

Table A2. Local segregation indices of Black women by educational level (1940-1980: 1950 classification; 1980-2010: 1990-based classification)
Sources: Authors' calculations based on the IPUMS samples.

C) Decomposing Segregation Changes

To decompose the segregation reduction, for example in the period 1940-1960, we may follow two different paths (i.e., we can use two different intermediate stages). The first path consists of initially determining the effect of a change in the occupational structure while keeping the distribution of the group unaltered and later on finding out the effect of a change in the distribution of the group. In the case of index *D*, for example, this would involve calculating $D(c_{40};t_{40}) - D(c_{40};t_{60})$ and $D(c_{40};t_{60}) - D(c_{60};t_{60})$, where c_{40} (respectively, c_{60}) denotes the occupational distribution of Black women in 1940 (respectively, 1960) and t_{40} (respectively, t_{60}) is the occupational structure of the economy in 1940 (respectively, 1960). Note that the two components add up the total change in segregation ($D(c_{40};t_{40}) - D(c_{60};t_{60})$). In Table A3, we can see that $D(c_{40};t_{40}) - D(c_{40};t_{60}) = -0.043$, $D(c_{40};t_{60}) - D(c_{60};t_{60}) = 0.129$, and the sum of both components is equal to $D(c_{40};t_{40}) - D(c_{60};t_{60}) = 0.086$. This table also offers the corresponding values for the remaining indices, indices that are broadly denoted by *I* (i.e., *I* denotes either *D*, *G*, $\Phi_{0.5}$, or Φ_1).

The second path involves first calculating the effect of a change in the distribution of the group (e.g., $D(c_{40};t_{40}) - D(c_{60};t_{40}) = 0.08$) and later the effect of a change in the

occupational structure (e.g., $D(c_{60};t_{40}) - D(c_{60};t_{60}) = 0.005$). This information is also given in Table A3.[25] An analogous procedure can be followed for the other periods (Tables A4 and A5).

1940-1960 Period

Table A3 reveals that if we only changed the occupational structure of the economy while keeping the distribution of Black women unaltered (first path, first row), segregation would increase between 1940 and 1960 (e.g., $D(c_{40};t_{40}) - D(c_{40};t_{60}) = -0.043$, which means that the segregation of the group when using the occupational structure of 1940 is lower than the segregation it would have with the occupational structure of 1960). If we changed the occupational structure but considered instead the distribution of the group in 1960 (second path, second row), segregation would increase with some indices or would remain almost unaltered with others (e.g., $D(c_{60};t_{40}) - D(c_{60};t_{60}) = 0.005$ and $\Phi_2(c_{60};t_{40}) - \Phi_2(c_{60};t_{60}) = -0.414$).

On the contrary, if we changed the distribution of the group, the segregation would decrease with both the occupational structures of 1940 and 1960 (e.g., $D(c_{40};t_{40}) - D(c_{60};t_{40}) = 0.08$ and $D(c_{40};t_{60}) - D(c_{60};t_{60}) = 0.129$). In other words, the reduction in segregation that took place between 1940 and 1960 was not the result of changes in the occupational structure of the economy but to changes in the distribution of Black women across occupations. Thus, for example, in the second path, the decomposition of index *D* shows that changes in the occupational structure would only account for 6% of the segregation reduction (which results from dividing 0.005 by 0.086), while the remaining 94% would be the result of changes in the distribution of Black women across occupations.

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[25] In their study on occupational segregation by gender in the US along 1970-2009, Blau, Brummund, and Yung-Hsu Liu (2013) decomposed the dissimilarity index to separately quantify the sex composition effect and the occupational mix effect when comparing only two groups: men and women. In that approach the composition effect quantifies segregation changes originated by changes in the representation of the group within occupations, c_j / t_j (the relative size of occupations remained constant), and the occupational mix effect measures how much segregation would have changed if only the relative size of occupations had changed (once the composition effect was already quantified). That procedure has similarities with the second path proposed here, but note that, as opposed to ours, their first component incorporates changes both in c_j and t_j.

		$\phi_{0.5}$	ϕ_1	ϕ_2	**D**	**G**
Total change	$I(c_{40};t_{40}) - I(c_{60};t_{60})$	0.240	0.270	0.894	0.086	0.054
First path	$I(c_{40};t_{40}) - I(c_{40};t_{60})$	-0.299	-0.513	-7.599	-0.043	-0.047
First path	$I(c_{40};t_{60}) - I(c_{60};t_{60})$	0.538	0.783	8.493	0.129	0.101
Second path	$I(c_{40};t_{40}) - I(c_{60};t_{40})$	0.203	0.274	1.308	0.080	0.045
Second path	$I(c_{60};t_{40}) - I(c_{60};t_{60})$	0.037	-0.004	-0.414	0.005	0.009

Table A3. Decomposing changes in segregation between 1940 and 1960
Sources: Authors' calculations based on the IPUMS samples.

1960-1980 Period

As provided in Table A4, the direct effect of shifts in the occupational structure (first path, first row) would have been negative (or zero) if the distribution of Black women across occupations had not changed (e.g., $D(c_{60};t_{60}) - D(c_{60};t_{80}) = 0$ and $\Phi_{0.5}(c_{60};t_{60}) - \Phi_{0.5}(c_{60};t_{80}) = -0.177$). In other words, segregation would have increased. This means that the reduction in segregation that we find using the first path is entirely due to changes in the distribution of Black women across occupations since the other factor halted that reduction.

If we first took into account the effect of changes in the distribution of Black women (second path), the shifts in the employment structure would have reduced segregation according to all indices (e.g., $D(c_{60};t_{60}) - D(c_{60};t_{80}) = 0.06$ and $\Phi_{0.5}(c_{60};t_{60}) - \Phi_{0.5}(c_{60};t_{80}) = 0.204$) but this reduction would have been lower than that generated by the occupational sorting of the group. In fact, the changes in the occupational structure explain 33.8% of the reduction in segregation according to index G, 27% according to indexes D (0.27=0.06/0.221) and $\Phi_{0.5}$ (0.27=0.204/0.756), and less with the other indices.

As a consequence of all of the above, the reduction in segregation between 1960 and 1980 was also mainly a consequence of changes in the distribution of Black women.

		$\phi_{0.5}$	ϕ_1	ϕ_2	**D**	**G**
Total change	$I(c_{60};t_{60}) - I(c_{80};t_{80})$	0.756	0.891	2.756	0.221	0.269
First path	$I(c_{60};t_{60}) - I(c_{60};t_{80})$	-0.177	-0.604	-12.522	0.000	-0.024
First path	$I(c_{60};t_{80}) - I(c_{80};t_{80})$	0.933	1.495	15.277	0.221	0.293
Second path	$I(c_{60};t_{60}) - I(c_{80};t_{60})$	0.552	0.680	2.225	0.161	0.178
Second path	$I(c_{80};t_{60}) - I(c_{80};t_{80})$	0.204	0.211	0.530	0.060	0.091

Table A4. Decomposing changes in segregation between 1960 and 1980
Sources: Authors' calculations based on the IPUMS samples**.**

1980-2000 Period

As we can see in Table A5, when using the first path, we observe that the reduction in segregation was only due to changes in the distribution of the group given that the change in the occupational structure actually fostered segregation (e.g., $D(c_{80};t_{80}) - D(c_{80};t_{00}) = -0.049$).

However, the effect of changes in the distribution of Black women while keeping the occupational structure unchanged is negative when using the structure of 1980 (e.g., $D(c_{80};t_{80}) - D(c_{00};t_{80}) = -0.029$), something that did not happened in the previous periods. This is so because although some changes reduced segregation many others fostered it, as we discuss in the main text of this paper.

There was a fall in the representation of Black women in occupations in which they were overrepresented. In addition, there was an increase in the representation of Black women in occupations where they had a low representation, especially many managerial and professional specialty occupations and some sales occupations. However, not all changes in the period halted the segregation of Black women. This was the case of many administrative support occupations and other large occupations (such as cashiers, hairdressers, or bus drivers) that experienced strong employment growth and even stronger increases in their numbers of Black women. Because this minority notably increased in occupations where it was highly concentrated, the segregation increases using the second path when keeping the occupational structure unaltered and changing

the distribution of Black women (e.g., $D(c_{80};t_{80}) - D(c_{00};t_{80}) = -0.029$), which was the distinctive feature of this period mentioned above.

		$\phi_{0.5}$	ϕ_1	ϕ_2	D	G
Total change	$I(c_{80};t_{80}) - I(c_{00};t_{00})$	0.134	0.133	0.196	0.067	0.077
First path	$I(c_{80};t_{80}) - I(c_{80};t_{00})$	-0.147	-0.156	-0.358	-0.049	-0.065
First path	$I(c_{80};t_{00}) - I(c_{00};t_{00})$	0.280	0.288	0.555	0.116	0.142
Second path	$I(c_{80};t_{80}) - I(c_{00};t_{80})$	-0.123	-0.169	-0.670	-0.029	-0.056
Second path	$I(c_{00};t_{80}) - I(c_{00};t_{00})$	0.257	0.302	0.866	0.096	0.133

Table A5. Decomposing changes in segregation between 1980 and 2000
Sources: Authors' calculations based on the IPUMS samples.