The Occupational Segregation of Black Women in the U.S.: A Look at its Evolution from 1940 to 2010*

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Abstract

Based on harmonized and 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 dramatically declined from 1940 to 1980 (especially in the 1960s and 1970s), it slightly decreased from 1980 to 2000, and it remained stagnated in the first decade of the 21st century. To assess the reduction in segregation in terms of well-being, this paper proposes new measures that penalize the concentration of Black women in low-paid jobs and finds that the integration process slightly reversed after 2000. Regarding the role that education has played, this study highlights that only from 1990 onward, Black women with either some college or university degrees have lower segregation (as compared with their peers) than those with lower education. Nevertheless, in 2010, Black women with university degrees still tend to concentrate in occupations that have wages below the average wage of occupations that high-skilled workers fill.

JEL Classification: J15; J16; J71; D63

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1. Introduction

Studies of occupational segregation in the United States have traditionally focused on segregation by gender. Although not undisputed due to cross-time comparability issues in available data, most studies agree that few changes occurred in sex occupational segregation in the first half of the 20th century (Jacobs, 1989). It was in the second half, mainly in the 1970s, when segregation declined (Beller, 1985; Bianchi and Rytina, 1986; Levanon et al., 2009), while the process halted in the first decade of the 21st century (Blaug et al., 2013). More recently, researchers have turned their attention to race (Blacks versus Whites) and ethnicity (Hispanics versus non-Hispanics). However, when analyzing this, most scholars either avoid examining women and men separately or restrict their analyses to the male population (Semyonov et al., 2000; Tomaskovic-Devey et al., 2006; Queneau, 2009).

The intersection of race/ethnicity and gender has barely been explored in the literature on occupational segregation (Albelda, 1986; King, 1992; Watts, 1995; Reskin, 1999; Kaufman, 2002, 2010; Mintz and Krymkowski, 2011). Nevertheless, enough evidence exists that these two social categories are "mutually constructed to produce and maintain social hierarchy" (Browne and Misra, 2003, p. 489), being a central point to understand the generating process of labor market inequalities, as multiracial feminist theorists have shown (Collins, 1999; Glenn, 1999). Thus, for example, England et al. (1999) found that differences in education help to explain the pay gaps among racial/ethnic groups (Whites, African Americans, and Hispanics), mainly for women. Education is, however, irrelevant when explaining the gender pay gap within these racial/ethnic groups, which is better explained by occupational and industrial segregation, especially for African Americans. As Reskin argues, "the patterns of segregation in a multiracial, ethnically diverse society are part of a complex structure of advantage and disadvantage. To understand ethnic and racial segregation among women requires making this structure visible" (Reskin, 1999, p. 198).

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. Thus, for example, Black women are usually compared with White women, Black men, and White men as well

as, more recently, with Hispanic women. However, for cross-time analyses, these comparisons become cumbersome and make it difficult to have a clear picture of the situation of the target group when not all pair-wise comparisons point in the same direction.[1] With respect to Black women, which is the group on which this paper focuses, the segregation trends in the second half of the 20th century show an extraordinary reduction in the occupational differentiation between Black and White women from 1960 to 1980, mainly explained by the former leaving domestic service and entering clerical work, followed by small declines from 1980 to 2000 (King, 1992; Kaufman, 2010; Mintz and Krymkowski, 2011). Essentially, nothing has been known about this phenomenon since then.

In any case, this reduction in segregation is the result of changes that both Black women and White women have experienced in the labor market. It is important to bear in mind that despite their sharing of gender roles, these women are exposed to different cultural stereotypes and occupy different positions in society. This explains why 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) and why their educational level was traditionally lower than that of White women and has not kept paced with the strong increase in the level of White women from 1980 onwards (McDaniel et al., 2011).

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. In doing so, in each occupation, the share of target individuals who work there is contrasted with the employment share of that occupation, and then, these discrepancies are aggregated using an index with good normative properties (Moir and Shelby Smith, 1979; Alonso-Villar and Del Río, 2010). This is the methodological approach that this study follows.

This paper's aim is to analyze the national trends in occupational segregation for Black women for the period 1940-2010 using detailed and harmonized occupational data of the U.S. censuses and the American Community Surveys taken from the Integrated

[1] Thus, for example, Kaufman (2010) found that segregation between Black and White women decreased between 1980 and 1990, while segregation between Black women and White men increased.

Public Use Microdata Series (IPUMS-USA) developed by (and available at) the Minnesota Population Center of the University of Minnesota.

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 using a common methodology that 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. For this purpose, this paper uses several segregation measures proposed by Alonso-Villar and Del Río (2010). Second, these measures can be decomposed so as to isolate changes in segregation due to variations in the distribution of the group across occupations from changes in the size of occupations. Third, this paper takes a step further assessing the discrepancy between the distribution of the target group and the occupational structure of the economy by penalizing the concentration of the group in low-paid occupations. Standard indices do not take into account that wage earnings vary considerably among occupations. However, in analyzing segregation it is important not only to determine how uneven the distribution of the group across occupations is with respect to others but also to identify the direction of these differences. For that purpose, this paper extends the framework developed by Del Río and Alonso-Villar (2012) by proposing new indices. Finally, this paper pays attention to the differences in segregation that Black women experience depending on their educational achievements and explores its evolution.

The paper is structured as follows. Section 2 presents the dataset and introduces the measures used in this study. Section 3 explores the occupational segregation trends of Black women from 1940 to 2010, decomposing segregation reduction into two components (distributional and structural effects), and assesses these changes by taking the wages of occupations into account. Section 4 explores the differences in segregation that Black women experience depending on their educational achievements and how they have evolved. Finally, Section 5 offers the main conclusions.

2. Measuring Segregation: Methodology

2.1 Local Segregation Measures

The segregation of Black women is usually measured while 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). However, when many groups are involved, these comparisons become cumbersome, and the performance of a target group is difficult to summarize.

The local segregation measures proposed by Alonso-Villar and Del Río (2010), $I(c;t)$, 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, $t \equiv \left(t_1, t_2, ..., t_J\right)$. 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). Depending on how the discrepancies between *c* and *t* are taken into account, several indices can be defined to measure the segregation of Black women. Denoting by $T = \sum_j t_j$ the total number of workers in the economy and by $C = \sum_j c_j$ the total number of Black women workers, these authors propose the following indices:

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

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

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

The first measure is a variation of the classic Gini index, the second represents a family of indices related to the generalized entropy family,[2] and the third measure is a variation of the index of dissimilarity.[3] 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.

Apart from these indices, these authors also propose the use of the local segregation curve, $S(\tau_j) = \frac{\sum_{i \le j} c_i}{C}$, where $\tau_j \equiv \sum_{i \le j} \frac{t_i}{T}$ is the proportion of employment represented by the first j occupations ranked in ascending order of the ratio $\frac{c_j}{t_j}$ (see Figure 1). The value of this curve at point 0.1 shows the proportion of Black women who work in occupations in which this group has the lowest representation ($\frac{c_j}{t_j}$) and that account for 10% of total employment. The curve at point 0.2 shows the proportion of Black women who work in occupations that represent 20% of total employment and in which this minority has the lowest representation, and so on.[4] Therefore, this curve shows the underrepresentation of Black women with respect to the occupations' size, percentile by percentile. 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, $\frac{t_j}{T}$), 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] a can be interpreted as a segregation sensitivity parameter, so that the higher its value the higher the sensitivity of the index against employment movements that involve occupations where the group has a high representation ($\frac{c_j}{t_j}$).

[3] As shown by Alonso-Villar and Del Río (2010), these local segregation measures are consistent with multi-group (overall) segregation measures that exist in the literature because these multi-group measures can be written as the sum of the local segregation level of each group into which the economy is partitioned (e.g. black women, black men, White women, White men, other women, and other men), weighted by the group's share in the whole population.

[4] This local segregation curve is related to the Lorenz curve used in the literature on income distribution and is also related to the segregation curve proposed by Duncan and Duncan (1955).

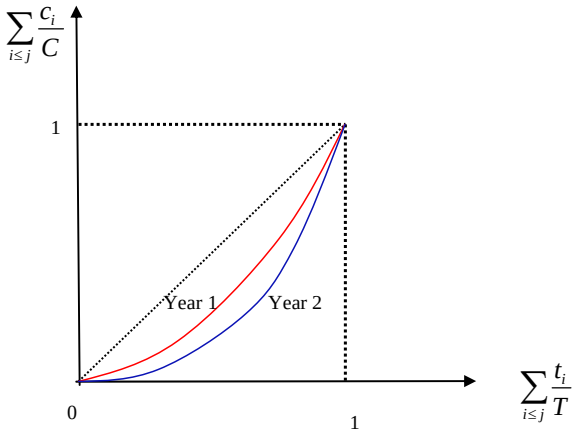


Figure 1. Local segregation curves of Black women in two years, S.

When comparing the distribution of Black women in two years, if the curve in year 1 lies at no point below year 2 and at some point above (as in Figure 1, where year 1 dominates year 2), all of the indices defined above (except for D) will always lead to the same conclusion as the curves do: Segregation is higher in year 2. This makes the use of these curves a robust procedure because, when segregation curves do not cross, a powerful conclusion can be reached without using several indices (as proved in Alonso-Villar and Del Río, 2010). However, if curves cross or if one is interested in quantifying the extent of segregation, the use of the indices seems to be the most appropriate.

2.2 Measuring the impact of occupational wage inequality on segregation

As shown by Del Río and Alonso-Villar (2012), the above tools can be extended to take into account that the consequences of an uneven distribution of Black women across occupations are not the same depending on whether these women concentrate in high- or low-paid occupations. These tools assess the discrepancies between the distribution of Black women and that of total employment by penalizing the concentration of Black women in low-paid occupations. The corresponding indices, labeled status-sensitive local segregation indices, are:

$$G^{w}(c;t)=\frac{\sum_{i,j}\frac{t_i}{T}\frac{t_j}{T}\frac{w_i}{\overline{w}}\frac{w_j}{\overline{w}}\left|\frac{c_i}{t_i\frac{w_i}{\overline{w}}}-\frac{c_j}{t_j\frac{w_j}{\overline{w}}}\right|}{2\frac{C}{T}} \tag{4}$$

$$\Phi_a^{w}(c;t)=\begin{cases}\dfrac{1}{a(a-1)}\displaystyle\sum_j\frac{t_j\frac{w_j}{\overline{w}}}{T}\left[\left(\frac{c_j/C}{\left(t_j\frac{w_j}{\overline{w}}\right)\Big/T}\right)^{a}-1\right] & \text{if } a\neq 0,1\\ \displaystyle\sum_j\frac{c_j}{C}\ln\left(\frac{c_j/C}{\left(t_j\frac{w_j}{\overline{w}}\right)\Big/T}\right) & \text{if } a=1\end{cases} \tag{5}$$

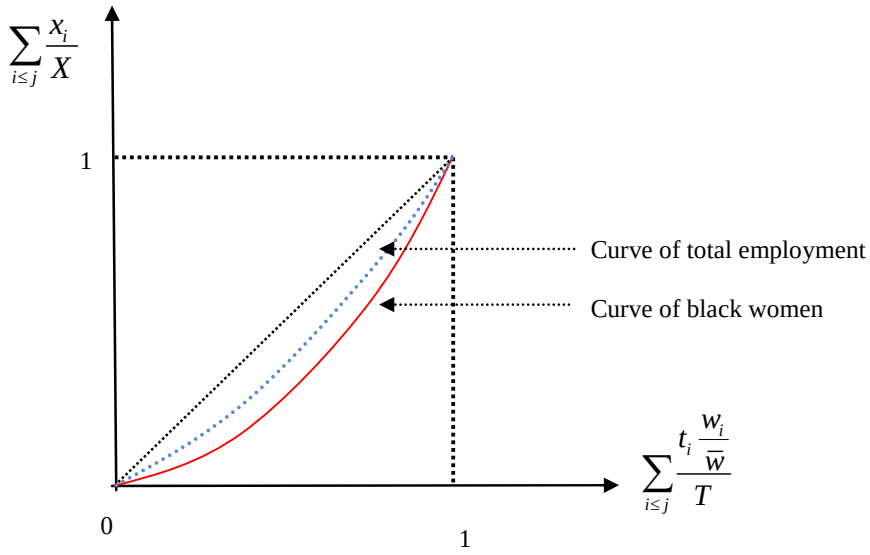
$$D^{w}(c;t)=\frac{1}{2}\sum_j\left|\frac{c_j}{C}-\frac{t_j}{T}\frac{w_j}{\overline{w}}\right|, \tag{6}$$

where w_j is the wage of occupation j and $\overline{w}=\sum_j\frac{t_jw_j}{T}$ is the weighted average wage. Therefore, these indices can be generally denoted by $I^{w}(c;t)$.

The status-sensitive local segregation curve of Black women is defined as $S^{w}(\lambda_j)=\frac{\sum_{i\le j}c_i}{C}$, where $\lambda_j\equiv\sum_{i\le j}\frac{t_i\frac{w_i}{\overline{w}}}{T}=\sum_{i\le j}\frac{t_iw_i}{\sum_i t_iw_i}$ and occupations are now ranked in ascending order of the ratio $\frac{c_j}{t_jw_j}$ (see the curve of Black women in Figure 2, and consider $x_j=c_j$ and $X=C$).

The interpretation of this curve is simple: It shows the cumulative discrepancy between the employment distribution of Black women and the distribution they would have if they followed the distribution of wage revenues (t_jw_j) across occupations (assuming that no wage differences exist within each occupation). The further the curve is from the 45º line, the larger is the status-sensitive segregation of Black women. Indices (4)-(5) are consistent with the dominance criterion that these curves give so that when one

curve is above another, any of these indices will lead to the same conclusion—a lower status-sensitive segregation for the distribution above—although each of them



quantifies how much each curve departs from the 45º line in a different way.

Figure 2. Status-sensitive local segregation curve of Black women, S^w, and status-sensitive curve of total employment, E^w.

It is important to note that the discrepancy between the employment distribution of Black women and the distribution of wage revenues across occupations is the result of two inequality sources, the occupational segregation of Black women (e.g., the disparities between the distribution of Black women across occupations and the occupational structure of the economy) and the occupational wage inequality. Both factors, which are jointly considered in these indexes, determine the economic position of Black women in the labor market. This explains why the status-sensitive segregation measures are not exactly segregation measures. As Del Río and Alonso-Villar (2012) show, these measures are not zero when local segregation is zero if there is occupational wage inequality.[5] Therefore, changes over time in the distribution of wages will affect

[5] In fact, we can define the status-sensitive curve of total employment as $E^w(\lambda_j)=\frac{\sum_{i\le j}t_i}{T}$, where $\lambda_j \equiv \sum_{i\le j}\frac{t_i\frac{w_i}{\bar{w}}}{T}$ and occupations are now ranked in ascending order of the ratio $\frac{t_j}{t_j w_j}=\frac{1}{w_j}$. This curve

the value of these indices, even if the segregation of Black women remains unaltered, because the situation of this minority has actually changed.

However, these measures alone do not allow us to quantify the effect of occupational wage inequality on the situation of Black women. The fact that the status-sensitive segregation curve of a group is below that of another group does not imply the former group being worse than the latter. What it really means is that its distribution across occupations is more distant from the distribution of wage revenues across occupations; but this could be a consequence of a higher concentration of the group in either low- or high-paid occupations since in both cases the status-sensitive segregation curve would be far from the 45º line. If one is interested in quantifying the effect that wage discrepancies across occupations has on the situation of the group, it is necessary to define measures that allow one to distinguish the above two cases.

With this objective, we propose a new family of indices, $\Delta\Phi_\alpha^w(c;t)$, that result from the difference between local segregation indices $\Phi_a(c;t)$ and the corresponding status-sensitive segregation indices, $\Phi_a^w(c;t)$:

$$\Delta\Phi_\alpha^w(c;t) = \Phi_a(c;t) - \Phi_a^w(c;t)\,. \qquad (7)$$

The larger the concentration of a demographic group in occupations with high wages, the higher the value of these indices (and the opposite, the larger the concentration in occupations with low wages, smaller the value of the indices). $\Delta\Phi_a^w$ is unbounded and can take both negative and positive values. It quantifies the effect that wage inequality has on the segregation of the group and is equal to zero when all occupations have the same wage. It takes higher values, the better the position of the group in the labor market. This is due to the fact that $\Delta\Phi_\alpha^w$ penalizes the concentration of the group in low-wage occupations at a higher extent, the higher is its segregation. This is so because this kind of measures inherits the ethic properties of the generalized entropy family of

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plots the cumulative proportion of total employment against the cumulative proportion of wage revenues once occupations are ranked from the highest to the lowest wage (see Figure 2, where this curve is obtained while considering $x_i = t_i$ and $X = T$). This curve is not equal to the 45º line due to the existence of wage dispersion across occupations. It shows the status-sensitive segregation that Black women would have if they were distributed across occupations according to the occupational structure.

inequality indices.[6] The Gini- and dissimilarity-based segregation indices are not, however, suitable to build our measures because they do not satisfy these properties.[7]

2.3 Data

Our data come from the IPUMS samples drawn from the U.S. decennial census for the period 1940-2000 and the 2005-2007 and 2008-2010 American Community Surveys, homogenized by the Minnesota Population Center of the University of Minnesota (Ruggles et al., 2010).[8] 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 can 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 has on segregation.[9] Our analysis allows us to provide estimates of

[6] As Blackorby and Donaldson (1978) show, the social welfare functions implicit in the generalized entropy family of inequality measures are not distributionally homothetic, where "distributional homotheticity implies that the way a social welfare function trades off income among individuals is independent of how equal or unequal the distribution of income is" (p. 72). Consequenly, in these indices, "if the distribution of income is very skewed, then improving the distribution among those who are not poor has little impact on social welfare. On the other hand, if the distribution of income is relatively dense then improvements in distribution above and below the mean are treated in a fairly symmetric fashion" (p. 75).

[7] Gini social welfare function is distributionally homothetic, and thus, the marginal rates of substitution are independent of scale (see Blackorby and Donaldson, 1978).

[8] 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.

[9] 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.

the occupational segregation of Black women during a seventy-year period (1940-2010) using consistent data.[10]

3. Occupational Segregation Trends of Black Women

In this study, unless otherwise specified, the 1950 census classification scheme is used for the period 1940-1980 and the 1990-based scheme for 1980-2010. Figure 3 (and Figure A1, in the Appendix)[11] shows that the 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.[12]

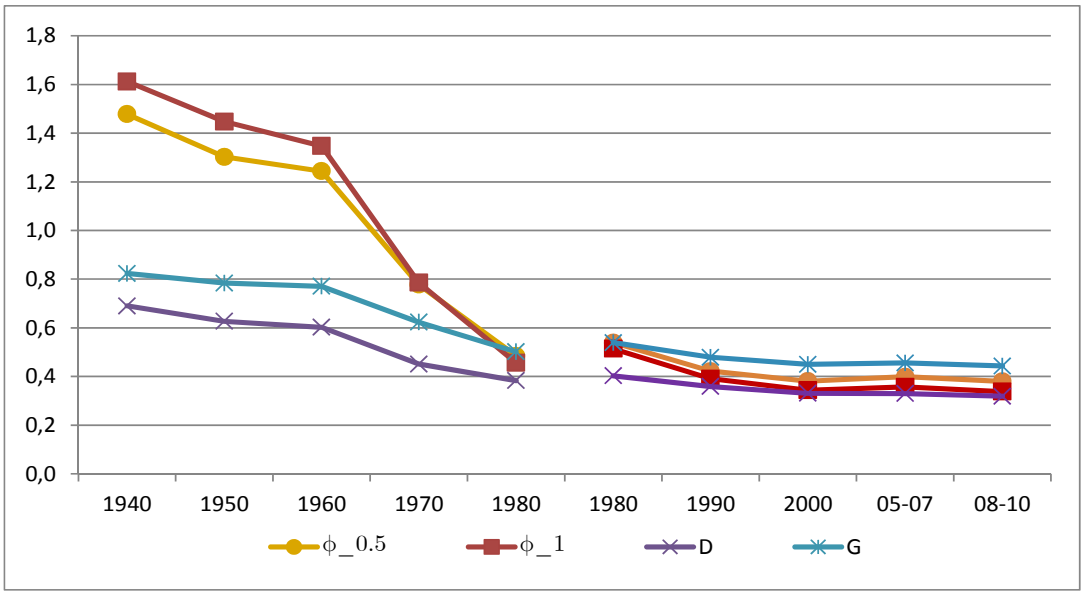

Figure 3. Segregation of Black women in 1940-2010 according to indices *G*, *D*, and Φ_a with $a = 0.5$, and 1 (1950 and 1990-based classifications).

As shown in Figure 4, this evolution is quite robust against changes in the classification of occupations because the indices provide similar patterns when we instead use the original occupational classification of each year (see Figure A2 for index $\Phi_2(c;t)$).

[10] 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 Blaug et al. (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.

[11] For scale reasons, index $\Phi_2(c;t)$ is not shown in Figure 1 but Figure A1. The values of all indices are given in the Appendix, see Table A1.

[12] Using the index of dissimilarity, King (1992) found that segregation between Black and White women decreased between 1960 and 1988 but not in the earlier decades. The evolution of segregation between Black women and White men was also intermittent along the period, decreasing between 1940 and 1950, rising in 1960, decreasing between 1960 and 1980, and rising again in 1988.

Despite this fact, from now on, this paper focuses on the common coding schemes, as they seem to be more appropriate for cross-time comparisons.

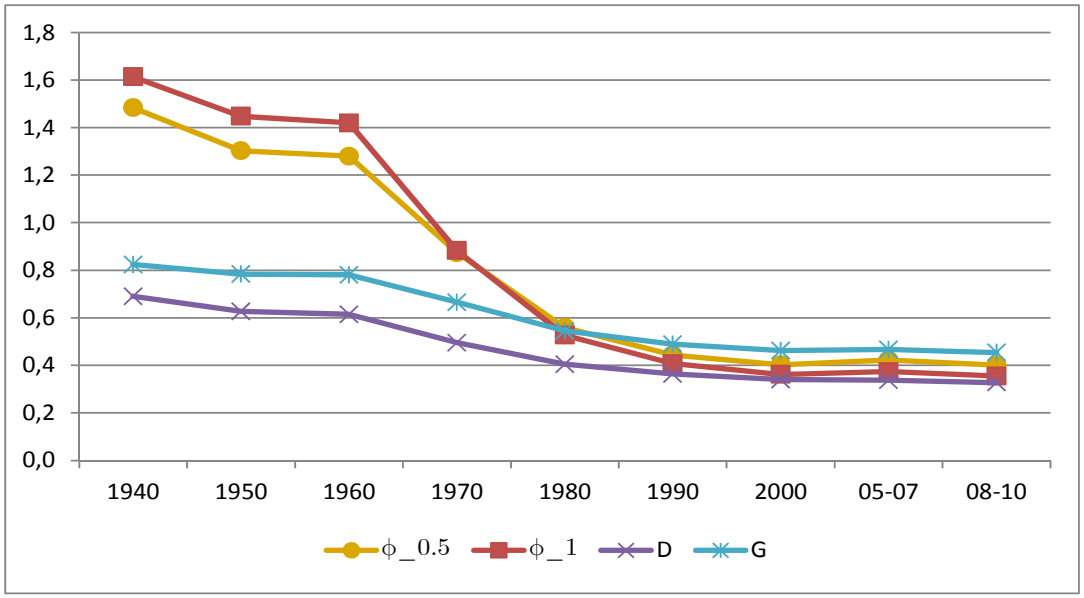

Figure 4. Segregation of Black women in 1940-2010 according to indices G, D, and Φ_a with $a = 0.5$, 1, and 2 (classification of each year).

Going back to Figures 3 and A1, the change between 1940 and 1980 is particularly evident when using index Φ_a with parameter $a = 2$. This index pays special attention to occupations where Black women have the highest representation $(\frac{c_j}{t_j})$. The sizable reduction in this index suggests that the presence of this minority in those occupations decreased substantially between 1940 and 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 service in private households alone accounted for 57.5% of Black women,[13] 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

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

workers. In other words, occupations that Black women highly filled in 1940 were no so "black-feminized" in 1980.

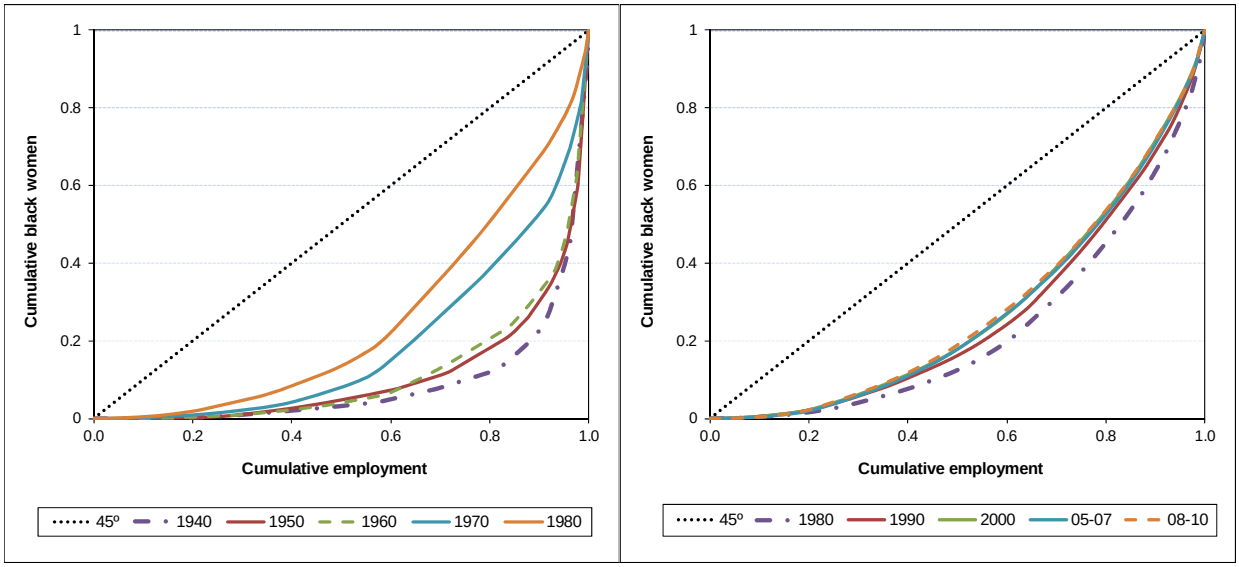

Figure 5. Local segregation curves of Black women (*S*): 1940-1980 (1950 classification) and 1980-2010 (1990-based classification)

Figure 5 (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 take very small values and that almost no change occurs across time. In fact, between 1940 and 1970, the curves take values below 0.009 at point 0.2. This means that 20% of jobs exists where the share of Black women who work there is 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 rises to 1.9% in 1980, although it is still very low. Figure 5 (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 tail of the curves, which is consistent with what we already mentioned. Thus, the value of the 1940 curve at point 0.8 is 0.12, while that of the 1980 curve is 0.51. This means that 88% of Black women (100%-12%) worked in occupations that accounted for 20% of total employment in 1940, while this percentage decreased to

49% (100%-51%) in 1980.[14] From 1980 to 2010, the reduction was much lower (from 55% to 46%).

Figure 5 also reveals that except for 1950, from 1940 to 1990, the curves get closer and closer to the 45º 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 five 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 yet, so that we cannot conclude that the reduction in segregation is conclusive. One could find indices according to which segregation would have increased in this decade. However, 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 Table A1). Something similar occurs between 1990 and 2000. From 2000 to 2010, the curves are almost undistinguishable, which suggests no further integration of Black women in the past decade.

3.1 Decomposing Segregation Changes

To delve deeper into the reduction in segregation that Black women have experienced, we now explore the role that changes in the occupational structure of the economy have played, 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.

[14] 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.

For that purpose, 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. In this section, we focus on three periods of segregation reduction: 1940-1960, 1960-1980, and 1980-2000.

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 (i.e., calculating $I(c_{40};t_{40})-I(c_{40};t_{60})$, where *I* denotes any local segregation index) and later on finding out the effect of a change in the distribution of the group ($I(c_{40};t_{60})-I(c_{60};t_{60})$). Note that the two components add up the total change in segregation ($I(c_{40};t_{40})-I(c_{60};t_{60})$). This is shown in Table 1, rows 2 and 3, where the two components are calculated for five segregation indexes. The second path involves first calculating the effect of a change in the distribution of the group ($I(c_{40};t_{40})-I(c_{60};t_{40})$) and later the effect of a change in the occupational structure $I(c_{60};t_{40})-I(c_{60};t_{60})$ (Table 1, rows 4 and 5).[15] An analogous procedure can be followed for the other periods (Tables 2 and 3).[16]

1940-1960 period

Table 1 (and Figure A4 in the Appendix) reveals that 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. Ceteris paribus, the direct effect

[15] In their study on occupational segregation by gender in the U.S. along 1970-2009, Blaug et al. (2013) decomposed the dissimilarity index proposed by Duncan and Duncan (1955) to separately quantify the sex composition effect and the occupational mix effect when comparing only two groups: men and women. In that approach, initially proposed by Fuchs (1975), 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.

[16] The segregation curves for 1940 and 1960 and the curves that correspond to the intermediate fictitious scenarios are shown in the Appendix (Figure A4). The curves for the periods 1960-1980 and 1980-2000 are also included in the chart.

of changes in the occupational structure was much lower[17] or even negative according to several indices. The latter suggests that either employment increased in occupations where Black women had low representation and/or decreased in occupations where they had high representation. In fact, we find that despite the economy facing an employment growth of 33% in this period, the number of *service workers on private households* diminished by 22% (mainly *laundresses*). Because these were jobs in which Black women tended to concentrate in 1940, ceteris paribus, the fall in these occupations' employment would tend to favor their concentration. However, segregation did not really increase because the share of Black women also decreased in these occupations substantially. This was not the result of a strong decline in the numbers of Black women there (they only decreased by 2.2%), but rather, it was the result of employment growth for this minority in other kinds of occupations. Therefore, the reduction in the share of Black women who worked in private households was more the consequence of new Black women entering other occupations versus Black women leaving them. Other occupations in which Black women were highly concentrated, those related to *farm laborers*, also faced a reduction in employment. The novelty of these occupations (especially, that of *unpaid family workers*) is that Black women strongly decreased there, which led to a segregation reduction.

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

Table 1. Decomposing changes in segregation between 1940 and 1960

On the contrary, some occupations in which Black women had low representation 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

[17] In the second path, the decomposition of index D shows that changes in the occupational structure would only account for 7% of the segregation reduction, while the remaining 93% would be the result of changes in the distribution of Black women across occupations (see Table1, rows 1, 4, and 5).

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 the employment surplus was filled by Black women (in the latter occupation, this minority was already overrepresented in 1940). 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.[18] One could think that the "Great Migration" of African Americans from Southern states to Northern cities not only signified profound demographic and cultural changes in the U.S. but also it was the origin of shifts in the employment patterns of Black women, enlarging the range of occupations to which they traditionally had access.[19]

1960-1980 period

As provided in Table 2, 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. The direct effect of shifts in the occupational structure (first path) would have been negative again if the distribution of Black women across occupations had not changed (Table 2, row 2, and Figure A4 in the Appendix). However, if we first take 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 and at a higher extent than in

[18] 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 is small).
[19] See Tolnay (2003) for a review research on the African American "Great Migration."

the previous period (Table 2, row 5).[20] This suggests the existence of important variations in both c_j and t_j, changes that would operate in the same direction.

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

Table 2. Decomposing changes in segregation between 1960 and 1980

On the one hand, there was, again, a remarkable employment reduction in some occupations in which Black women had an important concentration in 1960 (which explains the negative effect mentioned above). This is the case of *service workers in private households* (although now, they are mainly *unclassified private household workers*). In these occupations, 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 leads to the underrepresentation of this minority, who was traditionally highly concentrated there. Therefore, we observe Black women leaving these two types of occupations.

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 are now more intense, favoring a reduction in segregation.

[20] The changes in the occupational structure explain 27% of the reduction in segregation according to index D (see Table 2, rows 1, 4, and 5)

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 (*nurses*; *unclassified teachers*; *charwomen and cleaners*). In other occupations Black women are now starting 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*). Meanwhile, other occupations witness an increase in the representation of this minority in this period (*musicians and music teachers*; *unclassified managers, officials, and proprietors*; *unclassified salespersons and sales clerks*; *unclassified forepersons*; *unclassified laborers*).

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 discrimination in employment and labor unions, education, credit, public accommodation, etc. (King, 1992; Tomaskovic-Devey and Stainback, 2007). As Reskin (2012, p. 25) points out, "The Black-White gaps in earnings and educational attainment narrowed, and occupational and school segregation declined. […] [However] by the end of the 1970s black progress stalled, and gains in some domains were lost."

1980-2000 period

Our results confirm that in the period 1980-2000, 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. In addition, as we can see in Table 3 the effect of changes in the distribution of Black women, while keeping the occupational structure unchanged is negative when using the structure of 1980 (see row 4), which would tend to favor segregation, something that did not happened in the previous periods.[21] As we discuss below, this period is more complex than the previous ones because although some changes reduced segregation, many others fostered it.

[21] In fact, the corresponding intermediate curve plotted in Figure A4 (see Appendix; curve c2000) is below the curve for 1980. This does not happens for the previous periods (compare curves c1960 and 1940 and curves c1980 and 1960).

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

Table 3. Decomposing changes in segregation between 1980 and 2000

The reduction in segregation is both a consequence of:

a) A fall in the representation of Black women in occupations in which they were overrepresented. This is the case of *private household occupations*, where, as opposed to previous periods, total employment barely changes, but the novelty here is that Black women are replaced by Hispanic women. Other occupations with reductions in the representation of this minority include: *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 is 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. This may help to explain why segregation rises when keeping the distribution of Black women unaltered while changing the structure of the economy (see Table 3, row 2). 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*). 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, is also remarkable.

However, not all changes in the period halted the segregation of Black women. This is the case of administrative support occupations. Thus, 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*. All of these are large occupations 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 concentration increases when keeping the occupational structure unaltered and changing the distribution of Black women (see Table 3). A different pattern is observed in *chief executives and public administrators*, where the representation of this minority dramatically fell, which led to a segregation increase.[22]

3.2 Assessing the Reduction in Segregation

The reduction in segregation shown above reveals that Black women were much more evenly distributed across occupations in 2010 than in 1940, but it does not say anything about whether they increased their representation in low- or high-paid occupations. To analyze this matter, we now use the measures proposed in section 2.2 that penalize the concentration of the group in low-paid occupations.[23]

[22] It is worth mentioning that large occupations related to nursing, 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 overrepresentation of Black women in these kinds of occupations barely changed.

[23] For 1980, 1990, 2000, 2005-07, and 2008-2010 the wage of each occupation is proxied by the average wage per hour. Due to data limitations, for 1940, 1960, and 1970 we instead use the average wage per week (during the last two years, the number of worked weeks was estimated using a variable coded in intervals). In any case, note that our status-sensitive measures do not depend on these wages but on relative wages ($w_j / \overline{w}$). For 1980, we calculate these relative wages using both wages per hour and per week, and the values of the status-sensitive segregation indices were higher in the latter. This makes the two series (that based on the 1950 classification and the one based on the 1990 classification) less

By comparing the segregation curve and the status-sensitive segregation curve of each year, we find that the latter is always below the former. As an example, the curves for 2008-2010 are shown in Figure 6. The segregation curve, S, shows that some occupations represent 20% (respectively, 40%) of jobs but account for only 2.2% (respectively, 11.8%) of Black women. The wage-sensitive segregation curve, S^w, indicates that the share of Black women who worked in occupations that accounted for 20% (respectively, 40%) of total wage revenues is even lower, 1.6% (respectively, 7%).

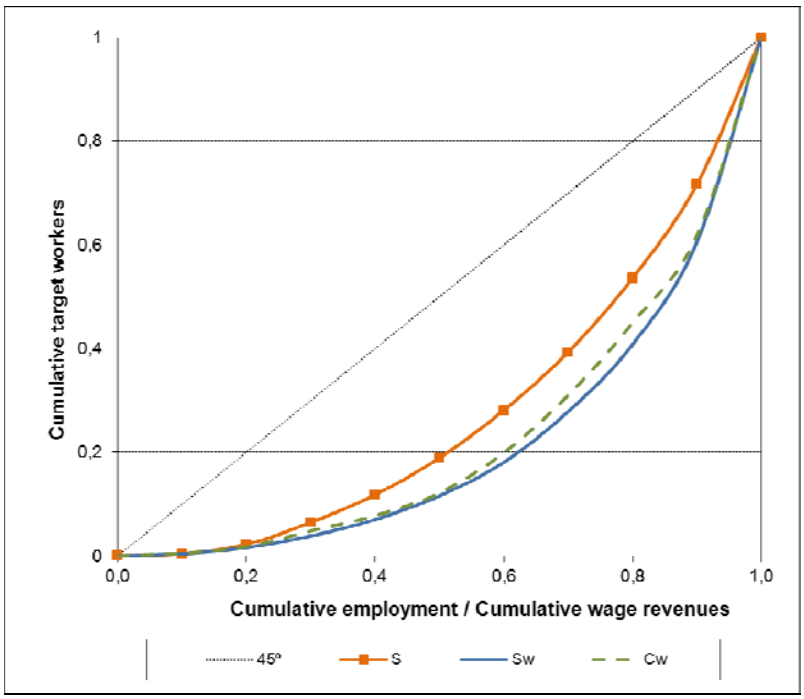

Figure 6. Local segregation curve (S), status-sensitive segregation curve (S^w), and status-sensitive concentration curve (C^w) of Black women, 2008-2010.

This fact, together with the similarity between the status-sensitive concentration curve, C^w, and the status-sensitive segregation curve, S^w, reveals the low presence of Black women in high-paid occupations.[24] As expected, the results for the remaining years

comparable than in the previous case. For 1950, we cannot calculate the average wage in each occupation because we only have information for the sample-line person of each household.

[24] The status-sensitive concentration curve, C^w, is analogous to the status-sensitive segregation curve except that the ranking of occupations is that of the segregation curve. We find that, in each year, C^w and S^w are similar. This suggests that there are not significant changes in the ranking of occupations when using $\left(c_j / t_j w_j\right)$ rather than $\left(c_j / t_j\right)$. Hence, the fact that the status-sensitive segregation curve is below the segregation curve is the result of Black women being concentrated in low-paid occupations.

suggest that this weak position was a common characteristic of the participation of Black women in the labor market over the seventy-year period.

To quantify the extent of this matter along the 1940-2010 period, Figure 7 (and A3, in the Appendix) shows the differences between segregation and status-sensitive segregation of Black women according to indices $\Delta\Phi_a^w$.[25] They reveal that Black women notably improved up to 1980; the process was much slower between 1980 and 2000, and it slightly worsened from 2000 to 2010. This temporal pattern is analogous to that depicted in our previous segregation analysis, except that the introduction of wages in the analysis has permitted us to single out the drawing back of Black women at the turn of the century.

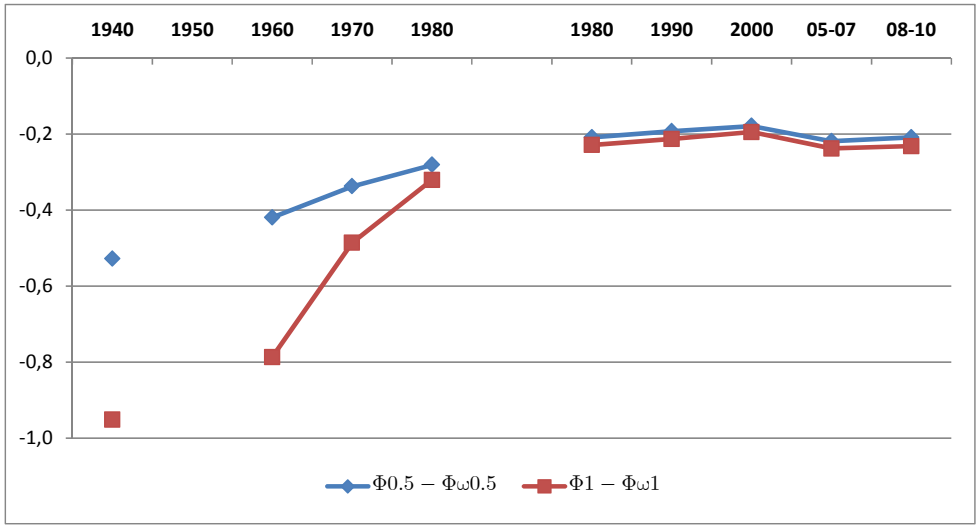

Figure 7. Differences between segregation and status-sensitive segregation of Black women in 1940-2010 according to indices $\Delta\Phi_a^w$ with a=0.5 and 1 (1950 and 1990-based classifications).

We can conclude that the strong segregation reduction in the 1960s and 1970s was accompanied by important wage improvements due to the higher presence of Black women in occupations with relative wages higher than those they enjoyed in 1940. However, from 1980 onward, an increasing wage inequality and a low improvement in segregation gave rise to small advances in the integration of Black women in the labor market. Consequently, their position in 2008-10 was not too different from that thirty years before.

[25] The values of indices I^w and $\Delta\Phi_a^w$ are given in the Appendix; see Tables A2 and A3, respectively.

4. Differences in Segregation by Education

In this section, we explore whether education plays a role in the segregation of Black women. For this purpose, we consider four levels of education: less than high school, high school, some college, and bachelor's degree (see Table A5 in the Appendix). 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 (as we did in the previous section). 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.

We find that Black women of any educational group experienced a reduction in segregation from 1940 to 2000, while differences between groups have existed in the past decade (see Table A4 in the Appendix). 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 reduction in segregation.

The analysis also reveals that for each census between 1940 and 1970, the segregation curves of the four education groups cross. This implies that along this period segregation was not lower for the more educated (as an example, see Figure 8, which shows the corresponding curves for 1960).

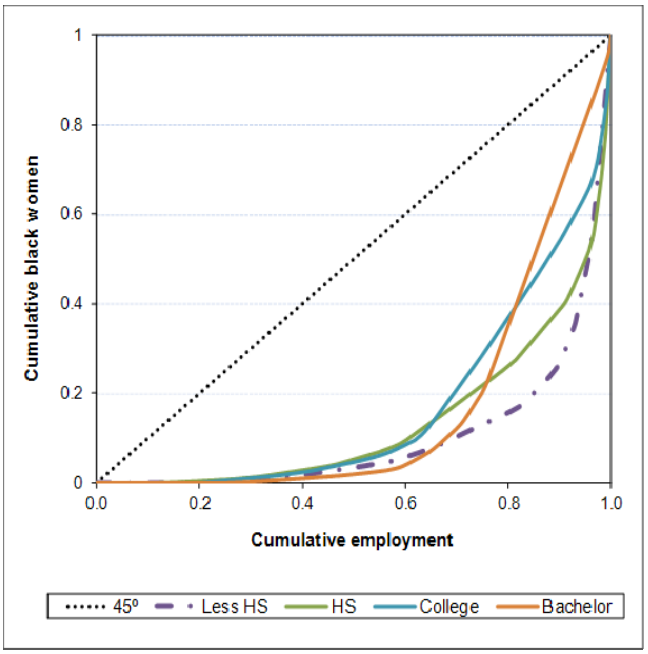

Figure 8. Local segregation curves (*S*) by educational achievements in 1960

Things start to change in 1980 because Black women with less than a high school education constitute 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 of those who have a bachelor's degree). Figure 9 shows the corresponding curves for 2008-2010.

We see that in that period, 20% (respectively, 50%) of jobs filled with workers with less than a high school education have almost no Black women (respectively, 10%) with the same education. In addition, almost 56% of Black women with that education are concentrated in occupations that account for 20% of employment. Something similar happens to those who have high school diplomas. The pattern is 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.

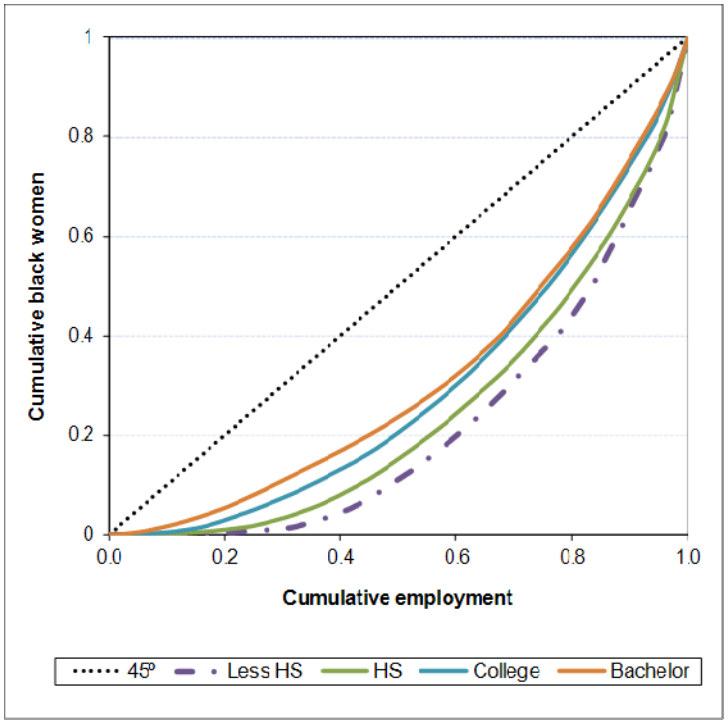

Figure 9. Segregation curves (*S*) by educational achievement in 2008-2010

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%). 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 building service*; *bus drivers*; *customer service reps, investigators and adjusters*; *guards, watchmen and doorkeepers;* and *secretaries*.[26] At this second stage of representation we also find occupations with very 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

[26] 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%.

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 9, 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 occupation wages are between 0.36 and 1.09 times the average wage. Among occupations with the highest representation of this group (ranging between 8.5% and 20% of workers), we can only identify one occupation with a wage slightly above the average— *registered nurses*. 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; 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.

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 (the underrepresentation in these occupations is between 40% and 85%). 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*, specially *veterinarians*, and *lawyers*).

5. Conclusions

Based on harmonized and detailed occupation titles (269 for the period 1940-1980 and 387 for 1980-2010) and making use of measures that do not require pair-wise comparisons among demographic groups, this paper has shown that the occupational segregation of Black women dramatically declined from 1940 to 1980 (especially in the 1960s and 1970s), it slightly decreased from 1980 to 2000, and it remained stagnated in the first decade of the 21st century. The fall in the representation of this minority in farm labor and the rise in several clerical occupations played an important role in explaining the segregation reduction between 1940 and 1960. Between 1960 and 1980, the segregation decline was instead due to a drop in the representation of Black women in domestic services, while some clerical jobs started to witness an overrepresentation of this minority. The decreasing presence of Black women in domestic services was fueled between 1980 and 2000 by Hispanic women who were entering this kind of occupations. In this period, the increase of Black women in many managerial and professional specialty occupations and in some sales occupations also help to explain the reduction in segregation, while many administrative support occupations, together with cashiers, hairdressers, and bus drivers, experienced an increase in the already high presence of this minority, thus contributing to halting the segregation decline. Their still low representation in high-paid occupations, such as those of chief executives and public administrators, lawyers, and health diagnosing occupations, did not contribute to reducing segregation more intensively.

These results are in line with those obtained by King (1992), Kaufman (2010), and Mintz and Krymkowski (2011). Thus, using 159 occupations for the period 1940-1988, King (1992) finds that segregation between Black and White women diminished from 1960 to 1988, while the segregation between Black women and White men and that between Black women and Black men decreased up to 1980. As opposed to King (1992), our results also suggest that Black women were more evenly distributed across occupations in 1960 than they were in 1940, while King finds different results depending on whether Black women are compared with either White women, White men, or Black men. Using the same dataset as we do, Kaufman (2010) updates King's (1992) study to analyze the period 1980-2000 and finds a reduction in segregation in all pair-wise comparisons except in the segregation between Black women and White men,

which increased in the 1990s. Mintz and Krymkowski (2011) also point to a reduction in segregation between Black women and men and between Black women and either White or Hispanic women from 1983 to 2002 when using Current Population Surveys.

To assess the reduction in segregation between 1940 and 2000 in terms of well-being, this paper has extended recent tools that quantify the discrepancy between the distribution of Black women across occupations and the occupational structure of the economy by penalizing the concentration of the group in low-paid jobs. These measures allow us to suggest the existence of an integration process for Black women from 1940 to 1980, especially in the 1960s and 1970s. The process was not so intense in the next two decades, and it slightly reversed after 2000.

Regarding the role that education has played, this study has shown that up to 1980, the segregation of Black women who have bachelor's degrees was not lower than the segregation of Black women with a lower education level because different results can be reached depending on the index used. However, from 1990 to 2010, a clear and distinctive pattern emerges. Black women with either some college or university degrees have lower segregation (as compared with their peers) than do those with lower levels of education. In fact, we found that in 2010 the higher the educational attainments, the lower the segregation from their peers. Even though Black women with university degrees do not depart from their peers in terms occupations to the same extent than they do those with lower education levels, the occupations in which they tend to work still have in 2010 wages substantially that are below the average wage of occupations that high-skilled workers fill. Almost a quarter of them are concentrated in occupations that account for 10% of high-skilled workers, and these occupations have (average) wages that range between 0.36 and 1.09 times the average wage of high-skilled occupations, which suggests that the educational level alone does not explain the segregation of Black women in the labor market (Alonso-Villar et al., 2012).

References

Albelda, R. (1986): "Occupational Segregation by Race and Gender, 1958-1981," *Industrial and Labor Relations Review* 39(3), 404-411.

Alonso-Villar, O., Del Río, C. and Gradín, C. (2012): "The Extent of Occupational Segregation in the US: Differences by Race, Ethnicity, and Gender," *Industrial Relations* 51, 179-212.

Alonso-Villar, O. and Del Río, C. (2010): "Local versus Overall Segregation Measures," *Mathematical Social Sciences* 60, 30-38.

Beller, A.H. (1985): "Changes in the Sex Composition of U.S. Occupations, 1960-1981," *Journal of Human Resources* 20, 235-250.

Bianchi, S.M. and Rytina, N. (1986): "The Decline of Occupational Sex Segregation during the 1970s: Census and CPS Comparisons," *Demography* 23, 79-86.

Blackorby, C. and Donaldson, D. (1978): "Measures of Relative Equality and Their Meaning in Terms of Social Welfare," *Journal of Economic Theory* 18, 59-80.

Blaug, F.D., Brummund, P. and Liu, A. Y.-H. (2013): "Trends in Occupational Segregation by Gender 1970-2009: Adjusting for the Impact of Changes in the Occupational Coding System," *Demography* 50, 471-492.

Browne, I. and Misra, J. (2003): "The Intersection of Gender and Race in the Labor Market," *Annual Review of Sociology* 29, 487-513.

Collins, P.H. (1999): *Black Feminist Thought: Knowledge, Consciousness and the Politics of Empowerment*. London: HarperCollins.

Del Río, C. and Alonso-Villar, O. (2012): "Occupational Segregation Measures: A Role for Status," *Research on Economic Inequality* 20, 37-62.

Duncan, O. and Duncan, B. (1955): "A Methodological Analysis of Segregation Indexes," *American Sociological Review* 20(2), 210-217.

England, P., Christopher, K. and Reid, L.L. (1999): "Gender, Race, Ethnicity, and Wages." In Irene Browne, ed., *Latinas and African American Women at Work. Race, Gender, and Economic Inequality*, 139-182. New York: Russell Sage Foundation.

Fuchs, V.R. (1975): "A Note on Sex Segregation in Professional Occupations," *Explorations in Economic Research* 2, 105-111.

Glenn, E.N. (1999): "The Social Construction and Institutionalization of Gender and Race: An Integrative Framework." In Myra Marx Ferree, Judith Lorber and Beth B. Hess, ed., *Revisioning Gender*, 3-43. Thousand Oaks (CA): Sage publications.

Jacobs, J.A. (1999): "The Sex Segregation of Occupations: Prospects for the 21st Century". In Gray N. Powell ed., *Handbook of gender and work*, 15-141. Newbury Park (CA): Sage publications.

Kaufman, R.L. (2002): "Assessing Alternative Perspectives on Race and Sex Employment Segregation," *American Sociological Review* 67, 547-572.

Kaufman, R.L. (2010): *Race, Gender, and the Labor Market: Inequalities at Work*. Lynne Rienner Publishers, Boulder (CO), USA.

King, M. (1992): "Occupational Segregation by Race and Sex, 1940-88," *Monthly Labor Review* 115, 30-37.

Levanon, A., England, P. and Allison, P. (2009): "Occupational Feminization and Pay: Assessing Casual Dynamics Using 1950-2000 U.S. Census Data," *Social Forces* 88, 865-981.

McDaniel, A., DiPrete, T.A., Buchmann, C. and Shwed, U. (2011): "The Black Gender Gap in Educational Attainment: Historical Trends and Racial Comparisons," *Demography* 48, 889-914.

Mintz, B. and Krymkowski, D. (2011): "The Intersection of Race/Ethnicity and Gender in Occupational Segregation," *International Journal of Sociology* 40(4), 31-58.

Moir, H. and Selby Smith, J. (1979): "Industrial Segregation in the Australian Labour Market," *Journal of Industrial Relations* 21, 281-291.

Queneau, H. (2009): "Trends in Occupational Segregation by Race and Ethnicity in the USA: Evidence from Detailed Data," *Applied Economics Letters* 16, 1347-1350.

Reskin, B. (1999): "Occupational Segregation by Race and Ethnicity Among Women Workers." In Irene Browne, ed., *Latinas and African American Women at Work. Race, Gender, and Economic Inequality*, 183-204. New York: Russell Sage Foundation.

Reskin, B. (2012): "The Race Discrimination System," *Annual Review of Sociology* 38, 17-35.

Ruggles, S., Alexander, T., Genadek, K., Goeken, R., Schroeder, M. and Sobek. M. (2010): "Integrated Public Use Microdata Series: Version 5.0" [Machine-readable database]. Minneapolis, MN: Minnesota Population Center.

Semyonov, M., Haberfeld, Y., Cohen, Y., and Lewin-Epstein, N. (2000): "Racial Composition and Occupational Segregation and Inequality across American Cities," *Social Science Research* 29, 175-187.

Tolnay, S.E. (2003): "The African American 'Great Migration' and Beyond," *Annual Review of Sociology* 29, 209-232.

Tomaskovic-Devey, D. and Stainback, K. (2007): "Discrimination and Desegregation: Equal Opportunity Progress in U.S. Private Sector Workplaces since the Civil Rights Act," *Annals of the American Academy* 609, 49-84.

Tomaskovic-Devey, D., Zimmer, C., Stainback, K., Robinson, C., Taylor, T. and McTague, T. (2006): "Documenting Desegregation: Segregation in American Workplaces by Race, Ethnicity, and Sex, 1966-2003," *American Sociological Review* 71, 565-588.

Watts, M.J. (1995): "Trends in Occupational Segregation by Race and Gender in the U.S.A., 1983-92: A Multidimensional Approach," *Review of Radical Political Economics* 27 (4), 1-36.

Appendix

I(c,t)	$\phi_{0.5}$	ϕ_1	ϕ_2	D	G
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
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. Values of the local segregation indices of Black women (1940-1980: 1950 classification; 1980-2010: 1990-based classification).

$I^w(c,t)$	$\phi^w_{0.5}$	ϕ^w_1	ϕ^w_2	D^w	G^w
1940	2.006	2.563	15.595	0.769	0.903
1950					
1960	1.663	2.134	13.339	0.666	0.847
1970	1.115	1.272	5.292	0.548	0.724
1980	0.766	0.777	1.624	0.487	0.628
1980	0.748	0.743	1.276	0.478	0.630
1990	0.615	0.604	0.868	0.438	0.582
2000	0.560	0.539	0.706	0.418	0.557
05-07	0.618	0.595	0.836	0.435	0.580
08-10	0.589	0.570	0.787	0.425	0.569

Table A2. Values of the status-sensitive segregation indices of Black women (1940-1980: 1950 classification; 1980-2010: 1990-based classification).

$\Delta\Phi^w_a(c,t)$	$\Phi_{0.5} - \Phi^w_{0.5}$	$\Phi_1 - \Phi^w_1$	$\Phi_2 - \Phi^w_2$
1940	-0,528	-0,951	-11,399
1950			
1960	-0,420	-0,787	-9,976
1970	-0,338	-0,486	-3,797
1980	-0,281	-0,321	-1,030
1980	-0,209	-0,229	-0,571
1990	-0,193	-0,213	-0,415
2000	-0,179	-0,195	-0,333
05-07	-0,219	-0,238	-0,445
08-10	-0,209	-0,232	-0,420

Table A3. Values of the difference between the local and status-sensitive segregation indices, $\Delta\Phi^w_\alpha(c;t)$, of Black women (1940-1980: 1950 classification; 1980-2010: 1990-based classification).

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 A4. Local segregation indices of Black women by educational level (1940-1980: 1950 classification; 1980-2010: 1990-based classification).

	Percentage of black women	Share of black women with Less than High School	Share of black women with High School	Share of black women with Some College	Share of black women with Bachelor's degree	Share of workers with Bachelor's degree
1940	3.31	86.98	7.58	3.39	2.05	5.84
1950	3.26					
1960	3.56	68.84	18.71	6.79	5.66	9.76
1970	4.12	52.34	29.53	11.42	6.71	12.82
1980	4.68	30.82	33.93	23.89	11.36	18.53
1990	5.08	20.46	30.55	33.36	15.63	23.31
2000	5.35	15.40	28.04	37.35	19.21	27.24
2005-7	5.60	10.71	31.04	36.62	21.63	29.36
2008-10	5.85	9.16	26.74	40.77	23.33	30.86

Table A5. Percentage of Black women and shares of Black women by educational level.

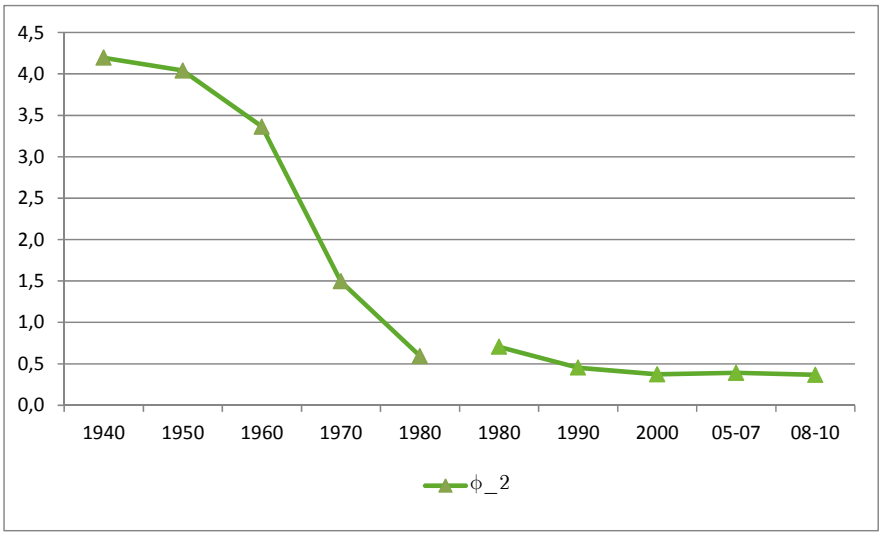

Figure A1. Segregation of Black women in 1940-2010 according to index Φ_2 (1950 and 1990-based classifications).

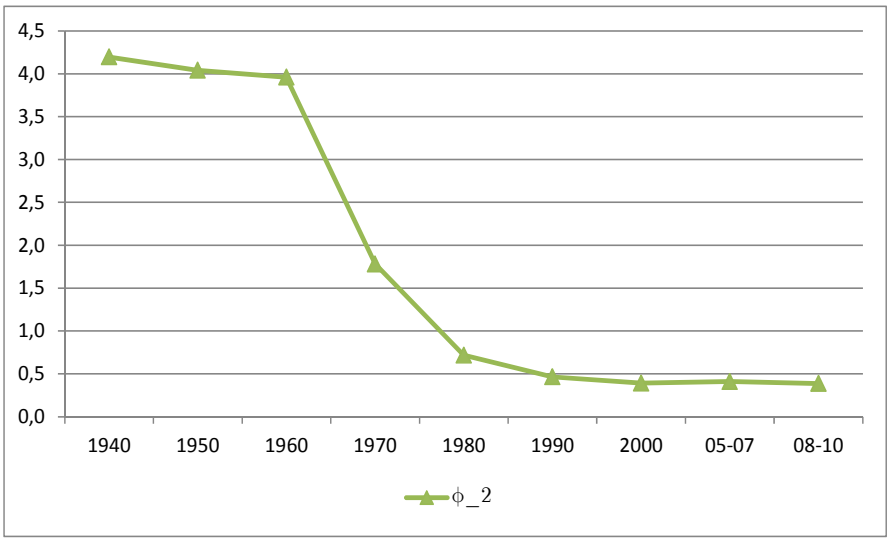

Figure A2. Segregation of Black women in 1940-2010 according to index Φ_2 (classification of each year).

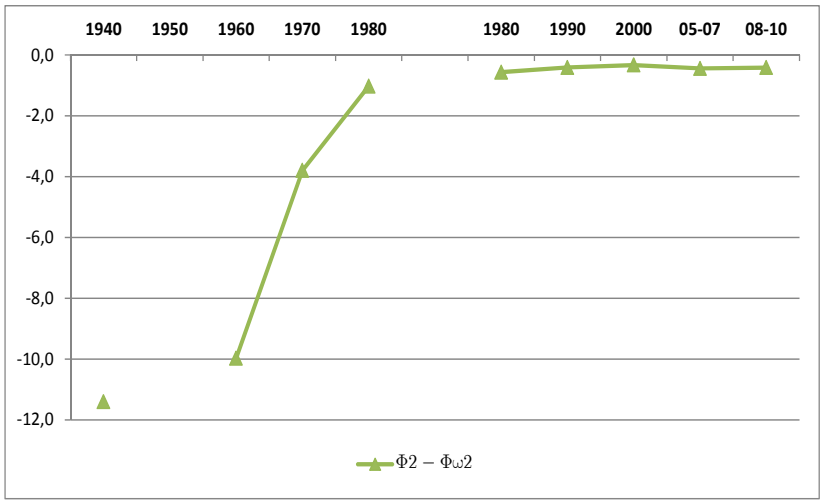

Figure A3. Differences between local and status-sensitive segregation indices for Black women in 1940-2010 according to index $\Delta\Phi_2^w$ (1950 and 1990-based classifications)

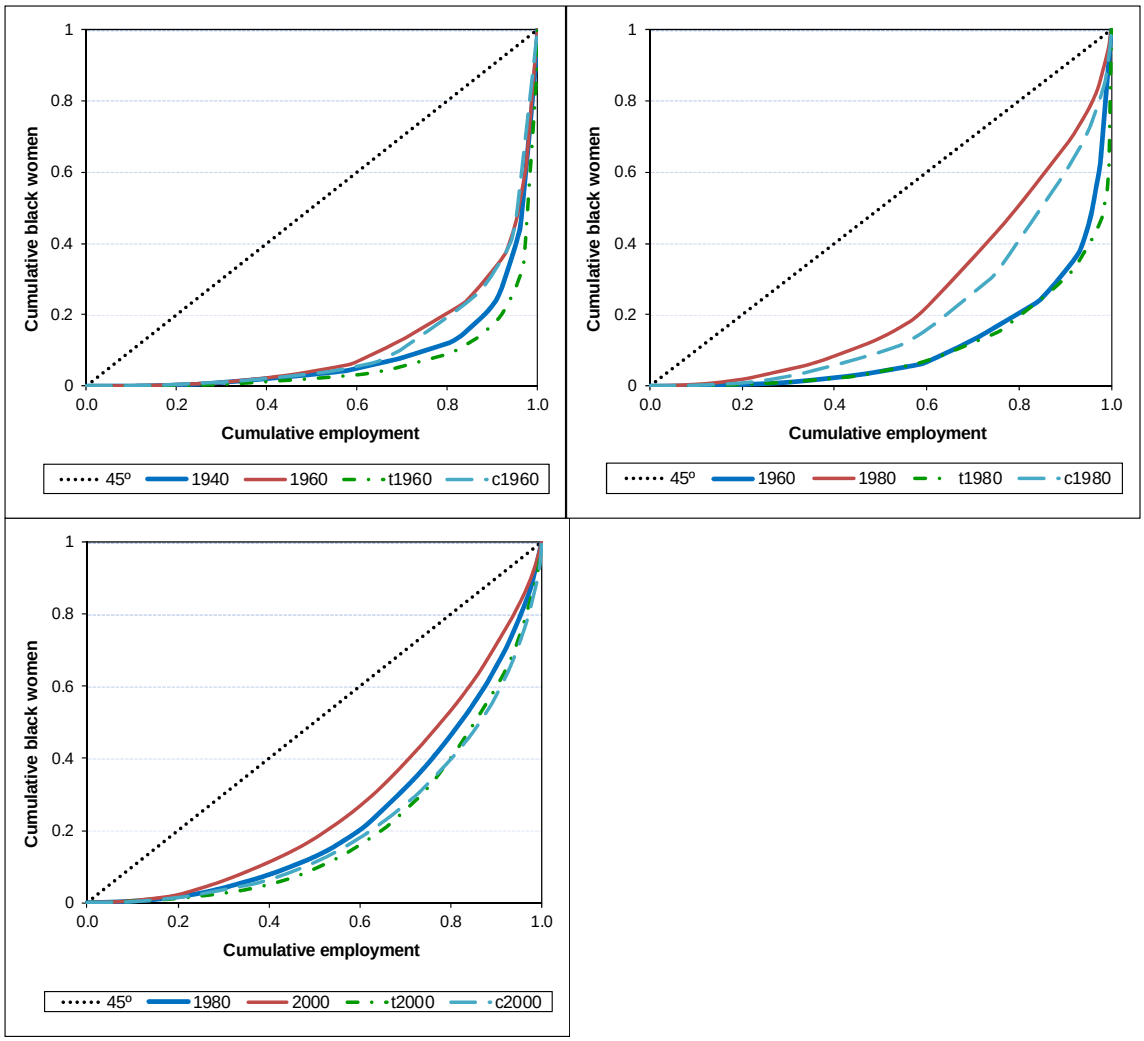

Figure A4. Decomposing segregation changes using local segregation curves: 1940-1960 and 1960-1980 (1950 classification); 1980-2000 (1990-based classification).