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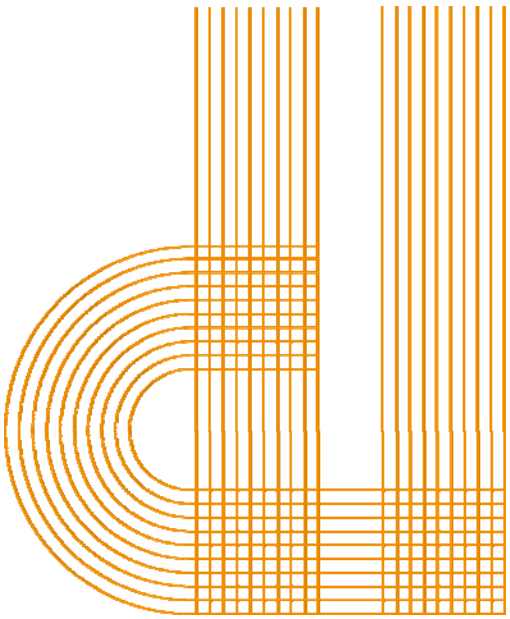

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# Occupational Segregation of Afro-Latinos

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**Abstract**

The goal of this study was to use census information to measure the level of occupational segregation of workers of African descent compared to whites in various Latin American countries. I further investigated the extent to which segregation levels can be accounted for by different factors, such as the impact of black-white inequalities on years of schooling or different age structures of the racial groups that are unevenly distributed across the countries. The results show that Afro-Latinos are generally highly segregated across occupations. However, while a large proportion of this segregation would not exist in Brazil and Ecuador if Afro-Latinos had attained the same education as whites, the proportion of occupational segregation explained by educational inequalities is much lower in Cuba, Puerto Rico, and Costa Rica. Further, occupational segregation would be even higher in most cases if the geographical distribution of black and white populations were similar across these countries.

**Keywords:** conditional occupational segregation, education, race and ethnicity, Afro-Latinos.

**JEL Classification:** D63, J15, J16, J71, J82.

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## 1. Introduction

Latin America is a region with a remarkably diverse population integrated by people with indigenous, European, African, and Asian origins. In particular, the early development of sugar and coffee plantations during the European colonization brought several million slaves captured in Sub-Saharan countries to Latin America. Later, several internal migrations of people of African descent within or between countries in response to new economic activities helped to shape the current demography of this group. The most salient case is Brazil where, according to the 2010 Census, 51 percent of its 191 million people reported that they were either black or of mixed race, officially outnumbering whites for the first time in many years and comprising the largest black population outside of Africa. Communities of African ancestry are also important in many other countries, especially in the Caribbean region, although their numbers are often controversial due to the lack of reliable sources.[1] Slavery was officially abolished in these countries during the 19th century, with Cuba and Brazil being the last to ban the practice in the 1880s, and there was no segregation of the type imposed in the U.S. South.[2] However, a legacy of racial inequality across several dimensions lingers all over the region, even today. Racial inequalities have extended to people's living conditions, especially with regard to higher poverty and deprivation rates, unequal access to quality education, lack of political representation, and generally worse labor market outcomes. One of the most important racial inequalities is related to the way blacks and whites enter the labor market, which constrains the opportunities of Afro-Latinos to earn a living and fulfill their personal aspirations. Indeed, in almost all countries with a significant black population and available data, there is a tendency for blacks to be overrepresented in some occupations, typically those that are informal, provide lower pay, and demand lower-skills, which directly affects social inclusion of nonwhites and may undermine social cohesion in these countries.

Despite its relevance, segregation by occupations based on race has not been extensively analyzed in Latin America. An important exception was an analysis by

[1] For a documented history of Afro-Latinos, see Andrews (2004).

[2] An important exception was the geographical confinement of Afro-Costa Ricans in the province of Limón and their lack of citizenship and other rights until 1948. Afro-Costa Rican communities were the result of the immigration of blacks from the British Indies to do railway construction work and who later worked on plantations.

King (2009), who recently documented the segregation of Afro-Brazilians in the period from 1976 to 2001. Using the dissimilarity index, she found evidence that segregation was decreasing for women but not for men. She also highlighted the relevance of education because segregation was lower for black workers with an educational level similar to that of whites, and that segregation increased with years of schooling. To our best knowledge, there has been even less attention paid to the segregation of people of African descent in other Latin American countries.[3]

Segregation by occupation based on race can be explained in various ways. It could be the consequence of discrimination in the labor market induced by racial prejudices held by employers, customers, or co-workers. It could also reflect the existence of inequality in human capital accumulation across races, providing access to a different set of available jobs depending on workers' skills. As a matter of fact, a high level of segregation among blacks can be partly due to pre-market inequalities, such as blacks dropping out of school earlier than whites or the fact that they are generally younger or migrants and thus have less experience in the local market. When segregation is measured at the national level, it may also be possible that it is the consequence of blacks and whites living in different areas of the country with different levels of economic development or regional specialization, so their occupational structures differ. Indeed, Alonso-Villar, Del Río, and Gradín (2010), and Gradín (2010), using different methodologies, showed that a large share of the segregation of Hispanic and Asian workers in the United States can be attributed to differences in initial endowments, mainly the result of recent immigration to the United States and the lack of English proficiency. However, in the case of blacks, the proportion that is explained by these characteristics is smaller, between 9 and 17 percent, depending on the index used (Gradín, 2010). Blacks' lower level of education is responsible for between 14 and 30 percent of observed segregation, but the geographical distribution of blacks counteracts that effect.

The aim of this paper is to document the extent of segregation of blacks and whites by occupations in some Latin American countries and then to measure how much of this segregation is explained by factors such as workers' education, location, migration

[3] By contrast, several studies have recently addressed the issue of occupational segregation by race in the United States. See, among others, Albelda (1986), King (1992), Spriggs and Williams (1996), Rawlston and Spriggs (2002), Queneau (2009), Alonso-Villar, Del Río and Gradín (2010), or Gradín (2010).

status, and age in order to better understand where segregation is actually produced. The level of segregation across occupations that cannot be explained by workers' characteristics is *conditional segregation*, which is a measurement of the probability of blacks and whites working in different occupations when they have the same characteristics, a more genuine measure of occupational dissimilarity. In order to separate explained and unexplained or conditional segregation and to attribute each factor's contribution to explaining segregation, I constructed counterfactual occupational distributions in which blacks are given the characteristics of whites using a re-weighting technique proposed by Gradín (2010), who extended an approach to wage differentials proposed by DiNardo, Fortin, and Lemieux (1996).

The structure of the paper is as follows. The next section describes the available data, the following one describes the methodology used. The last two sections provide the results and the main conclusions.

**2. Data**

The empirical analysis was based on microdata samples extracted from censuses conducted in 2000 in Brazil, Puerto Rico, and Costa Rica, and in Cuba, 2002, and Ecuador, 2001. The figures were obtained from the *Integrated Public Use Microdata Series International* (IPUMS-I) available at the Minnesota Population Center at the University of Minnesota.[4] This institution collected and harmonized censuses from all over the world. I have chosen those in the Latin American region with the relevant information available around 2000.[5] The use of census data guarantees larger samples from which to analyze segregation across a more detailed classification of occupations of groups that are not large enough in some countries, thus overcoming the problem of small units bias.

All these datasets provide the required information related to workers' characteristics. There are some comparability issues, however. The definition of race (or skin color) is self-reported in all countries, thus reflecting self-identification, except in Cuba where it is reported by the census enumerator except in specific cases in which the target person was absent and the color could not be inferred. Whites in Costa Rica are defined by

[4] The coverage of these databases was 10 percent of the population in Costa Rica, Cuba and Ecuador, 6 percent in Brazil, and 5 percent in Puerto Rico. See Table A1 in the Appendix for a detailed description of the samples used.

[5] In particular, Colombia, 2005, and Venezuela, 2001, were excluded because the former lacks the variable for occupation and the latter has no variable for race.

exclusion as those not claiming to be members of any other ethnic group (Indigenous, Afro-Costa Rican, or Asian-Chinese), which could cause over-estimation of this group. Blacks and people who are of mixed black and white races are all considered part of one group called Afro-Latinos due to the well-known potential endogeneity problems of self-identification. That is, black and brown (*preto*) in Brazil, or black and mulatto in Ecuador or Cuba are all regarded as Afro-Latino. [6,7]

Regarding occupations, I used two different classifications. The most aggregated one has 9 major categories, and according to the International Standard Classification of Occupations (ISCO), they have one digit, after excluding the armed forces and unknown or other occupations that are too small or nonexistent in some countries. This classification has the advantage of being standardized, so it is comparable across all datasets, but if the occupations' boundaries are too wide, a big share of segregation remains hidden. For that reason, I also used the most disaggregated classification of occupations in each dataset, the equivalent of three digits, allowing a more accurate measure of the level of segregation, but this made a direct comparison across countries harder because segregation indices are very sensitive to the classification used, and this one is country-specific. In this case, the number of categories goes from 103 in Costa Rica to 509 in Brazil. The other workers' characteristics are generally comparable. Education was measured as years of schooling and literacy (Brazil, Costa Rica and Ecuador). If the information was not available, I used the level of education attained (Cuba and Puerto Rico). Age and age squared were also included in order to measure potential experience. Several variables available in each dataset account for migration status, including internal migration, time of residence, or citizenship.[8] Geographical location is measured at the level of state (Brazil) or province (Costa Rica, Cuba, and Ecuador), also taking into account whether the area of residence was rural or urban (Brazil, Costa Rica, and Ecuador). In the case of Puerto Rico, the metropolitan areas were used instead, with a category for non-metropolitan areas.

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[6] Browns in Brazil could also include a minority of those of mixed white and indigenous ancestry.

[7] Telles (2002), for example, supports this view because it is less ambiguous. After comparing the consistency in a specific survey between interviewer and respondent categorizations, he showed that a racial classification of black and brown people in Brazil is influenced by characteristics, such as education, gender, age, and local racial composition.

[8] Citizenship was used in all countries. Time of residence since a person immigrated and migration status according to whether the worker lived in the same administrative unit or abroad five years ago was used in all countries except Puerto Rico.

## 3. Methodology

### 3.1 Measuring unconditional segregation

I adopted here the standard convention of approaching the racial segregation by occupations of blacks compared with the reference group, whites, in each country.[9] Several indices can be found in the literature to account for segregation levels, with the dissimilarity index (Duncan and Duncan, 1955) being, by far, the most popular in empirical analysis despite its well-known limitations. Other indices have been proposed verifying better properties, most of them borrowed from measurements of income inequality. Examples of these are the Gini index or the Generalized Entropy family of indices, which embrace the Theil index or the Hutchens square root as particular cases (Jahn, Schmid and Schrag, 1947, Duncan and Duncan, 1955, Hutchens, 1991, 2004). For the sake of robustness but wanting to keep things simple, in this empirical analysis I report the Hutchens and dissimilarity indices.[10]

Let us consider a population of $N$ workers divided into two groups: $N^0$, Afro-Latinos, and $N^1$, whites. We are interested in measuring the segregation of this population across $T$ occupations in the economy. Let us denote by $n^i = \left(n_1^i,...,n_T^i\right)$ the distribution for one group across occupations so that $N^i = \sum_{j=1}^{T} n_j^i$, $i=\{0,1\}$. Then, based on the proportions of whites and blacks in each occupation, we define the following two segregation indices:

$$D(n^0,n^1) = \frac{1}{2}\sum_{j=1}^{T}\left|\frac{n_j^1}{N^1} - \frac{n_j^0}{N^0}\right| \;;\; H(n^0,n^1) = 1 - \sum_{j=1}^{T}\sqrt{\frac{n_j^0}{N^0}\frac{n_j^1}{N^1}} \;. \qquad \textbf{(1)}$$

$D$ is the dissimilarity index proposed by Duncan and Duncan (1955). $H$ is the Hutchens square root index, which has appealing properties that were well-described in Hutchens (1991, 2004). Note that $D$ and $H$ are bounded between 0, when there is no segregation because whites and Afro-Latinos have the same distribution across

[9] Alternatively, I could have considered the measurement of multigroup segregation instead (see, among others, Reardon and Firebaugh, 2002, Alonso-Villar and del Río, 2010, or Frankel and Volij, 2011). However, I adopted the binary approach because I am interest in comparing the employment distribution of blacks and that of the affluent whites, and because of the fact that the number and size of groups vary across countries.

[10] Other indices such as Gini or those from the Generalized Entropy family behave very similarly to $D$ and $H$, respectively, and for that reason, those results are omitted for simplicity.

occupations, and 1, when segregation is at its maximum because there is no overlap between the two distributions (whites and Afro-Latinos work in different occupations).

### 3.2 Measuring conditional segregation

In this section, we follow the methodology outlined by Gradín (2010), who adapted the approach provided by DiNardo, Fortin, and Lemieux (1996) for measuring occupational segregation. This propensity score technique was initially used in the context of decomposing the wage differential between two given populations across the entire distribution. In presenting the procedure, we first need to reformulate the notation. Each individual observation belongs to a joint distribution $F(e, \mathrm{z}, W)$ of occupations $e \in \{1, 2..., T\}$, (continuous or discrete) individual characteristics $z = (z_1, \mathrm{z}_2, ..., z_k, ..., z_K)$ defined over the domain $\Omega_z$, and a dummy $W$ indicating group membership. The joint distribution of occupations and attributes of each group is the conditional distribution $F(e, \mathrm{z} \mid W)$. The discrete density function of occupations for each group, $f^i(e)$, can be expressed as the product of two conditional distributions:

$$f^i(e) \equiv f(e \mid W = i) = \int_z dF(e, z \mid W = i)dz = \int_z f(e \mid z, W = i) \cdot f(z \mid W = i)dz \,, \qquad \textbf{(2)}$$

where $i$=0 for Afro-Latinos and 1 for whites.

Then, under the general assumption that the structure of occupations of Afro-Latinos, represented by the conditional density $f(e \mid z, W = 0)$, does not depend on the distribution of attributes, we can define the hypothetical counterfactual distribution $f_z(e)$:

$$f_z(e) = \int_z f(e \mid z, W = 0) \cdot f(z \mid W = 1)dz = \int_z f(e \mid z, W = 0) \cdot \psi_z \cdot f(z \mid W = 0)dz = \int_z \psi_z f(e, z \mid W = 0)dz \qquad \textbf{(3)}$$

as the density that would prevail if the population of Afro-Latinos kept its own conditional probability of being in a given occupation, $f(e \mid z, W = 0)$, but had the same characteristics of whites given by their marginal distribution $f(z \mid W = 1)$. Expression (3) shows that this counterfactual distribution can be produced by properly reweighting the original distribution of the target group. The reweighting scheme $\psi_z$ can be obtained, after using Bayes' theorem, as the product of two probability ratios:

$$\psi_z = \frac{f(z \mid W = 1)}{f(z \mid W = 0)} = \frac{\Pr(W = 0)}{\Pr(W = 1)} \frac{\Pr(W = 1 \mid z)}{\Pr(W = 0 \mid z)} \,. \qquad \textbf{(4)}$$

The first ratio is given by the unconditional probabilities of group membership and is a constant. The second ratio is given by conditional probabilities and can be obtained by pooling the samples for whites and Afro-Latinos and estimating a logit (or probit) model for the probability of being white conditional on $z$. I estimated the following logit model:

$$\Pr(W=1|z)=\frac{\exp(z\hat{\beta})}{1+\exp(z\hat{\beta})}, \qquad \textbf{(5)}$$

where $\hat{\beta}$ is the associated vector of estimated coefficients. Alternatively, one could think in terms of using a nonparametric approach, estimating the weights based on the empirical distribution of characteristics in both groups, that is, by computing the proportion of both populations in each cell that result from crossing all discrete characteristics (for example, the proportion of native-born whites and Afro-Latinos with a university degree). However, this approach could be difficult to implement when a large number of covariates are involved (many cells will be zero or will have a small number of observations), or when some factors are approached by continuous covariates. The approach used in this study overcomes these problems and makes it easy to identify the individual contribution of each factor.

For any given segregation index $S$, we can measure unconditional segregation defined over the distributions of occupations for whites and blacks, $S(e)\equiv S\left(f(e|W=1), f(e|W=0)\right)$, and define segregation conditional on $z$ to be the same index computed after replacing the density of Afro-Latinos by the counterfactual: $S(e|z)\equiv S\left(f(e|W=1), f_z(e)\right)$. This is the amount of (unexplained) segregation that remains after controlling for characteristics. The change in segregation after conditioning on characteristics $S(e|z)-S(e)$ provides a measure of segregation that is actually explained by our covariates $z$. This is in line with how wage differentials are usually decomposed into their characteristics (explained) and coefficients (unexplained) effects.

Furthermore, the change in segregation after conditioning on characteristics (explained part) can be additionally disaggregated into the detailed contribution of each covariate (or subset of covariates) $z_k$ in order to identify which factors are more explicative (explaining a larger reduction in segregation after conditioning). With $s(z_k)$ being the relative contribution of covariate $k$,

$$S(e \mid z) - S(e) = \sum_k s(z_k)\left[S(e \mid z) - S(e)\right]. \quad \textbf{(6)}$$

In order to obtain this detailed decomposition, we could compute a new counterfactual distribution $f_{z_k}(e)$ in which the corresponding reweighting factor $\psi_{z_k}$ is obtained, setting all of the other logit coefficients but this one to zero (Lemieux, 2002). The problem with this approach is that it assumes that each factor is the only one that changes and the sum of the contributions do not total one. Alternatively, we can shift all of the coefficients following a specific sequence (i.e., first location, then immigration, schooling, etc.), computing the contribution of each factor as the result of changing its associated coefficients. This recalls the well-known path-dependency problem in inequality decomposition because the contribution of a factor to the overall change in segregation will depend on the order in which we consider them. This difficulty was overcome in the empirical analysis by computing the Shapley decomposition that results from averaging over all possible sequences (Chantreuil and Trannoy, 1999; Shorrocks, 1999). Thus, the contribution of a given factor (i.e., education) will be the average of the contribution of education for all possible paths when education coefficients are changed in the first case, in the second, and so on.[11] In this way, the contribution of each factor is path-independent, and the contributions of all factors add up to one.

**4. Occupational segregation of Afro-Latinos in selected countries**

It is a matter of fact that Afro-Latinos generally work in different occupations than whites in their countries. Table 1 shows the distribution of male and female workers in each country by race across major ISCO occupational categories.

Indeed, Afro-Latino male workers are more likely than whites to work in elementary occupations, and in other jobs that pay less like trade workers (in all countries except Costa Rica) and farmers/fishermen (in Ecuador and Brazil). On the other hand, they are less likely to be found working as managers, professionals, and plant operators in all countries or as technicians and clerks in Ecuador, Brazil, and Puerto Rico. The largest black-white gaps in the proportion of male workers, however, vary across countries. The proportion of blacks working in elementary occupations is 11 percentage points larger than whites in Ecuador, 5 in Costa Rica, but about 2 in the

[11] See Sastre and Trannoy (2002) for a formalization of this procedure.

rest. The black-white differential in the proportion of farmers/fishermen is 10 percentage points in Brazil and 7 in Ecuador, while it is negative in the other countries. Similarly, the proportion of white managers (professionals) is about 5 (4) percentage points higher than among blacks in Brazil, 4 (6) in Ecuador, 4 (3) in Puerto Rico, but 2 (1) in Cuba, and 1 (1) in Costa Rica.

**Table 1. Distribution of Afro-Latino and white workers by major occupational categories**
ISCO Classification of occupations (9 categories).
Source: Own construction based on IPUMS-I Censuses around 2000

| | Costa Rica | | Cuba | | Ecuador | | Puerto Rico | | Brazil | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Women** | **Afro-L** | **white** | **Afro-L** | **white** | **Afro-L** | **white** | **Afro-L** | **White** | **Afro-L** | **White** |
| **Legislators, senior officials and managers** | 2.6 | 2.4 | 7.1 | 8.6 | 2.1 | 5.7 | 5.4 | 7.3 | 1.6 | 4.9 |
| **Professionals** | 21.3 | 15.6 | 14.4 | 17.1 | 6.2 | 12.1 | 14.0 | 17.6 | 3.9 | 10.6 |
| **Technicians and associate Professionals** | 11.0 | 12.7 | 23.8 | 24.1 | 2.9 | 5.5 | 12.7 | 11.8 | 9.4 | 11.5 |
| **Clerks** | 18.6 | 14.6 | 10.6 | 13.6 | 6.2 | 14.3 | 33.4 | 35.7 | 9.5 | 15.5 |
| **Service workers and shop and market sales** | 18.3 | 19.2 | 17.3 | 16.7 | 25.2 | 27.8 | 13.6 | 10.1 | 43.7 | 32.2 |
| **Skilled agricultural and fishery workers** | 0.4 | 0.5 | 5.5 | 3.1 | 5.3 | 3.5 | 0.4 | 0.3 | 13.0 | 8.2 |
| **Crafts and related trades workers** | 3.0 | 2.6 | 6.1 | 5.6 | 7.6 | 10.0 | 4.0 | 4.5 | 2.2 | 2.7 |
| **Plant and machine operators and assemblers** | 2.9 | 7.1 | 1.7 | 1.4 | 1.1 | 1.0 | 5.5 | 5.9 | 6.3 | 7.1 |
| **Elementary occupations** | 21.9 | 25.4 | 13.6 | 9.9 | 43.5 | 20.2 | 10.9 | 6.8 | 10.3 | 7.4 |
| **Total** | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| **Men** | | | | | | | | | | |
| **Legislators, senior officials and managers** | 1.9 | 3.0 | 9.9 | 11.9 | 1.1 | 5.5 | 7.2 | 10.9 | 2.3 | 6.9 |
| **Professionals** | 5.3 | 6.1 | 5.3 | 6.5 | 2.2 | 8.6 | 7.7 | 10.5 | 2.3 | 6.4 |
| **Technicians and associate Professionals** | 14.7 | 12.9 | 8.2 | 8.0 | 1.4 | 3.8 | 5.3 | 6.5 | 4.7 | 8.0 |
| **Clerks** | 6.1 | 4.9 | 1.7 | 2.0 | 3.4 | 5.6 | 11.7 | 13.6 | 4.3 | 6.4 |
| **Service workers and shop and market sales** | 12.5 | 11.8 | 11.7 | 11.7 | 13.3 | 17.9 | 13.6 | 12.0 | 14.4 | 14.7 |
| **Skilled agricultural and fishery workers** | 4.8 | 7.7 | 18.7 | 20.4 | 16.8 | 9.4 | 2.0 | 2.6 | 28.3 | 18.1 |
| **Crafts and related trades workers** | 11.4 | 15.0 | 20.9 | 15.6 | 24.5 | 20.7 | 30.8 | 23.8 | 26.0 | 21.9 |
| **Plant and machine operators and assemblers** | 11.4 | 12.3 | 10.0 | 12.4 | 7.6 | 9.7 | 8.1 | 8.8 | 9.6 | 11.4 |
| **Elementary occupations** | 32.0 | 26.4 | 13.6 | 11.5 | 29.7 | 18.8 | 13.8 | 11.5 | 8.1 | 6.1 |
| **Total** | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

Afro-Latino women also have different jobs than whites. The former generally work in less-skilled occupations, except for the outstanding case of Costa Ricans. There is a larger concentration of black women in elementary occupations that is especially evident in Ecuador (23 percent larger than whites), but also important in Puerto Rico (4), Cuba (4), and Brazil (3), and among service workers in Brazil (11 percent higher) and Puerto Rico (3). To a lesser extent, black women are also more likely to work as famers/fisherpersons in Brazil (5), Cuba and Ecuador (2). On the opposite side, they

are also less likely to work as technicians (except in Puerto Rico), and as managers, professionals, or clerks, with the remarkable exception of Costa Rica where the situation is reversed.

Based on the distribution of workers by race across occupations, Table 2 reports segregation levels for each country, using both occupational classifications, along with the ISCO's 9 major categories in the first four columns and the country-specific one in the other four columns. Indices, *H* and *D* are both reported. The first row for each country shows the observed or unconditional level of segregation, while the second row provides the level of these two indices after conditioning on workers' characteristics.

**Table 2. Afro-Latino/white segregation in selected Latin American countries**
Using two classifications of occupations, Duncan (*D*) and Hutchens (*H*) indices
Source: Own construction based on IPUMS-I Censuses around 2000

| | | Harmonized ISCO (9 categories) | | | | National Classification | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Men | | Women | | Men | | Women | |
| Country | Segregation | *D* | *H* | *D* | *H* | *D* | *H* | *D* | *H* |
| Brazil | Unconditional | 0.162 | 0.022 | 0.193 | 0.025 | 0.202 | 0.035 | 0.228 | 0.039 |
| | Conditional | 0.060 | 0.004 | 0.085 | 0.006 | 0.136 | 0.013 | 0.143 | 0.016 |
| Costa Rica | Unconditional | 0.094 | 0.006 | 0.104 | 0.009 | 0.173 | 0.034 | 0.200 | 0.043 |
| | Conditional | 0.089 | 0.007 | 0.144 | 0.012 | 0.196 | 0.042 | 0.199 | 0.064 |
| Cuba | Unconditional | 0.075 | 0.004 | 0.076 | 0.005 | 0.108 | 0.010 | 0.133 | 0.050 |
| | Conditional | 0.082 | 0.004 | 0.055 | 0.003 | 0.114 | 0.011 | 0.126 | 0.042 |
| Ecuador | Unconditional | 0.221 | 0.038 | 0.252 | 0.044 | 0.231 | 0.048 | 0.281 | 0.060 |
| | Conditional | 0.129 | 0.013 | 0.140 | 0.014 | 0.158 | 0.022 | 0.188 | 0.029 |
| Puerto Rico | Unconditional | 0.109 | 0.007 | 0.087 | 0.006 | 0.172 | 0.032 | 0.164 | 0.034 |
| | Conditional | 0.108 | 0.007 | 0.050 | 0.001 | 0.147 | 0.028 | 0.136 | 0.028 |

According to standardized data, segregation of Afro-Latinos seems to be unsurprisingly high in Ecuador and in Brazil and much lower in Cuba, Puerto Rico, and Costa Rica. Segregation based on these major categories is also higher among women than among men in Brazil, Ecuador, and Costa Rica, while in Cuba and Puerto Rico, they look pretty similar (except for *D* in Puerto Rico, which is lower for women). Regarding welfare considerations, it is important to keep in mind that the segregation of blacks generally occurs in less-prestigious occupations except for Costa-Rican women, as previously shown.

The observed levels of segregation may be at least partially the result of the different characteristics by race in each country. In order to distinguish what part of segregation

is due to black-white inequality in factors such as geographical location, attained education, age, or migration, conditional levels of both indices are also reported in Table 2. It becomes clear that after conditioning on characteristics, segregation is substantially reduced in those two countries with the highest observed levels: Brazil and Ecuador. While Ecuador keeps its position as the most segregated country after conditioning by characteristics, Brazil turns out to have the lowest level of segregation among men.

**Table 3. Factors explaining Afro-Latino/white occupational segregation**

Percentage of change in unconditional segregation due to each set of characteristics (Shapley decomposition). Using two classifications of occupations, Duncan (D) and Hutchens (H) indices.
Source: Own construction based on IPUMS-I Censuses around 2000

| | | Harmonized ISCO (9 categories) | | | | National classification | | | |
|---|---|---|---|---|---|---|---|---|---|
| Country | Characteristics (% change) | Men | | Women | | Men | | Women | |
| | | *D* | *H* | *D* | *H* | *D* | *H* | *D* | *H* |
| Brazil | All | -63.3 | -80.0 | -55.8 | -77.7 | -32.6 | -61.2 | -37.4 | -60.0 |
| | Geog. location | -1.5 | 1.8 | 6.6 | 15.2 | 3.5 | 2.2 | 9.1 | 12.7 |
| | Education | -63.0 | -81.5 | -63.4 | -94.7 | -34.8 | -60.2 | -48.2 | -74.4 |
| | Migration | -0.9 | -1.3 | -0.2 | -0.4 | -0.6 | -1.2 | -0.2 | -0.4 |
| | Age | 2.0 | -0.6 | 1.2 | 1.5 | -0.7 | -2.0 | 1.9 | 2.0 |
| Costa Rica | All | -4.5 | 17.8 | 38.3 | 32.1 | 13.8 | 22.9 | -0.3 | 48.0 |
| | Geog. location | -14.8 | 2.1 | 15.2 | 14.0 | 2.7 | 14.7 | 13.3 | 41.9 |
| | Education | 3.5 | 5.7 | 26.7 | 17.2 | 5.8 | 0.2 | -9.0 | 4.6 |
| | Migration | 2.4 | 7.8 | -0.5 | 6.2 | 2.3 | 2.2 | -6.4 | -5.2 |
| | Age | -0.4 | 2.5 | -1.2 | -3.1 | 0.7 | -1.7 | 1.0 | 1.6 |
| Cuba | All | 9.6 | 11.8 | -27.9 | -50.0 | 5.1 | 6.0 | -5.1 | -15.5 |
| | Geog. location | 17.4 | 32.3 | 9.3 | 12.5 | 12.4 | 20.0 | 9.5 | 14.8 |
| | Education | -6.0 | -16.1 | -37.2 | -61.9 | -5.3 | -11.3 | -14.3 | -29.8 |
| | Migration | 0.9 | 1.6 | -0.8 | -2.0 | 1.5 | 4.2 | -0.8 | -1.1 |
| | Age | -2.7 | -5.9 | 0.9 | 1.4 | -3.5 | -6.9 | 0.4 | 0.6 |
| Ecuador | All | -41.6 | -66.3 | -44.5 | -67.6 | -31.4 | -53.7 | -33.1 | -51.8 |
| | Geog. location | -11.4 | -12.9 | 4.0 | 8.1 | -9.0 | -14.1 | -1.2 | -1.6 |
| | Education | -28.6 | -49.5 | -50.5 | -77.5 | -20.2 | -35.5 | -33.2 | -51.9 |
| | Migration | -1.3 | -3.0 | -1.8 | -3.2 | -1.5 | -2.6 | -1.1 | -2.2 |
| | Age | -0.3 | -0.9 | 3.8 | 4.9 | -0.6 | -1.5 | 2.4 | 3.8 |
| Puerto Rico | All | 6.5 | 0.3 | -42.2 | -75.1 | -14.5 | -14.5 | -17.2 | -18.0 |
| | Location | 6.1 | 0.2 | -0.1 | -2.6 | -1.6 | -1.4 | -1.7 | -1.3 |
| | Education | 5.8 | 0.2 | -31.4 | -52.3 | -12.2 | -13.3 | -10.7 | -11.5 |
| | Migration | 6.2 | 0.2 | -14.1 | -23.2 | -0.6 | 0.7 | -6.0 | -6.7 |
| | Age | 10.3 | 0.6 | 3.4 | 3.0 | -0.1 | -0.6 | 1.3 | 1.5 |

As a consequence, the proportion of segregation that is explained by workers' characteristics differing by race is substantial for both sexes in Brazil (80 percent for

men/78 percent for women) and Ecuador (66/68 percent), as well as for women in Cuba (50 percent) and Puerto Rico (75 percent). This is according to results for index *H* in Table 3 that reports the percentage of change in segregation induced by controlling for characteristics (for *D* the percentages are smaller). However, no segregation among men in Puerto Rico can be attributed to workers' characteristics, and segregation among both sexes would increase in Costa Rica and among men in Cuba if blacks are given whites' characteristics.

In all those cases in which a big share of segregation is explained, the main role in the reduction is obtained by compensating for inequalities in education. This seems to be especially important in the cases of women and men in Brazil (explaining 95 and 82 percent of observed segregation measured by *H* index), Ecuador (78 and 50 percent) and women in Puerto Rico (52 percent) and Cuba (62 percent). Even in those cases with no substantial reduction in segregation after conditioning on characteristics, education plays a role for men in Cuba (16 percent), but its impact is offset by the opposite side effect of equalizing the geographical location (that would increase segregation by 32 percent).

The role of education in explaining segregation is shown in Table 4, which reports the distribution of workers by years of schooling in Brazil, Costa Rica, and Ecuador. The proportion of black male workers with 15 or more years of schooling is lower than for whites in these three countries, but with a different magnitude, 15 percentage points in Ecuador, 7 in Brazil, and 2 in Costa Rica. The differential among females is similar in Ecuador, a bit higher in Brazil (9), and it is reversed in Costa Rica (-2), which is the reason they work in the best occupations. Table 5, similarly, demonstrates the distribution of attained education for people in Cuba and Puerto Rico. Whites are also more likely to have higher levels of education in Puerto Rico, especially achelor's degrees (9 percentage points among women and 7 among men), and in Cuba (4 and 3 percentage points higher, respectively, in post-secondary education).

**Table 4. Distribution of Afro-Latino and white workers by years of schooling**

Source: Own construction based on IPUMS-I Censuses around 2000

| | Women | | | | | | Men | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Brazil | | Costa Rica | | Ecuador | | Brazil | | Costa Rica | | Ecuador | |
| | Afro-L | white | Afro-L | white | Afro-L | white | Afro-L | white | Afro-L | white | Afro-L | White |
| **unknown** | 1.1 | 0.7 | - | - | 0.6 | 0.2 | 1.2 | 0.7 | - | - | 0.7 | 0.3 |
| **none** | 9.6 | 3.5 | 2.0 | 1.9 | 9.1 | 3.2 | 14.5 | 5.6 | 3.7 | 4.0 | 10.0 | 4.3 |
| **1-3** | 16.6 | 8.8 | 3.9 | 5.1 | 12.4 | 6.4 | 22.2 | 12.6 | 8.4 | 10.0 | 14.5 | 8.4 |
| **4-7** | 30.6 | 25.2 | 22.2 | 31.4 | 27.0 | 16.4 | 33.1 | 31.7 | 38.7 | 44.6 | 32.5 | 24.4 |
| **8-10** | 16.4 | 17.1 | 15.7 | 14.5 | 15.1 | 11.8 | 14.4 | 17.9 | 20.1 | 14.5 | 14.6 | 13.4 |
| **11-14** | 21.8 | 31.3 | 35.4 | 28.8 | 15.2 | 25.8 | 12.5 | 22.4 | 21.8 | 17.8 | 12.4 | 18.8 |
| **15+** | 3.9 | 13.4 | 20.8 | 18.4 | 20.7 | 36.1 | 2.0 | 9.1 | 7.3 | 9.2 | 15.4 | 30.3 |
| **Total** | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

**Table 5. Distribution of Afro-Latino and white workers by attained education**

Source: Own construction based on IPUMS-I Censuses around 2000

| Country | Level of attained education | Women | | Men | |
|---|---|---|---|---|---|
| | | Afro-L | white | Afro-L | White |
| **Cuba** | **Unknown** | 0.45 | 0.29 | 1.38 | 1.14 |
| | **None** | 2.2 | 1.8 | 4.6 | 4.5 |
| | **Primary** | 7.1 | 6.1 | 11.9 | 12.2 |
| | **Lower secondary: basic** | 22.1 | 20.3 | 31.6 | 31.0 |
| | **Lower secondary: skilled manual** | 1.4 | 0.9 | 4.5 | 3.2 |
| | **Upper secondary: pre-university** | 21.4 | 20.8 | 18.9 | 18.0 |
| | **Upper secondary: mid-level technical** | 25.5 | 26.5 | 17.6 | 17.6 |
| | **Upper secondary: mid-level teaching** | 2.2 | 1.9 | 0.6 | 0.6 |
| | **Post-secondary** | 17.5 | 21.3 | 9.0 | 11.7 |
| | **Total** | 100 | 100 | 100 | 100 |
| **Puerto Rico** | **None** | 1.0 | 0.9 | 2.5 | 1.5 |
| | **Primary, grade 1 to 4** | 2.0 | 1.0 | 3.4 | 2.4 |
| | **Primary, grade 5 to 8** | 7.5 | 4.3 | 12.5 | 9.8 |
| | **High School (9-12)** | 11.7 | 8.8 | 18.4 | 15.5 |
| | **High school graduate** | 22.8 | 20.4 | 27.0 | 26.4 |
| | **Some college, associate degree** | 31.3 | 32.1 | 23.4 | 25.0 |
| | **Bachelor's degree or higher** | 23.8 | 32.6 | 12.8 | 19.4 |
| | **Total** | 100 | 100 | 100 | 100 |

Among the other observed factors, inequalities in migration status explain an additional 23 percent of segregation for Puerto Rican women and 3 percent in Ecuador.[12] Compensating for inequalities in the geographic location of blacks and

[12] In Puerto Rico, the proportion of foreign-born workers was 13 (11) percent among female (male) whites, compared with 18 (16) percent among Afro-Latinos. In the case of Ecuador, foreign-born workers were 4 percent of whites of both sexes, in contrast with less than 2 percent among Afro-Latinos. In Costa Rica, the proportion of foreign-born workers was also larger among whites, 12 (10) percent for women (men), compared to 8 percent among Afro-Latinos. In

whites across the country would reduce segregation only in Ecuador among men. In the rest of cases, segregation would actually increase rather than decrease segregation, especially in Cuba (32 percent increase for men, 12 percent for women) and for females in Brazil (15 percent) and Costa Rica (14 percent).[13]

Costa Rica turned out to be a special case, given that compensating inequalities in all characteristics, including education, and with the only exception be8hg age for women, increased segregation (18 percent for men, 32 percent for women).[14]

The second part of Tables 2 and 3 reports the results using the national-specific classifications, which is more accurate but less comparable across countries. However, some features are qualitatively similar to those highlighted earlier. As expected, segregation increases with the narrower definition of occupations in all countries, and is generally larger among women than among men, unlike what happens with racial minorities in the United States (Gradín, 2010) where segregation was generally larger among male minorities. Additionally, the share of segregation that is explained is generally reduced, but still a large share of segregation is associated with racial inequality in the distribution of workers' characteristics in Brazil[15] (about 60 percent) and Ecuador (more than 50 percent), as well as for women in Costa Rica (48 percent), but it remains mainly unexplained in the other cases. These percentages are significantly larger than those found for African Americans (15-17 percent) in the United States and closer to those found regard8hg other minorities in that country (Gradín, 2010).

Education is responsible for most of the segregation, about 60 (74) percent among men (women) in Brazil and significant shares of 35 (52) percent in Ecuador. It also plays an

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Cuba and Brazil, the proportions were very small (less than 1 percent) for both races. See Table A2 in the appendix.

[13] Afro-Latinos are relatively overrepresented in certain areas of their countries: northeastern states of Brazil (such as Bahía, Pará, and Maranhão); Havana and most western provinces of Cuba (Santiago de Cuba, Guantánamo, Gramma); Limón on the Caribbean coast of Costa Rica; Esmeraldas in the north of Ecuador; and the metropolitan area of San Juan-Bayamón in Puerto Rico. See Table A3 in the appendix for details.

[14] Costa Rica is the only case studied in which Afro-Latinos are older on average than whites: 35.3 years old (36.4) for women (men) compared with 34.1 (35.7). In the other cases, either both groups have similar ages (Cuban and Puerto-Rican women), or Afro-Latinos are younger. See Table A4 in the appendix.

[15] A similar analysis using the *Pesquisa Nacional por Amostra de Domicílios* (PNAD) collected by the Instituto Brasileiro de Geografía e Estatística (IBGE), shows that segregation was reduced for the 2002-09 period, driven by a reduction in conditional or unexplained segregation, with the explained segregation remaining stable.

important role in Cuba, explaining segregation among women (30 percent) but not men (11 percent). In many cases, the geographical location goes in the opposite direction, and segregation rises after conditioning for it: Costa Rica (42 percent for women and 15 percent for men), Cuba (15 and 20), or Brazil (13 and 2). The exceptions are Ecuador (location explains 2 percent of segregation among women and 14 percent among men) and Puerto Rico (about 1 percent in both cases).

The use of the more detailed classification highlights a few features that would remain unclear with the major occupational groups. First, it is particularly interesting to note the large increase in segregation among Cuban, Puerto Rican, and Costa Rican Afro-Latinos, especially women, in the detailed classification with respect to ISCO, indicating that segregation in these countries mostly occurs within major occupational groups and not across them. Second, in Costa Rica, the role of education in explaining segregation, especially for women, was reduced, and the role of location increased with respect to the case using major categories.

**5. Geographical distribution in Brazil**

Brazil stands out for being the country with the largest Afro-Latino community. It is also remarkable as the case in which a large share of the observed level of segregation can be explained by workers' characteristics. For this reason, I extended the analysis for this country, looking at the geographical dimension of the phenomenon, to find out to what extent blacks are uniformly segregated across the country.

Table 6 reports segregation results, both conditional and unconditional, across the main metropolitan areas using the 2000 Census. This exercise allows us to discuss segregation at local markets, where some of the heterogeneity of workers linked to geographical variation of development, regional specialization, demographics, etc. in a large country like Brazil is already gone. It becomes clear that occupational segregation of blacks is generalized all across metropolitan areas in the country but not with the same intensity. Segregation for men and women is much larger in Salvador (northeast) and in the southeastern sector of the country, especially in Belo Horizonte but also in the other metropolitan areas (Rio de Janeiro, São Paulo, Porto Alegre, and Curitiba), and further north, in Belém, Recife, and Fortaleza. After controlling by characteristics, in all metropolitan areas there is a substantial reduction of segregation among men driven by the compensation of education inequalities. The figures go from 20 percent

in Porto Alegre and about a third in Curitiba and Belém to about 50 percent or more in the rest, with the largest proportional reduction in Belo Horizonte (60 percent). There is a similar pattern in segregation among women but with even higher reductions (the largest being Rio de Janeiro, 65 percent). As a consequence, the risk of blacks facing segregation even with the same characteristics of local whites (segregation conditional on characteristics) is largest in Porto Alegre and Curitiba in the southeast and Salvador in the northeast.

**Table 6. Afro-Latino/white segregation (*H*) in Brazil: main metropolitan areas**
Detailed occupations (509 categories)
Source: Own construction based on IPUMS-I Census 2000

| | Men | | | | | | Women | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Change in segregation after conditioning | | | | | | Change in segregation after conditioning | | | |
| Hutchens index | Uncond. | Cond. | All (%) | Educ. (%) | Migrat. (%) | Age (%) | Uncond. | Cond. | All (%) | Educ. (%) | Migrat. (%) | Age (%) |
| Belém | 0.043 | 0.028 | -35.5 | -34.5 | -0.7 | -0.4 | 0.036 | 0.022 | -39.5 | -40.2 | 0.0 | 0.6 |
| Fortaleza | 0.040 | 0.020 | -49.1 | -47.4 | -1.1 | -0.6 | 0.038 | 0.017 | -55.9 | -56.1 | 0.4 | -0.2 |
| Recife | 0.047 | 0.022 | -54.1 | -50.8 | -1.0 | -2.3 | 0.049 | 0.021 | -56.1 | -56.5 | -0.6 | 0.9 |
| Salvador | 0.087 | 0.037 | -57.6 | -52.0 | -3.0 | -2.6 | 0.082 | 0.031 | -62.0 | -61.2 | -1.5 | 0.7 |
| Belo Horizonte | 0.060 | 0.022 | -63.1 | -59.7 | -0.6 | -2.8 | 0.068 | 0.024 | -64.0 | -66.2 | -0.2 | 2.4 |
| Rio de Janeiro | 0.055 | 0.023 | -57.4 | -54.4 | -1.5 | -1.5 | 0.070 | 0.024 | -65.2 | -66.1 | -0.7 | 1.6 |
| São Paulo | 0.055 | 0.020 | -63.1 | -57.4 | -5.6 | -0.1 | 0.067 | 0.024 | -64.1 | -63.5 | -3.2 | 2.5 |
| Curitiba | 0.057 | 0.038 | -33.9 | -33.4 | 0.5 | -1.0 | 0.074 | 0.044 | -40.9 | -42.7 | 0.1 | 1.7 |
| Porto Alegre | 0.065 | 0.052 | -19.7 | -19.4 | -0.6 | 0.3 | 0.083 | 0.058 | -30.7 | -30.1 | -0.2 | -0.4 |
| *Unweig. average* | 0.057 | 0.029 | -48.2 | -45.4 | -1.5 | -1.2 | 0.063 | 0.029 | -53.2 | -53.6 | -0.7 | 1.1 |

## Conclusions

This study has demonstrated that workers of African descent are generally segregated in several Latin American countries, typically into low-paid occupations. Segregation is particularly higher in Ecuador and in Brazil across major occupational categories, but it is also important in other countries within the major occupations. Occupational segregation is largely explained by lower educational levels among African descendents in Brazil and to a lesser extent in Ecuador or among women in Cuba, but much less in the other cases. Indeed, after conditioning on workers' characteristics, Brazil turned out to have lower segregation than other countries while Ecuador remained the most highly segregated country. This means that Afro-Ecuadorians face both high inequality in access to education and a higher risk of being segregated even when they reach the same amount of schooling as whites do. On the opposite side, the geographical concentration of Afro-Latinos in certain areas of their countries generally

contributes to reducing or hiding the observed level of segregation. The level of segregation tends to be larger among women than among men, mainly due to larger inequalities in education attainment. In any case, in all countries a substantial factor related to segregation is that it cannot be attributed to pre-labor market conditions, even across major occupational groups. This could be the result of discrimination against blacks in some labor markets across the Latin American and Caribbean region. In addition, it reflects the different quality of education attained by this group. However, it is noteworthy that the segregation of Afro-Costa Ricans is not only generally lower, at least across major occupational groups, but the women also move into better occupations.

In the case of Brazil, this study showed that the level of segregation of Afro-Latinos varies across metropolitan areas, with Salvador and Porto Alegre showing higher levels both before and after conditioning on characteristics.

**References**


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

Alonso-Villar, Olga, and Coral del Río (2010), "Local Versus Overall Segregation Measures", *Mathematical Social Sciences*, 60(1): 30-38.

Alonso-Villar, Olga, Coral del Río, and Carlos Gradín (2010), "The Extent of Occupational Segregation in the US: Differences by Race, Ethnicity, and Gender," ECINEQ Working Papers Series, 180. Forthcoming in *Industrial Relations*.

Andrews, George R. (2004), *Afro-Latin America 1800-2000*, Oxford University Press.

Chantreuil, F. and Alain Trannoy (1999), "Inequality Decomposition Values: the Trade-Off Between Marginality and Consistency," THEMA Working Papers 99-24, THEMA, Université de Cergy-Pontoise.

DiNardo, John, Nicole M. Fortin, and Thomas Lemieux (1996), "Labor Market Institutions and the Distribution of Wages, 1973–1992: A Semiparametric Approach," *Econometrica* 64:1001–1044.

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

Frankel, David M. and Oscar Volij (2011), "Measuring School Segregation", *Journal of Economic Theory*, 146(1): 1-38.

Gradín, Carlos (2010), "Conditional occupational segregation of minorities in the US", ECINQ Working Paper Series, No. 185.

Hutchens, Robert M. (1991), "Segregation Curves, Lorenz Curves, and Inequality in the Distribution of People across Occupations," *Mathematical Social Sciences*, 21: 31-51.

Hutchens, Robert M. (2004), "One Measure of Segregation," *International Economic Review* 45(2): 555-578.

Jahn, Julius., Calvin F. Schmid, and Clarence Schrag (1947), "The Measurement of Ecological Segregation", *American Sociological Review*, 12(3): 293-303.

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

King, Mary C. (2009), "Occupational Segregation by Race and Sex in Brazil, 1989-2001", *The Review of Black Political Economy*, 36(2): 113-125.

Lemieux, Thomas (2002), "Decomposing Wage Distributions: a Unified Approach," *Canadian Journal of Economics*, 35(4): 646-88.

Queneau, Hervé (2009), "Trends in Occupational Segregation by Race and Ethnicity in the USA: Evidence from Detailed Data," *Applied Economics Letters*, 16(13): 1347-1350.

Rawlston, Valerie, and William E. Spriggs (2002), "A Logit Decomposition Analysis of Occupational Segregation: An Update for the 1990s of Spriggs and Williams," *Review of Black Political Economy*, 29(4): 91-96.

Reardon, Sean F. and Glenn Firebaugh (2002), "Measures of Multigroup Segregation", *Sociological Methodology*, 32(1): 33-67.

Sastre, Mercedes and Alain Trannoy (2002), "Shapley inequality decomposition by factor components: Some methodological issues," *Journal of Economics*, 9(supplement 1): 51-89.

Shorrocks, Anthony (1999), "Decomposition procedures for distributional analysis: a unified framework based on the Shapley value," Mimeo, University of Essex.

Spriggs, William E., and Rhonda M. Williams (1996), "A Logit Decomposition Analysis of Occupational Segregation: Results for the 1970s and 1980s", *Review of Economics and Statistics*, 78: 348-355.

Telles, Eduardo. E. (2002), "Racial ambiguity among the Brazilian population", *Ethnic and Racial Studies*, 25(3): 415-441.

Tomaskovic-Devey, Donald, Catherine Zimmer, Kevin Stainback, Corre Robinson, Tiffany Taylor, and Tricia McTague (2006), "Documenting Desegregation: Segregation in American Workplaces by Race, Ethnicity, and Sex, 1966-2003," *American Sociological Review*, 71: 565-588.

# Appendix

**Table A1. Proportion of Afro-Latinos, size and (non-empty) occupational categories of samples used in the analysis**

| | ISCO 9 categories | | | | National classifications | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Men | | Women | | Men | | | Women | | |
| IPUMS-I | % Afro-L | Size | % Afro-L | Size | % Afro-L | Size | categ. | % Afro-L | size | categ. |
| **Costa Rica, 2000** | 1.9 | 88,353 | 2,2 | 36,163 | 1.9 | 88,353 | 103 | 2,2 | 36,163 | 100 |
| **Cuba, 2002** | 34.6 | 268,216 | 37 | 150,900 | 35.1 | 276,797 | 117 | 37 | 152,750 | 117 |
| **Ecuador, 2001** | 34.9 | 44,389 | 27.6 | 23,639 | 35.2 | 49,060 | 115 | 27.7 | 26,110 | 111 |
| **Puerto Rico, 2000** | 14.1 | 38,528 | 13.4 | 31,056 | 14 | 38,598 | 452 | 13.4 | 31,068 | 398 |
| **Brazil, 2000** | 45.1 | 2,353,537 | 40.8 | 1,397,616 | 45.1 | 2,419,759 | 509 | 40.8 | 1,414,767 | 506 |
| **Belém** | | | | | 70.3 | 18,703 | 369 | 67.1 | 12,722 | 242 |
| **Fortaleza** | | | | | 62.2 | 32,060 | 405 | 56.9 | 22,151 | 285 |
| **Recife** | | | | | 59 | 32,579 | 408 | 54 | 22,335 | 288 |
| **Salvador** | | | | | 77.2 | 31,225 | 396 | 74.7 | 24,304 | 295 |
| **Belo Horizonte** | | | | | 52.3 | 53,069 | 440 | 48.6 | 38,558 | 340 |
| **Rio de Janeiro** | | | | | 46.2 | 122,808 | 472 | 44.7 | 86,150 | 396 |
| **São Paulo** | | | | | 33.3 | 208,409 | 488 | 30.7 | 143,773 | 434 |
| **Curitiba** | | | | | 18.5 | 35,752 | 422 | 15.1 | 24,185 | 309 |
| **Porto Alegre** | | | | | 12.7 | 45,818 | 450 | 13.4 | 32,902 | 358 |
| **Brazil, PNAD 2002** | | | | | 46.8 | 100,924 | 476 | 43.6 | 71,471 | 382 |
| **Brazil, PNAD 2009** | | | | | 52.1 | 108,991 | 476 | 48.5 | 81,611 | 404 |

**Table A2. Proportion of foreign-born Afro-Latino and white workers by country**
Source: Own construction based on IPUMS-I Censuses around 2000.

| | Women | | Men | |
|---|---|---|---|---|
| | **Afro-L** | **whites** | **Afro-L** | **whites** |
| **Brazil** | 0.1 | 0.4 | 0.1 | 0.7 |
| **Costa Rica** | 8.2 | 12.5 | 7.6 | 10.0 |
| **Cuba** | 0.1 | 0.2 | 0.1 | 0.1 |
| **Ecuador** | 1.7 | 4.3 | 1.2 | 3.9 |
| **Puerto Rico** | 18.0 | 12.8 | 15.6 | 11.3 |

**Table A3. Geographical distribution of Afro-Latino and white workers by country**
Source: Own construction based on IPUMS-I Censuses around 2000.

| | Women | | Men | |
|---|---|---|---|---|
| | **Afro-L** | **whites** | **Afro-L** | **whites** |
| **Brazil (States)** | | | | |
| Rondônia | 0.9 | 0.6 | 1.2 | 0.7 |
| Acre | 0.4 | 0.1 | 0.5 | 0.2 |
| Amazonas | 2.1 | 0.6 | 2.2 | 0.6 |
| Roraima | 0.3 | 0.1 | 0.3 | 0.1 |
| Pará | 4.7 | 1.3 | 5.7 | 1.6 |
| Amapá | 0.4 | 0.1 | 0.4 | 0.1 |
| Tocantins | 0.9 | 0.3 | 1.1 | 0.4 |
| Maranhão | 4.6 | 1.3 | 5.2 | 1.4 |
| Piauí | 2.5 | 0.7 | 2.8 | 0.8 |
| Ceará | 5.6 | 2.6 | 5.8 | 2.6 |
| Rio Grande do Norte | 1.8 | 1.1 | 1.9 | 1.1 |
| Paraíba | 2.4 | 1.3 | 2.5 | 1.4 |
| Pernambuco | 5.5 | 3.1 | 5.4 | 2.9 |
| Alagoas | 2.0 | 0.8 | 2.1 | 0.8 |
| Sergipe | 1.5 | 0.5 | 1.5 | 0.5 |
| Bahía | 12.1 | 3.1 | 11.8 | 3.2 |
| Minas Gerais | 11.5 | 10.4 | 11.3 | 10.9 |
| Espírito Santo | 2.3 | 1.8 | 2.2 | 1.8 |
| Rio de Janeiro | 9.6 | 8.8 | 8.1 | 8.2 |
| São Paulo | 15.3 | 29.3 | 14.2 | 29.0 |
| Paraná | 2.9 | 8.4 | 3.1 | 8.6 |
| Santa Catarina | 0.7 | 6.0 | 0.8 | 5.9 |
| Rio Grande do Sul | 2.0 | 11.3 | 1.8 | 10.7 |
| Mato Grosso do Sul | 1.2 | 1.2 | 1.3 | 1.3 |
| Mato Grosso | 1.6 | 1.1 | 2.0 | 1.4 |
| Goiás | 3.5 | 2.7 | 3.6 | 2.9 |
| Distrito Federal | 1.8 | 1.3 | 1.4 | 1.0 |
| **Cuba (provinces)** | | | | |
| Pinar del Rio | 4.3 | 7.4 | 4.1 | 8.5 |
| La Habana | 4.3 | 7.4 | 3.9 | 7.9 |
| Ciudad de la Habana | 29.2 | 21.5 | 23.1 | 16.9 |
| Matanzas | 4.9 | 7.1 | 4.6 | 7.3 |
| Villa Clara | 3.9 | 9.3 | 3.5 | 9.7 |
| Cienfuegos | 2.7 | 4.3 | 2.6 | 4.4 |
| Sancti Spiritus | 2.0 | 5.4 | 2.0 | 6.0 |
| Ciego de Ávila | 2.3 | 4.9 | 2.4 | 4.9 |
| Camagüey | 5.0 | 8.3 | 5.3 | 8.4 |
| Las Tunas | 2.7 | 4.6 | 3.6 | 5.4 |
| Holguín | 4.3 | 9.0 | 5.2 | 10.9 |
| Granma | 8.3 | 4.4 | 12.4 | 4.1 |
| Santiago de Cuba | 16.7 | 4.0 | 17.4 | 3.4 |
| Guantánamo | 8.2 | 1.6 | 9.0 | 1.4 |
| Isla de la Juventud | 1.1 | 0.9 | 1.0 | 0.7 |

| | Women | | Men | |
|---|---|---|---|---|
| | **Afro-L** | **whites** | **Afro-L** | **whites** |
| **Costa Rica (provinces)** | | | | |
| San José | 24.2 | 45.6 | 16.4 | 36.6 |
| Alajuela | 2.3 | 16.4 | 4.2 | 19.5 |
| Cartago | 1.6 | 11.4 | 2.4 | 12.2 |
| Heredia | 5.0 | 11.2 | 4.6 | 9.8 |
| Guanacaste | 1.3 | 4.9 | 1.4 | 6.1 |
| Puntarenas | 0.8 | 6.1 | 1.8 | 8.9 |
| Limón | 64.9 | 4.5 | 69.1 | 7.0 |
| **Ecuador (provinces)** | | | | |
| Azuay | 1.6 | 4.3 | 1.5 | 3.7 |
| Bolívar | 0.4 | 1.2 | 0.4 | 1.2 |
| Cañar | 0.4 | 0.7 | 0.6 | 0.7 |
| Carchi | 1.0 | 0.7 | 1.3 | 0.7 |
| Cotopaxi | 0.6 | 1.8 | 0.5 | 1.4 |
| Chimborazo | 0.6 | 1.9 | 0.5 | 1.4 |
| El Oro | 3.6 | 4.4 | 5.0 | 5.2 |
| Esmeraldas | 24.0 | 2.3 | 21.7 | 3.5 |
| Guayas | 36.3 | 38.3 | 37.1 | 39.4 |
| Imbabura | 3.6 | 1.7 | 2.4 | 1.3 |
| Loja | 0.4 | 0.9 | 0.6 | 0.9 |
| Los Ríos | 2.8 | 2.6 | 5.3 | 4.6 |
| Manabí | 2.6 | 4.4 | 4.5 | 5.9 |
| Morona Santiago | 0.1 | 0.4 | 0.1 | 0.5 |
| Napo | 0.2 | 0.4 | 0.2 | 0.4 |
| Pastaza | 0.1 | 0.3 | 0.2 | 0.4 |
| Pichincha | 18.4 | 28.5 | 14.3 | 23.1 |
| Tungurahua | 1.0 | 3.9 | 0.9 | 3.1 |
| Zamora Chinchipe | 0.1 | 0.1 | 0.1 | 0.3 |
| Galápagos | 0.2 | 0.2 | 0.1 | 0.2 |
| Sucumbíos | 1.0 | 0.5 | 1.4 | 0.9 |
| Orellana | 0.5 | 0.3 | 0.5 | 0.6 |
| Disputed Zones | 0.5 | 0.4 | 0.8 | 0.7 |
| **Puerto Rico (MAs)** | | | | |
| non MA | 29.1 | 37.4 | 32.6 | 40.6 |
| Aguadilla | 2.3 | 3.6 | 2.5 | 4.2 |
| Arecibo | 1.5 | 2.6 | 1.6 | 3.0 |
| Caguas | 2.4 | 4.4 | 2.5 | 3.9 |
| Ponce | 3.7 | 4.5 | 4.2 | 4.8 |
| San Juan-Bayamón | 61.1 | 47.6 | 56.7 | 43.5 |

**Table A4. Average age of Afro-Latino and white workers by country**
Source: Own construction based on IPUMS-I Censuses around 2000.

| | Women | | Men | |
|---|---|---|---|---|
| | **Afro-L** | **whites** | **Afro-L** | **whites** |
| **Brazil** | 34.1 | 34.7 | 34.3 | 35.9 |
| **Costa Rica** | 35.3 | 34.1 | 36.4 | 35.7 |
| **Cuba** | 38.7 | 38.5 | 38.9 | 39.9 |
| **Ecuador** | 34.3 | 37.0 | 35.1 | 37.8 |
| **Puerto Rico** | 37.9 | 38.2 | 38.8 | 39.6 |