

Racial Discrimination in the Brazilian Labor Market: Wage, Employment and Segregation Effects

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Abstract

The social science literature has done much to document pervasive racial discrimination in Brazil and there is little doubt that a very dark color is a handicap to social advancement. Nevertheless, very few empirical economic studies have attempted to quantify the impact of ethnic discrimination in Brazil. Using data culled from the Pesquisa Nacional por Amostra de Domicílios (PNAD), this paper fills this void by analysing ethnic wage and employment gaps, as well as occupational segregation in Brazil, using the Oaxaca decomposition methodology.

Keywords: Discrimination, Earnings, Unemployment, Occupational Segregation

JEL Classification: J71, J31

1 Introduction

Many people in Brazil associate racial discrimination with the hatred of specific ethnic groups. They also virulently reject any possibility of racial difference because of the widespread belief that Brazilian social relationships are both harmonious and based on principles of equality. In addition, the concept of "racial democracy", as initially developed by the anthropologist G. Freyre (1933), emphasizes the importance of miscegenation as a fundamental characteristic of Brazilian society, and is widely adhered to.¹ Moreover, the fluidity of the color

¹G. Freyre developed this concept while the theory of "scientific" racism based on the biological superiority of whites was very present in all minds. He originally wished to respond to O. Venna concerning the advantage of mixture among the Portuguese, Aboriginal and African ethnic groups (see Skidmore, 1992). Before G. Freyre, several Brazilian scholars presented miscegenation as being the salvation of Brazil through its "whitening" of the population. The object of these theories was to reconcile the multi-racial aspect of Brazilian society with the concept of white superiority. In the period following Freyre's work, some authors, for example Pierson (1942), T. de Azevedo (1952) or the group of scholars known as the "São Paulo School", led by F. Fernandes and F.H. Cardoso, concluded that class inequality is far more important than racial inequality.

line in Brazil, to whit the tendency of a person to declare themselves “brown” one day and “white” later on if their relative position on the social ladder has improved, was seen as a serious impediment to the study of racial inequalities. It was not until the end of the military dictatorship in 1986 that the first statistical studies dealing with racial inequalities appeared, since, in the name of national unity, the dictatorship vigorously upheld the concept of racial democracy. To that end, the department of sociology of the University of São Paulo was closed and racial issues were dropped from the 1970 national census. This effectively prevented all empirical research on racial issues. It was not until the 1976 national household survey (PNAD) that data by racial group became available once more.

The studies that flowed in the wake of the 1976 PNAD, all carried out by demographers and sociologists, highlighted the hurdles faced by Afro-Brazilians in terms of their attempts to improve their relative position in the labour market. Many Brazilians believe, consciously or otherwise, in a hierarchy of human groups.² This has led some observers to propose affirmative action programs geared towards breaking the discrimination inherited from the past.

The successful implementation of such policies is dependent upon identifying the relative importance of three types of discrimination that potentially plague the Brazilian labour market: (i) employment discrimination, (ii) wage discrimination, and (iii) occupational segregation. Economists have contributed little to this debate and to the best of our knowledge this paper constitutes the first study that applies the classic Oaxaca (1973, 1994) methodology to these three problems simultaneously. In contrast to the US literature, we will treat the black and brown ethnic groups separately, in order to allow for Degler’s (1971) celebrated concept of the “mulatto escape hatch”: browns are widely held to occupy a more privileged position than are blacks.³

The paper is organized as follows. In section 2 we outline the methodology used to decompose the ethnic wage and employment gaps. We also show how to identify the magnitude of occupational segregation in determining inter-ethnic wages differences while solving the index number problem. Section 3 presents the empirical results, while section 4 summarizes and concludes.

2 Decomposition methodology

The Oaxaca methodology (1973, 1994) was initially developed so as to decompose the earnings gap among groups into a first component that depends upon

²This study is limited to quantifying the importance of discrimination on the Brazilian labor market. The reasons that lie behind discrimination are not examined. Nogueira (1985), Skidmore (1974, 1992) and others have stated that, in Brazil, a person with a darker skin is perceived with a negative *a priori*. This form of discrimination would appear to square with the concept of statistical discrimination developed by Phelps (1972) and Aigner and Cain (1977) and, which results from imperfect information on the labor market.

³Nevertheless, it is contrary to the results obtained by N. V. Silva (1985, 1988) who shows that blacks and browns do not behave differently. In addition, Lovell (1991) finds that blacks suffer more discrimination than do browns.

individual characteristics that affect productivity and another component associated with discrimination. This approach has been extended to allow one (i) to identify inter-occupational and intra-occupational wage differences among groups (Brown *et al* (1980), Neuman and Silber (1996), Appleton *et al* (1999)) and (ii) to explain differences in employment rates (Blackaby *et al* (1994, 1998) or Altonji and Blank (1999)). The employment rate gap on the labour market is decomposed as follows :

$$\begin{aligned}
 (1) \quad \bar{P}_w - \bar{P}_b &= \underbrace{\left[\bar{\varphi}(\hat{\delta}_w^* X_w) - \bar{\varphi}(\hat{\delta}^* X_b) \right]}_{\text{Productivity}} \\
 &+ \underbrace{\left[\bar{\varphi}(\hat{\delta}_w X_w) - \bar{\varphi}(\hat{\delta}^* X_w) \right]}_{\text{White Advantage}} + \underbrace{\left[\bar{\varphi}(\hat{\delta}^* X_b) - \bar{\varphi}(\hat{\delta}_b X_b) \right]}_{\text{Black Disadvantage}} \\
 &\underbrace{\hspace{10em}}_{\text{Discrimination}}
 \end{aligned}$$

where \bar{P}_i is the predicted employment probability for ethnic group i , $\bar{\varphi}(\cdot)$ is the average predicted unemployment probability, X_i is the vector of endowments, $\hat{\delta}_i$ is the vector of estimated coefficients from the unemployment probit equation and δ^* is the vector of competitive coefficients which would obtain in the absence of discrimination. In his early work (on wage decompositions), Oaxaca (1973) proposed using the coefficient vector $\hat{\delta}_w$ or $\hat{\delta}_b$ as the non-discriminatory norm. However, Neumark (1988) argued that the appropriate decomposition should depend on the type of discrimination: on the one hand, employers may engage in nepotism that favors ethnic group i ; on the other hand, they may practice discrimination against ethnic group j . In the first case, the employment rate of ethnic group j would constitute the non-discriminatory norm while in the second case it would be the employment rate of group i . Eventually, Neumark (1988) and Oaxaca and Ransom (1994) proposed using, as the non-discriminatory norm, the vector of coefficients δ^* that is obtained by estimating the unemployment probit equation on data which pools all ethnic groups.⁴ More precisely, $\delta^* = \Omega\delta_w + (1 - \Omega)\delta_b$ where $\Omega = (X_w'X_w + X_b'X_b)^{-1}X_w'X_w$ is the Oaxaca-Ransom weighting matrix.⁵

The first term in equation (1) represents the portion of the earnings gap due to differences in individual characteristics while the second term is associated with differences in coefficients and is attributed to discrimination. The discrimination term is decomposed into two components: the advantage of ethnic group w and the disadvantage of ethnic group b relative to a non-discriminatory norm.⁶

⁴See Neumark (1988) for the assumptions that underlie the theoretical model. Initially, the discussion was about the competitive wage structure in the case of an earnings equation.

⁵See Reimers (1983) or Cotton (1988) for alternative weighting matrices.

⁶Note however that the discrimination component may in fact be partly the result of omitted variables, misspecification or measurement error. In particular, endogeneity bias may lead to a downwardly or upwardly biased estimate of the racial gap if the correlation of the explanatory variables with omitted variables is specific to ethnic group. See Kim and Polachek

In addition, as in Brown *et al* (1980), Neuman and Silber (1996) and more recently as in Appleton *et al* (1999), we identify the earnings gap $\Delta\bar{Y}$ due to human capital differences, wage discrimination and occupational segregation in the following way :⁷

$$(2) \quad \Delta\bar{Y} = \underbrace{\sum_{c=1}^{c=C} p_c^* [\underbrace{\bar{Z}_c^w (\hat{\beta}_c^w - \hat{\beta}_c^*) - \bar{Z}_c^b (\hat{\beta}_c^b - \hat{\beta}_c^*)}_{\text{Discrimination}} + \underbrace{\hat{\beta}_c^* (\bar{Z}_c^w - \bar{Z}_c^b)}_{\text{Endowments}}]}_{\Delta\bar{y} \text{ in absence of segregation}} + \underbrace{\sum_{c=1}^{c=C} [(p_c^w - p_c^*) \bar{Z}_c^w \hat{\beta}_c^w - (p_c^b - p_c^*) \bar{Z}_c^b \hat{\beta}_c^b]}_{\Delta\bar{y} \text{ due to occupational segregation}}$$

where p_c^* is the probability of being in sector c in the absence of segregation, p_c^i is the proportion of ethnic group i that belongs to occupational group c , \bar{Z}_c^i is the vector of average endowments of the members of ethnic group i , $\hat{\beta}_c^i$ is the vector of estimated coefficients from the traditional Mincerian wage equation, and $\hat{\beta}_c^*$ is the vector of competitive coefficients.⁸ Silber (1992) shows that, in the absence of segregation — which corresponds to a Duncan dissimilarity index of zero — the share of ethnic group i in occupation c should be equal to this occupation's share of the labour market.⁹ As stated by Neuman and Silber (1996), this means that one assumes that the reallocation of workers between occupations does not affect the occupational wage structure. Technically, the implication is that p_c^* will be the same for both groups, with

$$p_c^* = \left[\frac{N_c^w + N_c^b}{N^w + N^b} \right],$$

where N_c^i is the number of individuals of ethnic group i working in sector c and N^i is the number of individuals of ethnic group i in the labour market. Another approach, proposed by Brown *et al* (1980) and Miller (1987), assumes that one of the two groups does not suffer from occupational segregation, although this implies that their estimates suffer from an index number problem. These authors do, however, go further, in that they decompose the segregation effect into two components, the first stemming from differences in endowments and the second corresponding to a “pure” segregation effect. In order to do so and

(1994) for the impact of these biases on the decomposition of racial gaps.

⁷Note that this decomposition implies that the wage gap is the same along the whole of the wage scale. See Jenkins (1994) or Mwabu and Schultz (1996) for methods that relax this assumption such as the distributional or the quantile regression approaches.

⁸This vector of competitive coefficients is obtained by estimating a wage equation on data which pools all ethnic groups.

⁹The index of dissimilarity was developed by Duncan and Duncan (1955) and is given by $DDI = \sum_{c=1}^{c=C} \frac{1}{2} |p_c^w - p_c^b|$.

simultaneously solve the index number problem, one must estimate the coefficients associated with occupational choice that one would obtain in the absence of segregation. Using equation (2), we are able to implement this approach using Silber's result on p_c^* and, as mentioned by Neuman and Silber (1996), by noting that

$$(3) \quad p_c^* = \hat{p}_c^* = \sum_{c=1}^{c=C} \hat{\theta}_c \bar{W}_c$$

where \bar{W}_c are the population averages of the explanatory variables that affect occupational choice and $\hat{\theta}_c$ is the vector of coefficients obtained by estimating a multinomial logit model of occupational choice on pooled data.¹⁰ We can then decompose the earnings gap due to occupational segregation as follows :

$$(4) \quad \underbrace{\sum_{c=1}^{c=C} [(p_c^w - p_c^*) \bar{Y}_c^w - (p_c^b - p_c^*) \bar{Y}_c^b]}_{\Delta \bar{y} \text{ due to occupational segregation}} = \underbrace{\sum_{c=1}^{c=C} [p_c^w - \hat{p}_c^{w*}] \bar{Y}_c^w + [\hat{p}_c^{b*} - p_c^b] \bar{Y}_c^b}_{\Delta \bar{y} \text{ due to "pure" occupational segregation}} + \underbrace{\sum_{c=1}^{c=C} [\hat{p}_c^{w*} - \hat{p}_c^*] \bar{Y}_c^w + [\hat{p}_c^* - \hat{p}_c^{b*}] \bar{Y}_c^b}_{\substack{\text{White Advantage} \quad \text{Black Disadvantage} \\ \text{Endowments}}}$$

where \hat{p}_c^{*i} is the average predicted probability of an individual from ethnic group i with attributes \bar{Z}_c^i of being in sector c if he faced the non-discriminatory sectoral distribution $\hat{\theta}_c^*$. The first term on the right-hand-side represents the "pure" effect of segregation, while the second term is that part of the wage gap due to differences in employment attributes. This decomposition allows one to take sectoral differences in earnings into account.

3 Results

The data set is derived from the 1998 national household survey (PNAD) collected by the Institute of Geography and Statistics (IBGE).¹¹ The sample, composed of males of between 25 and 65 years of age, covers 69,956 individuals of whom 52.78% are white, 41.11% brown, and 6.11% black.¹²

¹⁰See Appleton *et al* (1999) who solve the index number problem in the same manner.

¹¹The data are available on their web site at <http://www.ibge.gov.br>

¹²The definition of an ethnic group in Brazil is fraught with difficulties. In particular, there is a bewilderingly large number of terms that are used to refer to a person's ethnic origin or skin color. Lovell (1999), who provides a useful summary of the current state of the literature, notes that a study by Valle Silva (1996) finds that only 57 percent of individuals faced with an open question in terms of their color classify themselves into one of the three groups referred to here. On the other hand, when faced with a closed question expressed in terms of the three above-mentioned groups, all individuals are able and (more or less) willing to classify themselves. "Yellows" were excluded from our sample as they did not constitute a group of sufficient magnitude.

Table 2 in the Appendix reports descriptive statistics for the three ethnic groups broken down into employed and unemployed individuals. The employment rate is defined as the percentage of individuals of age between 25 and 65 years who were employed during the interview week.¹³ The rate of predicted employment, which differs significantly by ethnic group, is equal to 88.92%, 84.98% and 82.51% respectively for whites, browns and blacks.¹⁴

Figure 1 presents the cumulative density function of the logarithm of hourly wage-earnings, by ethnic group. As should be obvious from Figure 1, there is a clear shift to the right of the respective cumulative densities (as in first order stochastic dominance) as one moves from Afro-Brazilians to the white ethnic group. However, there is no clear difference between browns and blacks. This same tendency emerges in Table 2. The hourly wage of blacks are on average half of those of whites, whereas browns appear to do as well as browns. Moreover, Afrobrazilians work mainly in the agricultural and industrial sectors where the average number of years of schooling is smaller. Differences in earnings and employment attributes may partly explain the ethnic-specific nature of the employment rates, earnings and occupational distributions. Browns and blacks are largely penalized in terms of human capital (educational attainment, labour market experience and health) with respect to whites, and this is true whether they are employed or not. Moreover, the concentration of blacks and browns is higher in the poorer regions of Brazil (North and Northeast), a geographic concentration that stems from three centuries of slavery. Lastly, Afrobrazilians are more concentrated in rural areas, which should also penalize them in terms of employment opportunities.

Table 1 displays the employment and earnings decomposition results. The first part of Table 1 displays the employment decomposition results. Employment probit equations were estimated both on pooled data and for each ethnic group in order to estimate $\hat{\delta}^*$ and $\hat{\delta}_i$. We considered attributes of employment such as age, age squared, years of schooling, self-evaluation of health, family status, region of residence, location (urban or rural), presence of a young child, and household income per capita (excluding own earnings).¹⁵

The results presented in Table 1 highlight that the employment gap between browns and whites is to a great extent due to differences in endowments (82.98%). This means (in the absence of pre-entry discrimination on the labour market) that the shortfall in the rate of employment faced by browns is mainly the outcome of social inequalities inherited from the past, rather than discrimination.¹⁶ In other words, it suggests that for browns, racial inequality could be

¹³We consider the unemployment rate as the percentage of individuals aged between 25 and 65 who were unemployed during the interview week. We are conscious of the fact that we should have only considered individuals who are both unemployed and actively looking for employment. However, many individuals in Brazil do not have the opportunity to actively search for a job because of the extremely difficult social conditions in their neighbourhoods.

¹⁴Note that the probit model implies that the predicted employment probability is slightly different from the actual employment proportion.

¹⁵See Table 4 of the Appendix for the estimates that underlie these results.

¹⁶Using a linear probability model does not change these results.

Table 1: Decomposition of Ethnic Employment and Earnings Differences

Components	Browns	Black
Employment Decomposition		
Mean total predicted differential	0.0394	0.0641
$\overline{P_w} - \overline{P_b}$	(100%)	(100%)
Differences in endowments	0.0327	0.0142
$[\overline{\varphi}(\widehat{\delta}^* \overline{X_w}) - \overline{\varphi}(\widehat{\delta}^* \overline{X_b})]$	(82.98%)	(48.52%)
Employment discrimination	0.0067	0.0302
$[\overline{\varphi}(\widehat{\delta}_w X_w) - \overline{\varphi}(\widehat{\delta}^* \overline{X_w})] + [\overline{\varphi}(\widehat{\delta}^* X_b) - \overline{\varphi}(\widehat{\delta}_b X_b)]$	(17.02%)	(51.48%)
Earnings Decomposition		
Mean total differential adjusted for self-selection	0.7235	0.7493
$[\overline{Y_w} - \overline{Y_b} - (\widehat{\gamma}_w \overline{\lambda}_w - \widehat{\gamma}_b \overline{\lambda}_b)]$	(100%)	(100%)
Differences in endowments	0.5179	0.4218
$\sum_{c=1}^{c=C} [p_c^* \widehat{\beta}_c^* (\overline{Z}_c^w - \overline{Z}_c^b)] + \sum_{c=1}^{c=C} [(\widehat{p}_c^{w*} - \widehat{p}_c^*) \overline{Y}_c^w + (\widehat{p}_c^* - \widehat{p}_c^{b*}) \overline{Y}_c^b]$	(71.58%)	(56.31%)
Wage discrimination	0.1676	0.2680
$\sum_{c=1}^{c=C} p_c^* [\overline{Z}_c^w (\widehat{\beta}_c^w - \widehat{\beta}_c^*) - \overline{Z}_c^b (\widehat{\beta}_c^b - \widehat{\beta}_c^*)]$	(23.16%)	(35.78%)
Occupational segregation	0.0380	0.0593
$\sum_{c=1}^{c=C} [(p_c^w - \widehat{p}_c^{w*}) \overline{Y}_c^w - (p_c^b - \widehat{p}_c^{b*}) \overline{Y}_c^b]$	(5.26%)	(7.91%)

Source: Pesquisa Nacional por Amostra de Domicílios, 1998.

Note: In the case of the earnings decomposition, we grouped different sectors into the seven main sectors (see the Appendix).

a purely transitory phenomenon. In contrast, for blacks, the shortfall in the rate of employment is explained by the two effects (endowment and discrimination) which are of roughly equivalent magnitude.

The second part of Table 1 displays the earnings decomposition results. We decomposed the ethnic wage gap while adjusting for self-selection into employment (Heckman, 1976, 1979).¹⁷ The attributes assumed to affect the logarithm of hourly wages considered were: experience on the labour market (age

¹⁷Following Reimers (1983), the wage gap is decomposed as: $\overline{Y}_w - \overline{Y}_b - (\widehat{\gamma}_w \overline{\lambda}_w - \widehat{\gamma}_b \overline{\lambda}_b) = \sum_{c=1}^{c=C} p_c^* [\overline{Z}_c^w (\widehat{\beta}_c^w - \widehat{\beta}_c^*) - \overline{Z}_c^b (\widehat{\beta}_c^b - \widehat{\beta}_c^*) + \widehat{\beta}_c^* (\overline{Z}_c^w - \overline{Z}_c^b)] + \sum_{c=1}^{c=C} [(p_c^w - p_c^*) \overline{Z}_c^w \widehat{\beta}_c^w - (p_c^b - p_c^*) \overline{Z}_c^b \widehat{\beta}_c^b]$

where $\overline{\lambda}_i$ is the average inverse Mill ratio controlling for selectivity into employment and $\widehat{\gamma}_i$ represents the coefficients estimated from the earnings equations (see Oaxaca and Neuman (2001) for alternatives and more detailed decompositions). We then analyse the adjusted wage differentials and *not* the observed wage differentials. Household income per capita (excluding own income) was used as the identifying variable. Note that the standard approach to correcting for selectivity bias assumes that the errors are normally distributed. See Schafgans (2002) for a semi-parametric approach that relaxes this assumption. Finally, there is potentially another source of selectivity bias due to the endogeneity of sectoral employment choice (see Appleton *et al* (1999)).

minus years of schooling minus 6), experience squared, years of schooling, self-evaluation of health, family status, region of residence, location (urban or rural), presence of a young child and signature of a formal labour contract. Earnings functions were estimated for each ethnic group and each occupation.¹⁸ Doing so allowed us to apply the classical decomposition procedure to each sector. In addition, a multinomial logit specification was estimated for each ethnic group in order to determine $\hat{\theta}_c^*$ and \hat{p}_c^{i*} . We considered the following seven aggregated sectors : Professional and Technical, Services, Administration, Trades, Transportation, Industry and Agriculture.¹⁹ In Table 5 of the Appendix, we present the actual distribution of each ethnic group, as well as the distribution that would prevail if their specific attributes were rewarded as if there were no discrimination. Finally, the last row displays the sectoral distribution in the absence of segregation.

The shortfall in wages suffered by the brown and black ethnic groups can be explained by three effects of different magnitude. First, lower levels of endowments explain more than half of inter-ethnic differences in wages. This effect should vanish with time, in particular if there is no discrimination in terms of access to educational opportunities. Second, “pure” discrimination, respectively for browns and blacks, accounts for 23 and 35 percent of the shortfall. It is interesting to note that the wage gap is slightly larger for browns, but that the discrimination component (in percentage terms) is greater for blacks. This corresponds to the same pattern as with the employment decomposition. While affirmative action programs may reduce labour market discrimination, available evidence for Brazil suggests that prejudice lies at its heart: as such, affirmative action programs may exacerbate this form of prejudice by suggesting that success is not wholly based on merit. Moreover, prejudice-based discrimination can be eliminated by permanent programs, which run counter to the principles upon which such initiatives are formulated in Brazil. Programs aimed at heightening awareness concerning the value of ethnic diversity might constitute a more promising approach. However, our results have to be interpreted with caution. This is because we are unable to isolate the component which is due to inequality of opportunity *before* entry into the labour market. In particular, the Brazilian educational system is characterized by the coexistence at all levels of private and public institutions that differ greatly in quality. Only wealthier students (i.e., whites) can afford private schools which display higher returns to schooling.²⁰ A portion of what we attribute to discrimination on the labour market may thus be due to the impact of differences in educational quality on

¹⁸See Tables 6, 7, 8 of the Appendix. All the estimates present a familiar pattern, that is to say, hourly earnings increase along with the human capital variables (years of completed schooling, health dummy). There are also important variations by region.

¹⁹If the sectors were ordered according to the type of qualification required we would have been able to estimate an ordered probit, as suggested by numerous authors. However, as stated by Meng and Miller (1995), the estimates provided by the ordered probit and those provided by the multinomial logit are quite similar.

²⁰See Herran and Rodriguez (2000) for a complete discussion concerning heterogeneity in the quality education in Brazil.

the returns to schooling stemming from whether students attended private or public schools. In other words, we are unable to isolate that portion of discrimination due to inequality of opportunity that flows from differences in family background.²¹

Finally, the most striking result is that the impact of occupational segregation is negligible. Therefore, programs aimed at facilitating the access of Afro-Brazilians to sectors where they are underrepresented do not appear as a legitimate course of action in the Brazilian case. This is either because existing programs have done their job or because there was (and remains) no occupational discrimination to speak of.

4 Concluding Remarks

This paper has investigated ethnic wage and employment gaps. We have found that discrimination in the Brazilian labour market is present, particularly with respect to wages. Nevertheless, this does not mean that discrimination is absent in employment insofar as unemployment duration may vary by ethnic group. We have also highlighted that there are no great differences in the employment and wage gaps suffered by blacks versus those affecting browns. In contrast, the portion of the gaps due to discrimination is far more important in the case of blacks.²² This result is in line with the idea that racial prejudice affects blacks more than it does browns. However, a portion of this discrimination is potentially due to unequal opportunities in the capacity to finance a private education.

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²¹See Bourguignon, Ferreira and Menéndez (2003).

²²Insofar as the coefficients estimated in the employment and wages equations are stochastic, it would be very interesting to test the statistical significance of the discrimination and endowment components. This would allow us to see whether differences between browns and blacks in the discrimination component are statistically significant.

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Table 2: Summary Statistics: Adult Males, by Ethnic Group

	Unemployed			Employed		
Racial group	White	Brown	Black	White	Brown	Black
Number of obs.	4090	4319	747	32833	24442	3525
Age: mean	31.81	30.34	31.50	37.62	35.79	36.47
(std deviation)	13.16	12.47	12.69	11.62	11.81	11.89
Hourly earnings (in Reais)				1.233	0.599	0.591
Yrs of completed schooling	6.53	4.77	4.87	7.40	5.01	5.05
(std. deviation)	3.97	3.66	3.57	(4.39)	(4.00)	(3.91)
Region of residence (%)						
North (%)	3.88	10.02	2.81	3.68	11.92	3.71
Northeast	23.44	42.04	41.36	15.70	43.67	31.97
Central Brazil	0.085	10.07	8.43	10.54	14.05	7.60
South	27.40	5.25	8.56	29.45	5.54	10.57
Southeast	36.74	22.59	38.82	40.63	24.82	46.15
Self-evaluation of health (%)						
Bad health	2.76	3.33	3.32	1.73	2.49	2.21
Occupational sector (%)						
Professional, Technical				9.64	4.59	4.91
Administration				19.79	10.47	8.57
Services				2.79	3.46	3.77
Trades				14.77	13.48	10.16
Transportation				9.39	8.27	8.11
Industry				29.06	34.91	44.14
Agriculture				14.56	24.81	20.34
Formal sector dummy				42.53	34.37	41.98

Source: Pesquisa Nacional por Amostra de Domicílios, 1998.

Table 3: Employment Equations, by Ethnic Group

	Full sample	White	Brown	Black
Education	0.026 14.64	0.030 11.69	0.018 6.52	0.016 2.27
Age	0.078 23.18	0.080 16.60	0.076 14.93	0.073 5.83
(Age) ²	-0.001 21.41	-0.001 15.61	-0.001 13.54	-0.001 5.40
Young child dummy	0.176 10.38	0.203 8.15	0.169 6.70	0.041 0.66
Bad health dummy	-0.278 6.94	-0.246 3.98	-0.304 5.40	-0.286 1.99
Household income <i>per capita</i>	-0.000 0.98	-0.000 1.20	-0.000 0.94	-0.000 1.34
Household head dummy	0.611 35.59	0.626 25.11	0.593 22.91	0.556 8.92
Region of residence				
Northeast	-0.169 9.83	-0.180 6.90	-0.134 4.83	-0.236 3.03
Southeast	0.002 0.10	0.029 1.29	-0.022 0.69	-0.036 0.47
Central Brazil	0.080 3.34	0.091 2.66	0.119 3.21	-0.189 1.81
Urban area	0.093 5.83	0.125 5.26	0.092 4.00	0.002 0.03
Constant	-0.900 15.18	-0.972 11.38	-0.845 9.44	-0.680 2.98
Observations	69956	36923	28761	4272
Pseudo R-squared	0.11	0.11	0.10	0.08
LR χ^2	5334.21	2598.58	2233.75	301.64
Prob > χ^2	0.00	0.00	0.00	0.00

Note: Probit Specification.

White heteroskedasticity-consistent absolute value of t-statistics below coefficients.

Table 4: Predicted and Actual Occupational Distribution

		1	2	3	4	5	6	7
p_c^i	White	0.096	0.197	0.027	0.295	0.147	0.093	0.145
	Brown	0.045	0.104	0.034	0.353	0.134	0.082	0.248
	Black	0.049	0.085	0.037	0.444	0.101	0.081	0.203
\hat{p}_c^{*i}	White	0.095	0.175	0.033	0.292	0.153	0.092	0.156
	Brown	0.043	0.113	0.040	0.316	0.146	0.086	0.251
	Black	0.042	0.115	0.043	0.346	0.143	0.097	0.211
p_c^*		0.073	0.153	0.031	0.322	0.139	0.088	0.190

(1) Professional and Technical, (2) Administration, (3) Services, (4) Industry,

(5) Trades, (6) Transportation, (7) Agriculture.

p_c^i is the actual proportion of ethnic group i in the relevant sector.

\hat{p}_c^{*i} is the predicted proportion of ethnic group i in the relevant sector if it

faced attributes \bar{Z}_c^i and "non-discriminatory" coefficients from the occupational choice model estimated using a multinomial logit.

p_c^* is the proportion of each ethnic group in the absence of segregation.

Table 5: Wage Equations*, by sector, for Whites

White group	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Experience	0.063	0.068	0.045	0.061	0.068	0.056	0.060
	[13.64]	[19.15]	[12.14]	[28.54]	[18.88]	[13.04]	[7.89]
(Experience) ²	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
	[9.05]	[11.42]	[9.97]	[21.55]	[14.31]	[9.71]	[6.57]
Yrs of schooling	0.187	0.154	0.117	0.118	0.142	0.101	0.103
	[33.39]	[48.81]	[23.40]	[48.12]	[40.46]	[21.46]	[10.85]
Formal sector	-0.059	-0.126	0.206	0.172	0.018	-0.133	0.066
	[2.04]	[6.01]	[9.70]	[13.87]	[0.75]	[5.50]	[1.46]
Bad health	-0.067	-0.171	-0.243	-0.254	-0.287	-0.257	-0.333
	[0.35]	[1.39]	[4.22]	[4.56]	[2.53]	[2.88]	[1.50]
Household head	0.570	0.648	0.608	0.609	0.595	0.527	0.553
	[15.48]	[22.52]	[21.58]	[38.10]	[20.22]	[16.71]	[10.13]
Region							
Northeast	-0.206	-0.154	-0.296	-0.359	-0.345	-0.306	-0.540
	[4.89]	[4.65]	[9.34]	[16.57]	[9.90]	[8.39]	[6.91]
Southeast	0.018	0.037	0.090	0.128	0.011	0.125	0.015
	[0.55]	[1.60]	[3.45]	[9.46]	[0.43]	[4.82]	[0.28]
Central Brazil	0.102	0.137	0.170	-0.019	-0.005	-0.003	-0.081
	[2.14]	[3.95]	[5.34]	[0.76]	[0.13]	[0.05]	[1.02]
Urban area	0.223	0.255	0.180	0.163	0.173	0.138	0.378
	[2.81]	[6.06]	[7.95]	[7.97]	[3.20]	[3.14]	[6.02]
Constant	-1.934	-1.841	-2.139	-1.859	-1.971	-1.298	-1.991
	[18.62]	[31.27]	[34.27]	[51.81]	[27.05]	[16.59]	[16.20]
Observations	3164	6497	4784	9541	4848	3084	915
R-squared	0.51	0.45	0.32	0.47	0.43	0.33	0.37

White heteroskedasticity-consistent absolute value of t-statistics below coefficients.

* Wage equation adjusted for the self-selection bias into employment.

(1) Professional and Technical, (2) Administration, (3) Services, (4) Industry, (5) Trades, (6) Transportation, (7) Agriculture.

Source: Pesquisa Nacional por Amostra de Domicílios, 1998.

Table 6: Wage Equations*, by sector, for Browns

Brown group	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Experience	0.056 [7.04]	0.077 [15.27]	0.055 [16.42]	0.072 [30.43]	0.065 [14.43]	0.062 [12.00]	0.075 [11.39]
(Experience) ²	-0.001 [4.24]	-0.001 [9.24]	-0.001 [14.31]	-0.001 [23.08]	-0.001 [11.48]	-0.001 [8.89]	-0.001 [10.51]
Yrs of schooling	0.152 [21.99]	0.150 [30.28]	0.096 [20.49]	0.106 [41.73]	0.121 [26.47]	0.085 [15.79]	0.093 [11.94]
Formal sector	0.016 [0.33]	-0.138 [4.16]	0.298 [16.98]	0.191 [14.71]	0.026 [0.90]	0.083 [2.73]	0.190 [4.27]
Bad health	-0.371 [1.35]	-0.436 [2.72]	-0.356 [8.03]	-0.447 [9.79]	-0.641 [7.60]	-0.317 [3.11]	-0.177 [1.16]
Household head	0.668 [11.30]	0.682 [16.40]	0.577 [26.60]	0.615 [37.55]	0.744 [20.75]	0.581 [15.44]	0.556 [11.53]
Region							
Northeast	-0.171 [2.75]	-0.255 [5.90]	-0.296 [10.71]	-0.265 [14.26]	-0.139 [3.58]	-0.261 [6.31]	-0.290 [4.27]
Southeast	-0.011 [0.16]	0.013 [0.27]	-0.069 [2.36]	0.117 [6.18]	0.099 [2.34]	0.106 [2.51]	0.114 [1.56]
Central Brazil	0.247 [3.38]	0.086 [1.65]	0.169 [5.57]	0.077 [3.35]	0.239 [4.98]	0.143 [2.57]	0.088 [1.07]
Urban area	0.237 [2.31]	0.426 [7.98]	0.151 [8.01]	0.172 [8.26]	0.195 [3.45]	0.216 [4.37]	0.280 [4.62]
Constant	-1.920 [15.00]	-2.353 [28.25]	-2.271 [41.62]	-2.151 [53.19]	-2.300 [27.39]	-1.744 [19.25]	-2.290 [19.34]
Observations	1121	2560	6065	8533	3296	2021	846
R-squared	0.54	0.49	0.34	0.50	0.40	0.37	0.45

White heteroskedasticity-consistent absolute value of t-statistics below coefficients.

* Wage equation adjusted for the self-selection bias into employment.

(1) Professional and Technical, (2) Administration, (3) Services, (4) Industry, (5) Trades, (6) Transportation, (7) Agriculture.

Source: Pesquisa Nacional por Amostra de Domicílios, 1998.

Table 7: Wage Equations*, by sector, for Blacks

Black group	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Experience	0.064 [3.08]	0.061 [5.35]	0.033 [3.98]	0.061 [10.69]	0.053 [4.17]	0.075 [6.72]	0.054 [2.68]
(Experience) ²	-0.001 [2.27]	-0.000 [3.17]	-0.000 [3.27]	-0.001 [7.31]	-0.001 [4.38]	-0.001 [5.08]	-0.001 [2.90]
Yrs of schooling	0.172 [8.79]	0.139 [12.37]	0.074 [6.10]	0.105 [18.35]	0.110 [8.22]	0.109 [6.44]	0.024 [0.99]
Formal sector	0.028 [0.19]	0.038 [0.46]	0.239 [4.94]	0.156 [5.20]	-0.023 [0.29]	0.210 [2.48]	0.146 [1.10]
Bad health	-0.209 [0.89]	-0.158 [0; 49]	-0.579 [4.85]	-0.462 [3.07]	-0.660 [1.62]	-0.183 [1.13]	-0.623 [2.17]
Household head	0.656 [4.94]	0.661 [7.27]	0.530 [9.63]	0.579 [16.05]	0.745 [7.73]	0.434 [4.58]	0.674 [4.27]
Region							
Northeast	-0.663 [3.98]	-0.493 [4.09]	-0.241 [3.07]	-0.361 [7.63]	-0.594 [4.70]	-0.406 [3.15]	-0.238 [1.11]
Southeast	-0.300 [1.74]	-0.231 [2.29]	0.038 [0.52]	0.023 [0.57]	-0.107 [0.86]	-0.049 [0.39]	0.026 [0.13]
Central Brazil	-0.426 [1.59]	-0.167 [1.17]	0.107 [1.00]	-0.131 [1.79]	-0.308 [1.61]	-0.095 [0.53]	-0.090 [0.38]
Urban area	-0.126 [0.38]	0.422 [2.29]	0.210 [4.54]	0.224 [4.03]	0.213 [1.76]	0.200 [2.18]	0.329 [2.02]
Constant	-1.663 [3.72]	-2.105 [8.68]	-1.946 [14.75]	-2.020 [22.27]	-1.716 [7.38]	-1.991 [8.55]	-1.759 [4.45]
Observations	173	302	717	1556	358	286	133
R-squared	0.57	0.55	0.35	0.48	0.49	0.39	0.31

White heteroskedasticity-consistent absolute value of t-statistics below coefficients.

* Wage equation adjusted for the self-selection bias into employment.

(1) Professional and Technical, (2) Administration, (3) Services, (4) Industry, (5) Trades, (6) Transportation, (7) Agriculture.

Source: Pesquisa Nacional por Amostra de Domicílios, 1998

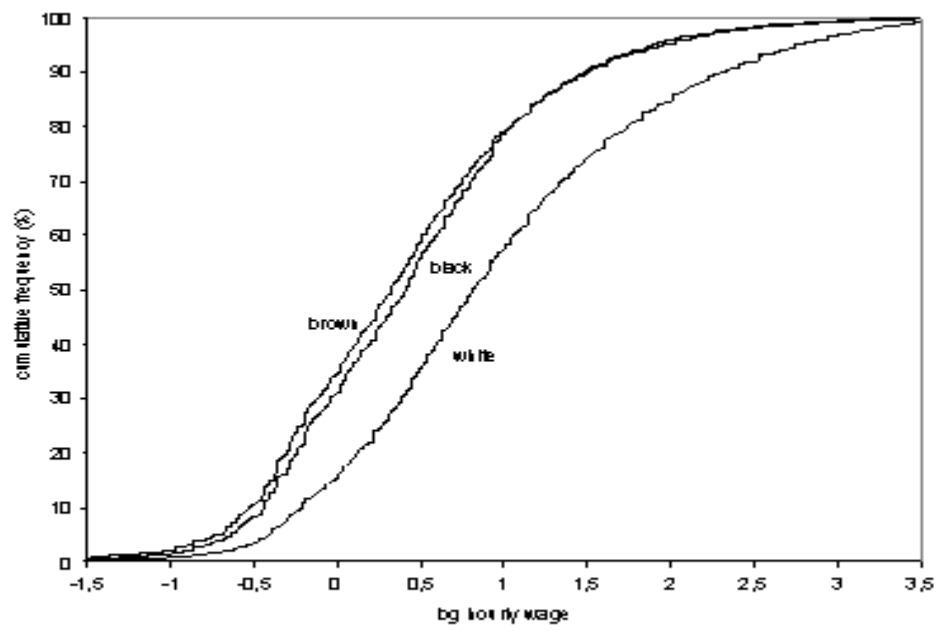


Figure 1: Cumulative densities of log hourly wage, by ethnic group