A Hipótese *Crowding* em um Estudo Sobre Discriminação e Composição Racial e Mercado de Trabalho Brasileiro

The Crowding Hypothesis in a Study on Discrimination and Racial Composition in the Brazilian Labour Market

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RESUMO: Neste artigo, estudamos os efeitos da raça sobre os salários no mercado de trabalho no Brasil, bem como o diferencial salarial entre as raças. As estimativas indicam que os salários variam inversamente com a densidade racial, levando a um diferencial de salário maior nos mercados onde há maior densidade racial. Nesse sentido, os principais resultados são consistentes com a hipótese de *crowding*. Encontramos ainda alguma evidência de que discriminação e densidade racial se relacionam positivamente. Para características como salários e níveis de escolaridade, o efeito discriminação parece ser mais evidente, alternando-se com a natureza específica do setor industrial. O artigo tem três seções. A primeira seção se refere à metodologia utilizada na pesquisa e a segunda corresponde à interpretação dos resultados. A terceira seção compreende as conclusões.

Palavras-chave: Discriminação, Densidade Racial, Gênero, Produtividade, Salários.

ABSTRACT: This article discusses the effect of race on wages and the wage gap between races in the Brazilian labor market. The results point out the negative effect of density over wages and consequently higher wage gaps in labor markets where racial density is higher. These results are consistent with the hypothesis of crowding in the labor market. We find out a positive correlation between discrimination and racial density and the discrimination effect is higher in the manufacturing sector. These achieving are structured in three sections. The first one presents the methodology that was used, in the second section we analyze the results and in the last section we present our conclusion.

Key words: Discrimination, Racial Density, Gender, Productivity, Wages.

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Since *Becker's* (1957) and *Arrow's* (1972) work, discrimination has provided numerous studies, which, along the time, have tried to explain the persistent differential of wages by gender and race (ethnic groups) in competitive labor markets, even when controlling for the workers' characteristics [*Cain* (1986), *Neumark* (1988) e (1998), *Darity*, (1998), *Gottschalk*, (1997), *inter alia*].

Becker (1957) discrimination model allows that in a competitive market, each agent has different preferences and may perform according to these preferences. It is assumed that individuals have rational behavior and maximize their utility based on these preferences. In an economy based on these preferences, any individual is able to negotiate products or services based on sex, race, religion and ethnic groups. While *Arrow's* (1972) discrimination model, on the other hand, explains wage differential as a rational reaction to uncertainties in the labor market.

Oaxaca (1973) found evidence that a substantial part of the wage differential proportion between men and women is due to the presence of discrimination in the labor market, while *Blinder* (1973) argued that wage differential among white and black, men and women, derived from discrimination in the labor market. *Gottschalk* (1997) also presented evidences, that wage differentials in competitive economies are probably derived from discrimination in the labor market.

In terms of the methodology which is usually used for this type of analysis, *Blinder* (1973) and *Oaxaca* (1973) methods are found more frequently in literature. This approach allows on to obtain estimates of the discrimination and the components of productivity of the wage differential as well as estimates of the composition of the share of discrimination in the wage differential. *Neumark's* (1988) article on employer's discriminatory behavior and the determination of wages, for example, uses *Oaxaca's* structure to analyze wage discrimination and applies two special cases of the general decomposition from wage differential. The model used to answer this question is an extension to *Becker's* (1957) model. *Neumark* (1988 and 1998) observes that there is a connection between the empirical estimators of wage differential and the theoretical models of employers discrimination, and concludes that *Oaxaca's* approach can be used for this purpose.

Hirsch and *Schumacher* (1992), for example, noted that wages for whites and blacks are lower in industries with groups with high rates of density of black workers, but the race differential of wages do not vary systematically with the racial density. The model does not make *Arrow* and *Becker's* discrimination theory evident. However, the result obtained establishes strong connections with the racial model of "crowding" and "language discrimination"(1).

The so-called "Crowding hypothesis" suggests that women and minorities are systematically excluded from high-wage occupations and employed in occupations that pay lower wages [MCCONNELL e BRUE (1995)].

(1) See Lang (1986) that provides a detailed analysis theorical and empirical of the theme.

A racial density variable (DEN) is defined as the number of black[2] workers divided by the sum of white and black workers in a labor market, is matched to each worker in the PNAD sample. In general, a density variable (DEN) varies from industry to industry.

Our analysis is limited to examining the effect of the racial composition of labor markets on wages and the racial wage gap. The main contribution of the paper is that it considers racial density by gender in a specific sector of the economy in the study of discrimination with the introduction of some controls directly related to the human capital theory.

To investigate the thesis relevance (racial density and discrimination), this study tests the hypothesis that wage differentials among groups are justified by racial discrimination by sex, instead of being by workers endowment, in three sectors of the Brazilian activities — service industry, commodities and transformation trade. Thus, controlling the variables, which measure the worker's performance, and varying the characteristics, if the differential of wages is maintained, it will reflect discrimination. These industries were chosen because they employ men and women in varied proportions, distinct wages, product and labor diversification and by the level of wage flexibility in the Brazilian labor market [BARROS *et al.* (1996)].

The negative effect of rational density over wages is directly related with all workers with higher education. Discrimination, in our models, results in part of this density among the individuals. In individual terms, however, dissimilarities among workers can have different effects, depending of racial identification of the individuals. The variability regarding race can result in more conflict and lower levels of productivity [BAUGH and GRAEN (1997)].

Specifically, there are no empirical studies on discrimination as a function of racial density, or on the technique of decomposition proposed by *Oaxaca* (1973) in the Brazilian labor market. Thus, this paper's main contribution is to fill the gap in literature on discrimination of the Brazilian case. The evidence of discrimination and the identification of their sources may serve as a parameter to other economies in development that present relationships of employment composition similar to the ones that prevails in Brazil.

The presence of racial discrimination in Brazil was studied by *Lovell* (1993), which concluded that discrimination concentrates in the South region, because it is more developed. Meanwhile in the Northeast region, where the black population is larger than in the rest of the country and being the poorest region (with the lowest educational index), yet it shows the lowest indexes of discrimination. *Silva's* (1985) article verified strong unexplained wage differentials, which the author understood as evidence of discrimination. Similar characteristics of the workers were investigated in different classes in the labor market.

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(2) The empirical data used here is from National Household Sample Survey/National Geographic and Statistics Institute/IBGE (PNAD). PNAD is an administrative record. The information collected in PNAD is taken on an individual basis. The individual determines his/her characteristics such as color, sex etc. In 1999 the Brazilian population was about 160 millions: 54% claimed to be white, 40% black, 5,3% black, 0,46% asian and 0,16% indians. Since the population of white and black corresponds to 94% of the Brazilian population we consider only them to work in this paper.

Some empirical analysis for the Brazilian case have demonstrated that women earn lower wages as compared to men, even when taking into consideration similar levels of human capital. The research done by *Barros et al.* (1992) adds that, if taken into account age and education, level of discrimination by gender is much more revealing than if estimating only the wage differential between men and women.

This paper is structured as follows. After this introduction, Section 2 covers the methodology applied to test the hypothesis on discrimination and density, Section 2 presents the results and Section 4 the conclusions.

1. Methodology

To examine the existence of relationship between discrimination and racial density, *Blinder* (1973) and *Oaxaca's* (1973) methodology was used for decomposition analysis. We used a sample of activities in three sectors of the economy — manufactures, service and commodities trade, by gender or by race, to estimate the following model form:

$$ln\, w_{ij} = \alpha + \Sigma \beta_i X_{ij} + \gamma_i DEN_{ij} + \varepsilon_i \qquad (1)$$

for the estimation of the equation (1). We adopted the same procedure of *Hirsch* and *Schumacher* (1992), where lnw_{ij} is a logarithm of worker's wages i in the economic sector j; X_j consists of $X_1=1$ and k - 1 variables measuring of individuals and economics characteristics, and regions; a is the interceptor of the equation, and k - 1 coefficients corresponding to variables in X; b_i and g_i are the parameters to be estimated; DEN is the ratio of black to white plus blacks employment and *y* is its coefficient; $y < 0$ means that wages in a group of workers grows with the decrease of density, and the opposite for $y > 0$; and e is the random error, independent and identically distributed.

The model of regression implies that the wage differential may be written in decomposition terms. The decomposition analysis explains the racial differential of wages by gender, in terms of productivity characteristics, discrimination and the racial density of the workers, by the following method,

$$\overline{lnw_w} - \overline{lnw_b} = (\alpha_w - \alpha_b) + \Sigma \beta_w \left(\bar{x}_w - \bar{x}_b\right) + \Sigma \bar{x}_b (\beta_w - \beta_b) + \\ + \Sigma \gamma_w \left(\overline{DEN}_w - \overline{DEN}_b\right) + \Sigma \overline{DEN}_b (\gamma_w - \gamma_b) \qquad (2)$$

$W = 1, ..., N_m$

$b = 1, ..., N_b$

adding a second superscript (w, b) to denote race, where b_1 and X_i are, respectively, the coeficient and mean of *i*th variable in an OLS wage (earnings) regression and the subscripts w and b denote whites and blacks, respectively. N is the number of individuals white w and blacks b.

Equation (2) is the average difference of logarit $\sum \overline{X_w}(\beta_w - \beta_b)$ of wages among the white and blacks individuals. The impact racial density is a product of y e (DEN_w - DEN_b). The contributions of racial density to wage differential are captures by the last term of Equation (2). The expression $\sum \beta_b(\overline{X_w} - \overline{X_b})$ is part of the differential of wages assigned to the differences of productivity characteristics, while $\sum \overline{X_w}(\beta_w - \beta_b)$ is part of the differential of wage, which is assigned to the differences in the regress of characteristics among races. In the absence of discrimination, the difference is explained by human capital and other measurable variables. The difference between the first term of the equation (2) on the left hand minus the sum of the two terms of the Equation (2) of the right hand is equal the measure of wage discrimination.

Equations (1) and (2) can be compared to the traditional equations (1') and (2') below, which does not include racial density composition:

$$ln\, w_{ij} = \alpha + \Sigma \beta_i X_{ij} + \varepsilon_i \qquad (1')$$

$$\overline{ln\, w}_w - \overline{ln\, w}_b = (\alpha_w - \alpha_b) + \Sigma \beta_w \left(\overline{x_w} - \overline{x}_b\right) + \Sigma \overline{x}_b (\beta_w - \beta_b) + \varepsilon_i \qquad (2')$$

On the other hand, the comparison between the two equations (2) and (2') points the extension in which the absence of the density variable affects the conventional estimates of wage racial differential (HIRSCH and SCHUMACHER, 1992, p. 509). The first and the third terms on the left of the equation (2') are typically attributed to discrimination. The second term corresponds to the wage differential part attributed to the groups related to productivity characteristics.

2. Analysis of the results

2.1. The data

We used cross-section data based on PNAD — National Household Sample Survey/ National Geographic and Statistics Institute/IBGE for 1998, with a sample of about 43,262 people, aged 18 to 65 that includes those who participate in the labor market. The sample used in this study is made up of 15,810 white and 10,905 black men, 8,182 white and 8,365 black women. The selected variables were race, sex, wages, years of study by level of education, experience, age, marital status, workers in the labor union and/or not in the labor union, firms activities, participation by race and sex in various levels of employment.

Table 1. The variables used

Variables	Description of the variables
Lnw	= Logarithm of average hourly earnings
White male	= 1, if white male workers, 0 otherwise
Black male	= 1, if black male worker, 0 otherwise
White female	= 1, if white female worker, 0 otherwise
Black male	= 1, if black female worker, 0 otherwise
Union	= 1, if unionized, 0 otherwise
Residence	=1, is worker reside in the region, 0 otherwise
Tenure	= years on current employment =1, 0 otherwise
Tenure^2	= 1 The square of tenure
Married	= 1, if married, 0 otherwise
Fulltime	= 1 if usual hours per week ≥ 35
Education	= years in school
Experience	= age - Schooling -6
Experience^2	= The square of Experience
Hours	= number of hours working per week
Region	= 4 dummies for the Northeast, Central, Seast and South = 1, 0 otherwise
Seast and South	= 1, if Seast and South, 0 otherwise
No Seast and South	= 1, No Seast and South, 0 otherwise
DEN	= Density = number of black workers divided by sum of white and black workers in individual's industry - occupation -region (IOR) cell

The variable lnwage represents real earnings because it is deflated to its set/99 value using the IPC's FGV/RJ deflator.

The numbers among brackets represent the proportion of the employed labor in each economic sector. In the Service sector: [51.81% are white male and 48.19 % are black male], [61.10 % are white female and 38.90% are black female]. In the Commodities trade sector: [57.33% are white male and 42.67 % are black male], [41.17% are white female and 58.83 % are black female]. In the Manufacture sector: [58.99% are white male and 41.01 % are black male]. [31.27% are white female and 68.73 % are black female].

Table 2 registers the basic descriptive statistics of endowment among white men, black men, white women and black women in the three sectors of economic activity. Concerning service sector, the white worker's experience (19.26) is greater than black men's experience (18.52), to which it may be influencing positively the wages of the whites. There are different levels of education among them, considering that white workers (7.68) have more and higher level of education than black workers (6.50). This racial differential does not seem proportional to the differences of race, relatively small races, which exist in terms of individual qualifications.

The most significant wage average difference (0.47) — in terms of gender — is in the commodities trade sector. White men have higher levels of education (8.76) than black men have (6,77), but when it comes to experience white men are behind (16.77 against 17.03, respectively).

Although white and black workers (men and women) have similar in years of experience (measured in years) the current employments, we observed that black workers earn average wages lower than white workers (men and women) in all economic activities. In each activity, the black workers earnings are 45% to 50% lower than the white workers' earnings. While, the differential earnings among women are about 22% to 42,8% in the white women's favor. These results seem to indicate that these sectors require a higher level of education (Table 2).

Through basic descriptive statistics of the characteristics between white women and black women in three sectors of the economy, it has been verified that in the service sector, in average terms, there are more white women than black women. White women (21.20) seem to have in average two years less of experience in the labor market when comparing to black women (18.45). *Hirsch* e *Schumacher* (1992) showed that the density effect is much lower for black workers with lower education level.

In commodities trade, the average wage for white workers (women) is higher than for black workers (0.51 against 0.19, respectively). However, the experience of white women workers (9.88) is higher than the experience of black women (8.58). Regarding manufacture sector, it can be observed that the number of contracts (average) and the average wage of white women workers (5.07 e 0.49) are superior to black workers (4.98 e 0.09), respectively, which can be linked to the level of education.

The racial density shows fairly significant differences with much higher proportions of white workers in the commodities trade, manufacture sector and service sector. Black women dominate in these same economics activities.

2.2. Econometric analysis

2.2.1. The density effect

Table 3 presents the estimated results of equations (1) and (2) with reference to the service sector. The "experience"(3) coefficient, although significant, has a low effect over the wages of white men (4.25%), black men (4.77%), white women (2.92%) and black women (4.09%) which is, considering 4 years of experience. We may interpret the estimate parameters as a return rate of education, because the function is log-linear. When analyzing education parameters, which represent years of study, it has been evidence that the effects over white men's wages (10.8%) are very similar comparatively to black men's wages (10.1%). The return rate of education for white female workers (9.76%) is similar to black female workers (9.07%). These almost identical rates point out to strong homogeneity

(3) To obtain the effects of experience on log earnings, we compute the partial derivative: $\ln w = \beta_0 + \beta_1 Exp + \beta_2 \frac{Exp^2}{100} + \mu_i \therefore \frac{\partial \ln w}{\partial Exp} = \beta_1 + 2\beta_1 \frac{Exp}{100}$, where w is hourly earnings, exp is experience.

indexes in return rates of education for workers. In accordance with human capital theory, much of the variables, which affect the decisions of workers for an occupation sector, also affect employers when selecting a specific worker.

Hirsch e *Schumacher* (1992) questioned how the wages for whites and blacks were estimated to capture changes when racial composition of the work for each group of workers leans to an equal opportunity, *i. e.*, they converge for an average data value. Analyzing the explained part of wage differential, for example, in the service sector, the average density for the entire sample of workers is of 0.2276. For white men, an increase of the current value density 0.1730 to 0.2276 is closely related to the decrease of their wages 2.35% ([exp (g_w (0.2276 - 0.1730)) -1] 100). For black men, a variation of 0.1610 in density to 0.2276 implies a loss in their wages of 3.97% ([exp (g_w (0.2276 - 0.1610)) -1] 100). One can observe that our results with respect to blacks (3.97%) are very close to the results found by *Hirsch* and *Schumacher* (1992), for United States case, it is 3.97% e 3.5%, respectively.

For white women, the variation in racial density of 0.2720 to 0.2276 will result in a gain in wages of 2.19% ([exp (g_w (0.2276 - 0.2720)) - 1] 100). For black women, a change of density of 0.3043 to 0.2276 will produce an increase of their wages of 4.65% ([exp (g_w (0.2276 - 0.3043)) - 1] 100).

The estimated parameter's values allow us to calculate the impact of density over the wages of all workers. The density coefficients are negative and significantly high for all workers in the service sector, which indicates that earnings vary inversely with racial density. The increase of density per race leads to a decrease in the wages of white men of 41.32%, while racial density affects negatively the wages of white women worker in 53.58% and black women worker in 44.68%.

As *Johnson* and *Solon* (1984) observed, the gain of both male and female is negatively related to the proportion of females in an occupation, even when there is a wide variety of controlled variables.

Table 3 also presents, the results obtained for trade sector. In this sector, the estimates of density show statistically significant coefficients for all workers. Be d the differential of the wage logarithm. The percentage may be calculated by [exp (d) - 1] 100. This differential has strong negative effects over wages in this sector, *i. e.*, in the same proportion which increases the density, it decreases white men's wages in 49.77%, and black men's wages in 41.91%. These results are compatible with *Hirsch* and *Schumacher's* (1992) findings, which demonstrated that for white and black men, there were negative rates of 51.9% e 39.2%, respectively. For white and black women, our results registered negative effects over wages of -2.86% and -48.14%, respectively. For white and black women, *Hirsh* and *Schumacher* (1992) observed negative effects over wages of percentage of -15.2% e -23.59%, respectively.

It was verified that education maintains a relationship of dependency with wages indicating that each change in the level of education corresponds a positive impact over wages, *i. e.*, the increase of education level leads to an increase of the worker's earnings. The return rate of education is higher for white workers (12.7%) than for black men

(10.6). Regarding women, approximately 9.93% is represented by the "white" race and the "black" race is around 8.88%. As expected, both coefficient of the experience variable and its square have signs compatible with human capital theory, but its effects are very low over wages.

Still in Table 3, we can observe a strong effect of the fulltime[4] parameter in setting wages. For example, in the manufacture sector, white male workers assure higher increases to their earnings for their work with this variable (22,75%) than with other variables in this sector of economy. The results show that the endowment of workers of the manufacturing industry sector have strong effects over wages, confirming the explanation of human capital theory. With respect to return rate per years of study and experience for both racial groups, the results present different outcomes. For example, for which men it was 14.4% and of 5.54% (at 4 years of education), respectively. While for white women, the rates of return per years of study are around 11.1% and 5.29% (at 4 years of experience) in that order. *Johnson* and *Solon* (1984) observed that much of these differences of earnings, even after controlling individual different characteristics, are still related with industrial distribution by sex.

The impact of density over wages of workers in manufacturing is also significant. Thus, it is observed that the coefficients are significant and negative for the more estimated models and maintain an inverse relation with the workers wages. The growth of density causes reduction of white men's wages in 54.72%, of black men in 41.13%, of white women in 30.51% and of black women in 60.21%.

The results of estimated coefficients when the samples are segmented in four demographic groups, by age, by region and by years of study, are presented in Table 4. In the service sector, the negative effects of density over wages are restricted to people ranging 35-64 years old (except black women) and to white youth with age between 16-34 years old. For the four demographic groups, the negative effect of density over wages is bigger for groups with 12 years of education. Among the demographic groups, the negative effects of density are stronger for white women with higher education. There is a big difference between women of both races. Data indicates that the relative size of the coefficients have greater negative effect over individuals who are in the southeast region, than of those whom are outside this region. These results on segmentation of four demographic groups are consistent with the findings of *Hirsch* and *Schumacher* (1992).

In the service sector, the labor union has a greater influence on worker's wages than in the other analyzed sector. It has been observed that the effects of the unions over white men's wages (29.56%) are superior comparing to black workers (25.99%), while the effects of union density over white women's wages (38.13%) have more impact than in the case of black women (20.20%).

Regarding the trade sector, the results show that the negative effects of density over wages are restricted to youths between 16-23 years old (except for black women), while these effects, over the wages of elderly people, are greater for both groups (except for

(4) To obtain the marginal effects of the dummy variable on log earnings (because the function is log-linear), the percentage may be calculated by [antilog(b)-1]100 where b is estimated parameter.

black men). The negative effect of density focuses in both demographic groups with 12 years of education. For women, the effect over wages is much higher for those with lower levels of education. One can verify that the impact of the negative effect of density over wages of people with less than 12 years of education in the trade sector is higher for white women than for every other worker: white men, black men and black women. For white and black men who work in the southeast region, the negative effect of density has lower impact on their wages than for white and black men who work in a region outside the southeast.

Finally, we observed in the transformation sector, for the four demographic groups, a negative relationship between the density effect and wages, of all workers (except for white women) between 16-34 years old. For the purpose of comparison, the results of the four demographic groups of the segmented samples with less than 12 years of education have the same direction of the density effects obtained by *Hirsch* and *Schumacher* (1992). Data reveal that the negative impact of density over the wages of four demographic groups (except for white women) is weaker in the southeast than outside this region.

2.2.2. Decompositions of the wage differentials

We present in Table 5 the results obtained with the methodology of the decomposition of wage differentials for the three sectors of the considered activity. It has been observed that in the service sector differences of wages between men (56.36%) are attributed to racial discrimination by gender, since that for a racial decomposition the differences between women, one may observe that the increase of density has 53.58% of white women and 44.68 % black women in most cases, the effect of reducing their wages.

Thus, we observe that the non-explained part of the decomposition represents about 51.36%. These results indicate also the existence of discrimination.

The worker of the service sector has approximately the same human capital, while in the other sectors of the economy, there are differences endowment between the workers. This information leads to the hypothesis of the relationship between discrimination-density, as well, as when the higher, the greater is the density of discrimination among workers.

Regarding the trade sector, the average wage difference is of 0.3902, and the average difference related to endowments is of 0.1614 (about 41.36%) of the average wage difference in natural logarithm of the wages of men and women. The other 58.64% are attributed to the non-explained variations (discrimination). In general, wage differentials increases initially between men and women and after it decreases with levels of education. Finally, the average wage difference of white-black women is 0.2018, while that the difference of endowments between them is 0.0860, which corresponds to 42.62 of the average wage difference, while 57.38% are explained by discrimination.

The manufacturing industry shows that the average wage differences between white and black men are of 0.3723. The average difference related to the non-explained part is 0.2195. These results indicate evidence of racial discrimination against black workers of 58.96%, while the wage average racial difference among women is 0.03233. The average difference linked to endowments between them is 0.3631. The difference of 0.1254 (51.22%) corresponds to the non-explained part, *i. e.*, represents discrimination.

The traditional approach [OAXACA, (1973)] meets levels of differentials (non--explained part) of 33% to 89% for white men. The results found by *Hirsch* and *Schumacher* (1992) were of 54,4% to 81%. *Neumark's* (1988) presents differential non-explained of 46,6% to 83,4% for men. While for white women, the levels of differentials are 51,22% to 61,22%, *Hirsch* and *Schumacher* (1992) obtained 80,9% to 183,0%.

With the approach of racial density coefficient for men and women whites, the levels of differentials were of 49,53 to 62,21% and of 42,36% to 58,13%, respectively. The levels of differentials found by *Hirsch* and *Schumacher* (1992) are of 45,5% to 46,6% for men and of 63,8% to 80,9% for women whites.

Specifically, we can observe that racial density $\left[\sum \overline{DEN}_b (\gamma_w - \gamma_b)\right]$ has a strong positive influence (except for men in the transformation industry) on the non-explained part $\left[(\alpha^w - \alpha^b) + \Sigma \overline{X} b (b^w - b^b) + \Sigma \overline{DEN}_b (\gamma^w - \gamma^b)\right]$. We can interpret these results as a positive relationship between racial density and discrimination.

In relative terms, the participation of racial density on the non-explained part for men and women in the service sector registers percentages of 13,80% and 20.93%, in the trade sector, of 3.27% and 8.05%, and in the transformation sector of -5.22% e 5.32% respectively.

Our main results are consistent with the "crowding" hypothesis. Wages vary inversely with racial density by sex, leading to a wage differential greater in markets with higher density, as was the case in the service sector. Racial density relates inversely with the worker's wages in every sector of activity in the Brazilian economy.

The coefficients of density are greater in the service sector than in the other sectors of economy.

Some results obtained in this paper confirm that the white worker's wages are significantly higher than of the black workers. The wage differential differs regarding the proportion of black workers and also for female employees. These results are basically the same found by *Hirsch* and *Schumacher* (1992). They show that the wages of whites and blacks (as black, for Brazil) are lower in occupied industries with groups with high-density rates of black workers.

3. Conclusion

It can be observed from the accomplished analysis that discrimination is a strong characteristic in the three sectors of the Brazilian economy. In the service sector, the negative effects of density over wages are restricted to people ranging 35-64 years old (except black women) and to white youth between 16-34 years of age. For the four demographic groups, the negative effect of density over wages is bigger for groups with 12 years of education. Regarding the trade sector, the results show that the negative effects of density over wages are restricted to youths between 16-23 years of age (except for black women). For women, the density effect on wages is bigger for those with lower levels of education. In this case, it was observed also that the discrimination is focused on

black workers. The results show that 58.96% of the average difference of men's wages and the 61.22% of the average difference of women's wages (industry of transformation), are explained by the discrimination. Besides, the study shows that discrimination decreases with higher levels of education. The correlation coefficient of wages between white and blacks, men and women, is high.

With the approach of racial density coefficient for men and women whites, the levels of differentials were of 49,53 to 62,21% and of 42,36% to 58,13%, respectively. The levels of differentials found by *Hirsch* and *Schumacher* (1992) are of 45,5% to 46,6% for men and of 63,8% to 80,9% for women whites.

It has been observed that in the service sector, differences of wages between men (56.36%) are attributed to racial discrimination by gender, since that for a racial decomposition the differences between women, one may observe that the increase of density has 53.58% of white women and 44.68 % black women in most cases, the effect of reducing, their wages.

The service sector is where the presence of racial discrimination among men is stronger, given a greater racial density among the people in this sector. In the service sector, there are strong indexes of homogeneity among workers by race in terms of the rate of return to education. The estimated coefficients of racial density per gender are also higher in this sector.

Table 2. Description of the Variables, Means and Standard Deviations by Demographic Group and Racial Density in Category

Male Female						
Variables	Service	Commerce Trade	Manufacture	Service	Commerce Trade	Manufacture
	Mean S.D.	Mean S.D	Mean S.D	Mean S.D	Mean S.D	Mean S.D
Lnw Br	0.61 0.83	0.59 0.88	0.70 0.84	0.10 0.78	0.39 0.78	0.42 0.73
Pr	0.19 0.79		0.33 0.72	-0.25 0.73	0.19 0.81	0.09 0.69
		0.20 0.83				
Schooling Br	7.68 0.04	8.76 3.59	8.23 3.69	6.73 3.36	9.88 3.31	8.86 3.51
Pr	6.50 3.30	6.77 3.52	6.61 3.51	5.75 3.12	8.58 3.54	7.65 3.43
experience Br	19.26 13.60	16.40 13.21	16.62 11.20	21.20 13.09	13.87 12.24	15.60 11.35
Pr	18.52 13.51	17.03 13.62	16.91 11.92	18.45 12.80		16.46 12.04
					15.37 13.01	
Tenure Br	5.19 2.78	5.17 2.78	5.21 2.81	4.97 2.83	5.05 2.83	5.07 2.77
Pr	5.16 2.90	5.05 2.85	5.07 2.84		5.01 2.80	4.98 2.83
				4.87 2.83		
Union Br	0.11 0.31	0.13 0.33	0.24 0.43	0.04 0.19	0.13 0.34	0.19 0.39
Pr	0.11 0.31	0.09 0.28	0.18 0.38	0.03 0.16	0.10 0.29	0.16 0.36
Married Br	0.62 0.49	0.56 0.50	0.61 0.49	0.50 0.50	0.69 0.46	0.69 0.50
Pr	0.55 0.50	0.53 0.50	0.56 0.50	0.41 0.49	0.66 0.48	0.44 0.50
Fulltime Br	0.10 0.98	0.06 0.76	0.02 0.49	0.35 1.83	0.30 1.70	0.08 0.89
Pr	0.10 1.01	0.09 0.53	0.03 0.51	0.30 1.69	0.36 1.87	0.09 0.93
Residence Br	0.66 1.28	0.58 1.26	0.57 1.27	0.67 1.31	0.60 0.59	0.60 1.28
Pr	0.54 1.15	0.57 1.17	0.55 1.15	0.60 1.17	0.54 1.19	0.53 1.19
Density Br	0.17 0.38	0.35 0.48	0.42 0.49	0.27 0.45	0.23 0.42	0.17 0.38
Pr	0.16 0.37	0.24 0.42	0.26 0.44	0.30 0.46	0.33 0.34	0.09 0.28

Table 3. Estimative of Equations of Wages of the White and Black Workers for Economics SectorsService Commerce Trade Manufacture

Variables	White Male (1)	Black Male (2)	White Female (3)	Black Female (4)	White Male (1)	Black Male (2)	White Female (3)	Black Female (4)	White Male (1)	Black Male (2)	White Female (3)	Black Female (4)
Schooling	0.108	0.101	0.0976	0.0907	0.127	0.106	0.0993	0.0881	0.144	0.111	0.125	0.106
	(24.72)	(24.72)	(26.49)	(27.30)	(32.93)	(23.01)	(19.51)	(11.98)	(45.60)	(29.12)	(25.11)	(15.02)
Experience	0.0481	0.0540	0.0356	0.0468	0.0507	0.0543	0.0384	0.0280	0.0624	0.0595	0.0351	0.0358
	(13.05)	(14.52)	(12.49)	(19.89)	(15.38)	(14.43)	(11.71)	(5.91)	(20.67)	(19.63)	(8.96)	(15.00)
Exper^2/100	-0.0699	-0.0789	-0.0402	-0.0574	-0.0610	-0.0712	-0.0524	-0.0322	-0.0870	-0.0827	-0.0465	-0.0485
	(-10.86)	(-12.29)	(-7.37)	(-12.35)	(-10.00)	(-10.91)	(-7.47)	(-3.41)	(-14.80)	(-12.18)	(-5.31)	(-4.58)
Tenure	0.0127	0.0040	0.0298	0.0199	0.0027	0.0104	0.0129	0.0266	0.0302	0.0331	0.0511	0.0746
	(0.63)	(0.20)	(1.90)	(1.48)	(0.15)	(0.50)	(0.61)	(2.26)	(2.05)	(1.97)	(2.34)	(2.51)
Tenure^2	-0.0808	0.0797	-0.166	-0.0417	0.0519	-0.0001	-0.0370	-0.328	-0.0019	-0.0017	-0.0038	-0.0065
/100	(-0.46)	(0.47)	(-1.196)	(-0.35)	(0.33)	(-0.03)	(-0.20)	(-1.28)	(-1.45)	(-1.13)	(-1.98)	(-2.47)
Union	0.259	0.231	0.323	0.184	0.163	0.199	0.209	0.0984	0.189	0.159	0.180	0.0936
	(5.88)	(5.12)	(5.45)	(306)	(4.267)	(3.84)	(4.70)	(4.70)	(7.55)	(5.08)	(4.60)	(1.60)
Married	0.205	0.149	0.0648	-0.0115	0.183	0.105	0.0186	0.0116	0.152	0.0968	-0.0299	0.0332
	(5.97)	(4.44)	(2.77)	(-0.59)	(5.58)	(3.84)	(0.58)	(0.27)	(5.56)	(3.26)	(-0.90)	(0.75)
Fulltime	0.155	0.134	0.0949	0.101	0.151	0.114	0.0937	0.0923	0.205	0.129	0.112	0.122
	(11.11)	(9.87)	(15.71)	(10.03)	(9.17)	(7.45)	(10.67)	(8.40)	(9.63)	(5.61)	(6.50)	(5.36)
Residence	0.0466	0.0739	0.0527	0.0802	0.0465	0.0485	0.0355	0.0518	0.0299	0.0667	0.0388	0.0493
	(4.34)	(6.10)	(6.26)	(10.03)	(4.622)	(3.87)	(3.03)	(3.03)	(3.52)	(6.51)	(3.26)	(2.76)
Density	-0.4310	-0.6082	-0.4880	-0.5921	-0.5125	-0.5432	-0.3187	-0.3825	-0.4134	-0.3662	-0.800	-0.9217
	(-14.58)	(-18.84)	(-21.63)	(-32.30)	(-19.22)	(-18.79)	(-11.71)	(-10.29)	(25.52)	(-22.17)	(-13.74)	(-11.98)
N=	2486	2312	3905	4369	6612	4472	4277	2578	6712	4121	2798	1418
F=	133.92	115.98	129.88	182.63	212.27	114.44	71.60	29.98	350.28	165.40	88.16	0.271
R^2	0.327	0.312	0.231	0.274	0.384	0.311	0.231	0.167	0.487	0.392	0.345	32.53

Note: The t statistic are given in parenthesis below in coeficients. Sample sizes in brackers. The F statistic are significative in all models .

Table 4. DEN Coeficientes from Segmented Regressions by Age, Schooling, and Region, Racial Gender Group Service Commerce Trade Manufacture

Variables	White Male (1)	Black Male (2)	White Female (3)	Black Female (4)	White Male (1)	Black Male (2)	White Female (3)	Black Female (4)	White Male (1)	Black Male (2)	White Female (3)	Black Female (4)
Age 16-23	0.0697	0.195	0.0360	0.165	-0.071	-0.0031	-0.019	0.0668	0.258	-0.012	-0.016	0.027
	(1.26)	(3.78)	(0.78)	(4.57)	(-2.02)	(0.83)	(-0.45)	(1.17)	(1.62)	(0.15)	(-0.34)	(0.392)
	[618]	[657]	[996]	[1348]	[1352]	[1061]	[1061]	[595]	[1366]	[1093]	[614]	[311]
Age 16-34	-0.0150	0.105	0.0444	0.102	0.134	0.136	0.040	-0.058	-0.156	-0.022	0.047	-0.010
	(-0.22)	(1.55)	(0.75)	(2.02)	(3.55)	(3.19)	(0.80)	(-0.89)	(-0.81)	(-0.23)	(0.88)	(-0.03)
	[1111]	[1004]	[1684]	[1841]	[3273]	[2338]	[2462]	[1497]	[3521]	[2380]	[1616]	[826]
Age 35-64	-0.130	-0.095	0.0165	-0.041	0.0122	-0.002	-0.056	-0.120	-0.605	0.010	-0.095	0.118
	(-0.16)	(-1.11)	(0.22)	(-0.63)	(0.27)	(-0.04)	(-0.95)	(-1.52)	(-2.29)	(0.50)	(-1.47)	(1.15)
	[591]	[433]	[1022]	[813]	[2690]	[1595]	[1524]	[902]	[2684]	[1401]	[979]	[486]
Schooling < 12	-0.215	-0.281	-0.01	-0.274	-0.118	-0.328	-0.057	-0.0221	-0.512	0.489	-0.282	0.262
	(-1.71)	(-1.25)	(-0.70)	(-1.37)	(-1.61)	(-1.64)	(-0.80)	(-0.16)	(-1.81)	(1.111)	(-2.93)	(0.98)
	[2421]	[2311]	[3872]	[4375]	[5668]	[4373]	[3740]	[2489]	[5944]	[4024]	[2459]	[1376]
Schooling = 12	-0.396	-0.339	-0.658	-0.094	-0.147	-0.110	-0.285	-0.192	-0.250	-0.693	-0.146	-0.570
	(-2.82)	(-1.26)	(-4.59)	(-0.40)	(-1.90)	(-0.52)	(-3.62)	(-1.11)	(-0.95)	(-1.46)	(1.45)	(-1.94)
	[432]	[240]	[432]	[267]	[1649]	[660]	[1504]	[774]	[1383]	[535]	[644]	[254]
Schooling > 12	0.4601	0.434	0.860	0.161	0.230	0.204	0.340	0.271	0.269	1.032	0.375	0.734
	(3.03)	(1.58)	(5.68)	(0.66)	(2.60)	(0.93)	(3.67)	(1.49)	(0.76)	(2.19)	(3.28)	(2.42)
	[522]	[258]	[527]	[288]	[2272]	[745]	[1916]	[833]	[2026]	[607]	[927]	[289]
Non -South	-0.784	-1.156	-1.238	-1.460	-0.957	-0.994	-0.893	-1.040	-0.885	-1.185	-0.601	-1.624
	(-4.12)	(-4.53)	(-7.39)	(-6.67)	(-8.63)	(-4.58)	(-6.66)	(-5.10)	(-1.14)	(-2.28)	(-3.22)	(-4.68)
	[2417]	[2240]	[3772]	[4172]	[705]	[281]	[482]	[139]	[797]	[290]	[317]	[107]
South	-0.834	-1.173	-1.238	-1.104	-1.0190	-1.014	-0.828	-1.115	-1.00	-1.259	-0.394	-1.714
	(-4.28)	(-4.11)	(-7.10)	(-5.99)	(-10.40)	(-4.85)	(-6.96)	(-6.04)	(-1.28)	(-2.45)	(-2.31)	(-5.23)
	[127]	[98]	[226]	[234]	[5907]	[4191]	[3795]	[2439]	[5915]	[3831]	[2481]	[1311]

Note: The t statistic are given in parenthesis below in coeficients. Sample sizes in brackers. The F statistic are significative in all models .

Table 5. Decomposition of Racial Wage Differences, by Gender
Male Female

Specification	Service	Commodities trade	Manufactur e	Service	Commodities trade	Manufacture
A. .All Individual **(1)** and firm caracteristics	0.2352	0.2288	0.2195	0.1826	0.1158	0.1979 (51.22%)
	(56.36%)	(58.64%)	(58.96%)	(51.22%)	(57.38%)	0.1254 (48.78%)
	0.1821	0.1614	0.1528	0.1739	0.0860	0.3233
	(43.64%)	(41.36%)	(41.04%)	(48.78%)	(42.62%)	-0.0635
(2)	0.4173	0.3902	0.3723	0.3565	0.2018	(-19.65%)
(3)	0.0232	-0.0506	-0.0787	0.0472	-0.0197	0.1879 (58.13%)
B. Line (1) plus DEN **(DEN)**	(5.57%)	(-12.97%)	(-21.14%)	(13.24%)	(-9.75%)	0.1989
	0.2065	0.2215	0.2316	0.1510	0.1071	(61.52%)
(1)	(49.53%)	(56.77%)	(62.21%)	(42.36%)	(53.07%)	0.3233
(2)	0.1874	0.2193	0.2194	0.1583	0.1144	5.32%
(3)	(44.90%)	(56.20%)	(58.93%)	(44.40%)	(56.68%)	
C. The participation of the racial density **(4)**	0.4173	0.3902	0.3723	0.3565	0.2018	
	13.80%	3.27%	-5.22%	20.93%	8.05%	

(1) Unexplained part. (2) Explained part. (3) The total wage gap in natural logarithm. The total racial wage gap is The Line (1) is calculated by equation (2'). Explained part is by. The unexplained part is.

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