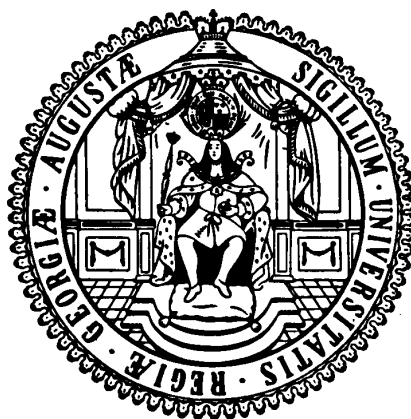# Ibero-Amerika Institut für Wirtschaftsforschung
Instituto Ibero-Americano de Investigaciones Económicas
Ibero-America Institute for Economic Research
(IAI)

Georg-August-Universität Göttingen
(founded in 1737)

Diskussionsbeiträge · Documentos de Trabajo · Discussion Papers

Nr. 118

Race Discrimination or Inequality of Opportunities:
The Brazilian Case

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October 2005

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September 2005

Second draft

ABSTRACT

Following the topics discussed by Campante *et al* (2004), this paper contributes to the literature of the Brazilian racial discrimination by isolating the effect of intergeneration transmission of schooling and the school's quality in the race discrimination effect. Instead of modelling just one mincer-type equation like others papers, it was decided to use the Two Stage Least Square Model where the first step of modelling control the endogeneity of individual schooling instrumenting it by family background and ability tests while attending school. The paper also provide a comparative profile of urban racial discrimination in the Northeast and the Southeast recognizing the important differences across regions in Brazil both in terms of economic development and racial composition of the population. As found by *Campante et al (2004)*, results reveal that part of the component of wage differentials ordinarily attributed to labor market discrimination is actually explained by persistent educational inequalities between races. However because they didn't control the potential bias due to the endogeneity of some variables, their discrimination effect is 15 to 19 percentage points higher than it should be. The mechanism of intergeneration transmission is correlated with financial constraints and higher education of parents because *blacks* have lower elasticities of education with respect to parent's education due to selection and causation. Even controlling the model using instruments, Private sector remains as the sector where race discrimination is really an issue. Moreover, the regional profile suggests that the labor market is a more important locus of the racial issue in the Southeast than in the Northeast, although the significant presence in both regions. However, we are not controlling for selection bias and consequently the results must be viewed with caution because it is not sure how precise the estimations are.

I- Introduction

The study of racial discrimination in the Brazilian economic literature has been increasing in volume since the 90's. In 2004, *Campante, Crespo* and *Leite* revised the estimated model from *Soares* (2000) by including new controls leading to a different profile for the Brazilian discrimination. Based on the international literature on the topic[2] they included variables such as educational level of parents due to a strong pattern of intergenerational transmission of education in the country as previously stressed by *Lam* (1999). The authors show that adding mother's education as an additional explanatory variable turns out the results found in Soares (2000) reducing the discrimination component of wage differentials. They also have identified and quantified racial discrimination between *whites* and *non-whites* in the Brazilian labor market using decomposition methods as suggest in *Juhn, Murphy and Pierce* (1993) that allow them to disentangle the part of the difference attributable to discrimination within the labor market[3] from what is associated with different individual characteristics and/or differences in how the market remunerate individuals with similar characteristics. In this sense, some of the race issues being attributed to the labor market are in fact more closely associated to other instances, such as educational inequalities and their intergenerational transmission. However, parent's education is not exogenous because individual's schooling is, according the literature of intergenerational transmission, function of parent's schooling. Regressing wages on both individual's schooling and parent's schooling without control possible endogeneity (correlation) of variables may lead to biased estimates and consequently dubious results.

Campante et al (2004) have also discussed the importance of the Brazilian asymmetries between regions to explain the determinants of the wage differential in the labor market. This issue was discussed in *Cavalieri* and *Fernandes* (1998), where metropolitan areas were studied separately and in *Soares* (2000) where the inclusion of regional dummy variables in his model had reduced the estimated discrimination effect. This procedure, however, only deals with different intercepts across regions, with no attention paid to the possibility that the full set of parameters may vary across regions. Estimating different models for Southeast and Northeast, *Campante et al.* (2004) found that the labor market seems to be a much more important locus of the racial issue in the Southeast than in the Northeast, especially when mother's education is included in the analysis. They also pinpoint an important role for the status of public sector workers in determining the discrimination term. By separately analyzing the labor market, they found that *black* individuals are relatively better off working for the public sector when compared to *white* individuals.

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[2] In this regard, see Altonji and Black (1999).
[3] In the sense of different payments for individuals with identical productive characteristics, in identical jobs

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The present paper intends to go further in the some aforementioned directions, focusing in the intergenerational transmission of human capital and focusing in the effect of the quality of the school on individual's education. First we will recompute the model used by *Campante et al (2004)* in order to present the magnitude of a possible bias while estimating the model without instruments for individual schooling due to its correlation with mother education by using *Two Stage Least Squares* method instead of a Ordinary Least Squares. Later, we will instrument schooling with family background and ability test while attending schools by each Brazilian Municipality segmented in public and private schools. The method allows us to study in what stand *black* workers, which are more likely to experience some financial constraints affecting their educational choices, can be in a lower position in the labor market and consequently reaching lower wages. Pre-market human capital difference determines inequality of opportunities in the labor market and consequently explains part of the wage gap that is constantly wrongly attributed to racial discrimination. Besides, we intend to compare workers with similar characteristics in identical sectors. The analysis will be held only for urban areas and also separately for Southeast and Northeast[4] with data collect by the national representative household survey of 1996.

In order to present and discuss these results, the paper is organized as follows: Section II presents the methodology and the adopted specification, relating them to the existing literature on the topic. Section III briefly describes the data while section IV features the obtained results. Finally, Section V concludes.

II- Specification and Methodology

Before specify the model or the methodology, it's necessary to define what it will be defined as *Discrimination* in the paper. Reviewing the literature of racial discrimination we found that authors usually define labor market (racial or gender) discrimination as a situation in which persons with similar characteristics in the same sector/occupation are treated unequally due to their observable characteristics.

However, even controlling by many observable characteristics it's very difficult to measure two important unobservable characteristics that could lead to different wages in the labor market such as individual's ability or jobs satisfaction. Some authors, as *Clark* (2004), take individual's ability or jobs satisfaction as a proxy of utility at work and consequence wages

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[4] These two regions are the two most heavily populated regions (about 60% of the total of white individuals in Brazil, and about 70% of the total of black individuals), which allows for larger sample sizes and hence more reliable results, as well as the fact that they represent two extremes in terms of Brazilian economic development.

can be determined by theses variables. Clark argues that workers in some jobs can do enjoy their jobs making more effort in the jobs being reward with better salaries[5] that can be misunderstood as discrimination due to lack of information. However, it's also possible to think that the utility of work is, in fact, a function of earnings because both *black* and *white* workers in a given sector could have the same preference and taste but been rewarded in a different way due to their race.

In absence of such variables as suggested by Clark and assuming that utility is a function of earnings, *Campante et al* (2004) shows that the presence of mother's education in the model reduces the importance of race effect in the wage gap differential. In general what author's identifies as labor market discrimination should be credited to the heritage of educational inequality and its racial component by the inclusion of mother's education as an additional variable. However, they do not take in account that the unobservable in the earnings equation cannot be assumed independent of the effort variables as schooling. Adding mother's education, which has a direct effect either in schooling or in earnings, could bias the coefficients of the observable variables. Consequently the use of valid instruments is needed to have non-bias estimates of the race discrimination.

In addition to this, any of Brazilian literature papers discuss the effect of the quality of the school on the determination of individual's education. Individual's wage is normally determined by 'circumstances' (race, gender) and 'efforts' (schooling, migration) they are faced with. For example, individuals from poor families are more likely to experience some financial constraints affecting their educational choices and consequently, educational choice or/and earnings are inherited from their parents. Bourguignon, Ferreira and Menendez (2003) had discussed the effect of the demand for schooling (how much parents invest in their children) conditionally on their own characteristics finding that the inequality of the observed opportunities (inequality of circumstances) accounts for approximately 8-10 percentage points of the individual's earning Gini coefficient. The authors' deal with the endogeneity of efforts and the absence of adequate exogenous instruments to deal with it, by estimating some bounds inspired by Manski and Pepper (2000). In this paper, we suggest an average of the proficiency test of primary students while attending public or private schools by each municipality and also average level of satisfaction with the school by each municipality, as well parents level of education, as valid instruments to deal with the endogeneity of efforts. The proficiency tests and level of satisfaction are really exogenous[6] while parents' education will be assumed to be exogenous but it's not necessary a good instrument. Instrumenting

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[5] It is the idea of tournament models presented in Lazear and Rosen (1981) and Lazear (1998).
[6] See Card (2001).

individual schooling by family background (parents education), proficiency tests and school satisfaction we are able to separate out the impact of the instrument and of the variable it is instrumenting for, because family background can be an independent determinant of earnings by itself. The instruments allow the estimation of unbiased coefficients for 'circumstances' that, without instrumentation, can be misunderstood, for example, as discrimination.

The central idea of the paper is to determine how much of the observed wage differentials between races are due to labor market discrimination or inequality of opportunities (circumstances). The proposed methodology will follow the steps presented in *Campante et al* (2004) and in *Bourguignon et al* (2003) but controlling possible endogeneity of schooling by using instrumental variables estimating a Two Stage Least Square model to deal with the potential bias due to the individual's schooling endogeneity. We are going to bypass the discussion of 'discrimination' or self-selection bias because we are looking only for workers that are already in the labor market without take in account potential workers that could be in the market. We understand that it could have mixed concepts, but because we are interested in explain the observed wage gap we decide to not correct potential selection bias using Heckman methods, paying attention only to the endogeneity of education.

II.a Intergeneration transmission

In Brazil[7], around 51% of the total population is *white*[8] but on average, the household per capita income of households headed by *white* is 129% higher than household incomes of households headed by *blacks*. Besides, *blacks* headed 70% of the poorest households in the country. As consequence *blacks* are more likely to make their educational choices faced to limited resources.

Lack of resources is only one possible channel of transmissions of values from parents to children. The literature presents the confidence of the parents in the public educational system as another, extremely, important issue that could explain part of the intergeneration transmission. Important questions raised in the literature can be resume by 3 questions: Are the schools prepared to cover all demand from the Brazilian population? How does parent's education affect children's education? How much parents invest in their children?

According to *Black et al.* (2003) some plausible explanations of the intergeneration

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[7] Estimated from the Brazilian Household Survey of 2003 (PNAD).
[8] The Brazilian literature on the topic usually compares brancos and amarelos (individuals with Asian ascendancy) versus pretos, pardos and índios (those who would be called the "native" population, in the US). We exclude amarelos and índios, as we believe that these groups, besides being numerically much less than the others, have peculiarities in terms of their insertion in the labor market that do not justify their being lumped together with the

transmission are: *Selection* - more educated parents earns higher wages influencing their children that will do so as well; or *Causation* - better educated parents leads their children to better education. However, it's not clear by which mechanism the intergenerational correlations are transmitted from parents to childrens. The basic view is the financial constraints as main source of transmission. *Carneiro* and *Heckman* (2003) suggest parental education levels as main channel. However, *Chevalier* (2004) shows that the effect of the potential endogeneity of income and its correlation with education can bias all results from the children's schooling choice.

Despite the consensus of the importance of parent's education to children's education, a new educational policy is not the fastest way to improve education for future generations. The level of education does not change as much as we expect from generation to generation for both *whites* and *blacks* in Brazil. *Velez et al.* (2001) confirms the strong demographic inertia in Brazil showing that improvements in the school system take long to translate into more education for the population as a whole.

In addition to this, another possible channel of transmission is the effort of the individual to reach a given level of education. It's the same idea presented in Clark (2004) where individuals that enjoy their school can make more efforts to reach higher levels of education and also, individual's ability can explain why some reach higher level of education than others even when they are faced to same financial constraints. We can take individual's ability measured by proficiencies tests of Portuguese and Mathematics of students from primary schools (both public and private schools) by municipality, as well the overall level of satisfaction with the school as a proxy of utility of schooling that determines the educational level reached.

In Brazil, these variables, satisfaction and proficiency, are very important because in the beginning of the century, schools were privilege of the aristocrats (*whites/riches*). Then after many law's changes, *blacks* (former slaves - poors) gained the right to study in the same schools of *whites* (universal education). However, *riches* had migrated to private schools. By law, there isn't any racial segmentation in the educational system but in majority *non-poors* are in private schools while *poors* remained in the public system. Private schools, from kindergarten to high school, have always better quality than public schools with rarely exceptions like Military Schools. Moreover, undergraduate courses are privilege of a small part of population. Public Universities are synonym of quality and good education. However,

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other groups. Blacks represent the subgroup of Blacks and Pardos altogether.

only 32% of 1.2 millions of undergraduate students from Public Universities in 2003 were *blacks* and only 2-3% of both *whites* or *black*s students belong to the first quartile of household income distribution, i.e, under-graduation is privilege of *non-poors*.

II.b Is there discrimination between similar workers in the same job?

Another interest point discussed by *Campante et al* (2004) is the absence of 'discrimination' between workers from public sector in Brazil. In other terms, the public sector demand workers with pre-determined characteristic of schooling and experience without take race as factor of hiring someone. The admission of public sector is based on qualifying examinations at national or regional level. In that case, race is not a criterion to determine the salary except in case of promotion not based in examinations.

As the public sector careers block wage discrimination, this might point to discrimination at work in the private sector. Along with the fact that being regularly inscribed in the social security system (*com carteira*) has a more severe impact on *whites* as suggested in *Campante et al.* (2004), it may have a mechanism of discrimination at work concerning the insertion of individuals into the labor market. Following these steps, we focus our attention in a sub sample of workers in the same sector to measure the degree of discrimination in the labour market for a given sector. In one hand, we can control any type of noisy or bias coming from education inequality or inequality of opportunities because our sample comprises workers with similar characteristics. In other hand, we are not able to measure any type of discrimination in the access to this job, i.e., we do not take in account any possible discrimination during the process of insertion of workers in the labour market.

II.c Methodology

The literature of the causal effect of family background on the child's educational attainment has relied on different identification strategies as presented by *Behrman and Rosenzweig* (2002), *Sacerdote* (2002), *Plug* (2004) or *Black et al* (2004). In the proposal model there aren't any interest to find a causality effect of parental education, individual's ability or school satisfaction on child schooling but only to control their effect during the estimation of parameters in the wage equation.

The easiest way to deal with the endogeneity of individual's schooling is by using instrumental variables in a Two Stage Least Square model (2SLS). To avoid all types of sophisticated notation and asymptotic approximations, we present the simple special case.

Consider the structural equation:

$$\ln w = \beta \cdot Ed + X \cdot \gamma_1 + \varepsilon$$
$$Ed = Z \cdot \pi + X \cdot \lambda + \upsilon$$

(1)

where w is the wage of the individual, Ed its educational level, Z is a vector that contains *ParEd* - parents education, PT – average of the proficiency test at the municipality level and ST – average satisfaction of students at the municipality level (instruments) and X a control vector with other individuals characteristics such as race, age, experience, occupation and sector of activities and demographic characteristics as states dummies or regional dummies. ε and ν are unobserved error vector.

Assuming that Z is correlated with *Ed* and not with ν, it is possible to conduct non biased inference on β and γ_1. The identifying assumption is that the exogenous variables do not appear in the wage equation. The reduced form of the model is written by[9]:

$$Y = Z \cdot \pi \cdot a' + X\eta + V$$

(2)

where $Y=[\ln w; Ed]$, $Z=[EdPar, PT, ST]$ $V=[\nu_1,\nu]$, $a'=[\beta,1]'$, $\eta=[\gamma,\lambda]$, $\nu_1=\varepsilon+\nu\beta$; $\gamma=\gamma_1+\lambda\beta$

Despite the relevance of the 2SLS model of instrumental variables, we decide not only to look at the discrimination coefficient that comes out of the previous model by setting a dummy variable if *white* in the model. Following some steps from *Bourguignon et al.* (2002) we are going to simulate the potential earnings of *blacks* under the hypothesis that they are paid as *whites*. With that in mind, our methodology is an adaptation of the Oaxaca-Blinder procedure (Oaxaca, 1973 and Blinder, 1973). Subscribing *W* for *whites* and *B* for *blacks* we will model separately *whites* and *blacks* in order to estimate "prices" for both population groups and then use *white*'s parameter estimates on *black's* characteristics to estimate what would be the wage of *blacks* if they were paid as *whites*. Mathematically the simulation is defined as:

Model 1

$$Y_B^* = Z_B \cdot \hat{\pi}_B \cdot \hat{a}_W' + X_B\hat{\eta} + V$$

(3)

where $Y_B^* = [\ln w_B^*; Z_B]$, $Z_B = [EdPar_B; PT_B; ST_B]$, $V = [\varepsilon_B + v_B\hat{\beta}_W; v]$

$\hat{a}_W' = [\hat{\beta}_W; 1]'$, $\hat{\eta} = [\hat{\gamma}_{1W} + \hat{\lambda}_B\hat{\beta}_W; \hat{\lambda}_B]$

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[9] See *Andrews et al.* (2004) for further details on the model specification.

Model 2

$$Y_B^* = Z_B \cdot \hat{\pi}_W \cdot \hat{a}_W{}' + X_B \hat{\eta} + V \tag{4}$$

where $Y_B^* = [\ln w_B^*; Z_B]$, $Z_B = [EdPar_B; PT_B; ST_B]$, $V = [\varepsilon_B + v_B \hat{\beta}_W; v]$

$\hat{a}_W{}' = [\hat{\beta}_W; 1]'$, $\hat{\eta} = [\hat{\gamma}_{1W} + \hat{\lambda}_W \hat{\beta}_W; \hat{\lambda}_W]$

Furthermore, after estimating the counter-factual from equation (3) by changing only the set of parameters in the wage equation, it's easy to compute the wage gap differential by the following decomposition:

$$\Delta = \overline{Y}_W - \overline{Y}_B = (\overline{Y}_W - \overline{Y}_B^*) + (\overline{Y}_B^* - \overline{Y}_B) = \Delta_1 + \Delta_2 \tag{5}$$

The first term on the right-hand side corresponds to the part of the differential to be ascribed to characteristics, since it presents the comparison between estimated wages of the two groups of individuals under the same parameters, which is named as *characteristic effect*. The second term, on the other hand, is about how much the wages of *black* individuals vary due to these parameters. This is dubbed the *price effect*, which tells us how differently are rewarded the characteristics of white individuals, relative to *black* individuals. In the case of equation 4 the decomposition is not so simple because it mix both price and characteristics effect. It will be called the overall effect.

In addition to the decomposition, the proposal technique allows us to compute the wage density distribution of the counter-factual because it deals not only with the average characteristics as Oaxaca-Blinder approach but also with the whole distribution of wages.

III. Data characteristics

The used data was extracted from the PNAD (*Pesquisa Nacional por Amostra de Domicílio*), the main household Brazilian Survey, that is an annual household survey conducted by IBGE (*Instituto Brasileiro de Geografia e Estatística*) collecting information about 100,000 households and 300,000 individuals per year. The sample is representative for the whole country except rural areas from North Regions that comprises the states of Acre, Amazonas, Rondônia, Roraima, Amapá, Pará and Tocantins.

The choice of 1996 is due to the fact that it's the more recent year in which the survey has included a supplement with information of parents' schooling of the household head and spouse that allow us study the intergeneration transmission of schooling from parents to

children. The sample will be also limited to household heads, spouses, and their children. Others members will be excluded due to unavailability of information regarding their parents. We also exclude the domestic workers, self-employed and the employers because our scope is naturally limited to those who can be discriminated against by their employers.

The proficiency test and school's satisfaction data is collect every 2 years by the Instituto Nacional de Estudos e Pesquisas Educacionais Anísio Teixeira - Inep/MEC since 1990. The survey is well-known as Sistema Nacional de Avaliação da Educação Básica (Saeb). The Saeb collect information about students, teachers and principals from private and public school around the country. They evaluate students from primary and secondary schools by applying proficiency tests in Portuguese and Mathematic while attending schools. The 2003 sample collect information of 300,000 students, 17,000 teachers, 6,000 principals in 6,270 schools from all 27 Brazilian states. The data used in this paper is the average of the proficiency test and school satisfaction of 2001 and 2003 (pooled) by each municipality in all 27 states that are presented in the PNAD sample. The final data set contains only municipalities that are considered representative according to the PNAD sample.

The sample will be restricted to individuals that finished their schooling aged 25 to 45 years old that have finished their studies. The final restriction regards those individuals living in rural areas, which are fully excluded due to unreliability of the income data for these areas, as pointed out by *Ferreira et al.* (2000).

It is also important to stress that upon studying discrimination we decide to keep the IBGE definition of race that was tested by many specialist in 1997 and 1998 without finding any significant result to change IBGE definition.

IV. Results

During the 90's, we observed an important valorisation of the 'Black Culture' that affect the distribution of *pardos* and *blacks'* in Brazil. The percentage of *pardos* decreased for the first time since the 40's. Defining both *pardos* and *blacks* as *blacks* the Brazilian population comprises 45% of *blacks*, 54% of *whites* and 1% of *orientals* or *indigenous* people. Breaking down the country by regions, the Northeast and Southeast represent around 70% of the population while 69% of the Northeast population is *blacks* while 34% in the Southeast.

On average, the schooling of workers aged 25 to 45 years old in urban areas measured by years of schooling, is 38% higher for *whites* than *blacks*, 8.3 and 6 respectively. *Whites* average earnings are almost the double of *blacks* while the hours worked is quite the same.

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Center-West has the smaller wage gap in the country while Southeast the higher wage gap. The Northeast's workers have the lowest average earnings in the country for both *black* and *whites*. Note that *whites* dominate the labor market in Southeast while *blacks* in Northeast that totally correlated with the race distribution in the population and not only due to discrimination.

Table 1: Workers aged 25 to 45 years old in Urban Areas

	Total			
	# Workers	Years of Schooling	Earnings	Workly hours
Brazil	24,340,567	7.4	597.63	43.41
North	1,215,448	6.8	502.99	44.40
Northeast	4,937,054	6.5	383.38	41.75
Southeast	12,370,650	7.8	692.32	43.69
South	4,087,818	7.6	602.79	43.90
Center-West	1,729,597	7.2	586.23	44.36
	Whites			
	% Workers	Years of Schooling	Earnings	Workly hours
Brazil	60.9%	8.3	737.10	43.62
North	31.0%	8.1	679.03	44.36
Northeast	33.3%	7.9	548.73	41.76
Southeast	67.5%	8.6	819.67	43.72
South	87.1%	7.9	641.98	44.07
Center-West	50.8%	8.2	714.95	43.97
	Blacks			
	% Workers	Years of Schooling	Earnings	Workly hours
Brazil	39.1%	6.0	380.62	43.09
North	69.0%	6.1	424.04	44.42
Northeast	66.7%	5.8	300.72	41.74
Southeast	32.5%	6.2	427.25	43.61
South	12.9%	5.4	338.17	42.72
Center-West	49.2%	6.2	453.23	44.77

Source: PNAD 1996; Author's Calculation

The stylized facts about the labor market presented in table 1 shows that exists a difference between *blacks* and *whites'* workers, not importing if we look at the educational levels or earnings. However this kind of unidimensional study do not capture all complexity of the subject discrimination.

Following the methodology describe in section II, we decided to use a Two Stage Least Square Method (2SLS) of estimation. We are not going to test the quality of the used instrument as suggested by *Andrews et al* (2004) because testing the weakness of the instrument is very important when instruments are weakly correlated with the endogenous explanatory variable. In our case individuals schooling are highly correlated with parent's education as you can see below in the table 2 (and the distribution of individual's schooling conditional to parent's schooling in table A in appendix). The overall correlation of schooling variables is positive and significant around 0.53. In general correlations range from 0.496 in North region to 0.548 in Northeast.

Table 2: Individuals aged 25 to 45 years old that has finished their studies

	Total		Whites		Blacks	
	ρ	Spearman Coefficient	ρ	Spearman Coefficient	ρ	Spearman Coefficient
Brazil	0.5301	0.5318	0.5312	0.5394	0.4730	0.4696
North	0.4957	0.5039	0.4734	0.4864	0.4801	0.4827
Northeast	0.5478	0.5526	0.5739	0.5948	0.4984	0.5054
Southeast	0.5317	0.5299	0.532	0.5425	0.4435	0.4400
South	0.5245	0.5183	0.5228	0.5203	0.4123	0.3887
Center-West	0.4971	0.4893	0.4935	0.5008	0.4541	0.4254

Source: PNAD 1996; Author's Calculation

Note: All correlations and spearman coefficients are significant at 5%.

IV.1. Results of intergeneration transmission

Comparing *Campante et al* (2004) findings with our proposed method of instrumental variables we found that due to the endogeneity of mother's education (parents) and individuals schooling, their estimates are over biased. Firstly, we reproduced their main result of 26% of the wage gap determined by prices differences, i.e., the race discrimination effect would explain almost 1/4 of the Brazilian wage gap. However, only instrumenting individual schooling by mother's education the racial discrimination effect drop 15 points reaching 11% of the wage gap, i.e., the importance of the characteristics turns out to be more important than prices. It's important to remark that family background has also a direct effect on earnings and consequently more instruments are needed to really capture the price effect as we are going to do later on by adding ability tests. Regionally, instrumental variable methods lead to an increase of 19% or 16% in the characteristic effects, respectively to Southeast and Northeast.

Table 3: Comparing race discrimination by different methods - logarithm of hourly wages

CCL(2004) - OLS			2SLS		
Blacks	**Whites**	**Δ**	**Blacks**	**Whites**	**Δ**
1.64	2.17	0.53	1.64	2.18	0.54
Blacks paid as whites:1.78		0.14	**Blacks paid as whites:**1.70		0.06
Δ_2		26%	Δ_2		11%
Southeast					
1.80	2.28	0.48	1.80	2.28	0.48
Blacks paid as whites:2.00		0.20	**Blacks paid as whites:**1.91		0.11
Δ_2		42%	Δ_2		23%
Northeast					
1.37	1.82	0.45	1.37	1.82	0.45
Blacks paid as whites:1.45		0.08	**Blacks paid as whites:** 1.38		0.01
Δ_2		18%	Δ_2		2%

Source: PNAD 1996; Author's Calculation

Restricting the sample to workers not attending school aged 25 to 45 years old, the gap of the logarithm of hourly wages between *whites* and *blacks* is 0.53. In the Southeast the wage gap is closed to the National gap but in the Northeast the gap is smaller, around 0.46.

Table 4: Average hourly wage's logarithm by Race - Urban
workers aged 25 to 45 years of schooling

	White Y_W	Black Y_B	Δ
Brazil	2.54	2.01	0.53
Northeast	2.28	1.82	0.46
Southeast	2.63	2.13	0.50

Source: PNAD 1996; Author's Calculation

Defining 3 groups of characteristics to estimate the regressions we have the following structure. The first group, *individual characteristics*, features those variables (race, education, experience - i.e. age minus age of entry into the labor market – experience squared and gender) that are directly related to the individual being surveyed. The second group, *labor market characteristics*, comprises variables that are related to the individual's job[10]. The next group, *regional characteristics*, corresponds to controls for metropolitan area, and the region in which the individual works: Southeast, South, Center-West, North and Northeast. Finally, a set of dummies of parent's education, average of students' proficiency test by municipality (public and private schools), average of proficiency test of individuals that were studying and working at the same time by municipality for both public and private schools, and level of satisfaction from both public and private schools at the level of the municipality will be set as instrument of individual's years of schooling. The first three groups of wage equation notwithstanding stand for the aspects that are taken into account in *Campante et al* (2004) and in *Soares* (2000) whereas the instrument variable approach is the new specification from this paper following suggestions from *Bourguignon et al* (2003).

Estimating equation (2) (see table A.1 in Appendix) we estimate a significant elasticity of 0.124 for race (white's dummy) on wages suggesting higher wages for *whites* compared with b*lacks*. In addition to this, one more year of schooling would increase the wages by 19%. Without using a 2SLS, i.e., running an OLS model (table A2 in Appendix) including all instruments directly in the wage regression, the race elasticity is also significant, 0.186, but it's sort out as being more important than schooling, 0.107. Both methods give us significant effect of racial discrimination but *IV* estimate of 0.124 is statistically different of 0.187 (p-value 0.0023). As we would expect from the international literature (Altonji and Black, 1999, p. 3161), the discrimination term is reduced[11] by the addition of a good measure of intergeneration transmission/school quality. In other terms, the estimate of 0.124 has the following meaning: assuming that everything remain unchanged except the fact that blacks will be paid as whites, i.e, their average earnings will increase 0.124 reducing the wage gap of 0.53 to 0.406 (23.4%). The fact of have higher coefficients of schooling by using instruments

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[10] Occupational status dummys for informal workers and Sector of activities dummies.
[11] We should always keep in mind that what is being attributed to discrimination actually includes all the aspects that were left out of the specification.

is remarked by Card (2001), which suggests that marginal returns to education among the subgroup of low educated workers is relatively high, reflecting their high marginal costs of schooling rather than lower ability that could limit their return to education.

Table 5: Hourly wage's logarithm model - Urban workers
aged 25 to 45 years old

		OLS		IV	
Brazil		Coef	Std	Coef	Std
Individual's Schooling		0.107	0.003	0.176	0.006
Race Discrimination (white's dummy)		0.187	0.017	0.124	0.021
Gender -Male		0.308	0.018	0.347	0.020

Source: PNAD 1996; Author's Calculation

Now we can verify how is the profile of discrimination at a regional level. We are going to proceed with a similar model from above using 2SLS but analyzing the Southeast and the Northeast separately. As stressed before, these are the two most populated regions on Brazil illustrating a case in which the majority of the population is *white* (Southeast) and another one in which the majority is *black* (Northeast) besides the higher level of economic development in Southeast. By running equation (2) separately for both regions, we estimate a much lower elasticity of race in Northeast - 0.071 - than in Southeast - 0.177[12] - as expected but in the Northeast is not significant at 5% level. Observe that in the Southeast even controlling the endogeneity of education, race seems to be more important than schooling highlighting the discrimination effect ('circumstances') in the Southeast. The result presents a quite distinct profile for each region: on the one hand, the Southeast features a discrimination term that is greater than the national average; the Northeast, in contrast, illustrates a situation in which discrimination is much less present. These results confirm previous findings of *Campante et al* (2004) in which race discrimination seems to be more important to explain wage differences in Southeast. In this case, the coefficient of race in the Southeast explains 35.4% of the wage gap (0.50) against 15.4% in Northeast (see tables 4 and A.3-A.6 in appendix for coefficients).

Table 6: Hourly wage's logarithm model - Urban workers

		Northeast		Southeast	
		Coef	Std	Coef	Std
Individual's Schooling		0.191	0.010	0.160	0.009
Race Discrimination (white's dummy)		**0.071**	**0.037**	0.177	0.032
Gender -Male		0.398	0.037	0.320	0.031
R^2		0.36		0.39	
# observations		2,917		3,138	

Source: PNAD 1996; Author's Calculation

One possible explanation to the lower discrimination effect in Northeast could be correlated to the higher proportion of *blacks* in its population. In this interpretation, more *blacks* workers

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[12] Runing an OLS model the coefficients are, respectively, 0.154 and 0.200 at Northeast and Southeast.

may lead to less discrimination because they have more bargaining power in the labor market. To conclude this section, controlling the endogeneity of variables in the model, we show that the discrimination effect in the labour market is smaller than previous findings as in *Campante et al* (2004). Moreover, the schooling effect is underestimated in presence of endogeneity, meaning that the differences in characteristics of workers plays a role more important to explain the wage gap between *blacks* and *whites* than the race per se. In other terms, *blacks* are more often in low skill jobs due to their lower level of schooling and consequently reaching lower wages. It's the inequality of opportunities explaining part of the wage gap.

IV.2. Micro-simulation

In order to decompose the wage gap between price and characteristics ('circumstances') effects, we run the micro-simulation method following *Bourguignon et al* (2002). As described by equation (3), we can simulate what would be the wage of *blacks* if they had similar prices of *whites* in the wage equation (model 1). Then, a second counterfactual can be generated by using equation (4) that first simulate what would be the education of *blacks* if the transmission of schooling from parents to children followed the same mechanism of *whites* (due to the fact that the proficients tests and school's satisfaction are fixed by municipalities) and then, if they have similar prices of *whites* in the mincer type equation (model 2). As described in section II, we must estimate first the set of parameters and residual, separately, for both *black* and *whites*[13].

Table 7 below presents the results of both micro-simulations. The upper part of the table contains the results of the decomposition (price and circumstances) presented in equation (3) and (5) while the bottom end the overall decomposition (equation (4)) that combines prices and characteristics. In the upper part, the column (e) is the part of the differential ascribed to the characteristics, Δ_1, while the column (f) is the part ascribed to the prices, Δ_2. The *price effect* (equation 3) explains 18% of the wage gap (column g) confirming that characteristics of both *blacks* and *whites* workers is much more important to explain the wage gap than discrimination. By estimating the counterfactual by region, we observe that in the Northeast the price effect is quite small, only 2%, confirming that the null effect of discrimination per se while in the Southeast, where prices explain 27% of the gap, the racial locus in much more important than in Northeast.

In addition to this, if the intergeneration transmission of *blacks* had the same mechanism of

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[13] Demand coefficients to author if necessary.

whites (same coefficients)*,* the remained wage gap falls because we simulate not only the effect of prices but also the circumstances by increasing *blacks* schooling. The combined effect (Overall effect) reaches 56% (3 times more than only prices) of the wage gap meaning that *whites* and *blacks* education is sensible to the mechanism of transmission from parents to children. Following the literature, financial constraints and lower parent's education seems to be some edge that is very difficult for *blacks* to get through. In the Southeast the overall effect is again higher than in Northeast meaning that in the Southeast the inequality of opportunities (basically education inequality) is one of the determinants of the wage gap that can be misunderstood as racial discrimination.
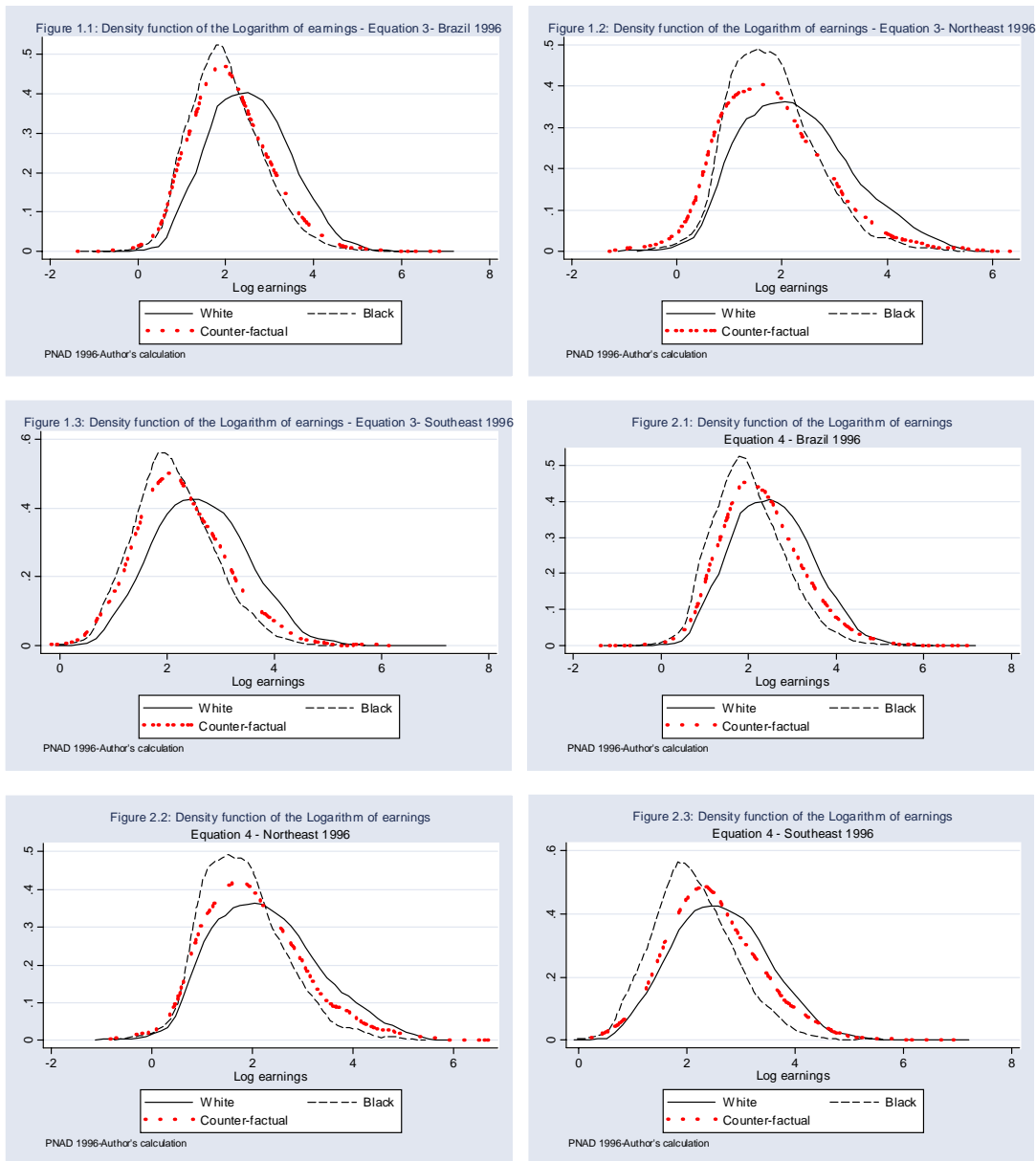
Table 7: Average hourly wage's logarithm difference - Urban workers aged 25 to 45 years of schooling

	Observed			Black with White's Prices Y_B - Equation (3)			
	White Y_W (a)	Black Y_B (b)	Δ (c)=(a)-(b)	Y^*_B (d)	Δ_1 (e)=(a)-(d)	Δ_2 (f)=(d)-(b)	Price Effect (g)=(f)/(c)
Brazil	2.540	2.010	0.53	2.104	0.436	0.094	18%
Northeast	2.285	1.823	0.46	1.830	0.455	0.007	2%
Southeast	2.629	2.129	0.50	2.263	0.366	0.134	27%
	Observed			Black with White's Prices/Schooling Y_B - Equation (4)			
	White Y_W (a)	Black Y_B (b)	Δ (c)=(a)-(b)	Y^*_B (d)	(e)=(d)-(b)		Overall effect (f)=(e)/(c)
Brazil	2.540	2.010	0.53	2.304	0.294		56%
Northeast	2.285	1.823	0.46	2.041	0.218		47%
Southeast	2.629	2.129	0.50	2.488	0.359		72%

Source: PNAD 1996; Author's Calculation

Note: Δ_1 and Δ_2 from equation (5).

The same results from above are also presented in the following kernel densities of the wages, in which figures 1 contain the upper part of the table and figures 2, the bottom part of the table. Note that in all figures, the observed wages of *black* is shifted left compared with *whites*. Estimating the first counterfactual (equation (3)) the *black* wage's curve shift slightly right representing the small effect of prices presented in table 7 (figures 1). Then the counterfactual generated by equation (4) shifted the curve more intensely to right becoming closer to the *white's* curve (figures 2). It means that the remained difference not explained by our model would be determined basically by the sectoral composition and occupations distribution that *whites* and *blacks* have in the labor market or other omitted variable. Observe that the overall effect makes the counter-factual densities to lay down of whites curves mainly in the bottom of the distribution where we find a subgroup of blacks-low educated workers that have limited returns to education. While making possible to *blacks* to reach higher education by simulation they can reach higher wages. However, we do not explain the upper tail of the distribution meaning high skill jobs are exclusivity of *white's* workers.

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Figure 1.1: Density function of the Logarithm of earnings - Equation 3- Brazil 1996

PNAD 1996-Author's calculation

Figure 1.2: Density function of the Logarithm of earnings - Equation 3- Northeast 1996

PNAD 1996-Author's calculation

Figure 1.3: Density function of the Logarithm of earnings - Equation 3- Southeast 1996

PNAD 1996-Author's calculation

Figure 2.1: Density function of the Logarithm of earnings
Equation 4 - Brazil 1996

PNAD 1996-Author's calculation

Figure 2.2: Density function of the Logarithm of earnings
Equation 4 - Northeast 1996

PNAD 1996-Author's calculation

Figure 2.3: Density function of the Logarithm of earnings
Equation 4 - Southeast 1996

PNAD 1996-Author's calculation

IV.2. Results of discrimination in similar jobs

Once we study the effect of the intergeneration transmission on the Brazilian racial wage gap, we are going to study the race discrimination by controlling our sample for individuals working in the same sector of activities. Our first set of results is built based on *Campante et al* (2004) suggestion that working for the public sector (55.8% of *whites*) is much more valuable for *blacks* relative to being in the formal sector (54.6% of *whites*). Observe in table 8 that the wage gap in the formal sector is higher than the other 2 sectors. Running a similar model of the previous section for each sector (public, formal and informal) we estimate non-significant race coefficient in both public and informal sector (47.6% of *whites*). The fact that race does not determine wage differences in public service it's explained by the fact that public sector careers block wage discrimination due to its admission procedure based on

qualifying examinations. Besides, we do not observe significant race discrimination in the informal sector that is also a particular case, because 'circumstances' and 'efforts' (education, gender or race) are not determinants to enter in the informal sector. Be part of the informal sector is more a consequence of not finding a job in the formal sector, so both *whites* and *blacks* are in equal position.

As consequence, the private sector sort out as the source of discrimination in Brazil. Being regularly inscribed in the social security system (*com carteira*) has a more severe impact on *whites* than on *blacks* leading to a mechanism of discrimination at work concerning the insertion of *black* individuals into the labor market[14] that can be also associated to inequalities of opportunities as well discrimination. The access to jobs in the formal sector, and also earnings, is determined by circumstances as gender and race as well efforts (education) that are beyond the control of the individuals.

Table 8a: Hourly wage's logarithm model - Urban Public Sector workers 25 to 45 years old

		IV		Wage Gap
Brazil		Coef	Std	Δ
	Individual's Schooling	0.242	0.018	
	Race Discrimination (white's dummy)	**0.049**	**0.051**	
	Gender -Male	0.280	0.052	0.436
	R^2	0.23		
	# observations	1,781		

Source: PNAD 1996; Author's Calculation

Table 8b: Hourly wage's logarithm model - Urban Formal workers 25 to 45 years old

		IV		Wage Gap
Brazil		Coef	Std	Δ
	Individual's Schooling	0.169	0.007	
	Race Discrimination (white's dummy)	0.159	0.025	
	Gender -Male	0.363	0.023	0.544
	R^2	0.42		
	# observations	5,657		

Source: PNAD 1996; Author's Calculation

Table 8c: Hourly wage's logarithm model - Urban Informal workers 25 to 45 years old

		IV		Wage Gap
Brazil		Coef	Std	Δ
	Individual's Schooling	0.143	0.014	
	Race Discrimination (white's dummy)	**0.047**	**0.053**	
	Gender -Male	0.377	0.051	0.462
	R^2	0.30		
	# observations	1,702		

Source: PNAD 1996; Author's Calculation

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[14] Discrimination in the insertion into the labor market is not being explicitly controlled for here, but recent papers (e.g. Juhn, 2001) show that when this is done wage differences between races become even greater. See also Campante et al. (2004)

Going deeper in the formal sector (57% of *whites*) analysis, we divide workers from this sector into 3 subgroups according their levels of schooling (13 or more; 9-12; and 0-8). We estimate that 80.2% of workers belonging to the more educated group are *whites*. The percentage of *whites* in the formal sector is smaller in the second (60%) and in the third schooling group (51.5%). Estimating one model for each one of the educational groups we had significant race coefficients in all 3 models but at different levels. In the first (13 or more) and second (9-12) subgroups, education is not significant emphasising the role of race discrimination in the labor market to explain the wage gap between *whites* and *blacks* formal workers. The lower number of blacks in the sample can drive the estimated coefficient for the more educated workers, however the results founded for the two other groups confirms the race discrimination profile of the formal sector mainly for workers with 9-12 years of schooling.

Table 9a: Hourly wage's logarithm model - Urban Formal Workers 25 to 45 years old with 13 or more years of Schooling

		IV		Wage Gap
Brazil		Coef	Std	Δ
	Individual's Schooling	**0.209**	**0.314**	
	Race Discrimination (white's dummy)	0.260	0.070	
	Gender -Male	0.331	0.059	0.336
	R^2	0.24		
	# observations	833		

Source: PNAD 1996; Author's Calculation

Table 9b: Hourly wage's logarithm model - Urban Formal Workers 25 to 45 years old with 9 -12 years of Schooling

		IV		Wage Gap
Brazil		Coef	Std	Δ
	Individual's Schooling	**0.145**	**0.201**	
	Race Discrimination (white's dummy)	0.251	0.039	
	Gender -Male	0.319	0.040	0.393
	R^2	0.31		
	# observations	1,905		

Source: PNAD 1996; Author's Calculation

Table 9c: Hourly wage's logarithm model - Urban Formal Workers 25 to 45 years old with 0 -8 years of Schooling

		IV		Wage Gap
Brazil		Coef	Std	Δ
	Individual's Schooling	0.121	0.020	
	Race Discrimination (white's dummy)	0.165	0.028	
	Gender -Male	0.359	0.030	0.274
	R^2	0.20		
	# observations	2,919		

Source: PNAD 1996; Author's Calculation

Runing a similar model for low educated formal workers (0 to 8 years of schooling) to Northeast and Southeast, we observe that the Southeast region drives the race discrimination result at the National Level. The race coefficient in the Northeast is not significant at all and educational level or gender explains the observed wage gap but the observed variables don't

have a good prediction power (very low R^2). However in the Southeast, not only the prediction power is better but also the race sort out as very important variable to explain the wage gap (0.235 of 0.552) that is almost 3 times higher than the schooling coefficients.

Table 10a: Hourly wage's logarithm model - Urban Formal Low Educated Workers in Northeast 25 to 45 years old

		IV		Wage Gap
Brazil		Coef	Std	Δ
	Individual's Schooling	0.138	0.027	
	Race Discrimination (white's dummy)	**0.017**	**0.056**	
	Gender -Male	0.349	0.058	0.430
	R^2	0.05		
	# observations	876		

Source: PNAD 1996; Author's Calculation

Table 10b: Hourly wage's logarithm model - Urban Formal Low Educated Workers in Southeast 25 to 45 years old

		IV		Wage Gap
Brazil		Coef	Std	Δ
	Individual's Schooling	0.081	0.030	
	Race Discrimination (white's dummy)	0.235	0.038	
	Gender -Male	0.363	0.044	0.552
	R^2	0.22		
	# observations	1,147		

Source: PNAD 1996; Author's Calculation

In sum, the Brazilian wage gap has different determinants according to the studied sample. The intergeneration transmission seems to be transmitted from parents to children through the income channel related to financial constraints. It's the importance of selection or causation as mechanism of transmission. Combined with some measure of school quality, the intergeneration transmission plays an important role for human capital accumulation that can be translated in future wages while in the labor market. Using instruments we found that marginal returns to education among the subgroup of low educated workers reflects their high marginal costs of schooling because the estimated coefficients by 2SLS is always higher than by using a OLS. It highlights the importance of the inequality of opportunities that is commonly associated to lower levels of education of *blacks*. The results are in line with the evidence form the international literature on the topic of intergeneration transmission. By separately analyzing the labor market, it is possible to note that *black* individuals are relatively better off working for the public sector when compared to *white* individuals. As previously mentioned, this shed additional light on the presence of discrimination in the labor market in the private sector for formal workers. Wage disparities are better understood by looking at inequalities in terms of characteristics (inequality of opportunities) that can be wrongly defined as race discrimination in the literature. In the latter, we have a situation in which racial discrimination in the labor market is much more important in the Southeast than in the Northeast. The national profile is just in between the two extremes, hiding the regional diversity of the racial issue in Brazil.

V- Concluding remarks

The first important result from this paper is: without controlling possible bias due to endogeneity of schooling, *Campante et al.* (2004) had estimated higher levels of racial discrimination in Brazil than it should be. Removing the bias by instrumental variables, the Brazilian racial discrimination drops 15% reaching 11%. Regionally, it drops from 42% to 23% and 18% to 2% respectively to Southeast and Northeast.

Restricting the sample to workers aged 25 to 45 years old, we estimate *whites'* wages 69.9% higher than *blacks'* wages in 1996. The estimated discrimination component of wage is around 13.2% (exponential of the race coefficient 0.124 from table 5) that is far from negligible in favor of *whites*. This rate is close to 12% found to US by *Altonji and Black* (1999) controlling for measures of education and experience using 1996 CPS data. In one hand, we found that pre-market human capital difference is basically responsible of the wage gap between *blacks* and *whites*. This part of the component of wage differentials is ordinarily attributed to labor market discrimination but it is actually explained by persistent educational inequalities between races. This event in more related to inequality of opportunities than racial discrimination in the market. In other hand, even controlling for individuals characteristics, the 13.2% wage gap due to racial discrimination could describe a "taste" for discrimination among firms or statistical discrimination as suggests *Altonji and Black* (1999). The Brazilian case shows different status of discrimination across regions meaning that the market is adaptive to the offer of workers they have. Moreover, the regional profile suggests that the racial issue is much more important in the Southeast than in the Northeast.

The use of instruments leads us to higher education coefficient estimates than in an OLS regression. Card (2001) explains that the marginal return of education reflects a higher marginal cost of schooling between low educated workers rather than lower ability that could limit their return to education. This is the case in Brazil where *blacks* are more often taking their decisions face to limited resources and consequently in the end they reach lower levels of education. The use of instruments allows us to conduct non-biased inference over the estimates of circumstances and efforts.

As *Altonji and Black* (1999), *Junh et al*. (1993), our proposal method of analyses break the *black-white* wage gaps down into two components: part that is due to human capital differences between groups (such as differences in levels of ability, education, or experience), and the remainder—not explained by human capital differences, and therefore thought to be due to discrimination – how agent's are priced. Our decomposition analyses estimate that the price effect is around 18% in Brazil, 2% in the Northeast and 27% in the Southeast. By

controlling and simulating the same mechanism of human capital accumulation the overall simulated effect reaches respectively, 56%, 47% and 72%. The Brazilian education inequality is one of determinants of the wage gap and some educational policies must be done to reduce this inequality. Policies should be aimed to equalize the gap between private and public school around the country, mainly in big cities. The higher effect of both prices and characteristic at the Southeast is explained by the fact that the region contains 3 important cities to the Brazilian economy: Rio de Janeiro, São Paulo and Belo Horizonte. Consequently, not only we observe higher inequality of opportunities but also higher gap between the quality of public and private schools and consequently the marginal effect of education reflects the high marginal costs of schooling in these regions.

Although discrimination within the labor market is usually the focus of the literature, this paper presents evidence according to which there is also a strong component of racial inequalities that stems from the process of insertion into the labor market. To illustrate this, we consider the case of workers from the public sector where race is not a selection criterion, and where wages are not subject to any racial screening. Given that, in comparison to other positions, like formal workers, working for the public sector means to the *black* individual that there isn't any significant racial discrimination. Their wages are only dependent on their educational level and position in the job. This fact exemplifies the barrier that is created by inequality in the access to education. The insertion of the *blacks* into the labor market is troublesome due to their low skill profile reflecting in their wages at the time they reach a formal job.

Our evidence suggests that *blacks* are in disadvantage in terms of qualification because they typically have lower levels of schooling leading them to a lower bottom position in the labor market. Then, as a snowball, there is evidence of discrimination in terms of insertion in the market because they are less likely to find formal jobs due to their educational levels; and finally, race discrimination at the time they got the jobs because they are paid differently, as was widely shown in this paper.

Another interest point to remark is the distinct profiles for wage differentials in the two analyzed regions (Northeast and Southeast), which is commonly smoothed in the national approach to the issue. We have focused the fact that the discrimination term is different, i.e., the Southeast estimated coefficient is more than the double of the estimated in the Northeast. It seems unlikely that any policy be able to deal with the issue in a consistent manner whether ignores these regional differences. Policies should be substantially different in terms of their application and their target by taking into account the specific causes and consequences in

each region.

As a general conclusion, it's quite clear that policies focusing on the issue of educational inequalities, with special attention to the intergenerational transmission of these inequalities, may help in fighting wage disparities between races in Brazil. Due to financial constraints *blacks* have less access to private schools, which are in general reputed as having better quality than the public system. Under this hypothesis, investing in the improvement of the quality of public education is warranted, as well as some investment in signaling this improved quality to the market because education by itself had a large impact on the access to the labor market, and on wages paid in it. In that sense, it's also necessary to increase the confidence of parents to the public education network because schooling is also a result of trust in the system. If the system is not attractive, parents may force children stop working to help them in the labor market.

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Appendix

Table A.1: 2SLS regression - Equation (2) - Urban workers 25-45 years old

Depend variable: Logarithm of hourly wage		Coef	Std	p-value
IV. Schooling		0.176	0.006	0.000
Race - white		0.124	0.021	0.000
Gender - Male		0.347	0.020	0.000
Experience		0.020	0.005	0.000
Experience squared		0.000	0.000	0.429
Formal worker		-	-	-
Informal worker		-0.115	0.026	0.000
Sector of activity				
	Industry of transformation	-	-	-
	Construction	0.034	0.039	0.382
	Others industries	0.208	0.056	0.000
	Comerce	-0.229	0.031	0.000
	Services	-0.179	0.031	0.000
	Auxiliary services	-0.061	0.044	0.168
	Transport and Comunication	-0.040	0.036	0.263
	Social Services	-0.181	0.035	0.000
	Public Administration	-0.057	0.036	0.114
	Others	0.125	0.048	0.009
Region dummys				
	North	-0.038	0.026	-1.470
	Northeast	-0.277	0.021	-13.420
	Southeast	-	-	-
	South	0.033	0.027	0.218
	Center-West	0.039	0.034	0.243
Metropolitan Region		0.075	0.018	0.000
Intercept		0.199	0.068	0.004
R^2	0.40			
#obs	9,140			

Source: PNAD 1996; Author's Calculation

Table A.2: OLS regression - Equation (2) -Urban workers 25-45 years old

Depend variable: Logarithm of hourly wage		Coef	Std	p-value
Schooling		0.107	0.003	0.000
Race - white		0.187	0.017	0.000
Gender - Male		0.308	0.018	0.000
Experience		0.025	0.004	0.000
Experience squared		0.000	0.000	0.113
Formal worker		-	-	-
Informal worker		-0.165	0.024	0.000
Sector of activity				
	Industry of transformation	-	-	-
	Construction	-0.073	0.035	0.035
	Others industries	0.268	0.055	0.000
	Comerce	-0.189	0.029	0.000
	Services	-0.201	0.028	0.000
	Auxiliary services	0.048	0.040	0.239
	Transport and Comunication	-0.008	0.032	0.802
	Social Services	0.004	0.029	0.876
	Public Administration	0.105	0.031	0.001
	Others	0.298	0.043	0.000
Region dummys				
	North	0.025	0.031	0.424
	Northeast	-0.231	0.027	0.000
	Southeast	-	-	-
	South	0.060	0.026	0.023
	Center-West	0.050	0.033	0.131
Metropolitan Region		0.087	0.017	0.000
High parent's education				
	0 y.s.	-0.456	0.045	0.000
	1to3ys	-0.459	0.043	0.000
	4ys	-0.373	0.042	0.000
	5to7ys	-0.420	0.046	0.000
	8ys	-0.320	0.049	0.000
	9to11ys	-0.310	0.087	0.000
	12ys and plus	-0.213	0.045	0.000
LN Proficiency Test of public school students		-8.534	2.519	0.001
LN Proficiency Test of private school students		1.009	0.148	0.000
LN Proficiency Test of public school students with workers status		8.048	2.500	0.001
LN Proficiency Test of private school students with workers status		0.069	0.082	0.401
Ratio of proficiency test of worker and total students from public schools		-8.781	2.652	0.001
% of Public schools classified as bad		-0.186	0.131	0.157
% of Public schools classified as good		-0.026	0.125	0.836
% of Public schools classified as excelent		-0.087	0.119	0.464
Intercept		6.571	2.924	0.025
R^2	0.47			
#obs	9,140			

Source: PNAD 1996; Author's Calculation

Table A.3: 2SLS regression - Equation (2) - Northeast Urban workers 25-45 years old

Depend variable: Logarithm of hourly wage		Coef	Std	p-value
IV. Schooling		0.191	0.010	0.000
Race - white		0.071	0.037	0.057
Gender - Male		0.398	0.037	0.000
Experience		0.017	0.008	0.044
Experience squared		0.000	0.000	0.659
Formal worker		-	-	-
Informal worker		-0.088	0.046	0.056
Sector of activity				
	Industry of transformation	-	-	-
	Construction	0.224	0.076	0.003
	Others industries	0.540	0.098	0.000
	Comerce	-0.179	0.063	0.005
	Services	-0.054	0.058	0.360
	Auxiliary services	-0.010	0.082	0.900
	Transport and Comunication	0.045	0.065	0.488
	Social Services	-0.176	0.070	0.012
	Public Administration	-0.012	0.071	0.868
	Others	0.318	0.107	0.003
Metropolitan Region		0.134	0.030	0.000
Intercept		-0.266	0.110	0.016
R^2	0.36			
#obs	2,917			

Source: PNAD 1996; Author's Calculation

Table A.4: 2SLS regression - Equation (2) - Southeast Urban workers 25-45 years old

Depend variable: Logarithm of hourly wage		Coef	Std	p-value
IV. Schooling		0.160	0.009	0.000
Race - white		0.177	0.032	0.000
Gender - Male		0.320	0.031	0.000
Experience		0.014	0.008	0.058
Experience squared		0.000	0.000	0.167
Formal worker		-	-	-
Informal worker		-0.090	0.044	0.042
Sector of activity				
	Industry of transformation	-	-	-
	Construction	-0.058	0.063	0.358
	Others industries	-0.037	0.094	0.696
	Comerce	-0.288	0.048	0.000
	Services	-0.253	0.047	0.000
	Auxiliary services	-0.072	0.066	0.272
	Transport and Comunication	-0.059	0.055	0.283
	Social Services	-0.177	0.051	0.001
	Public Administration	-0.194	0.054	0.000
	Others	0.055	0.064	0.392
Metropolitan Region		0.052	0.030	0.085
Intercept		0.417	0.113	0.000
R^2	0.39			
#obs	3,138			

Source: PNAD 1996; Author's Calculation