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RACE DISCRIMINATION IN BRAZIL: AN ANALYSIS OF THE AGE, PERIOD AND COHORT EFFECTS

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DISCUSSION PAPER

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SUMMARY

SINOPSE

Os diferenciais de rendimentos entre brancos e negros apresentam uma tendência decrescente para as coortes mais novas no Brasil. Argumentamos neste artigo que a redução na discriminação para as gerações mais recentes pode ter desempenhado um papel importante para esse resultado. Usando dados da Pesquisa Nacional por Amostra de Domicílios (PNAD) de 1987 a 2002, o diferencial de rendimentos entre raças é decomposto em dois termos através da metodologia de Oaxaca-Blinder: o primeiro é o efeito característica e o segundo é o termo de discriminação. Essa decomposição é implementada para 90 células definidas pela coorte de nascimento e o ano da pesquisa. Em seguida, a parcela do diferencial de rendimentos atribuída ao termo de discriminação é decomposta nos efeitos idade, período e coorte. De acordo com os resultados, os efeitos de coorte são menores para as gerações mais novas, e os efeitos da idade apresentam uma tendência de redução para os trabalhadores mais velhos. As evidências mostram, também, que períodos de alta inflação estão associados com uma menor contribuição do termo de discriminação para o diferencial de rendimentos.

ABSTRACT

Earnings differential between white and black workers present a decreasing trend for younger cohorts in Brazil. We argue in this paper that the reduction in economic discrimination for younger cohorts could have played an important role on this result. Using the Brazilian National Household Sample Survey data [Pesquisa Nacional por Amostra de Domicílios (PNAD)] from 1987 to 2002, the earnings differential by race is decomposed into two parts through the Oaxaca-Blinder methodology: the first one is the characteristic effect and the second is the discrimination term. This decomposition is made for 90 cells defined by cohort and year. After that, the amount of earnings differential due to discrimination term is decomposed into age, period and cohort effects. According to the evidences, the cohort effects are smaller for younger generations, and the age effects present a decreasing trend for older workers. The results show also that periods with high inflation are associated with weaker contribution of discrimination term to earnings differential.

1 INTRODUCTION

Earnings gap between white and black workers is noticeably high in Brazil. Also, despite several changes occurred in the Brazilian economy,[1] the racial differential has remained practically constant during the last two decades. Data from the Brazilian National Household Sample Survey [Pesquisa Nacional por Amostra de Domicílios (PNAD)] show that in 1987 the average white workers' main job earnings were 78% greater than black workers'. In 2002, this difference increased slightly, becoming 81%. The picture of relative stability in the racial earnings gap changes dramatically when the analysis is carried out for different generations. In the younger cohorts the earnings differential between white and black workers is much smaller than in older ones.

A standard approach in the literature about discrimination is to divide the earnings differential between groups into two different terms. First, earnings may differ because characteristics of individuals in each group are different, what implies in different productivities. Second, it is possible that individuals in each group are actually equally productive, but one group is discriminated, in the sense that it faces lower wages [Altonji and Blank (1999)].

Empirical evidences show that the greatest part of the earnings gap between white and black workers in Brazil is due to different characteristics, mainly education and occupation [see for example, Soares (2000) and Campante, Crespo and Leite (2004)]. Since the educational gap as well as the occupational distributions seems to be constant during the last two decades, these factors contributed to the stability in the earnings differential over time. On the other hand, the decreasing trend of the racial earnings gap across cohorts had not been accompanied by reductions in the education and occupation differences for younger cohorts. In fact, the differences in years of schooling and occupational distribution between white and black workers are very similar for different cohorts. This evidence suggests that changes in discrimination could have played an important role in the reduction of racial earnings differential for younger generations. The earnings differential between whites and blacks that cannot be explained by observable characteristics is referred in this paper as discrimination term. Although this term includes all unobserved factors, it contains important information about racial discrimination. According to our arguments, effects associated to birth cohort, age and period played a significant role to the patterns in the discrimination term and, consequently, to the earnings differential by race across generations in Brazil.

The literature divides economic models of discrimination into two main classes: taste-based and statistical discrimination models. Following Becker (1957) seminal study, taste-based models stress the fact that some employers attach a disutility from employing members of the minority group.[2] Statistical discrimination models, associated to Phelps (1972) and Arrow (1973), emphasize the role of employers' beliefs and expectation on

1. Starting in the middle 1980's, many economic plans were put in practice to stop inflation, being well succeeded only in 1994. Also, during this whole period the Brazilian economy experienced an intense process of trade liberalization and the State presence in the economy was reduced, which had important impacts on the labor market as a whole.

2. Becker also discussed the role of other agents on the discrimination process, as discrimination coming form consumers and from work colleagues.

workers productivity. In this context, these models said that employers use the observable race to proxy for unobserved characteristics, which are the source of productivity. Another statistical discrimination models stress that the information employers have about productivity is less accurate for black workers than for whites. We argue in this paper that factors associated to taste-based and statistical discrimination could be related to age, period and cohort effects and help us to explain earnings differences between white and black workers over time and across generations.

We expect that effects related to cohort characteristics might have contributed to reduce the discrimination for younger generations. Discrimination can have permanent effects when it affects individuals' future opportunities, as it is shown in Lundberg and Startz (1998), and can, therefore, influence the performance of a whole generation. In this way, the fact that black workers got some better opportunities might have lead to a decrease in employers' uncertainty about black people's productivity among younger generations. Also, legal barrier against discrimination should have directed to the same result, since it increased the employer's discrimination cost. Older generations, who were already in the labor market, did not manage to get these benefits, since they started their professional life in a different condition, which could have affected their careers.

Another point stressed in this paper is that as discrimination may be due to information problems, we could also expect it to be different during the life cycle. Information about workers productive characteristics is revealed with experience in the labor market [Farber and Gibbons (1996) and Altonji and Pierret (2001)]. Consequently, if employers beliefs about black workers attributes a lower expected productivity than the actual productivity, discrimination should be higher among younger than older workers, whose productivity have already been revealed in the labor market.

Changes in the macroeconomic environment may also have influenced the discrimination profile. The economy stabilization with the end of the high inflation rates, and the consequent increase of wage rigidity, may have turned the uncertainty about productive characteristics a relatively more important issue for employers. Whenever high inflation rates take place, it is much easier to adjust real earnings, allowing information revealed in the labor market to be reflected more rapidly in real earnings changes [Reis and Camargo (2005)]. Once firms cannot use this mechanism anymore after the inflation stabilization, the effect of uncertainty about productive characteristics of different racial groups becomes a bigger problem. In addition, period effects could influence discrimination through favorable macroeconomic conditions, which propitiate higher rents and could induce more discrimination.

The main goal of this paper is to analyze the age, period and cohort effects on the component of racial earnings gap due to discrimination. In order to do so, data from PNAD for white and black males[3] between 1987 and 2002 were used. All the individuals in the sample were divided into cells defined according to their birth cohort and the survey year. The Oaxaca-Blinder methodology was used in each cell,

3. Women were not included in the sample to avoid the necessity to take into account the possibility that gender discrimination could affect the results.

so that the component due to differences in the coefficients and the one due to differences in characteristics were obtained. Then, the discrimination term share is decomposed into age, cohort and year effects using the methodology presented in Deaton and Paxson (1994) and Deaton (1997). The empirical results show that all these effects are consistent with the theoretical argument presented above and played an important role on the determination of the earnings differential by race in Brazil over time.

Apart from this introduction, this paper is divided into more six sections, including this introduction. The next section presents the data and describes the behavior of the racial earnings differential and some of it´s determinants from 1987 to 2002, emphasizing differences across cohorts. The methodologies to estimate the share of earnings differential due to discrimination term in each cohort-period group and to compute the age, period and cohort decomposition are presented in Section 3. The following section shows and discusses the empirical results, and Section 5 presents a robustness analysis. Finally, Section 6 presents the main conclusions.

2 DATA

The empirical analysis on the paper uses Brazilian database from the PNAD in the following years: 1987, 1990, 1993, 1996, 1999 and 2002. The survey is conducted each September by the Brazilian Census Bureau [Instituto Brasileiro de Geografia e Estatística (IBGE)] and the sample is representative of Brazilian population. The sample used in this paper includes only men aged between 21 and 65 years old, living in urban areas, who were working in the week of reference. In 1987, PNAD included on its questionnaires a question about race, which is self-reported. Based on this information the sample was divided into white and black workers. It is included in the black group those who reported themselves as black or colored.

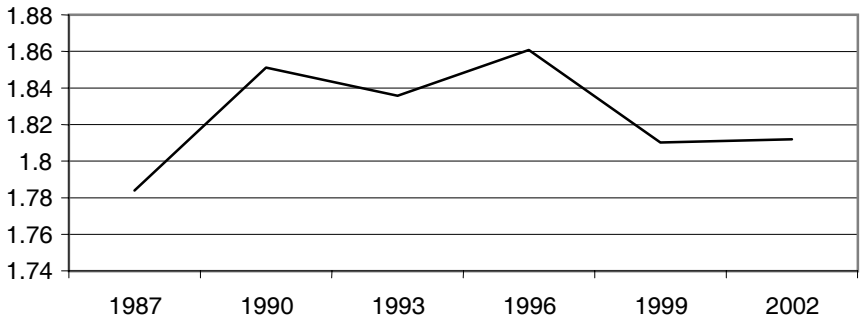
Besides race, the following variables are included in the analysis: main job earnings, years of schooling, age, region, occupation, and industry. The variable occupation is divided in the following groups: formal, informal and self-employed workers. Employers and public sector employees, for whom there is low degree of discrimination, are excluded. The individuals are classified according to the age group with three years interval, where the youngest group is composed by workers aged between 21 and 23 years old and the oldest one includes those aged between 63 and 65 years old. Information about the survey year and age are used to classify workers into different birth cohorts. Table 1 shows all the cohorts in different years.

The remaining of this section presents a descriptive analysis of earnings, years of schooling and occupation evolution by race over time. Figure 1 shows the racial earnings differential during the period between 1987 and 2002. Two facts should be pointed out about this figure. First, the racial earnings differential is quite high in all the years considered here. Second, the earnings gap does not show clear signals of changing, oscillating around 78% and 86%.

TABLE 1
DEFINITION OF THE COHORTS

Age groups	Year					
	1987	1990	1993	1996	1999	2002
21-23	1964-1966	1967-1969	1970-1972	1973-1975	1976-1978	1979-1981
24-26	1961-1963	1964-1966	1967-1969	1970-1972	1973-1975	1976-1978
27-29	1958-1960	1961-1963	1964-1966	1967-1969	1970-1972	1973-1975
30-32	1955-1957	1958-1960	1961-1963	1964-1966	1967-1969	1970-1972
33-35	1952-1954	1955-1957	1958-1960	1961-1963	1964-1966	1967-1969
36-38	1949-1951	1952-1954	1955-1957	1958-1960	1961-1963	1964-1966
39-41	1946-1948	1949-1951	1952-1954	1955-1957	1958-1960	1961-1963
42-44	1943-1945	1946-1948	1949-1951	1952-1954	1955-1957	1958-1960
45-47	1940-1942	1943-1945	1946-1948	1949-1951	1952-1954	1955-1957
48-50	1937-1939	1940-1942	1943-1945	1946-1948	1949-1951	1952-1954
51-53	1934-1936	1937-1939	1940-1942	1943-1945	1946-1948	1949-1951
54-56	1931-1933	1934-1936	1937-1939	1940-1942	1943-1945	1946-1948
57-59	1928-1930	1931-1933	1934-1936	1937-1939	1940-1942	1943-1945
60-62	1925-1927	1928-1930	1931-1933	1934-1936	1937-1939	1940-1942
63-65	1922-1924	1925-1927	1928-1930	1931-1933	1934-1936	1937-1939

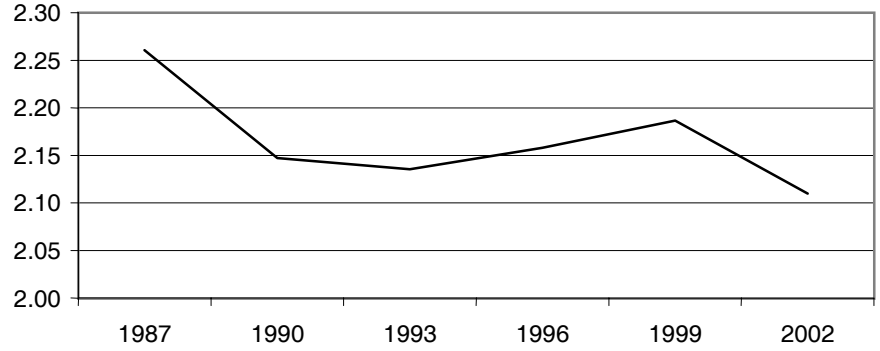
FIGURE 1
WHITE AND BLACK WORKERS´ MAIN JOB EARNINGS RATIO—1987-2002



Source: PNAD data, including male workers aged between 21 and 65 years old living in urban areas.

The educational gap between blacks and whites, as pointed out above, is one of the main determinants of earnings differential by race. Figure 2 shows also that the educational gap was basically constant during the whole period from 1987 and 2002. In the first year considered, white workers had 2.26 years of schooling more than the black ones, while in 2002 the difference was 2.11 years.

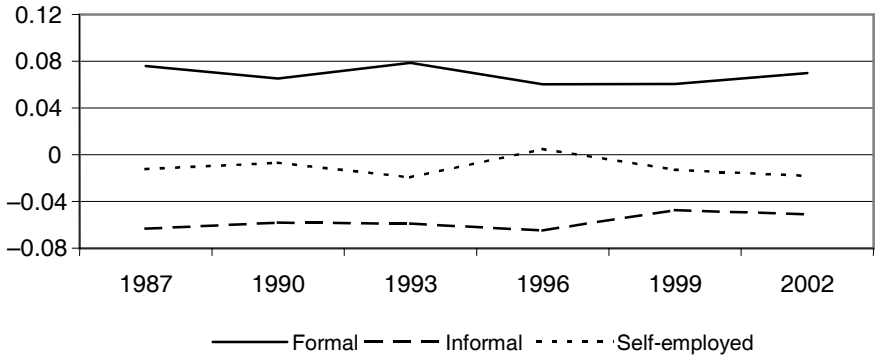
FIGURE 2
RACIAL EDUCATIONAL GAP IN YEARS OF SCHOOLING



Source: PNAD data, including male workers aged between 21 and 65 years old living in urban areas.

In the same way, different occupational distribution may contribute to explain the earnings gap. During the whole period considered, a lower proportion of black workers were in the formal sector, where the earnings are usually higher. Figure 3 shows, however, that the changes on employment composition by occupation were very similar for both racial groups.

FIGURE 3
DIFFERENCE IN THE PROPORTION OF WHITE AND BLACK WORKERS BY OCCUPATION

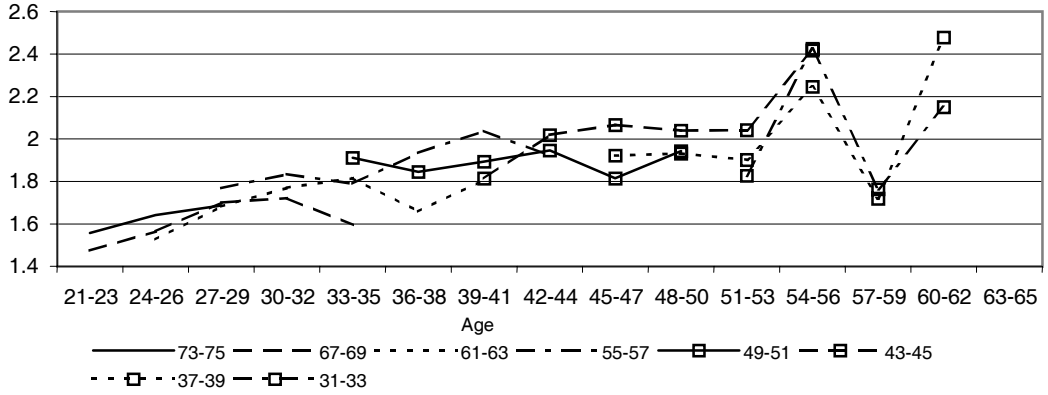


Source: PNAD data, including male workers aged between 21 and 65 years old living in urban areas.

Figure 4 allows us to analyze the path of racial earnings differential over the life cycle for different birth cohorts. Each line represents the earnings gap for a given cohort in different age groups. As could be seen, the black workers' earnings got closer to the white workers' earnings among the younger cohorts. For example, the earnings differential is around 60% for individuals who were born in 1967-1969 while for workers in 1949-1951 generation the differential is about 90%, and it is ever higher for older generations.

It is also possible to notice from Figure 4 that the earnings gap appears to be increasing with age for each cohort. This seems to be associated with the facts that the returns to experience are higher among more educated workers and whites have a higher level of education on average.

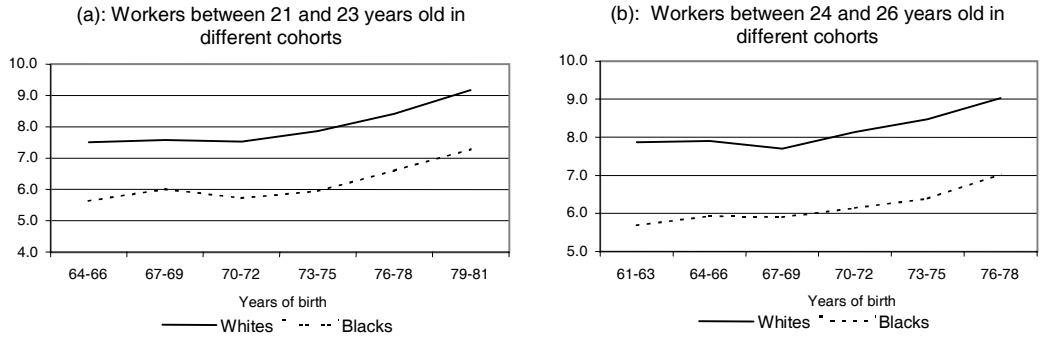
FIGURE 4
EARNINGS GAP BETWEEN WHITE AND BLACK WORKERS BY AGE IN DIFFERENT COHORTS



Source: PNAD data, including male workers aged between 21 and 65 years old living in urban areas.

Figure 5 presents the difference in average years of schooling between white and black young workers from 1987 to 2002. Since most of the individuals in these two age groups had already defined their level of education, patterns in Figure 5(a) and (b) basically reflect differences by cohorts—mainly in panel (b). The trends in average years of schooling are positive for both white and black workers, but the difference between these two groups remains practically constant during the whole period.

FIGURE 5
AVERAGE SCHOOLING BY AGE AND COHORT

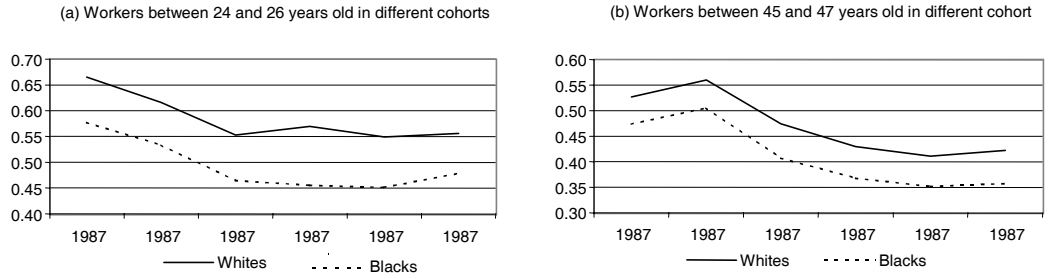


Source: PNAD data.

Figure 6(a) and (b) shows the proportion of formal workers in two different age groups (24-26 and 45-47 years old) over time. As it can be seen, the differences between black and white workers do not have any particular trend for each of these groups during the period reported.

To sum up, the descriptive analysis presented in this section shows that during the period between 1987 and 2002 very few changes occurred on the black and white workers' relative performance (in aggregated terms) in the Brazilian labor market. There is almost no variation on the earnings differential, as well as on the educational gap and on the occupational distribution. Nevertheless, whenever the analysis is carried out for different generations, some important features are verified. There is a decreasing trend in the earnings gap for younger generations, and this happened without any change in the educational gap or the occupation distributions across cohorts.

FIGURE 6
PROPORTION OF FORMAL WORKERS BY AGE AND COHORT



Source: PNAD data.

3 METHODOLOGY

This section describes the methodology used to decompose into age, cohort and year effects the part of the racial earnings gap due to discrimination. First, we compute the amount of racial earnings differential due to discrimination through Oaxaca-Blinder methodology for each cohort-year cell defined above. Next, this amount is decomposed into age, period, and cohort effects using the methodology proposed by Deaton and Paxson (1994) and Deaton (1997).

Following the basic idea presented by Oaxaca (1973), separated mincerian equations are computed for each racial group. Two different dependent variables are used in these regressions: the logarithm of the main job earnings and the logarithm of hourly earnings in the main job. The regressions use two types of specification: in the first one, only dummies for education and region are included, and in the second one, controls for occupation and industry are added.[4,5]

Once the coefficients are computed for both equations, it is possible to calculate the counter-factual average black workers' earning in case they were remunerated as whites. It means that the coefficients from the white workers regression are transposed to the black workers' earnings equation, so that we get the following:

$$\overline{Y}_W = \overline{X}_W\hat{\beta}_W \text{ , } \overline{Y}_B = \overline{X}_B\hat{\beta}_B \text{ and } \tilde{Y}_B = \overline{X}_B\hat{\beta}_W \quad (1)$$

where the W and B sub-indexes represent the whites and blacks, respectively. The vector $\overline{X}$ contains the average characteristics of each group, $\hat{\beta}$ are the estimated returns to these characteristics, $\overline{Y}$ is the predicted average logarithm of the earnings and $\tilde{Y}_B$ is the counter-factual average logarithm of black workers' earnings.

With these equations we can compute the discrimination term through the following decomposition:

4. As pointed out by Altonji and Blank (1999), in the first type of regressions the importance of background and choice-based characteristics on the labor market to discrimination are probably underestimate and the second group of regressions probably underestimate the effect of labor market restrictions.

5. The regressions include 5 schooling dummies, 9 industry dummies and 3 occupational categories (formal, informal and self-employed), besides of 5 dummies for region.

$$\overline{Y_W} - \overline{Y_B} = \bar{X}_B \left(\hat{\beta}_W - \hat{\beta}_B\right) + \left(\bar{X}_W - \bar{X}_B\right) \hat{\beta}_W \quad (2)$$

where in the left side we have the total differential between white's and black's earnings and on the right hand side we have the sum of two terms, the discrimination term $\bar{X}_B \left(\hat{\beta}_W - \hat{\beta}_B\right)$ and the amount of the differential due to the characteristics $\left(\bar{X}_W - \bar{X}_B\right)\hat{\beta}_W$. As said above, this decomposition is carried out for each cohort-year cell. So, the coefficients estimated are age and period[6] specific.

The next step of the methodology is to decompose the discrimination term share into age, period and cohort effects. This kind of decomposition, however, presents a well-known identification problem, since age can be computed subtracting the birth cohort from the period. In order to be able to identify these effects two strategies are adopted.[7] The first one was proposed by Deaton and Paxson (1994) and Deaton (1997), and consists in normalizing the period effects in such a way that they are orthogonal to a time trend and they add up 0. In this fashion, the trends are attributed to the age and cohort effects, while the period effect, represented by normalized dummies, captures the cyclical fluctuations, with long run mean equal to 0.

The empirical results are obtained regressing observations for racial earnings differential share due to discrimination term in each cohort-period cell on cohort dummies (f_c), age dummies (a_{t-c}) and normalized period dummies (d_t^*). These regressions are estimated by weighted least squares, and the relative number of white and black workers in each cell is used as weight. Therefore, the estimated model is the following:

$$D_{ct} = f_c + a_{t-c} + d_t^* + e_{ct} \quad (3)$$

where D_{ct} is the contribution of the discrimination term on the total earnings differential for cohort *c* in period *t*, and e_{ct} represents the specification or data errors.

The second identification method consists in substituting the period effect by direct measures, i.e., variables associated to macroeconomic factors. The variables used are: the per capita Gross Domestic Product (GDP) deviations from a linear time trend (GDP_1),[8] the per capita GDP changes between periods (GDP_2) and the inflation rate, measured by the National Price to the Consumer Index [Índice Nacional de Preços ao Consumidor (INPC)]. All these variables are calculated by IBGE. It is important to call attention to the fact that even when these direct measures are used the trends keep on being associated to the age and cohort effects.

4 RESULTS

The first step on this section is to have a look on the patterns of discrimination term, estimated according to equation (2), across cohorts in different years. Figure 7(a)

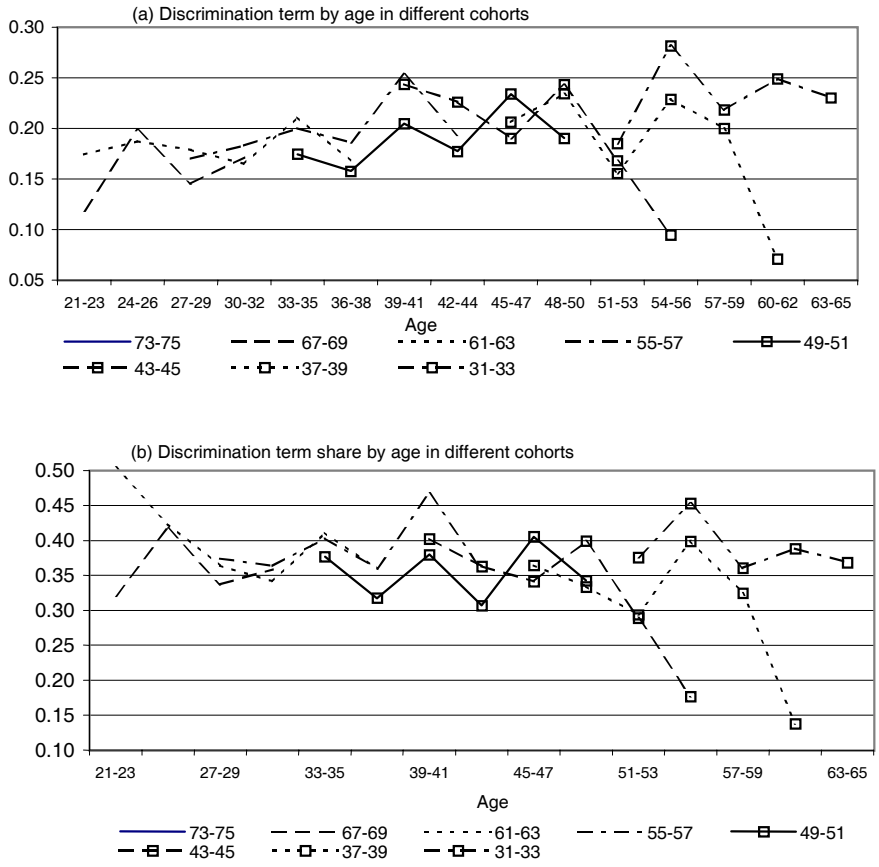
6.The Appendix A reports the number of observation for black and white workers in each of these cohort-period cells, which are sufficient large to implement the Oaxaca-Blinder decomposition with any confidence.

7. See Wilmoth (1998) for a discussion about identification methods of age, period and cohort models.

8. In order to do so, the per capita GDP is regressed in a linear time trend and a constant for the period between 1985 and 2002. The deviations were gotten from subtracting the observed from the predicted value.

reports the evolution of the discrimination term estimated using only education and region as controls for some cohorts over different age groups. For each line, which represents a given cohort, there is a decreasing trend with age. This figure indicates also that discrimination term diminishes for younger cohorts.

FIGURE 7
DISCRIMINATION TERM AND DISCRIMINATION TERM SHARE BY AGE AND COHORT



Source: PNAD data.

Using the same specification, Figure 7(b) shows the share of earnings gap due to unexplained factors. There is also a decreasing trend with age in each cohort but the pattern of discrimination term across cohorts is not so clear. However, these figures do not allow us to identify precisely the influence of age, period and cohort effects over the discrimination measures. To do so, we need to proceed with the decomposition in the equation (3).

Table 2 presents the estimated results for regressions using the share of earnings gap due to discrimination term as dependent variable. On the first column the age, period and cohort effects are represented by dummy variables. On the next two ones the period effects are represented by inflation rate and GDP variables. Figure 8(a), (b) and (c) represents graphically the coefficients estimated in the first column of this table.

In all specifications the results for the cohort effects show a strong decreasing trend of discrimination term share for younger generations. In fact this result is consistent with the argument that more information about the black workers' productive characteristics, mainly in activities that they usually did not performance

before, may have lead to a lower level of discrimination. The results are also compatible with the hypotheses that higher legal costs of discriminatory practices occurred in the last years could have reduced taste-based discrimination. In both cases the black younger generations may have faced better conditions and opportunities in the beginning of their career, generating permanent future effects on the performance of these generations.

TABLE 2
DECOMPOSITION OF THE DISCRIMINATION TERM SHARE INTO AGE, PERIOD AND COHORT EFFECTS

	(1)		(2)		(3)	
	Coefficient	t-statistics	Coefficient	t-statistics	Coefficient	t-statistics
Constant	0.500	39.99	0.545	16.65	0.545	16.97
Cohort effects						
1979-1981	–0.251	–4.20	–0.445	–3.47	–0.444	–3.63
1976-1978	–0.329	–5.78	–0.522	–4.11	–0.520	–4.29
1973-1975	–0.302	–5.30	–0.485	–3.82	–0.482	–3.99
1970-1972	–0.294	–5.13	–0.469	–3.91	–0.463	–4.10
1967-1969	–0.254	–4.57	–0.417	–3.48	–0.412	–3.63
1964-1966	–0.240	–4.17	–0.392	–3.53	–0.388	–3.64
1961-1963	–0.269	–4.88	–0.411	–3.81	–0.406	–3.93
1958-1960	–0.224	–4.09	–0.356	–3.53	–0.351	–3.70
1955-1957	–0.224	–4.15	–0.344	–3.50	–0.340	–3.59
1952-1954	–0.237	–5.16	–0.347	–4.10	–0.343	–4.24
1949-1951	–0.245	–5.35	–0.344	–4.25	–0.340	–4.37
1946-1948	–0.237	–5.03	–0.325	–4.33	–0.321	–4.43
1943-1945	–0.157	–3.55	–0.235	–3.34	–0.231	–3.39
1940-1942	–0.228	–5.05	–0.295	–4.91	–0.291	–4.92
1937-1939	–0.154	–5.55	–0.210	–4.27	–0.206	–4.38
1934-1936	–0.123	–4.35	–0.171	–3.96	–0.166	–4.00
1931-1933	–0.144	–6.05	–0.180	–5.27	–0.175	–5.25
1928-1930	–0.157	–4.25	–0.182	–4.71	–0.177	–4.50
1925-1927	–0.090	–1.29	–0.099	–1.47	–0.098	–1.47
Age effects						
60-62	–0.050	–1.49	–0.039	–1.13	–0.039	0.03
57-59	0.057	1.83	0.079	2.29	0.079	0.03
54-56	–0.001	–0.01	0.032	0.67	0.032	0.05
51-53	0.048	1.41	0.091	2.07	0.091	0.04
48-50	0.074	1.99	0.128	2.47	0.127	0.05
45-47	0.094	2.10	0.159	2.59	0.158	0.06
42-44	0.048	0.95	0.123	1.80	0.122	0.07
39-41	0.123	2.55	0.209	2.89	0.209	0.07
36-38	0.073	1.48	0.170	2.20	0.169	0.07
33-35	0.138	2.87	0.245	2.95	0.244	0.08
30-32	0.142	2.44	0.260	2.66	0.259	0.09
27-29	0.161	2.91	0.290	3.04	0.289	0.09
24-26	0.147	2.68	0.285	2.91	0.285	0.09
21-23	0.168	2.77	0.315	3.11	0.315	0.10

(cont.)

(cont.)

	(1)		(2)		(3)	
	Coefficient	t-statistics	Coefficient	t-statistics	Coefficient	t-statistics
Period effects						
1993	–0.019	–1.23				
1996	0.016	1.18				
1999	–0.008	–0.71				
2002	0.000	0.01				
Direct measures						
GDP1			0.108	0.81		
GDP2					0.223	0.95
Inflation			–0.093	–1.72	–0.088	–1.83
R-squared	0.518		0.508		0.511	
Observations	90		90		90	

Source: PNAD data, including male workers aged between 21 and 65 years old living in urban areas.

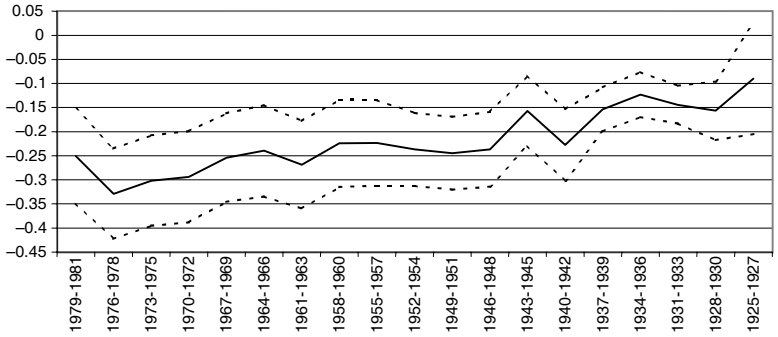
Note: The regressions are implemented through WLS, where the weights are the number of black workers in each cell. The t-statistics are computed from robust standard errors. GDP_1 is the per capita GDP deviations from a linear time trend, GDP_2 is the per capita GDP changes between periods and the inflation rate is measured by the INPC.

The evidences for the age effects show that the discrimination term share is higher for the younger workers than for the older ones, who have more experience in the labor market. This is also consistent with our argument that since information about the workers' skill is revealed to experience over time in the labor market, discrimination tends to reduce with workers age.

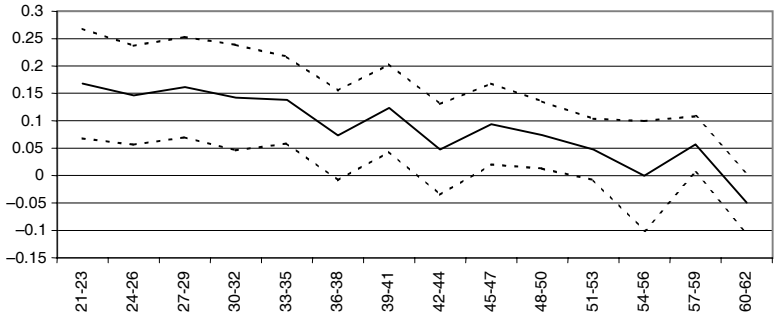
The results for the cyclical fluctuation effects show that only the dummy for 1996 has a positive and significant effect on discrimination term share. Evidences in columns (2) and (3), that use inflation and GDP variables instead of year dummies help us to explain the period effects. Higher inflation rates are associated with reductions on the explicative power of the discrimination term share, which may be due to the fact that higher real wages flexibility reduces the impact of firms' uncertainty about workers productivity on discrimination. It would be expected a positive effect of GDP on the discrimination term share, since product market pressures should reduce the employers ability to engage in costly discrimination [Becker (1957)]. However, GDP variables present a positive but non-significant coefficient. In 1996 the macroeconomic environment was supposed to be favorable to discrimination practices because the inflation rate was in a very low level and the per capita GDP was increasing.

FIGURE 8
COEFFICIENTS FOR AGE, PERIOD AND COHORT EFFECTS

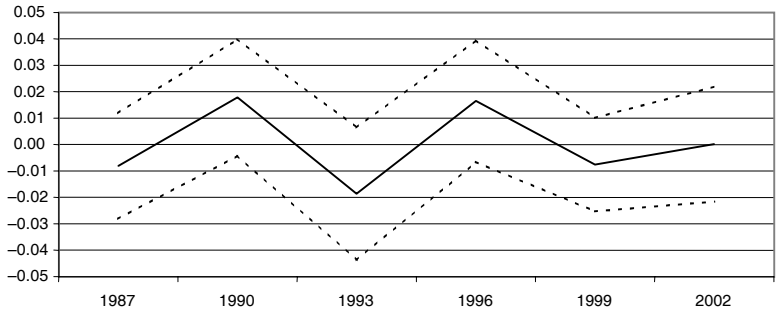
(a) Cohort effects



(b) Age effects



(c) Period effects



Notes: Coefficients are presented in colunm (1) of Table 2. The dashed lines show the 90% intervals of confidence.

5 ROBUSTNESS ANALYSIS

In order to investigate the robustness of the evidence presented in the last section, many other specifications were adopted. The Appendix II shows the graphical representation of the coefficients estimated for age, period and cohort effects in each one of these regressions.

Figure A.1 presents the results obtained when the mincerian equations include controls for occupation and industry. As it can be seen, the patterns for age, period and cohort effects in this case are very similar to that one presented in Table 2.

Figures A.2 and A.3 report the coefficients estimated using the log of hourly earnings as dependent variable in the mincerian equation. The former figure includes

only schooling and region dummies as regressors and in the later figure controls for occupation and industry are added. Period and cohort coefficients in these figures reveal patterns similar to that provided using the log of the earnings, although the difference between younger and older cohort is reduced for hourly earnings. On the other hand, age effects do not present a significant reduction for older workers relative to younger ones, as identified in Section 4 regressions.

The age, period and cohort effects are estimated using polynomials for cohort and age. In this way, the degrees of freedom are increased, but a restrictive pattern is imposed for these effects. In the Figure A.4, cohort and age are modeled as quartic polynomials, and in the Figure A.5 cubic polynomials are used to represent cohort and age effects. Cohort effects are declining with younger generations and the age effects are lower for older workers relative to younger ones.

Finally, the age, period and cohort decomposition is implemented using PNAD annual data from 1987 to 2002. This specification increases the number of observation for the second step regression. However, the Oaxaca-Blinder decomposition is calculated for few observations in each cohort-period cell, reducing the confidence in these results. For this reason, the coefficients fluctuate very much. The cohort effects show a lower discrimination term share for younger generations, while the age effects don't present any clear trend. The year dummy for 1992 is negative and the year dummy for 1996 is positive. Following this argument, the high inflation level and the decreasing per capita GDP could explain the negative effect for 1992.

6 CONCLUSION

This paper has shown that racial earnings differential is much smaller for younger generations than in older ones in Brazil. It was argued that this fact could be explained by a reduction in economic discrimination for new cohorts.

Using data from 1987 to 2002, the earnings differential was decomposed into two parts through the Oaxaca-Blinder methodology, the first one is the characteristic effect and the second is the discrimination term. This decomposition was made for 90 cells defined by cohort and year. After that, the amount of earnings differential due to discrimination was decomposed into age, period and cohort effects.

According to the evidence, the cohort effects implies in a discrimination term share lower for younger generations relative to older ones, which is in accordance with the argument that information transmission across generations increased the labor market opportunity for new cohorts of black workers. The results for the age effects indicate that the discrimination component is higher for the younger workers than for the older ones, what could be explained by the process of employers learning about workers characteristics that reduces the negative signal represented by race. About the period effects, the evidences show that higher inflation rates are associated with reduction on the discrimination term share, which is consistent with the hypothesis that higher wage flexibility decreases the economic discrimination.

The evidences presented in the paper have strong implications for economic policy. First, it seems that the market is a channel against discrimination. Since information revealed leads to a reduction of discrimination across generations, young

cohorts of black workers faces a labor market perspectives much more favorable than their parents. This mechanism could be improved by economic policies that increase the information dissemination about workers skill. The results in the paper suggest that as fast as employers acquire information about the minority group productivity, there is a tendency to reduce the negative signal represented by race.

APPENDIX

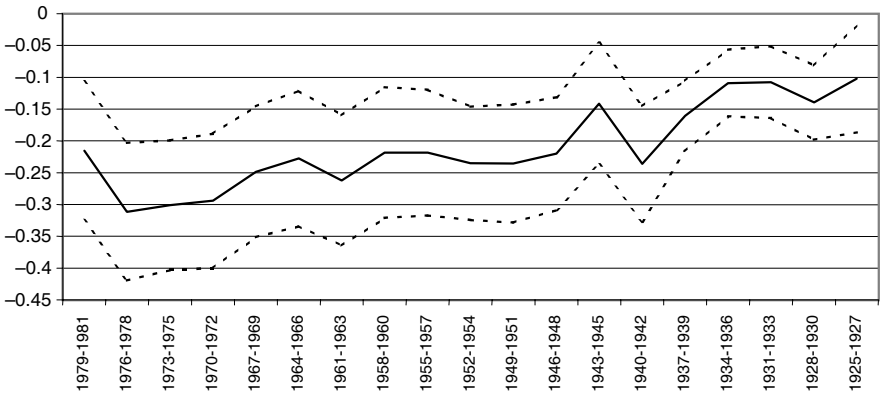
TABLE A.1
NUMBER OF OBSERVATIONS IN EACH CELL

Whites						
Age/year	1987	1990	1993	1996	1999	2002
21-23	2.764	2.436	2.532	2.515	2.705	3.148
24-26	2.798	2.605	2.667	2.707	2.772	3.038
27-29	2.665	2.399	2.911	2.648	2.725	2.959
30-32	2.546	2.371	2.803	2.816	2.728	3.074
33-35	2.370	2.376	2.657	2.699	2.804	2.904
36-38	2.019	2.087	2.397	2.531	2.598	3.020
39-41	1.748	1.818	2.269	2.301	2.496	2.720
42-44	1.572	1.544	1.958	2.128	2.253	2.489
45-47	1.293	1.346	1.579	1.785	1.923	2.159
48-50	1.239	1.177	1.309	1.544	1.610	1.892
51-53	965	980	1.021	1.095	1.285	1.493
54-56	722	780	786	918	1.012	1.250
57-59	671	618	657	732	774	908
60-62	501	513	521	583	583	686
63-65	379	358	435	407	421	471
Blacks						
Age/year	1987	1990	1993	1996	1999	2002
21-23	2.398	2.480	2.548	2.582	2.733	3.550
24-26	2.264	2.470	2.407	2.502	2.633	3.366
27-29	2.068	2.237	2.493	2.317	2.565	3.215
30-32	1.928	2.122	2.299	2.402	2.437	3.127
33-35	1.782	1.873	2.156	2.215	2.480	2.905
36-38	1.678	1.785	1.927	2.142	2.318	2.810
39-41	1.421	1.558	1.752	1.841	2.017	2.579
42-44	1.175	1.270	1.497	1.677	1.808	2.350
45-47	1.071	1.140	1.209	1.361	1.574	1.967
48-50	840	1.034	1.046	1.160	1.285	1.591
51-53	679	725	900	908	997	1.340
54-56	550	628	709	722	837	1.007
57-59	490	507	494	578	663	821
60-62	397	444	441	451	481	622
63-65	265	304	348	308	361	421

Source: PNAD data, including male workers aged between 21 and 65 years old living in urban areas.

FIGURE A.1
COEFFICIENTS FOR AGE, PERIOD AND COHORT EFFECTS—REGRESSION THAT INCLUDES CONTROLS FOR OCCUPATION AND INDUSTRY IN THE MINCERIAN EQUATION

Cohort effects

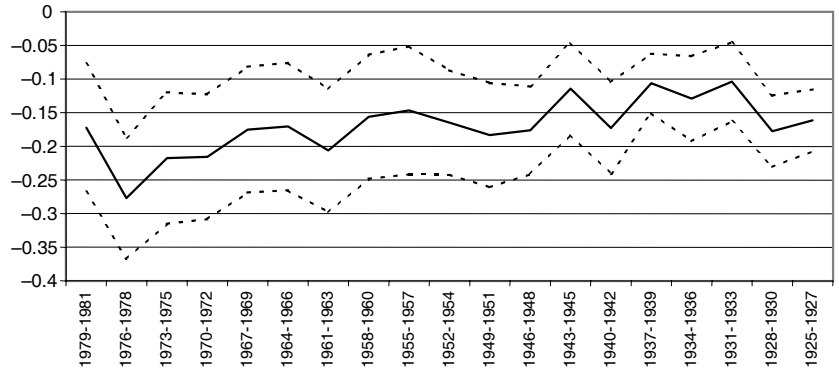


Age effects

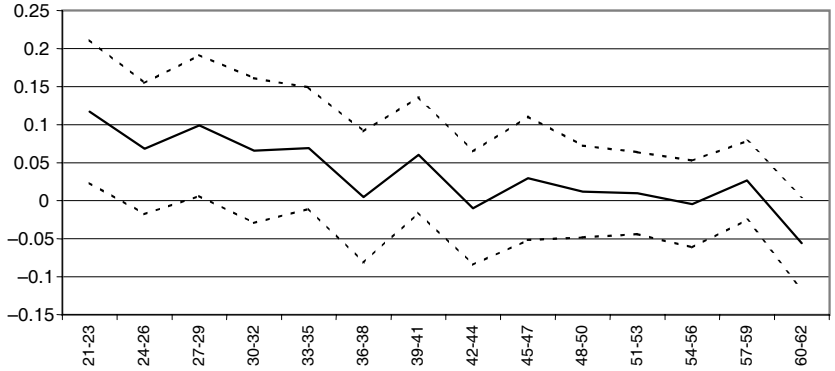
Period effects

FIGURE A.2
COEFFICIENTS FOR AGE, PERIOD AND COHORT EFFECTS—REGRESSION WITH HOURLY EARNINGS AS DEPENDENT VARIABLE IN THE MINCERIAN EQUATION

Cohort effects



Age effects



Period effects

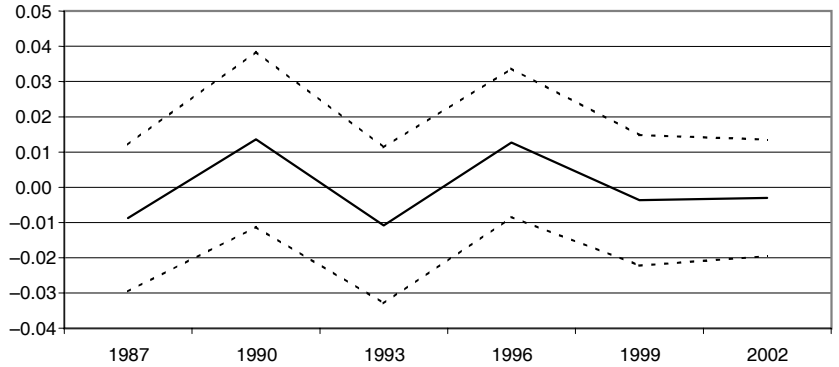
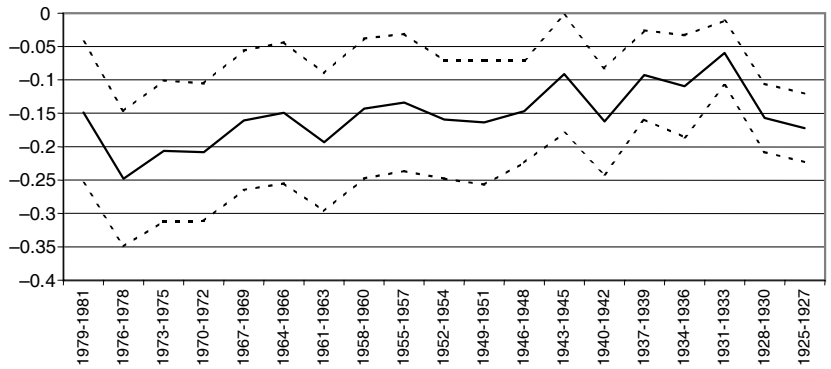
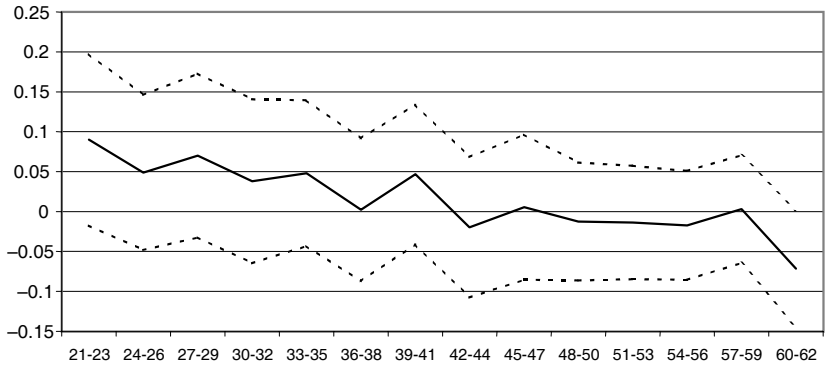


FIGURE A.3
COEFFICIENTS FOR AGE, PERIOD AND COHORT EFFECTS—REGRESSION WITH HOURLY EARNINGS AS DEPENDENT VARIABLE INCLUDING CONTROLS FOR OCCUPATION AND INDUSTRY IN THE MINCERIAN EQUATION

Cohort effects



Age effects



Period effects

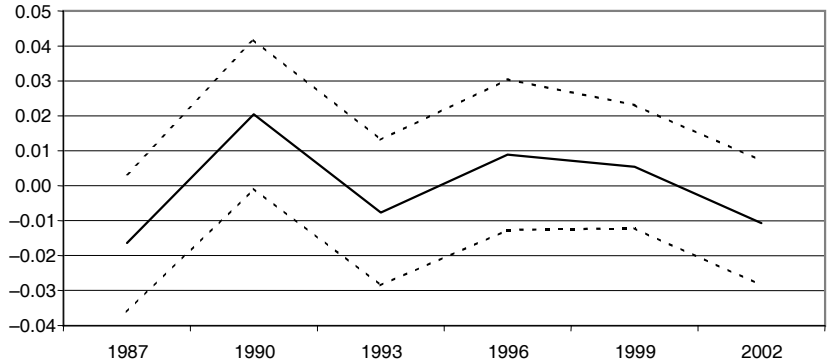


FIGURE A.4
COEFFICIENTS FOR AGE, PERIOD AND COHORT EFFECTS—REGRESSION WITH QUARTIC POLYNOMIALS FOR COHORT AND AGE IN THE MINCERIAN EQUATION

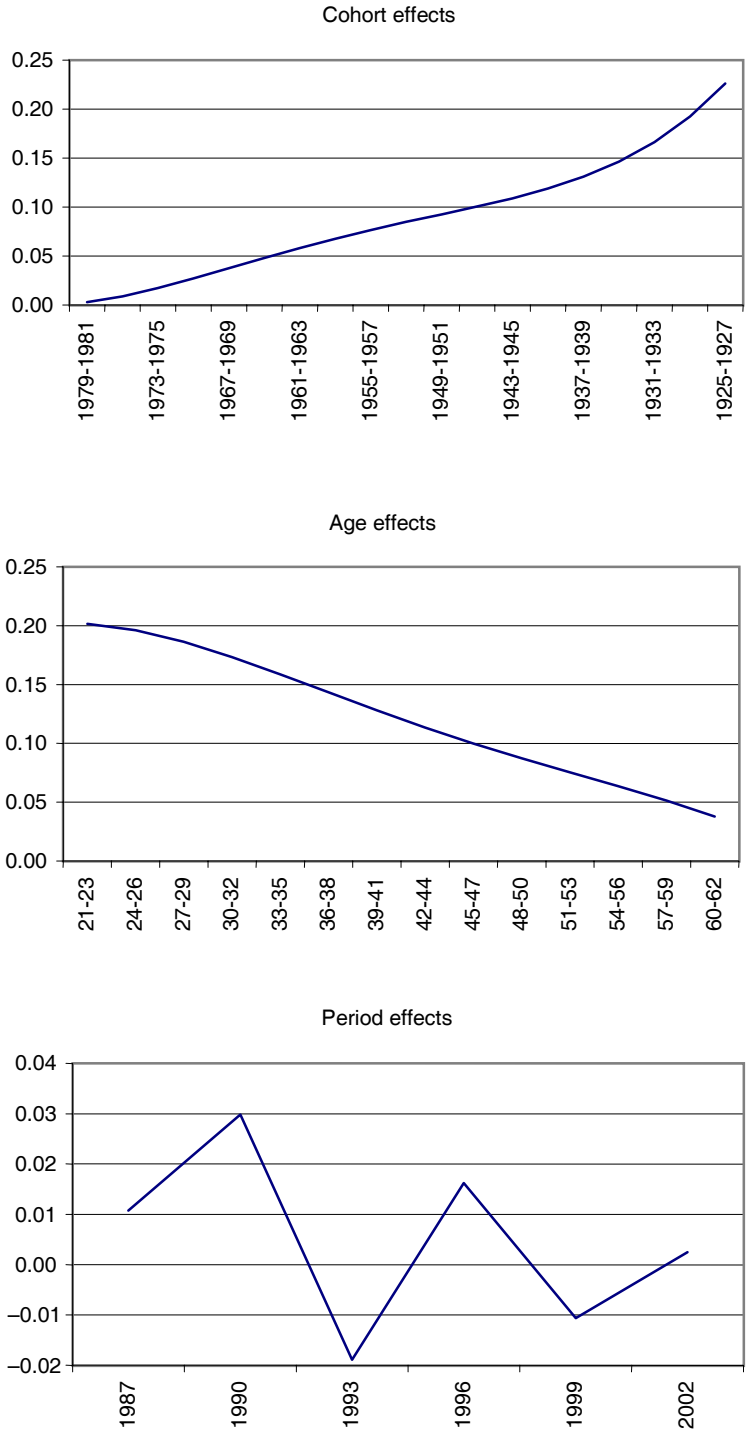
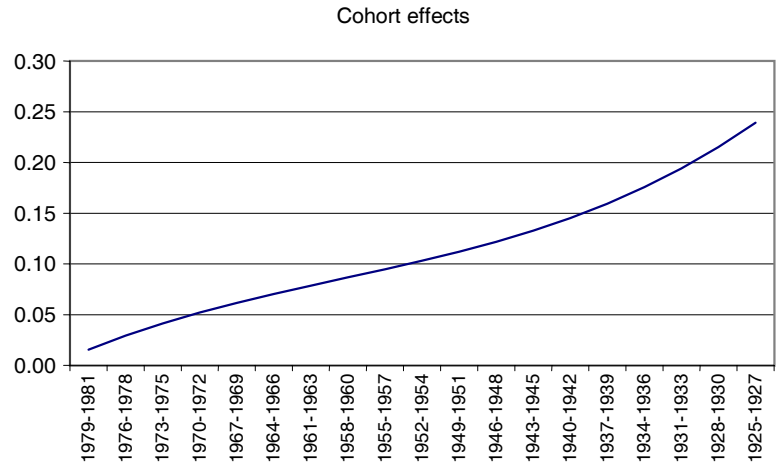
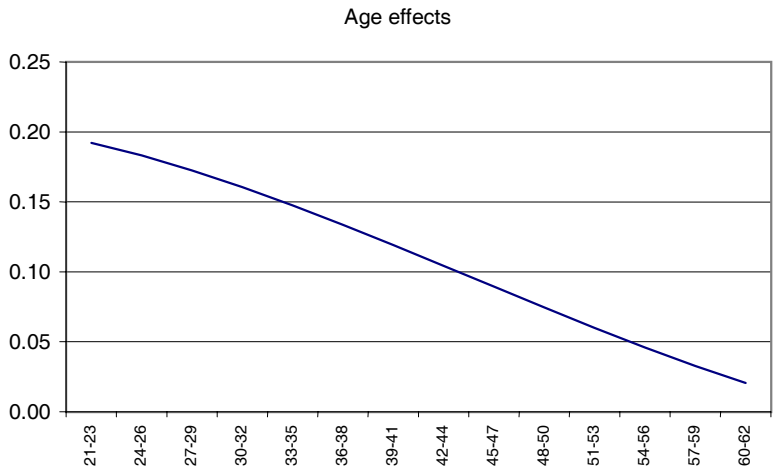


FIGURE A.5
COEFFICIENTS FOR AGE, PERIOD AND COHORT EFFECTS—REGRESSION WITH CUBIC POLYNOMIALS FOR COHORT AND AGE IN THE MINCERIAN EQUATION





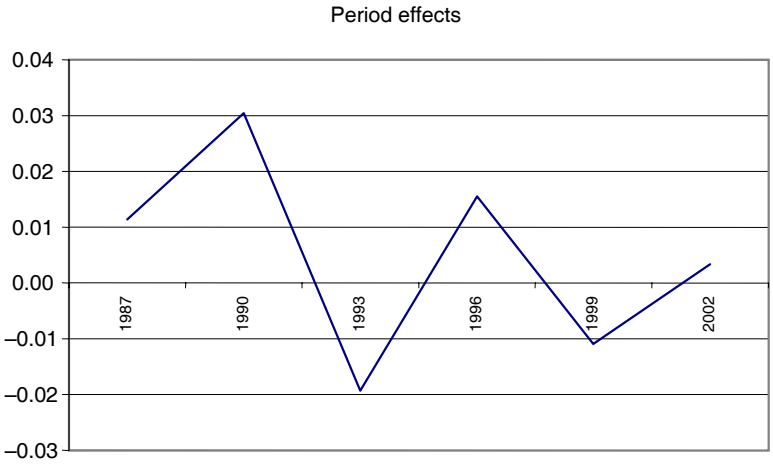
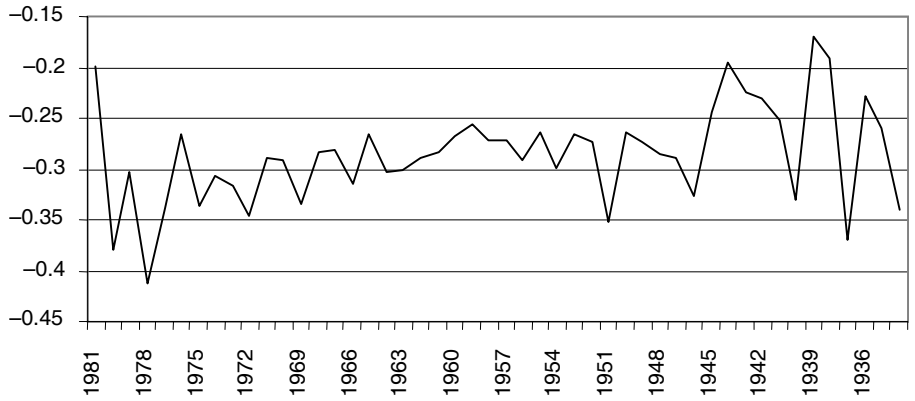
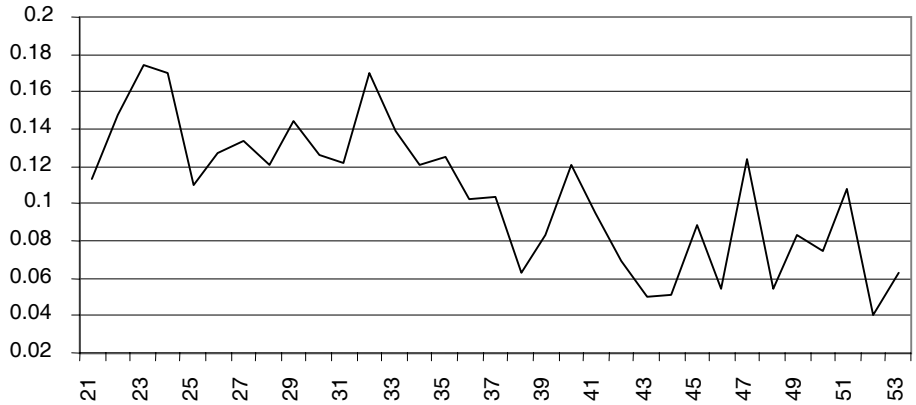


FIGURE A.6
COEFFICIENTS FOR AGE, PERIOD AND COHORT EFFECTS—REGRESSION WITH ANNUAL DATA

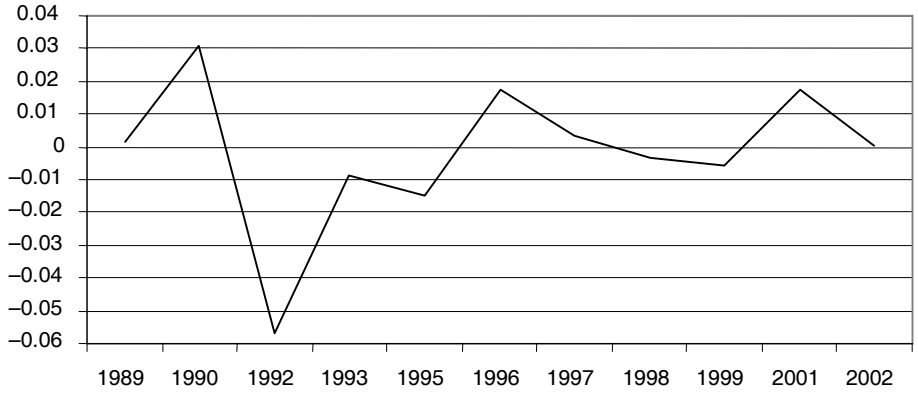
Cohort effects



Age effects



Period effects



BIBLIOGRAPHY

ALTONJI, J., BLANK, R. Race and gender in the labor market. In: ASHENFELTER, O. A., CARD, D. (eds.). *Handbook of Labor Economics*, v. 3C. Elsevier, 1999.

ALTONJI, J., PIERRET, C. Employer learning and statistical discrimination. *Quarterly Journal of Economics*, v. 116, n. 1, 2001.

ARROW, K. The theory of discrimination. In: ASHENFELTER, O. A., REES, A. (eds.). *Discrimination in labor market*. Princeton, N. J.: Princeton University Press, p. 3-33, 1973.

BECKER, G. *The economics of discrimination*. Chicago: University of Chicago Press, 1957.

CAMPANTE, F., CRESPO, A., LEITE, P. Desigualdade salarial entre raças no mercado de trabalho urbano brasileiro: aspectos regionais. *Revista Brasileira de Economia,* v. 58, n. 2, 2004.

DEATON, A. *The analysis of household surveys: a microeconometric approach to development policy*. John Hopkins University Press, 1997.

DEATON, A., PAXSON, C. Saving, growth, and aging in Taiwan. In: WISE, D. (ed.). *Studies in the economics of aging.* Chicago: University of Chicago Press, 1994.

FARBER, H., GIBBONS, R. Learning and wages dynamics. *Quarterly Journal of Economics,* v. 111, n. 4, 1996.

LUNDBERG, S., STARTZ, R. On the persistence of racial inequality. *Journal of Labor Economics*, v. 16, 1998.

OAXACA, R. L. Male-female wage differentials in urban labor markets. *International Economic Review*, v. 14, p. 693-709, 1973.

PHELPS, E. The statistical theory of racism and sexism. *The American Economic Review,* v. 62, 1972.

REIS, M., CAMARGO, J. M. *Desemprego dos jovens no Brasil: os efeitos da estabilização em um mercado de trabalho com informação incompleta*. 2005, mimeo.

SOARES, S. *O perfil da discriminação no mercado de trabalho — homens negros, mulheres brancas e mulheres negras*. Ipea, 2000 (Working Paper, 769).

WILMOTH, J. Age-period-cohort models in demography. In: CASELLI, G., VALLIN, J., WUNSCH, G. (eds.). *Démographie*: *analyse et synthèse*. 1998.

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