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LABOR MARKET AND POVERTY IN BRAZIL*

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RESUMO

Este texto investiga a importância do mau funcionamento do mercado de trabalho brasileiro, tanto em termos de subutilização como de sub-remuneração do fator trabalho, para a determinação do nível de pobreza registrado no país. Utilizando uma metodologia baseada em microssimulações, estimamos o impacto de cada imperfeição do mercado de trabalho sobre a pobreza, quais sejam: desemprego, segmentação e discriminação.

Para realizar essas estimativas foi necessário definir previamente os conceitos de desemprego, segmentação e discriminação. Além disso, também foi necessário definir uma situação ideal em que os recursos humanos eram propriamente utilizados e remunerados, dadas as condições da economia brasileira.

Os resultados mostram que o efeito da eliminação de todas as imperfeições do mercado de trabalho sobre a pobreza não seria muito significativo. Essa eliminação das imperfeições foi operacionalizada de duas formas alternativas. Primeiro, se as condições do segmento médio do mercado de trabalho brasileiro fossem estendidas a todos os segmentos, o hiato de renda média (P1) cairia dos 12,1% observados para 9,6%. Segundo, se essa condição fosse estendida somente àqueles abaixo da média, o efeito sobre a pobreza ainda não seria muito alto, com P1 caindo para 8,1%.

ABSTRACT

This paper investigates if the responsibility of the poverty level registered in Brazil is the poor operation of the labor market, in terms of underremuneration and underutilization of the labor factor. By means of a microsimulation based decomposition of distributional changes we assess the impact on the degree of poverty of unemployment, segmentation, and discrimination.

In order to estimate the effect of these labor market imperfections on poverty, it was necessary, first, to define precisely the concepts of unemployment, segmentation and discrimination. Secondly, it was necessary to define how an ideal situation where human resources are properly used and remunerated would look like, given the prevailing macroeconomic conditions.

It was found that, if the conditions of the average segment of the Brazilian labor market were extended to all segments, the effect on poverty would not be very significant (the average income gap would drop from the observed 12.1% to 9,6%). Even if this condition were extended only to those below the mean, the effect on poverty would not be so higher (P1 would drop to 8,1%). Among the items of the effect of underremuneration and underutilization of labor, it is worth mentioning that the effect of unemployment is extremely limited in absolute terms, although in relative terms it is the major effect on poverty.

1 - INTRODUCTION

How human resources are used and remunerated is one of the main determinants of the level of poverty in a society.[1] The greater the efficiency in allocating the available human resources to economic activities[2] and the better the remuneration received by those engaged in economic activities, the smaller will be the prevailing level of poverty. In other words, the greater the underutilization of human resources in economic activities and the greater the underremuneration received by those engaged in economic activities, the grater will be the level of poverty. Since the allocation and remuneration of the available human resources depends to a large extent on the functioning of the labor market, it follows that the prevailing level of poverty depends to a large extent on the functioning of the labor market.[3]

The underutilization and underremuneration of the available human resources assume basically three different forms. First, since the economy may not be able to offer jobs to all persons interested and available to work, part of the economically active population may remain unemployed. Secondly, to the extent that human resources are allocated to jobs of unnecessary low quality, given the general conditions of the economy, human resources will be partially under-employed and underremunerated. In this case workers with equal potential productive will end up with different productivity and wage characterizing the segmentation of the labor market and the underutilization and underremuneration of part of the labor force. Finally, to the extent that certain groups are discriminated while seeking and performing economic activity, these groups will be underremunerated and probably also underemployed.

The objective of this paper is to assess the impact on the degree of poverty in Brazil of each of these three specific forms of the labor market inefficiency: unemployment, underemployment and discrimination. We address these issues by means of a microsimulation-based decomposition of distributional changes similar to those implemented by Langoni (1973), Reis and Barros (1991) and Ferreira and Barros (1999).

Precise definitions for unemployment, segmentation and discrimination and their measurement are still controversial [see Hussmanns, Mehran and Verma (1990) and ILO (1995)]. Hence, we dedicate Section 2 to introduce how these concepts and their measurement are treated throughout this study. Section 3 discusses the empirical implementation of these concepts.

[1] For an overall discussion of the determinants of poverty see Barros, Camargo and Mendonça (1995).

[2] The inclusion in economic activities does not represent the only way of using human resources with important effects on poverty. For instance, the use of such resources by the parents to help their children in school activities or in preventive medical habits, actions or aid also presents important impacts on the level of poverty, at least in the long run.

[3] For the sake of simplicity, in this study the labor market discusses all segments which create jobs, including the self-employed and nonremunerated.

The following four sections will then be dedicated to analyze relationship between unemployment, segmentation and discrimination, in one hand and poverty, on the other hand, in Brazil. Section 4 presents some basic information about the database and magnitudes of poverty. Section 5 describes empirical preliminaries such as unemployment magnitude and wage differentials in Brazil. Section 6 discusses the overall impact on the degree of poverty of unemployment, segmentation and discrimination, also comparing the overall impact of these labor market imperfections with the impact of alternative strategies to eliminate poverty. Section 7 addresses the decomposition of the overall impact of labor market imperfections, presenting separate estimates for the impact of unemployment, segmentation and discrimination.

Sections 8 and 9 are then devoted to investigate to what extent temporal and regional differences in the degree of underutilization and underremuneration of human resources can explain concomitant variations in the degree of poverty. Finally, Section 10 presents the main conclusions and recommendations of this study.

2 - THE CONCEPTS OF UNEMPLOYMENT, SEGMENTATION AND DISCRIMINATION

In order to estimate the effect of labor market imperfections on poverty, it is necessary, first, to define precisely the concepts of unemployment, segmentation and discrimination. Secondly, it is necessary to define how an ideal situation where human resources are properly used and remunerated would look like, given the prevailing macroeconomic conditions. Accordingly, the objective of this section is to define these concepts and to specify the ideal situation where human resources are properly used and remunerated.

2.1 - Unemployment

The concept of unemployment that will underlie our analysis is empirically grounded. We pragmatically opted for the definition of unemployment traditionally used to produce the official statistics from household surveys. According to this definition, unemployment prevails whenever someone that did not have a job in a reference week did look for a job over the same period.[4]

Concerning to the definition of the ideal situation, trough most of this paper we assume that any level of unemployment represents evidence of underutilization of the labor force. Later on, in Section 7 we will also work with an alternative assumption that consider short term unemployment (less than three months) compatible with the full utilization of the labor force.

[4] Despite the large use of this definition, there are innumerous controversial issues on it. For example people disagree about the delimitation of which activities could be considered as work, about the reference period, and (less frequently) about the condition of looking for a job.

It must be mentioned that in order to fully specify the ideal situation, in addition to identify the unemployed, it is necessary to determine how they would be inserted in the labor market. In other words, it is necessary to specify which jobs and what remuneration the unemployed would have in the ideal situation. In this study, we opted to face them with the same labor market conditions as those experienced by the employed workers with identical observed characteristics. This option implies in particular that unemployed workers in the ideal situation would perceive a market where segmentation and discrimination would prevail at their current level.

2.2 - Segmentation

For the purposes of this study, a labor market is considered to be segmented whenever there are workers, who are perfect substitutes in production, receiving different wages as a consequence of being employed in different economic sectors or regions. As a result, in a segmented labor market, jobs are going to be of different quality, with some being better than others.

We are going to assume that workers allocated to inferior quality jobs to a given threshold would be underutilized and underremunerated. In the ideal situation we eliminate these jobs. Workers allocated to jobs of quality above the threshold may be considered overremunerated or not which give us two ideal situations. This approach to specify the ideal situation raises two difficulties. First, it requires that a threshold must be specified. Secondly, it requires the specification of a method to determine the proper remuneration of workers allocated to jobs with quality below and above the threshold.

As a threshold for workers with a given set of characteristics, we choose the current level of the average remuneration of all workers in this group. The ideal remuneration is specified in two alternative ways. In both cases we consider that all jobs paying wages below average, should ideally remunerate workers at average level. The two alternatives differ with respect to the remuneration of the workers with wages above average. The first alternative considers as appropriated the remuneration of all workers with wages above average. In this case, in the ideal situation, the wage bill and so the average wage would be greater than the values actually observed. The second alternative considers that in the ideal situation all workers would be remunerated at the current mean value. In this case, the wage bill and the average wage in the ideal situation would be identical to the current values.

Estimates of the impact of labor market segmentation on poverty would also depend heavily on the number and nature of segments one divide the labor market. In this study we consider two forms of segmentation: regional and sectorial. The specific segments considered in each of these forms of segmentation have important influence on the magnitude of impact of segmentation on poverty. A description of the segments used in this study is presented in Subsection 4.3.

Finally, it is worth noting that when adjusting the income of workers in each segment, their remuneration are altered proportionally, with the income of each worker being multiplied by the ratio between the overall average wage and the average wage for the correspondent segment. This strategy implicitly assumes that all intra-segment wage heterogeneity is due to the differences unrelated to segmentation.

2.3 – Discrimination

The concept of discrimination is closely related to the concept of segmentation. Hence, we consider that there exist labor market discrimination whenever white and nonwhite and men and women, all perfectly substitutable in production, do not receive the same remuneration even when employed in the same segment of the labor market. According to this concept there is discrimination whenever there are wage differentials among perfect substitutable workers employed in the same segment of the labor market. Those with remuneration below average are discriminated.

Similarly to our proposal to deal with segmentation, we assume that in the ideal situation, either men and women, whites and nonwhites will be on average equally remunerated as long as they are perfect substitute in production and are working in the same segment of the labor market or the over remunerated workers will remain at their original situation.

Finally, it is worth noting that when adjusting the income of workers in each group, their remuneration are altered proportionally, with the income of each worker being multiplied by the ratio between the overall average wage and the average wage for the correspondent demographic group This strategy implicitly assumes that all intra-group wage heterogeneity is due to the differences unrelated to discrimination.

3 - ELIMINATING UNDERUTILIZATION AND UNDERREMUNERATION: METHODOLOGICAL ASPECTS

The methodology used in this study relies on a series of regressions that are then used to estimate a series of counterfactual wages reflecting the elimination of labor market imperfection. The set of basic regressions is described in the first subsection. In the following four subsections we describe the construction of series of counterfactual incomes, reflecting the elimination of alternative forms of labor market imperfections. In each case two alternatives are pursued. In one case, (alternative A) the remuneration of every worker in the ideal and current situations is different. In the other case, only those with wages below average have different remuneration in the ideal and current situations (alternative B). Some final methodological remarks are presented in the last subsection.

3.1 - The Complete Regression Framework

To simulate the impact of eliminating labor market imperfections on the level of poverty, we have to rely on a series of regressions relating remunerations to workers' characteristics and indicators for the segment of the labor market they are employed. These regressions differ with respect to the set of characteristics used as explanatory variable. The more complete regression can be written as the following:

$$E[\ln(w) \mid e,i,g,c,s,r] = \boldsymbol{f}(e,i,g,c,s,r)$$

Where:

w = remuneration[5]
e = educational level
i = age
g = gender
c = race
s = segment of the labor market
r = geographical location.

In addition to this complete regression a series of other shorter regressions are also necessary. In some cases, it is equally necessary to know how the average logwage varies with the characteristics of individual workers and geographical location unconditioned on the segment they are employed. In this case, the relevant regression is the following

$$E[\ln(w) \mid e,i,g,c,r] = \boldsymbol{g}(e,i,g,c,r)$$

Sometimes, it is necessary to know how the average logwage varies with the characteristics of individual workers unconditioned on the segment they are employed and their geographical location. In this case, the relevant regression is the following:

$$E[\ln(w) \mid e,i,g,c] = \boldsymbol{h}(e,i,g,c)$$

Finally, it is also necessary to know how the average logwage varies with the workers productive characteristics. In this case, the relevant regression is the following:

$$E[\ln(w) \mid e,i] = \boldsymbol{m}(e,i)$$

For the construction of the counterfactual wages, it is necessary to define the residuals of the first regression

$$\varepsilon_f \equiv \ln(w) - \boldsymbol{f}(e,i,g,c,s,r)$$

[5] The remunerations considered are those earned in the main job (from now on wage).

In estimating all these regressions we made use of two simplifying hypotheses:

a) We assumed that all regression functions were additionally separable, that is, for instance,

$$\boldsymbol{f}(e,i,g,c,s,r) = \boldsymbol{f}_1(e) + \boldsymbol{f}_2(i) + \boldsymbol{f}_3(g,c) + \boldsymbol{f}_4(r) + \boldsymbol{f}_5(s)$$

b) We also assumed that, as a function of age, these functions are quadratic, for instance,

$$\boldsymbol{f}_2(i) = \alpha_f + \beta_f.i + \delta_f.i^2$$

All other variables are represented by dummies. We did not consider any interaction (besides gender and color) due to complications that this procedure would generate in our simulations. Another reason is the lack of theory to guide the correct functional specification.

3.2 - The Overall Impact

Alternative A

According to alternative A, the income given to each unemployed worker is equal to the average income for all those currently occupied with the same schooling and age plus an imputed residual, u_f. This residual term (u_f), is taken from the residuals (ε_f) distribution derived from the complete regression [$\boldsymbol{f}$ (e,i,g,c,r,s)]. In other words, we assume that the distribution of unobserved characteristics of those unemployed is similar to the analogous distribution for the employed (ε_f).[6] In sum, each unemployed person receives a wage w_{A*} equal to

$$w_{A*} = \exp(\boldsymbol{m}(e,i) + u_f)$$

In the case of the employed, each worker receives the average wage estimated for all those occupied who have the same schooling and age, plus the worker residual from the complete regression. In this case, the calculated wage, w_{A*}, is given as

$$w_{A*} = \exp(\boldsymbol{m}(e,i) + \varepsilon_f)$$

Once a new labor income is given to every member of the economically active population, the per capita family income and the degree of poverty can be recalculated. The contrast between the degree of poverty before and after this simulation, indicates the overall impact of underutilization and underremuneration of human resources on poverty according to alternative A.

[6] See the complete description for the residual imputation procedure on Appendix.

Alternative B

According to alternative B, the income given to each unemployed worker is equal to that in alternative A. Therefore, each unemployed person receives a wage w_{B*} equal to

$$w_{B*} = \exp[\boldsymbol{m}(e,i) + u_f]$$

For the employed workers, alternatives differ. In this alternative, each employed worker receives the maximum between his current wage and the average wage for all those with identical schooling and age plus the worker's residual from the complete regression. In this case, the counterfactual wage, w_{B*}, is given as

$$w_{B*} = \max \{\exp[\boldsymbol{m}(e,i) + \varepsilon_f], w\}$$

Once a new labor income is given to every member of the economically active population, the per capita family income and degree of poverty are recalculated. The contrast between the degree of poverty before and after this simulation indicates the overall impact of underutilization and underremuneration of human resources on poverty according to alternative B.

It might be helpful to have an idea about the relevance of each one of the imperfections on this aggregate result. In order to achieve this information we implement four sequential steps that allow us to infer about the relevance of the respective labor market imperfection.

3.3 - Impact of Sectoral Segmentation

Alternative A

Each employed worker receives the average wage estimated for all those with the same schooling, age, gender, race and geographical location, plus the worker's residual from the complete regression. In this case, the imputed wage, w_{A1}, is given by

$$w_{A1} = \exp[\boldsymbol{g}(e,i,g,c,r) + \varepsilon_f]$$

Just as in the previous case, once a new labor income is given to every member of the economically active population, the per capita family income and degree of poverty are recalculated. The contrast between the degree of poverty obtained after the simulation and the original degree of poverty indicates the impact of the sectoral segmentation on poverty, according to alternative A.

Alternative B

Each employed worker receives the maximum between his own current wage and the average wage for all those with the same schooling, age, gender, race and

geographical location, plus the worker's residual from the complete regression. In this case, the imputed wage, w_{B1}, is given as

$$w_{B1} = \max\{\exp[\boldsymbol{g}(e,i,g,c,r) + \varepsilon_f] , w\}$$

Just as in the previous case, once a new labor income is given to every member of the economically active population, the per capita family income and degree of poverty are recalculated. The contrast between the degree of poverty obtained after the simulation and the original degree of poverty indicates the impact of the sectoral segmentation on poverty, according to alternative B.

3.4 - Impact of Unemployment

Alternative A

Each unemployed worker receive a labor income equal to the average wage for all employed workers who have the same schooling, age, gender, race and geographical location plus an imputed residual, u_f. This residual is constructed as described in Subsection 3.2. As a consequence, each unemployed worker receives a wage w_{A2} equal to

$$w_{A2} = \exp[\boldsymbol{g}(e,i,g,c,r) + u_f]$$

The income of all employed workers are set as in the previous subsection, i.e.,

$$w_{A2} = \exp[\boldsymbol{g}(e,i,g,c,r) + \varepsilon_f]$$

Just as in the previous case, once a new labor income is given to every member of the economically active population, the per capita family income and degree of poverty are recalculated. The contrast between the degree of poverty obtained after this simulation and the degree of poverty obtained from the previous simulation indicates the impact of unemployment on poverty, according to alternative A.

Alternative B

The treatment of the unemployed worker is the same as in the alternative A, i.e., each unemployed worker receives a wage w_{B2} equal to

$$w_{B2} = \exp[\boldsymbol{g}(e,i,g,c,r) + u_f]$$

The income of all employed workers are set as in the Alternative B of the previous subsection, i.e.,

$$w_{B2} = \max\{\exp[\boldsymbol{g}(e,i,g,c,r)+\varepsilon_f], w\}$$

Just as in the previous case, once a new labor income is given to every member of the economically active population, the per capita family income and degree of

poverty are recalculated. The contrast between the degree of poverty obtained after this simulation and the degree of poverty obtained from the previous simulation indicates the impact of unemployment on poverty, according to alternative B.

3.5 - Impact of Regional Segmentation

Alternative A

The income given to each unemployed worker is equal to the average wage of all workers with the same schooling, age, gender and race plus a imputed residual u_f. In sum, each unemployed worker is given a wage w_{A3} equal to

$$w_{A3} = \exp[\boldsymbol{h}(e,i,g,c) + u_f]$$

Each employed worker is given the average wage among all workers with the same schooling, age, gender and race plus the residual of the complete regression. In this case the imputed wage, w_{A3}, is given by

$$w_{A3} = \exp[\boldsymbol{h}(e,i,g,c) + \varepsilon_f]$$

Just as in the previous case, once a new labor income is given to every member of the economically active population, the per capita family income and degree of poverty are recalculated. The contrast between the degree of poverty obtained after the simulation and that obtained from the previous simulation indicates the impact of the regional segmentation on poverty, according to alternative A.

Alternative B

The income given to each unemployed worker is equal to the average wage for all worker with the same schooling, age, gender and race plus a imputed residual u_f. In sum, each unemployed person is given a wage w_{B3} equal to

$$w_{B3} = \exp[\boldsymbol{h}(e,i,g,c) + u_f]$$

Each employed worker is given the maximum between his/her own wage and the sum of the average wage of workers with the same schooling, age, gender and race and race the residual of the complete regression ε_f. Hence, w_{B3}, is given by

$$w_{B3} = \max \{\exp[\boldsymbol{h}(e,i,g,c)+\varepsilon_f], w\}$$

Just as in the previous case, once a new labor income is given to every member of the economically active population , the per capita family income and degree of poverty are recalculated. The contrast between the degree of poverty obtained after the simulation and that obtained after the previous simulation indicates the impact of regional segmentation on poverty, according to alternative B.

3.6 - Impact of Discrimination

The income given to each worker is based on the average wage of all workers with the same schooling and age. So the counterfactual remuneration used on this step are w_{A*} *and* w_{B*} already defined on Subsection 3.2. The impact of discrimination on poverty is then achieved as a residual according to both alternatives. In order to be obtained, we contrast the degree of poverty estimated after all labor marker imperfections are eliminated with the level of poverty resulting from the previous simulation.

3.7 - Methodological Remarks

The methodology described above, may give rise to controversial issues that we would like to stress here. First, we don't consider general equilibrium effects that may arise from each one of the simulations. For example we eliminate the unemployment like a caeteris paribus exercise when this elimination would probably affect the wage level of the labor force. The incorporation of these effects on the other hand would complicate enormously the methodological description as well as the analysis of the results.

The second potential controversial issue is related to the ordination that we choose to present the impact of each one of the imperfections. The results would probably differ if we change this ordering. However our ordination is based on a combination of data limitation and a theoretical argument. PNAD have no information about the sector in which the unemployed individual is looking for a job. Hence the sectorial step must precede the unemployment step. Besides that, color and gender are the most exogenous characteristics among those associated to imperfections on the labor market. Hence discrimination should be the last imperfection analyzed since color and gender should be included on the regression framework except when we analyze discrimination.

Finally, we would like to mention the possibility (that can occur even in alternative B where we increase the income of all those below average) of poverty to increase with the elimination of some forms of labor market imperfection.

This possibility is a consequence of the fact that the average wage conditioned on a set of characteristics do not change monotonically with the number of elements of this set. Particularly it doesn't decrease monotonically as we diminish the number of characteristics of this set. That is the average wage for an individual conditioned on his characteristics can be higher when it is conditioned on n-1 characteristics than when it is conditioned on n. For instance, when we eliminate discrimination poverty may increase if the following inequality holds for a sufficient number of workers:

$$\exp(\boldsymbol{m}(e,i) + \varepsilon_f) < w < \exp(\boldsymbol{h}(e,i,g,c) + \varepsilon_f) \qquad (1)$$

In this case,

$$w_{A3} = w_{B3} = \exp(\boldsymbol{h}(e,i,g,c) + \varepsilon_f)$$

and

$$w_A^* = \exp(\boldsymbol{m}(e,i) + \varepsilon_f)\ ,\ w_B^* = w$$

So we have that,

$$w_A^* < w_{A3} \text{ and } w_B^* < w_{B3}$$

That is, when (1) holds for some individuals their income after elimination of segmentation and discrimination (w_A^* or w_B^*) will be lower than if only segmentation was eliminated (w_{A3} *or* w_{B3}). In other words, in this case the elimination of discrimination would decrease the income of these workers. This result implies that (if the opposite does not happen with a sufficient number of workers) poverty would increase when discrimination is eliminated.

4 - EMPIRICAL PRELIMINARIES

In this section we introduce our data base and the basic empirical concepts we are going to use throughout this study.

4.1 - Database Description

The entire empirical analysis in this study is based on the Brazilian national household survey — PNAD. This survey is conducted annually by Instituto Brasileiro de Geografia e Estatística (IBGE). We concentrate our analysis on the 1995 version of this survey, except on Section 6 when we analyze the temporal stability of the results. This survey covers the entire Brazilian territory except the rural area of the North region.[7] Every year close to 100.000 households are interviewed.

4.2 - Poverty

For the purposes of this study, poverty means insufficient monetary income. We classify a persons as poor whenever his household per capita income is inferior to a pre-specified threshold, the poverty line.[8] Hence, to estimate the aggregated level of poverty we need to specify a poverty line and a method to aggregate individual poverty in an overall index.

Three alternative values for poverty lines were used: R$ 25; R$ 50 and R$ 75. Although these are arbitrarily choices, the first value is similar to the one dollar per person per day, a poverty line used by the World Bank Reports [e.g. World Bank (1997)], among other studies.[9] In terms of the minimum wage prevailing at

[7] In fact the survey covers the rural area of Tocantins, which is located in the North region.
[8] We consider as member of the household those witch are part of the family.
[9] The exchange rate in the last week of September (reference period for PNAD) was 0,95 R$/US$.

the date of the survey, the three values corresponds respectively to 0,25; 0,50 and 0,75 minimum wages.

To aggregate poverty into an aggregated index, we choose the three basic members of the Foster-Greer-Throbecke class of poverty measures, known as $P(\alpha)$, $\alpha = 0, 1, 2$. With three poverty lines and three poverty indices, we end up with nine poverty measures. For the sake of illustration it is worth mentioning that the poverty level was 12% in 1995 according to the P1 index when a R$ 50 poverty line is used. The poverty level obtained according to the other eight alternatives are presented in Table 1.

Table 1
Brazilian Poverty Level — 1995

(%)

	Proportion of poor (P0)	Average Income gap (P1)	Average squared Income gap (P2)
R$ 25 poverty line	12,0	5,5	4,1
R$ 50 poverty line	28,2	12,1	7,9
R$ 75 poverty line	40,1	19,2	12,4

Source: Based on PNAD of 1995.

4.3 - Categories

To operationalize the concept of segmentation it is necessary to specify a partition of the labor market in segments potentially subjected to segmentation. By the same token, to operationalize the concept of discrimination it is necessary to specify a partition of the labor market in demographic groups potentially subject to discrimination.

In this study two types of segmentation are investigated: sectoral and regional segmentation. In the case of sectoral segmentation we divide the labor market into two alternative partitions. The first partition decomposes the labor market into nine segments according to the nature of the economic activity. The second partition decomposes the labor market into four segments according to the nature of the employment relation.[10]

In the case of regional segmentation we also divide the labor market into two alternative partitions. The first partition decomposes the labor market into

[10] The activities considered are: industry (excluded on the regression), traditional services, distributive services, productive services, social services, personal services, government activities, agriculture, construction and a residual activity. The employment relations are: employee with a formal contract, employee without a formal contract (informal employee), employer and self-employed.

eighteen segments associated to the partition of the country in States.[11] The second partition separate the country between urban and rural areas.

To investigate discrimination we divide the labor market into six demographic groups based on gender and race. For race we use three categories: white, mulattos, and blacks.

Finally, to operationalize the concepts of segmentation and discrimination it is necessary to specify how workers perfectly substitutes in production are going to be identified. In this study, as an approximation, we are going to assume that workers with identical schooling and age are perfect substitutes in production.

5 - EMPIRICAL EVIDENCE ON LABOR MARKET IMPERFECTIONS

The objective of this section is to present some evidence on the magnitude of some basic forms of labor market imperfection: unemployment, segmentation and discrimination. The first subsection presents basic statistics about unemployment in Brazil. Estimates of the degree of segmentation and discrimination are based on a wage regression. Accordingly, the second subsection describes this regression, while estimates of the degree of segmentation and discrimination are reported in the third and fourth subsections.[12]

5.1 - Unemployment

The impact of eliminating unemployment on poverty depends on three factors: *a*) the unemployment rate; *b*) the concentration of the unemployed among the poor, and *c*) the income the unemployed would receive if they were employed. The lower the unemployment rate, the lower the concentration of the unemployed among the poor and the lower the potential labor income of the unemployed the weaker will be the impact of eliminating unemployment on poverty.

In terms of the magnitude, in 1995 the national unemployment rate was moderate reaching a value of 6,7%.[13] In terms of the concentration among the poor, Figure 1 shows how the unemployed individuals are distributed along the percentiles of the income distribution. This figure reveals that 30% of the unemployed are concentrated among the poorest 20%.Overall this figure reveals that although the incidence of unemployment is certainly higher among the poor than among the

[11] The majority of these partitions corresponds to a federation unity and the others aggregates more than one federation unity. We aggregate the eleven federation unites located in the North and Mid-West regions in five groups. The same was done with the nine Northeastern federation unites that were redefined on six groups.

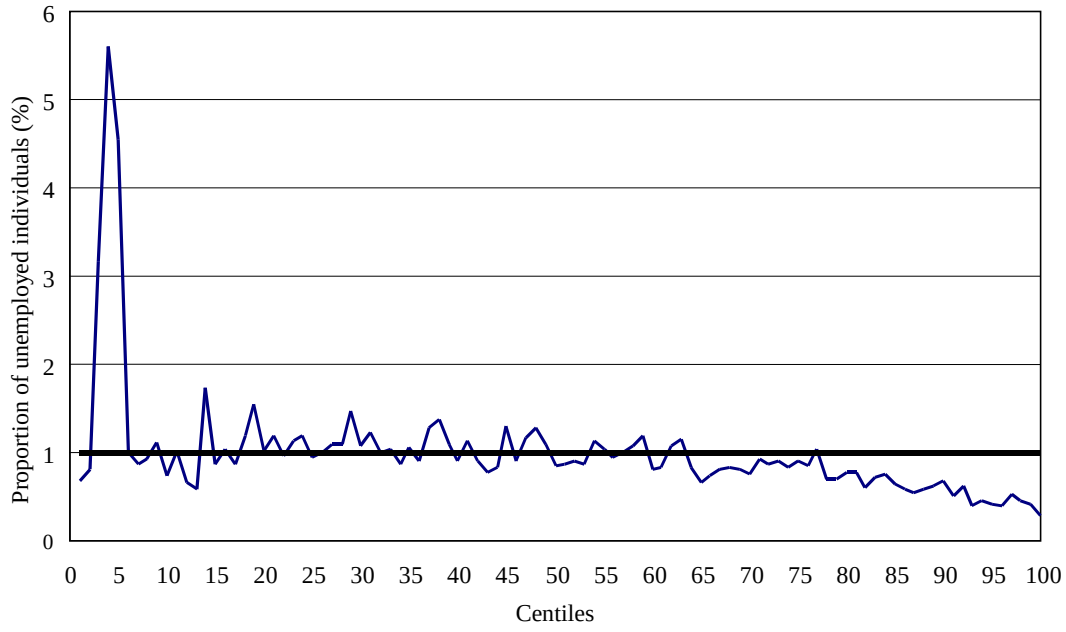
[12] The ideal information at this point of the analysis would be the average wage of each cell analyzed here. Unfortunately this would be very troubling due to the huge number of cells that we consider in our analysis. A complete description of these cells will be reported on next section.

[13] This is the unemployment rate computed for our sample. The unemployment rate for the PNAD sample (widely used as the national unemployment rate) was 6,1%.

nonpoor, less than 50% of the unemployed workers are living below the poverty line.

Another determinant of the impact of the elimination of underemployment on poverty is the wage given to those who leave the state of unemployed. It means that even when there are many poors among the unemployed pool, the impact of the elimination of this pool may be limited if they receive a very low wage as occupied. According to the procedure described to simulate the wage given to those unemployed, they would have an average (per individual) labor income of R$ 210,76. This is a high value compared to the R$ 185,57 corresponding to the average labor income computed for those occupied in 1995. This result indicates that the characteristics associated to higher wage are more frequent among unemployed individuals than employed.

Figure 1
Proportion of Unemployed Among Each Centile



5.2 - Wage Regression

The fundamental ingredient to estimate the impact of labor market imperfections on poverty is a set of regressions of log-wages on individual and job characteristics as introduced in Subsection 3.1. Tables 2a and 2b display the estimated regression.

In this regressions, except for the age coefficients all others can be interpreted as a measure of log-wage differential between the category associated to the coefficient the reference category.[14]

Concerning to the impact of productive characteristics, the regression results indicate that wages increase monotonically with schooling[15] and, as a function of age, have the traditional Mincerian inverted u-shape.

Table 2a
Relation between Wage and Individual Characteristics

	Coeficient	P-value
Intercept	1,269	0,000
Schooling		
Illiterate	-1,695	0,000
1st grade	-1,671	0,000
2rd grade	-1,543	0,000
3rd grade	-1,489	0,000
4th grade	-1,367	0,000
5th grade	-1,304	0,000
6th grade	-1,256	0,000
7th grade	-1,216	0,000
8th grade	-1,099	0,000
9th grade	-1,101	0,000
10 th grade	-0,997	0,000
11 th grade	-0,755	0,000
12 th grade	-0,525	0,000
13 th grade	-0,485	0,000
14 th grade	-0,374	0,000
Age		
Age	0,075	0,000
Age squared	-0,001	0,000
Color/Gender		
Man/mulattos	-0,109	0,000
Man/black	-0,173	0,000
Woman/white	-0,515	0,000
Woman/mulattos	-0,635	0,000
Woman/black	-0,583	0,000

Source: Based on PNAD of 1995.

[14] Actually the coefficients are the difference between the respective logarithms of wages.

[15] In fact wages for those who completed the 8th or 9th grades are very similar.

Table 2b
Relation between Wage and Job Characteristics

	Coeficient	P-value
Regions		
Sergipe/Alagoas	-0,470	0,000
Paraíba/Rio Grande do Norte	-0,683	0,000
Maranhão/Piauí	-0,852	0,000
Pará/Amapá	-0,367	0,000
Amazonas/Rondônia/Acre/Roraima	-0,178	0,000
Mato Grosso/Mato Grosso do Sul	-0,210	0,000
Goiás/Tocantins	-0,360	0,000
Rio de Janeiro	-0,292	0,000
Espírito Santo	-0,314	0,000
Minas Gerais	-0,369	0,000
Paraná	-0,274	0,000
Santa Catarina	-0,123	0,000
Rio Grande do Sul	-0,304	0,000
Bahia	-0,502	0,000
Pernambuco	-0,539	0,000
Ceará	-0,637	0,000
Distrito Federal	0,077	0,000
Rural	-0,190	0,000
Sectors		
Traditional services	-0,146	0,000
Construction	-0,033	0,003
Distributive services	-0,084	0,000
Productive services	0,013	0,286
Social services	-0,284	0,000
Personal services	-0,245	0,000
Government	-0,131	0,000
Agriculture	-0,351	0,000
Residual sector	-0,123	0,000
Informal employee	-0,264	0,000
Employer	0,747	0,000
Self-employed	-0,107	0,000

Source: Based on PNAD of 1995.

5.3 - Segmentation and Discrimination

With respect to sectoral segmentation, these tables corroborate most traditional results.[16] Industry and productive services are the economic activities associated with higher wages while agriculture and personal and social services are those associated with lower wages. In terms of the type of the employment relationship, these tables reveal that employers tend to have the higher income than employees and the self-employed. Among the employees and self-employed the highest wages are among the formal employees followed by the self-employed. Informal employee are those with the lowest wages.

[16] Barros and Mendonça (1996) present a valuable survey of these results.

As far as regional segmentation is concerned, these tables reveals that labor income tend to be lower in the Northeast. The wages are the highest in the Federal District, São Paulo, Rio de Janeiro and in the Southern States. The results for rural and urban areas confirms the usual pattern that rural areas are associated with lower wages.

Concerning to discrimination, these tables indicate, as expected, that women earn less than men and that mulattos and blacks also earn less than whites. This table also corroborate results from other studies indicating small differences between mulattos and blacks.

6 - THE OVERALL IMPACT OF UNDERUTILIZATION AND UNDER-REMUNERATION ON POVERTY

This section describes the results obtained in relation to the overall impact on the degree of poverty of underutilization and underremuneration. However, the fact that these effects must be increased or reduced represents, ultimately, a relative question. For an easier assessment, in this section the magnitude of this impact is compared to that of other ways to reduce poverty. The comparison is done with three alternative ways to diminish poverty: *a*) with the impact on poverty by increasing in the work force's education; *b*) with that of a process of balanced economic growth; and *c*) with the impact of reductions in the degree of inequality.

6.1 - Basic Results

Table 3 presents the results of the impact of the various simulations on the level of poverty, considering the A and B alternatives. Based on this table, independent of the indicator chosen, elimination of unemployment, underemployment and discrimination in the labor market would have a relatively limited effect on poverty when alternative A is chosen. On the other hand if alternative B is chosen the impacts are shown to be more significant. This contrast is more evident for higher values of poverty lines.

For instance, when using a R$ 25 poverty line, it is assumed that the proportion of poor would drop from 12% to 7,3% or 8,4%, according to the alternative chosen to eliminate unemployment, underemployment and discrimination in the labor market, and the average poverty gap would drop from 5,5% to 3,3% or 3,7%. If we use a R$ 75 poverty line the proportion of poor would drop from 40% to 32% or 37% and the average poverty gap would drop from 19% to 14% or 16,5% according to the alternative chosen.

The results reveal that the importance of the impact on poverty by eliminating underutilization and underremuneration of human resources, depends the way we define proper utilization and remuneration. From now, we will mention results for the P1 indicator and a R$ 50 poverty line. Analogous results for other indicators and poverty lines will be available on Appendix tables.

Table 3
Overall Impact of Underutilization and Underremuneration on Poverty — 1995

(%)

	Proportion of poor (P0)	Average income gap (P1)	Average squared income gap (P2)
R$ 25 poverty line			
Observed values	12,0	5,5	4,1
Simulated values			
Everyone to the mean (A)	8,4	3,7	2,6
Moving only those below the mean (B)	7,3	3,3	2,4
R$ 50 poverty line			
Observed values	28,2	12,1	7,9
Simulated values			
Everyone to the mean (A)	23,3	9,6	5,8
Moving only those below the mean (B)	20,1	8,1	5,0
R$ 75 poverty line			
Observed values	40,1	19,2	12,4
Simulated values			
Everyone to the mean (A)	37,0	16,5	9,9
Moving only those below the mean (B)	31,9	14,0	8,5

Source: Based on PNAD of 1995.

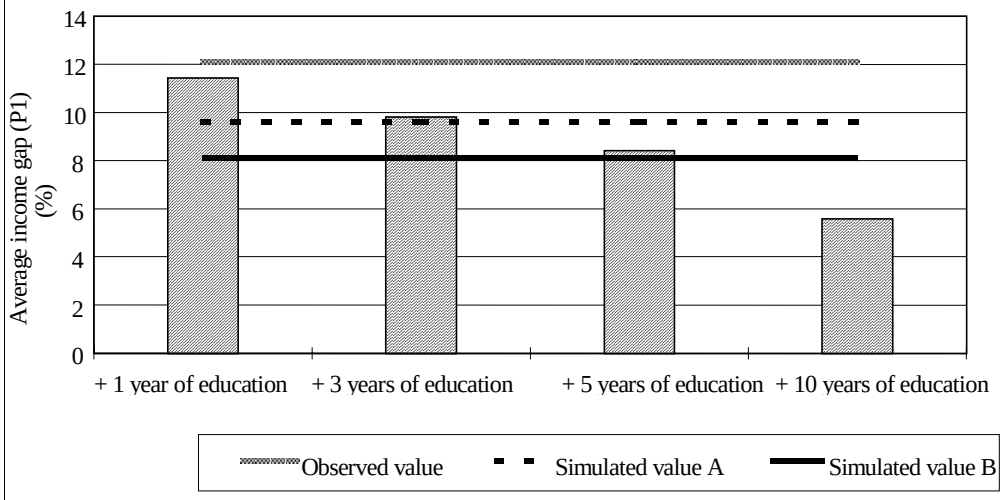
6.2 - The Impact of Education

Figures 2a and 2b demonstrate series of simulations which permit the comparison of the impact of eliminating unemployment, underemployment and discrimination with the impact of an increase in education. The highest horizontal line presents the poverty level in Brazil in 1995, while the other reveal how poverty would be if all unemployment, underemployment and discrimination were eliminated according to both alternatives (A and B from above to below). These information were taken from Table 3.

The bars of the figures show how the degree of poverty in Brazil would be affected with an increase of the labor force's education. Two procedures are used to increase the level of education. First is based on 15 cumulative steps and in each step all workers with less than 15 years of education (full university education) receive one year of extra study.

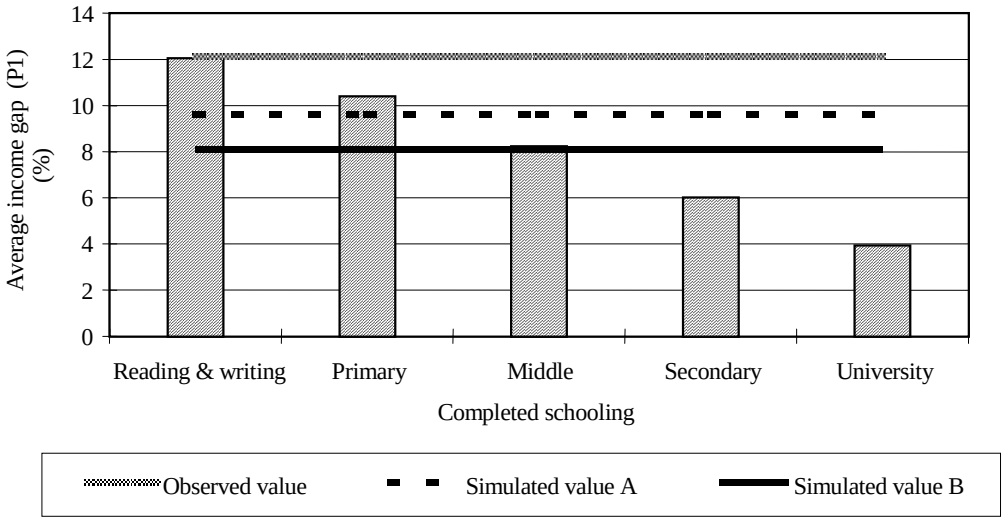
The results for some of these simulations (the 1^{st}, 3^{rd}, 5^{th} and 10^{th} steps) are reported on Figure 2a. The impact associated to alternative A is comparable to a resulting from an increase of three years on the schooling level of everyone. Table A 2a on Appendix extend these results to the others poverty measures. The alternative B, as one should expect, is comparable to an higher increase in educational level. The impact on poverty associated with this alternative is higher than the one obtained increasing the schooling level by five years.

Figure 2a
Comparison between the Impact of Eliminating Underutilization and Underremuneration with the Generalized Increase in Schooling — 1995 (R$ 50 Poverty Line)



Source: Based on PNAD of 1995.

Figure 2b
Comparison between the Impact of Eliminating Underutilization and Underremuneration with the Restricted Increase in Schooling — 1995 (R$ 50 Poverty Line)



Source: Based on PNAD of 1995.

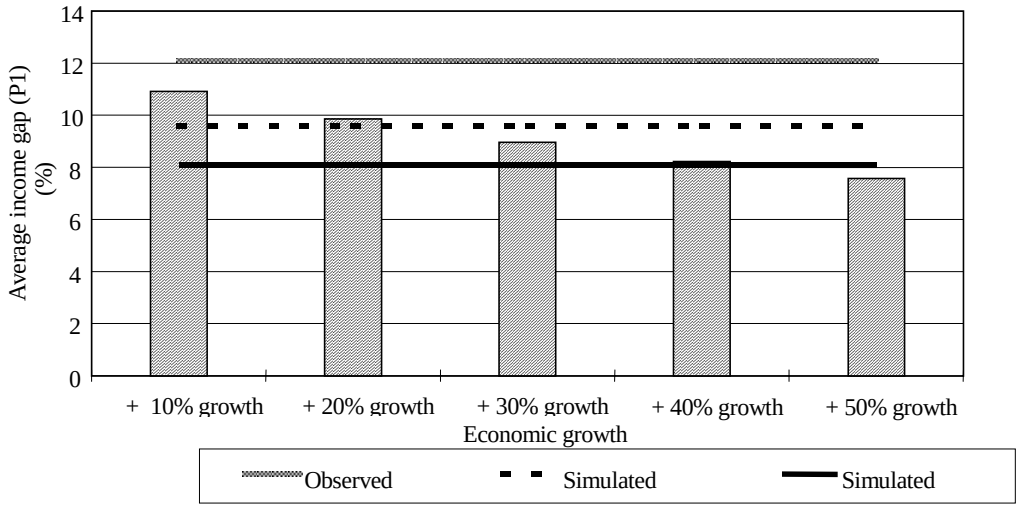
The second procedure is also based on 15 cumulative steps, but now in each step only workers with the lowest level of education are raised to the level immediately above. In this case, anyone with no schooling moves to one year of study, in the next step anyone with one year of schooling moves to two years and so on until

they all have at least 15 years education. Figure 2b reports the results for the 1st, 4th, 8th, 11th and 15th steps while Table A 2b extend them to all poverty measures. The outcome of this simulation shows that the impact of eliminating the imperfections of the labor market is equal to guaranteeing everyone something more than the first four years of basic education (4th step) or the first eight years (middle education – 8th step) according to the alternative chosen to eliminate the imperfections.

6.3 - The Impact of Economic Neutral Growth

Figure 3 shows a serie of simulations which permit the comparison of the impact of eliminating unemployment, underemployment and discrimination with that of a process of neutral economic growth. Once more the highest horizontal line gives the 1995 poverty level in Brazil, while the other two reveal how poverty would be if all unemployment, underemployment and discrimination were eliminated according to the alternative implemented. These information were taken from Table 3.

Figure 3
Comparison between the Impact of Eliminating Underutilization and Underremuneration with Economic Neutral Growth Rates — 1995
(R$ 50 Poverty Line)



Source: Based on PNAD of 1995.

The bars on this figure show how the degree of poverty in Brazil would be affected by a process of neutral growth from the distribution point of view. To obtain the impact of economic growth, the average income of 1995 is increased by 10%, 20%,..., 50% and the resulting degree of poverty is recalculated.

The outcome of this simulation indicates (see Figure 3) that the comparison of the impact of eliminating the imperfections of the labor market with the impact of a

neutral (from the distribution point of view) economic growth is sensible to the alternative implemented. The impact associated to alternative A is comparable to the one obtained through a 20% rate of economic growth, while a 40% rate is comparable with alternative B.[17] Table A3 extend the results for other poverty measures.

6.4 - The Impact of Inequality

Figure 4 shows a series of simulations which permit the comparison of the impact of eliminating unemployment, underemployment and discrimination with that of reducing the degree of inequality. The bars of the figure shows the degree of poverty in Brazil if the total volume of resources is like the Brazilian but the form of its distribution was like that of another Latin American country. It is shown how the degree of poverty varies according to the country chosen for comparison.[18] As already mentioned for previous figures, the highest horizontal line gives the 1995 poverty level in Brazil, while the other two reveal how poverty would be if all unemployment, underemployment and discrimination were eliminated according to the alternative implemented.[19] These information were taken from Table 3.

This figure also shows that the impact on poverty by eliminating all the imperfections of labor market is equal to that which would be obtained using a redistribution program which would lead to a drop in the inequality of income in Brazil, to the extent of becoming comparable to the level experimented by Mexico or Honduras, according to the alternative implemented. It's worth mentioning that both countries have an higher degree of inequality than the South American countries in the figure.[20] Table A4 extend the results for other poverty lines.

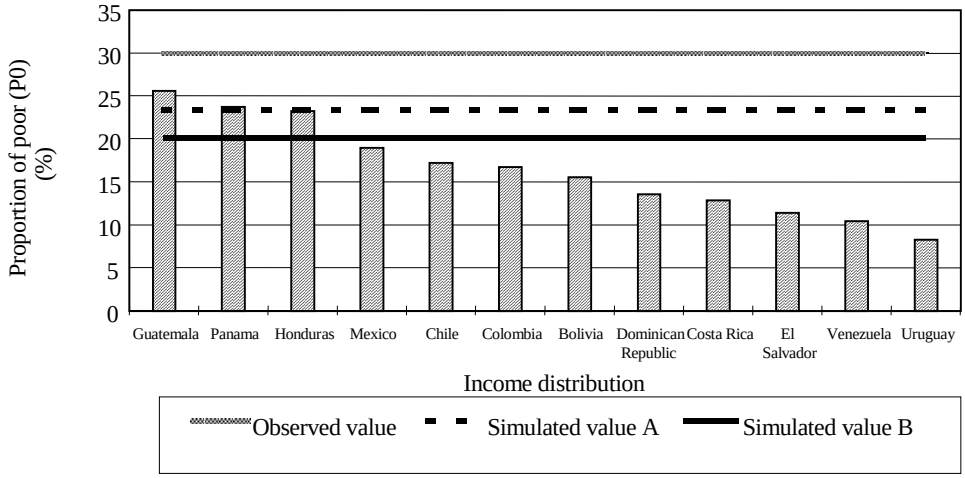
[17] The 40% rate of economic growth is comparable to what Brazil had from 1970 to 1973, years associated to highest growth rates in the postwar period.

[18] In fact we approximate the income distribution by the income share associated to each decil. This information combined to Brazilian average income give us the average income of each decil according to the alternative income distributions considered. A linear interpolation for the income between consecutive decil is then enough to provide us the P0 under the alternatives considered.

[19] Due to methodology limitation we have to use P0 as the poverty measure in these simulations. Also due to the methodology employed the observed value for the poverty level does not correspond to the one previous reported on Figures 2 and 3.

[20] For the sake of illustration the Gini index for Brazil was 0,63 while for Honduras and Mexico we had 0,53 and 0,50 respectively [see The World Bank (1997)].

Figure 4
Comparison between the Impact of Eliminating Underutilization and Underremuneration with Changes in Income Distribution — 1995
(R$ 50 Poverty Line)



Source: Based on PNAD of 1995.

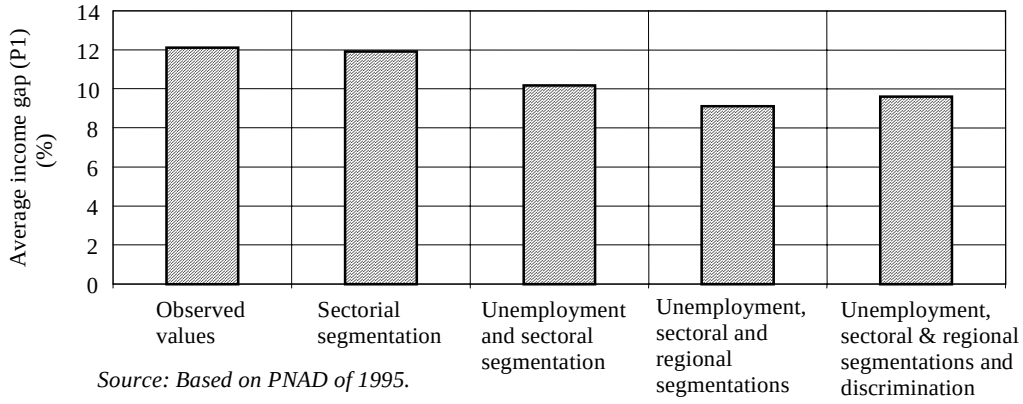
7 - BREAKING DOWN THE OVERALL EFFECT

This section shows the breakdown of the impact of eliminating the flaws in the labor market on poverty, separating the impact of unemployment, sector and regional segmentation and discrimination on the labor market.

7.1 - The Effect of Sectorial Segmentation

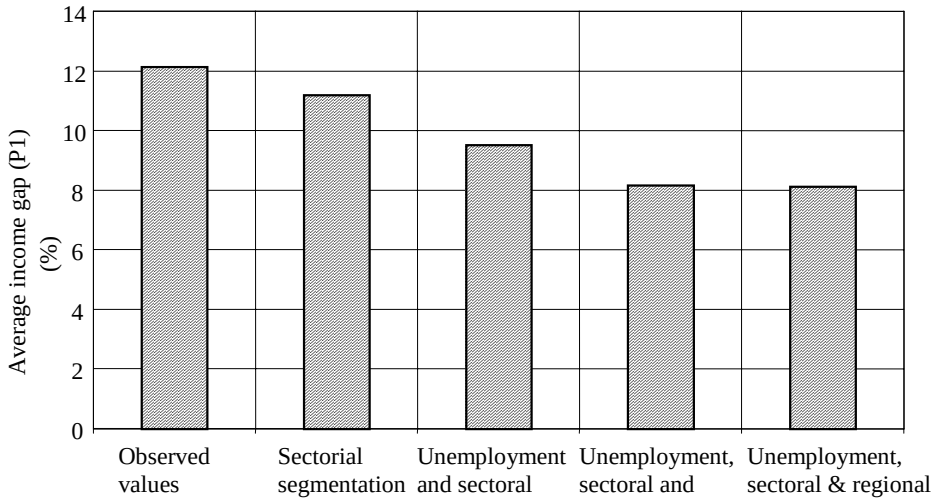
According to Figure 5a the elimination of sectorial segmentation among those occupied has a very limited impact on poverty when alternative A is implemented (P1 stays around 12%). The analogous simulation based on alternative B shows an higher impact, but still not very significant. As Figure 5b shows, P1 moves from 12,1% to 11,2%. This greater impact on poverty associated to alternative B was expected since according to this alternative we give the average remuneration only for those whose original remuneration was below the mean. Table A5a extends these results for all poverty measures, according to both alternatives.

Figure 5a
Poverty Level Registred for the Various Stages in Eliminating Underutilization and Underremuneration Alternative A — 1995



Source: Based on PNAD of 1995.

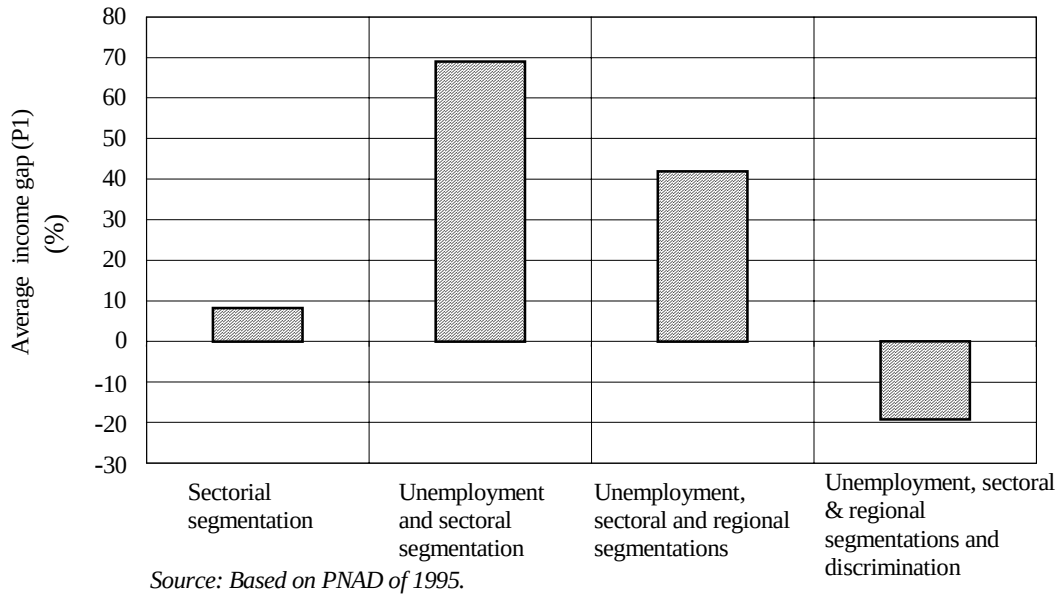
Figure 5b
Poverty Level Registred for the Various Stages in Eliminating Underutilization and Underremuneration Alternative B — 1995



Source: Based on PNAD of 1995

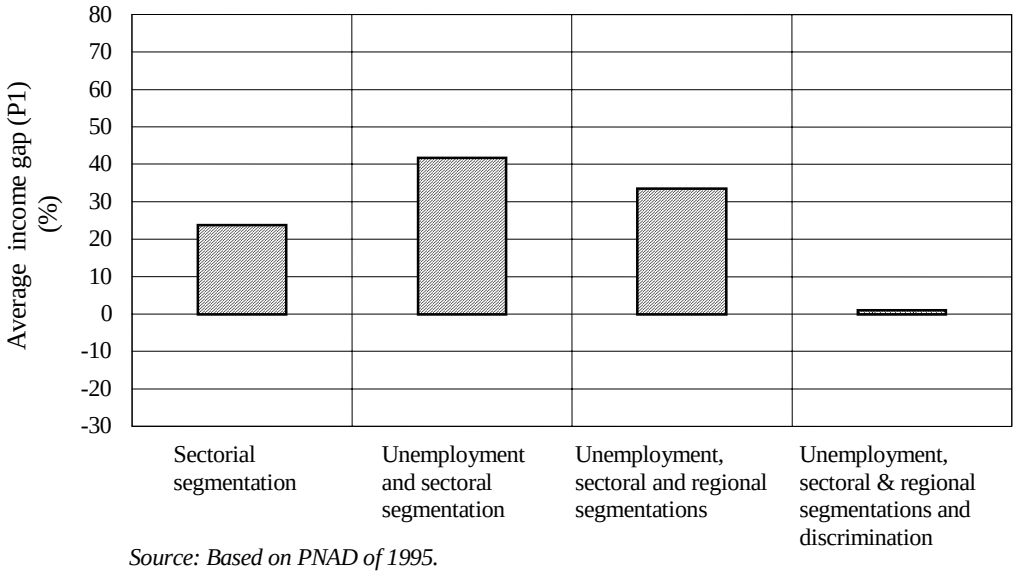
Relative to the overall impact on poverty, the one registered for the sectorial segmentation is one of the two less significant according to both alternatives. Figures 5c and 5d display these relative impacts for alternative A and B respectively, while Table A5b extends these results for all poverty measures, according to both alternatives.

Figure 5c
Relative Impact on Poverty of Various Stages in Eliminating Underutilization and Underremuneration Alternative A — 1995



Source: Based on PNAD of 1995.

Figure 5d
Relative Impact on Poverty of Various Stages in Eliminating Underutilization and Underremuneration Alternative B — 1995



Source: Based on PNAD of 1995.

7.2 - The Effect of Unemployment

Figures 5a and 5b also show that the elimination of the unemployment in a sectorial nonsegmented labor market has an impact significantly higher than the elimination of sectorial segmentation among the occupied, but still limited in absolute terms. The poverty level moves from 11,9% to 10,2% if we use alternative A and from 11,2% to 9,5% for alternative B. So, despite the 6,7% unemployment rate in 1995, the inclusion of this whole contingent in the occupied population would have an impact lower than 2 percentage points in the average income gap that can be considered relatively small in absolute terms.

It is worth mentioning that both alternatives are associated with a drop of 1,7 percentage points on P1. In relative terms, abolition of unemployment represents around 70% of the effect of eliminating all forms of underutilization and underremuneration of human resources in the labor market according to alternative A (see Figure 5c). The analogous proportion obtained from alternative B is 42% (see Figure 5d). Table A 5a extends these results for all other poverty measures computed.

So, the impact of the elimination of unemployment is limited in absolute terms, as the overall impact of underutilization and underremuneration is. On the other hand, in relative terms it represents the major form of underutilization and underremuneration of human resources.

7.3 - The Effect of Regional Segmentation

Figures 5a and 5b also show the impact of the regional segmentation on poverty. Figure 5a shows a limited drop of only 1 percentage point, falling from 10,2% to 9,1% on average income gap according to alternative A and Figure 5b shows an analogous drop from 9,5% to 8,2% for alternative B.[21]

In relative terms, regional segmentation also represents one of the main source of imperfection in the labor market, since its impact is close to 42%, according to alternative A, and 33,6%, for alternative B, of the impact on poverty after the elimination of all kinds of imperfection in the labor market (see Figures 5c and 5d). Table A5a extends these results for all other poverty measures computed, in absolute and relative terms respectively.

7.4 - The Effect of Discrimination

Figures 5a and 5b also help in assessing the impact on poverty of discrimination by gender and color in the labor market. In the case of discrimination, the elimination of this imperfection does not show an improvement of the poverty level significantly in both alternatives. Actually, eliminating discrimination using alternative A increases significantly the poverty, from 9,1% to 9,6%, as shown in Figure 5a. According to alternative B the impact is almost null with the poverty

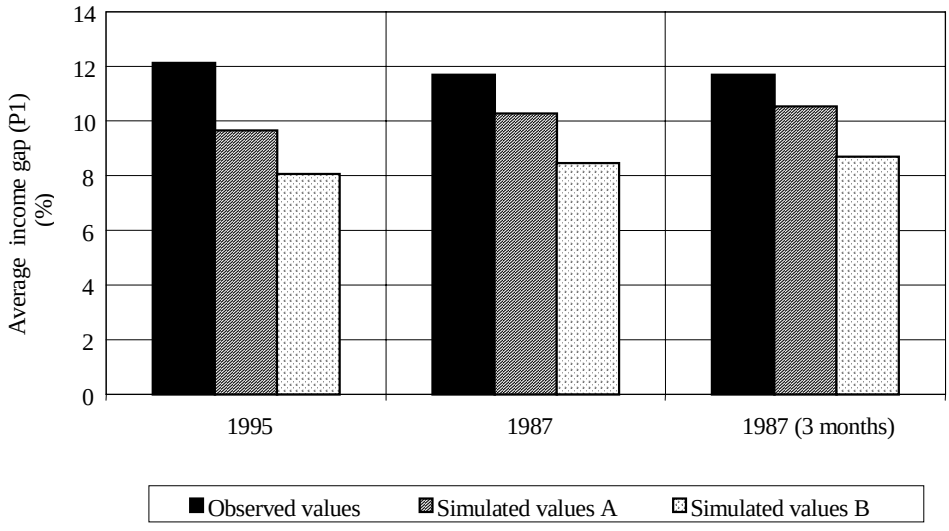
[21] Actually this result may depend on the sequence chosen on the simulation (first we eliminate sectorial segmentation, than eliminate regional and finally discrimination).

level slightly dropping from 8,2% to 8,1%, as shown in Figure 5b. The same negative and significant pattern according to alternative A prevail in relative terms, as well as the insignificant result for alternative B (see Figures 5c and 5d for these results).

8 - TIME SENSIBILITY

In order to ascertain to what extent this labor market influence on poverty is an structural characteristic of Brazilian society the 1987 PNAD is used to obtain the corresponding results.[22] Figure 6a shows that the overall impact of our simulation for 1987 register similar results to those for 1995 according to alternative B. The overall impact for both years is close to 3 percentage points. On the other hand, according to alternative A the impact is shown to be lower in 1987 (see other poverty measures on Table A6 for 1987 results and Table 3 for 1995 results).

Figure 6a
Overall Impact of Underutilization and Underremuneration on Poverty



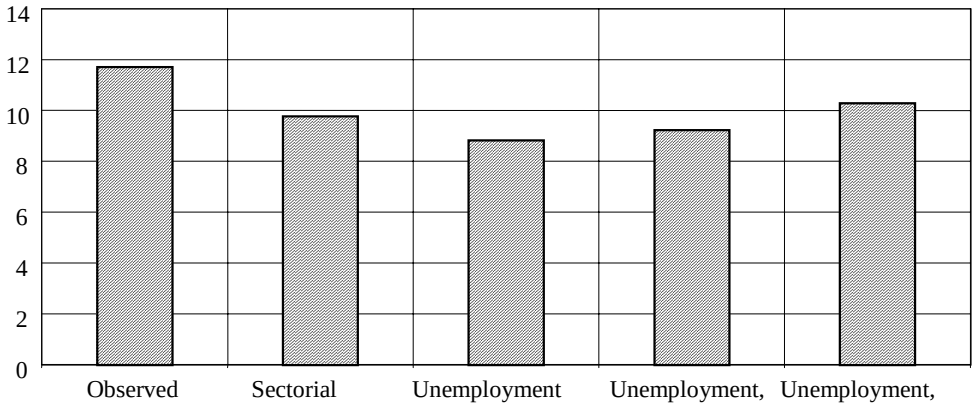
Source: Based on PNAD of 1987 and 1995.

According to Figure 6b and 6c, the impacts of regional segmentation and specially discrimination are responsible for the different results according to alternative A but similar according to alternative B (see Figure 5a and 5b for the 1995 results). The results attributed to discrimination are both negative for 1987, which suggests a wizard impact of the elimination of this imperfection during a context of relative

[22] PNADs from 1990 to the present do not investigate duration of unemployment spell. Some of the PNADs before 1990 do not investigate the color of the individuals. So PNAD 1987 is one of the few available alternatives that contain all the information we need.

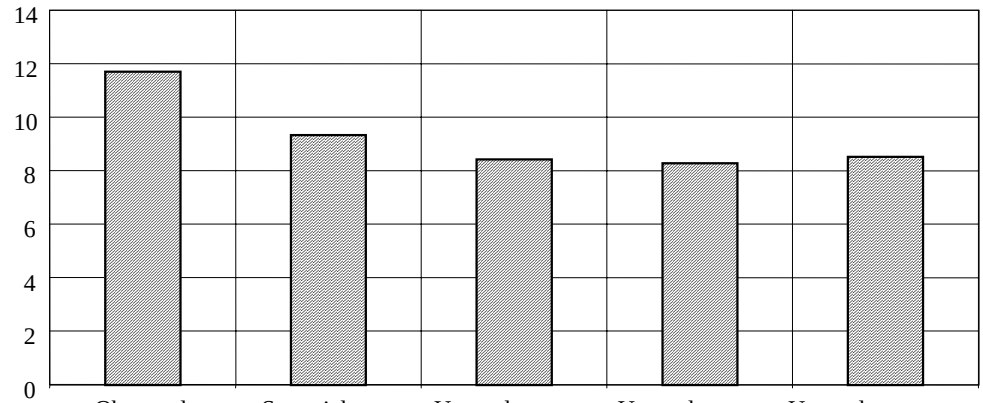
low poverty level. Finally, the elimination of unemployment has a more limited impact on poverty in 1987, according to both alternatives, as was expected since the unemployment rate was lower that year than in 1995. These partitioned results for the impact on poverty in 1987 are illustrated for other poverty measures on table A7a and can be compared to the 1995 ones reported on Table A 5a.

Figure 6b
Poverty Level Registred for the Various Stages in Eliminating Underutilization and Underremuneration: Alternative A — 1987



Source: Based on PNAD of 1987.

Figure 6c
Poverty Level Registred for the Various Stages in Eliminating Underutilization and Underremuneration: Alternative B — 1987



Source: Based on PNAD of 1987.

The PNAD 1987 also allow us to adopt an alternative relation between unemployment and underutilization. This alternative, as already described, considers the short-run spells of unemployment compatible with an efficient use of human resources. So, instead of eliminating all the unemployment, this

procedure eliminates the unemployment with longer duration spells than three months.

Table A1 show the basic unemployment statistics, related to its impact on poverty, for both set of unemployed individuals considered (besides the analogous numbers for 1995 already mentioned on Subsection 4.3). The unemployment rate was 3,6% for the hole contingent and 2,6% for those with longer duration spell. These numbers are three and four percentage points lower than the one registered in 1995. Other characteristics of unemployment seem not to be much different than what we had for 1995. For example the concentration of unemployed individuals among the first quintile of the income distribution was near 28% (all unemployed) and 29% (those with longer duration spell) in 1987, only two or one percentage points lower than the number computed for 1995.

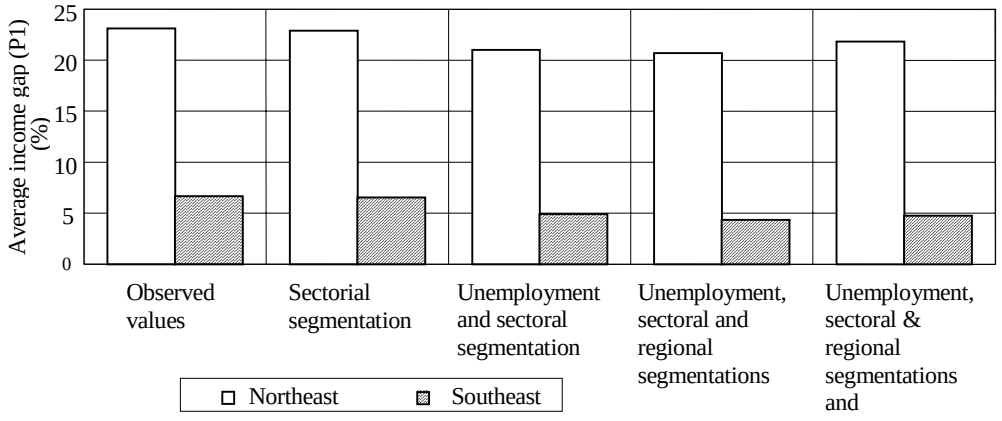
Figure 6a allows a comparison between the two alternative procedures to eliminate unemployment. We can see that the overall impact on poverty is only slightly larger when all unemployment is eliminated (see Table A6 for other poverty measures). This result suggests that our basic results for 1995 are not overestimated, even if someone believe that the correct relation between unemployment and underutilization is the last one described.

9 - REGIONAL SENSIBILITY

In the two previous sections, the impact of labor market inefficiencies on poverty level was investigated for Brazil as a whole. However, these imperfections can acquire a differentiated importance according to the degree of regional development. This section offers some evidence in this respect, to the extent that it shows estimations of the impact of inefficiencies of the labor market on poverty in two subsamples corresponding to the Northeast and Southeast regions. These estimates are reported on Figures 7a and 7b, for alternatives A and B respectively, and extended to all poverty measures computed in Tables A 8a and A 8b.

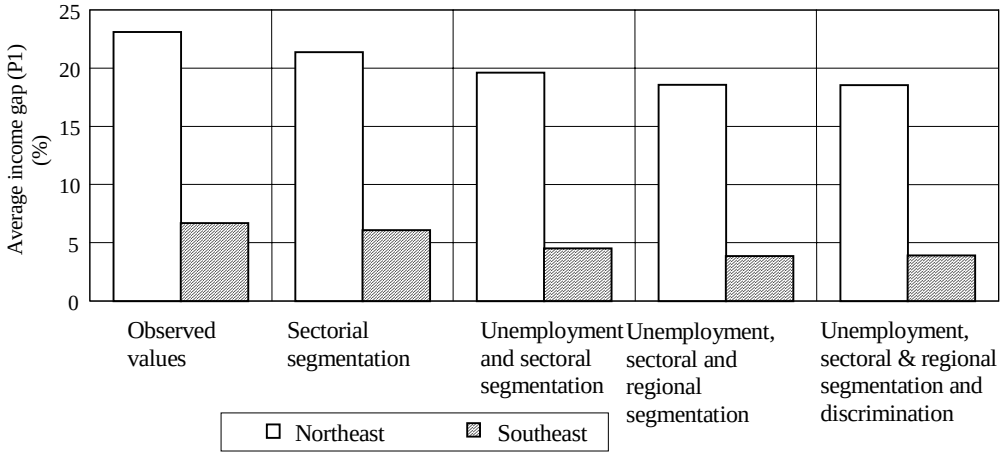
These figures first show that, according to alternative A, even in absolute terms, the impact of the inefficiencies in the labor market tend to be higher in Southeast than in Northeast (2,0 and 1,3 percentage points, respectively). On the other hand, we can see that, according to alternative B, the impact tend to be higher in Northeast than in Southeast, in absolute values. Relative to the initial poverty level, the impact on Southeast can still be considered higher even according this alternative.

Figure 7a
Poverty Level Registred for the Various Stages in Eliminating Underutilization and Underremuneration: Alternative A — 1995



Source: Based on PNAD of 1995.

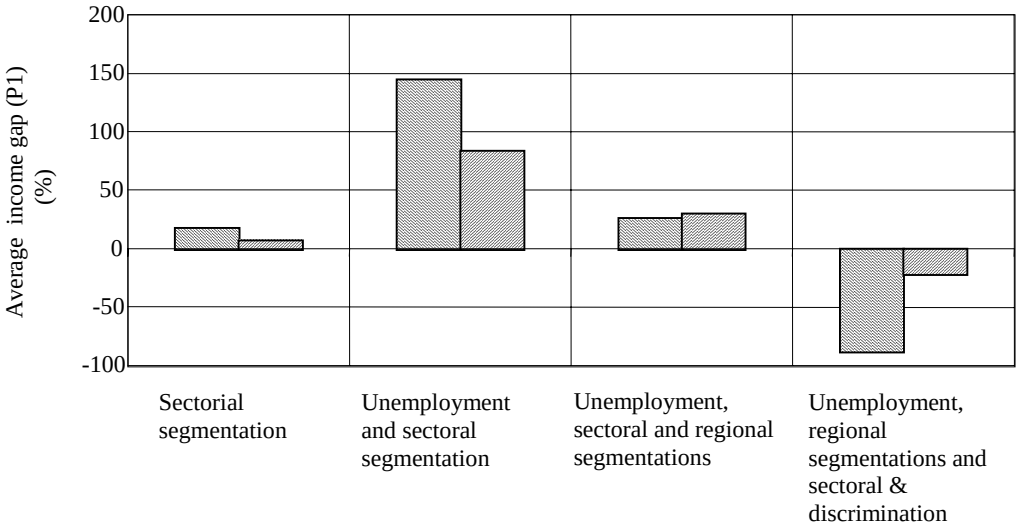
Figure 7b
Poverty Level Registred for the Various Stages in Eliminating Underutilization and Underremuneration Alternative B — 1995



Source: Based on PNAD of 1995.

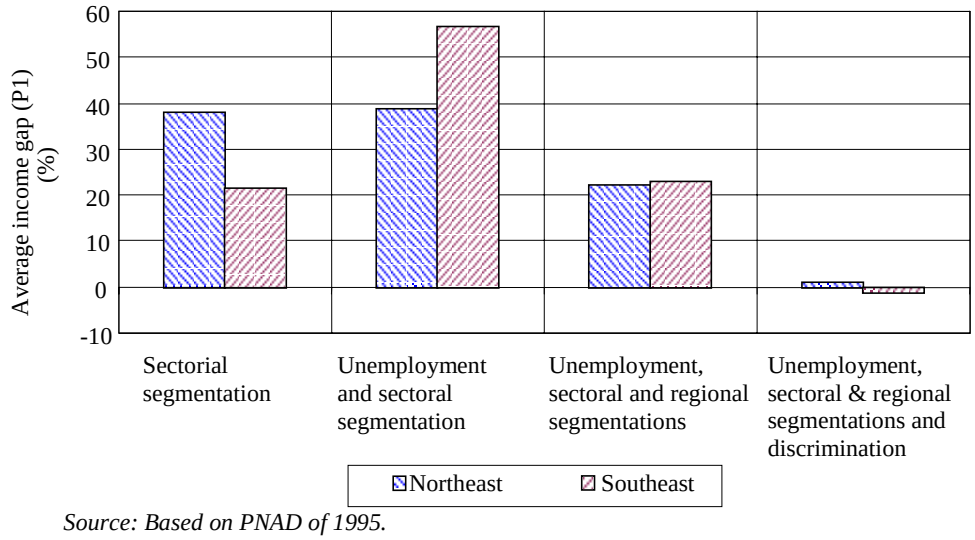
In terms of the contribution of various parts of the imperfections of the labor market, Figures 7c and 7d shows clear-cut regional differences and similarities. First, according to alternative A, it's considered that, in relative terms, the pattern registered for the Southeast is similar to the national pattern. On the other hand, the impacts of the elimination of unemployment and elimination of discrimination are much more pronounced in Northeast than in Southeast. According to alternative B, the relative impacts are shown to be more similar between the two regions, but still there are some differences that worth our mention. The impact of sectoral segmentation is shown to be higher on Northeast than on Southeast, in relative terms, while the impact of unemployment is shown to be more important in Southeast. Extensions to all other poverty measures computed are displayed on Tables A 8c and A 8b.

Figure 7c
Relative Impact of Various Stages of Eliminating Underutilization and Underremuneartion Poverty Alternative A — 1995



Source: Based on PNAD of 1995.

Figure 7d
Relative Impact of Various Stages of Eliminating Underutilization and Underremuneration on Poverty Alternative B — 1995



Source: Based on PNAD of 1995.

10 - CONCLUSION

A natural candidate for the responsibility of the poverty level registered in Brazil is the poor operation of the labor market, in terms of underremuneration and underutilization of the labor factor. When this possibility was investigated for Brazil in 1995, it was found that, if the conditions of the average segment of the Brazilian labor market were extended to all segments, the effect on poverty would not be very significant (the average income gap would drop from the observed 12,1% to 9,6%). Even if this condition were extended only to those below the mean, the effect on poverty would not be so higher (P1 would drop to 8,1%).

Compared to other alternative policies to reduce the poverty level, these results are equivalent to an increase of 20% or 40% in the average income or a redistribution of income in order to afford the same pattern as those registered for Mexico or Honduras (depending on the alternative implemented). The results were also compared to those obtained by simulations of two alternative education policies. According to these comparisons, the results obtained by labor market simulation are equivalent to the simulated impact of a three or five years increase on the labor force schooling level. Alternatively, targeting the educational policy guaranteeing at least the first four or eight years of education to the labor force would generate similar results.

Among the items of the effect of underremuneration and underutilization of labor, it's worth mentioning that the effect of unemployment is extremely limited in absolute terms, although in relative terms it's the major effect on poverty. These results are maintained for both regional subsamples analyzed: the Northeast and Southeast regions.

The stability of these results for other years, seems to depend on which alternative we consider to simulate the impact of imperfections of labor market on poverty. If we extend the average condition to everyone, the impact registered to 1987 is much more limited then the one registered for 1995.

APPENDIX

Valuing Residual Terms Unemployed

This appendix describes how to introduce a component related to unobserved characteristics in the estimated income for the unemployed individuals. This problem has a trivial solution for those employed, that consists on make use of the residuals estimated through a regression based on observable characteristics such as those described on Subsection 3.1. As the regressions estimate residuals only for those who are employed, the solution for this problem is not so trivial for those who are unemployed.

The crucial assumption of the procedure implemented is that the distribution of these residual terms for both groups (occupied and unemployed) is very similar. It means that we are considering an overall effect on wage, of all other variables not included on the regression, independent to the group to which the individual belong.

So, the procedure consists on taking values from the estimated residual of the regression based on observed variables for those occupied. The procedure is based on five steps described below.

a) Create 200 partitions containing, each one, 1/200 observations of the estimated residuals for the occupied (ε_f). The observations should be sorted according to the respective values before the partition.

b) Associate a random value to each unemployed individual.

c) Sort the unemployed individuals according to their random value.

d) Create 200 partitions containing, each one, 1/200 of unemployed individuals.

e) Associate to each unemployed individual the average of the residuals contained in his corresponding partition. This value corresponds to his imputed residual (u_f). That is, if the unemployed belongs to the first partition of the unemployed distribution we give him the average number of the residuals contained in the first partition of the residuals distribution.

Table A1

Estimation of Underremployment Magnitude and It's Potencial Impact on Poverty

	Years 1987 (3 month)	1987	1995
Unemployment rate	2,63	3,63	6,67
Proportion of unemployed among the first quintile: F (0.20)	28,81	27,79	30,00

Source: Based on PNAD of 1987 and 1995.

Table A2a

Comparison between the Impact of Eliminating Underutilization and Underremuneration with the Generalized Increase in Schooling — 1995

(%)

	R$ 25 poverty line			R$ 50 poverty line			R$ 75 poverty line		
	Proportion o poor (P0)	Average income gap (P1)	Average square income gap (P2)	Proportion of poor P0)	Average income gap (P1)	Average square income gap (P2)	Proportion of poor (P0)	Average income gap (P1)	Average square income gap (P2)
Observed values	12,0	5,5	4,1	28,2	12,1	7,9	40,1	19,2	12,4
Simulated values									
Everyone to the mean (A)	8,4	3,7	2,6	23,3	9,6	5,8	37,0	16,5	9,9
Moving only those below the mean (B)	7,3	3,3	2,4	20,1	8,1	5,0	31,9	14,0	8,5
+ 1 year of education	10,4	5,3	3,9	24,9	11,4	7,4	37,3	18,1	11,7
+ 3 years of education	9,0	4,6	3,6	22,0	9,8	6,4	33,3	15,8	10,1
+ 5 years of education	7,5	4,2	3,4	18,8	8,4	5,6	29,1	13,5	8,7
+ 10 years of education	5,2	3,4	3,0	11,3	5,6	4,1	18,0	8,6	5,8

Source: Based on PNAD of 1995.

Table A2b

Comparison between the Impact of Eliminating Underutilization and Underremuneration with the Restricted Increase in Schooling — 1995

	R$ 25 poverty line			R$ 50 poverty line			R$ 75 poverty line		
	Proportion of poor (P0)	Average income gap (P1)	Average square income gap (P2)	Proportion of poor (P0)	Average income gap (P1)	Average square income gap (P2)	Proportion of poor (P0)	Average income gap (P1)	Average square income gap (P2)
Observed values	12,0	5,5	4,1	28,2	12,1	7,9	40,1	19,2	12,4
Simulated values									
Everyone to the mean (A)	8,4	3,7	2,6	23,3	9,6	5,8	37,0	16,5	9,9
Moving only those below the mean (B)	7,3	3,3	2,4	20,1	8,1	5,0	31,9	14,0	8,5
Reading & writing	11,6	5,5	4,0	27,5	12,0	7,8	39,4	19,1	12,3
Primary	9,5	4,7	3,6	24,7	10,4	6,7	36,8	17,1	10,8
Middle	7,2	4,0	3,3	19,3	8,2	5,5	31,2	13,8	8,6
Secondary	5,4	3,4	3,0	13,2	6,0	4,3	22,7	9,9	6,4
University	3,8	2,9	2,7	6,9	3,9	3,3	10,3	5,4	4,1

Source: Based on PNAD of 1995.

Table A3

Comparison between the Impact of Eliminating Underutilization and Underremuneration with the Rise in Economic Growth — 1995

	R$ 25 poverty line			R$ 50 poverty line			R$ 75 poverty line		
	Proportion of poor (P0)	Average income gap (P1)	Average square income gap (P2)	Proportion of poor (P0)	Average income gap (P1)	Average square income gap (P2)	Proportion of poor (P0)	Average income gap (P1)	Average square income gap (P2)
Observed values	12,0	5,5	4,1	28,2	12,1	7,9	40,1	19,2	12,4
Simulated values									
Everyone to the mean (A)	8,4	3,7	2,6	23,3	9,6	5,8	37,0	16,5	9,9
Moving only those below the mean (B)	7,3	3,3	2,4	20,1	8,1	5,0	31,9	14,0	8,5
+ 10% growth	9,7	5,0	3,8	23,4	10,9	7,1	36,4	17,4	11,1
+ 20% growth	9,0	4,7	3,6	21,7	9,9	6,5	33,7	15,8	10,1
+ 30% growth	7,6	4,3	3,5	19,5	9,0	5,9	30,8	14,4	9,2
+ 40% growth	7,2	4,1	3,3	17,9	8,2	5,5	29,2	13,2	8,5
+ 50% growth	6,9	3,9	3,2	17,0	7,6	5,2	28,2	12,1	7,9

Source: Based on PNAD of 1995.

Tabela A4

Comparison between the Impact of Eliminating Underutilization and Underremuneration with Reductions in Inequality of Income Proportion of Population below the Poverty Line

(%)

Income distribution alternatives	Poverty line		
	R$ 25	R$ 50	R$ 75
Observed values[a]	13,0	30,0	40,0
Simulated values			
Everyone to the mean (A)	8,4	23,3	37,0
Moving only those below the mean (B)	7,3	20,1	31,9
Guatemala	12,0	25,6	37,6
Panama	12,3	23,7	34,9
Honduras	8,7	23,2	37,6
Mexico	6,3	19,0	31,9
Chile	4,4	17,2	33,5
Colombia	6,1	16,7	30,4
Bolivia	6,0	15,6	28,2
Dominican Republic	3,8	13,5	27,6
Costa Rica	5,2	12,9	22,2
El Salvador	4,1	11,4	20,7
Venezuela	3,6	10,4	20,4
Uruguay	3,1	8,2	17,6

Source: Based on data from World Bank of 1992 and PNAD of 1995.

[a]The observed values does not correspond exactly to those reported on previous tables due to methodological problems.

Note: The income distributions refer to 1989.

Table A5a

Poverty Level Registred for the Various Stages in Eliminating Underutilization and Underremuneration — 1995

(%)

	R$ 25 poverty line			R$ 50 poverty line			R$ 75 poverty line		
	Proportion of poor	Average income gap	Average squared income gap	Proportion of poor	Average income gap	Average squared income gap médio	Proportion of poor	Average income gap	Average squared income gap
Observed values	12,0	5,5	4,1	28,2	12,1	7,9	40,1	19,2	12,4
Simulated values									
Everyone to the mean (A)									
Sectorial segmentation	11,0	5,4	4,0	26,6	11,9	7,7	39,4	19,0	12,1
Unemployment and sectoral segmentation	9,3	4,1	2,8	24,0	10,2	6,2	36,5	16,9	10,4
Unemployment, sectoral and regional segmentations	7,9	3,5	2,5	22,5	9,1	5,5	36,1	15,9	9,5
Unemployment, sectoral & regional segmentations and discrimination	8,4	3,7	2,6	23,3	9,6	5,8	37,0	16,5	9,9
Moving only those below the mean (B)									
Sectorial segmentation	10,4	5,1	3,8	25,3	11,2	7,2	37,5	17,9	11,4
Unemployment and sectoral segmentation	8,8	3,9	2,7	22,7	9,5	5,8	34,8	15,9	9,8
Unemployment, sectoral and regional segmentations	7,2	3,2	2,3	20,5	8,2	5,0	32,7	14,2	8,5
Unemployment, sectoral & regional segmentations and discrimination	7,3	3,3	2,4	20,1	8,1	5,0	31,9	14,0	8,5

Source: Based on PNAD of 1995.

Table A5b

Relative Impact on Poverty of Various Stages in Eliminating Underutilization and Underremuneration — 1995

(%)

Impact	R$ 25 Line			R$ 50 Line			R$ 75 Line		
	Proportion of poor (P0)	Average income gap (P1)	Average squared income gap (P2)	Proportion of poor (P0)	Average income gap (P1)	Average squared income gap (P2)	Proportion of poor (P0)	Average income gap (P1)	Average squared income gap (P2)
Everyone to the mean (A)									
Sectorial segmentation	28,2	8,3	6,4	33,0	8,2	9,5	22,0	8,3	9,5
Unemployment and sectoral segmentation	48,3	70,6	78,0	53,7	69,0	69,0	91,9	75,9	70,4
Unemployment, sectoral and regional segmentations	38,1	32,8	22,6	30,3	42,0	36,3	12,4	37,2	38,2
Unemployment, sectoral & regional segmentations and discrimination	-14,6	-11,8	-7,1	-17,0	-19,2	-14,8	-26,3	-21,5	-18,1
Total	100	100	100	100	100	100	100	100	100
Moving only those below the mean (B)									
Sectorial segmentation	33,0	17,8	12,5	35,5	23,7	21,3	30,7	25,1	23,8
Unemployment and sectoral segmentation	35,4	55,6	68,0	31,5	41,7	48,5	33,4	38,1	42,3
Unemployment, sectoral and regional segmentations	32,6	28,2	20,8	27,8	33,6	30,7	25,2	31,6	31,8
Unemployment, sectoral & regional segmentations and discrimination	-1,0	-1,6	-1,4	5,1	1,0	-0,6	10,7	5,2	2,2
Total	100	100	100	100	100	100	100	100	100

Source: Based on PNAD of 1995.

Table A6
Overall Impact of Underutilization and Underremuneration on Poverty — 1987

	Proportion of poor (P0)	Average income gap (P1)	Average squared income gap (P2)
R$ 25 poverty line			
Observed values	10,5	4,5	2,9
Simulated values			
Considering all unemployment			
Everyone to the mean (A)	8,9	3,4	2,0
Moving only those below the mean (B)	7,3	2,9	1,8
Not considering short-run unemployment			
Everyone to the mean (A)	9,0	3,6	2,2
Moving only those below the mean (B)	7,4	3,1	1,9
R$ 50 poverty line			
Observed values	26,6	11,7	7,0
Simulated values			
Considering all unemployment			
Everyone to the mean (A)	25,2	10,3	5,8
Moving only those below the mean (B)	20,8	8,5	4,9
Not considering short-run unemployment			
Everyone to the mean (A)	25,6	10,5	6,0
Moving only those below the mean (B)	21,1	8,7	5,0
R$ 75 poverty line			
Observed values	39,9	19,0	11,8
Simulated values			
Considering all unemployment			
Everyone to the mean (A)	39,6	17,8	10,5
Moving only those below the mean (B)	33,2	14,8	8,8
Not considering short-run unemployment			
Everyone to the mean (A)	40,0	18,1	10,8
Moving only those below the mean (B)	33,6	15,1	9,0

Source: Based on PNAD of 1987.

Table A7a

Poverty Level Registred for the Various Stages in Eliminating Underutilization and Underremuneration — 1987

(%)

	R$ 25 poverty line			R$ 50 poverty line			R$ 75 poverty line		
	Proportion of poor	Average income gap	Average squared income gap	Proportion of poor	Average income gap	Average squared income gap médio	Proportion of poor	Average income gap	Average squared income gap
Observed values	10,5	4,5	2,9	26,6	11,7	7,0	39,9	19,0	11,8
Simulated values									
Everyone to the mean (A)									
Sectorial segmentation — step 1	8,2	3,6	2,4	23,4	9,8	5,7	37,3	16,8	10,1
Unemployment and sectoral segmentation — step2	7,3	2,9	1,8	22,0	8,8	5,0	35,7	15,6	9,1
Unemployment, sectoral and regional segmentations	7,6	3,0	1,8	23,3	9,2	5,1	37,7	16,5	9,6
Unemployment, sectoral & regional segmentations and discrimination	8,9	3,4	2,0	25,2	10,3	5,8	39,6	17,8	10,5
Moving only those below the mean (B)									
Sectorial segmentation — step 1	7,9	3,5	2,4	22,3	9,3	5,5	35,5	16,0	9,6
Unemployment and sectoral segmentation — step2	7,0	2,8	1,7	21,0	8,4	4,8	34,0	14,9	8,7
Unemployment, sectoral and regional segmentations	6,9	2,7	1,7	20,8	8,3	4,7	33,6	14,7	8,6
Unemployment, sectoral & regional segmentations and discrimination	7,3	2,9	1,8	20,8	8,5	4,9	33,2	14,8	8,8

Source: Based on PNAD of 1987.

Table A7b

Relative Impact on Poverty of Various Stages in Eliminating Underutilization and Underremuneration 1987 — (with all Unemployment)

(%)

Impact	R$ 25 line			R$ 50 line			R$ 75 line		
	Proportion of poor (P0)	Average income gap (P1)	Average squared income gap (P2)	Proportion of poor (P0)	Average income gap (P1)	Average squared income gap (P2)	Proportion of poor (P0)	Average income gap (P1)	Average squared income gap (P2)
Everyone to the mean (A)									
Sectorial segmentation — step 1	137,7	83,3	55,9	230,5	137,2	105,4	710,0	187,1	138,0
Unemployment and sectoral segmentation — step2	54,3	60,5	69,2	103,6	67,4	63,7	432,2	94,2	73,0
Unemployment, sectoral and regional segmentations	-18,9	-6,6	-2,7	-97,1	-28,2	-15,1	-547,6	-71,0	-34,5
Unemployment, sectoral & regional segmentations and discrimination	-73,1	-37,3	-22,4	-137,1	-76,4	-54,1	-494,6	-110,3	-76,6
Total	100	100	100	100	100	100	100	100	100
Moving only those below the mean (B)									
Sectorial segmentation — step 1	81,5	64,3	48,5	74,1	74,4	69,6	66,5	72,7	72,3
Unemployment and sectoral segmentation — step2	26,6	41,7	54,9	23,4	28,7	35,0	22,2	26,1	29,6
Unemployment, sectoral and regional segmentations	3,4	3,5	3,2	2,7	4,5	4,2	5,2	3,8	4,0
Unemployment, sectoral & regional segmentations and discrimination	-11,5	-9,6	-6,6	-0,2	-7,6	-8,8	6,1	-2,5	-5,9
Total	100	100	100	100	100	100	100	100	100

Source: Based on PNAD of 1987.

Table A7c

Poverty Level Registred for the Various Stages in Eliminating Underutilization and Underremuneration — 1987 (with Longer Unemployment Spells)

(%)

Impact	R$ 25 line			R$ 50 line			R$ 75 line		
	Proportion of poor (P0)	Average income gap (P1)	Average squared income gap (P2)	Proportion of poor (P0)	Average income gap (P1)	Average squared income gap (P2)	Proportion of poor (P0)	Average income gap (P1)	Average squared income gap (P2)
Observed values	10,5	4,5	2,9	26,6	11,7	7,0	39,9	19,0	11,8
Simulated values									
Everyone to the mean (A)									
Sectorial segmentation — step 1	8,2	3,6	2,4	23,4	9,8	5,7	37,3	16,8	10,1
Unemployment and sectoral segmentation — step2	7,6	3,1	2,0	22,3	9,1	5,2	36,1	15,9	9,4
Unemployment, sectoral and regional segmentations	7,9	3,2	2,0	23,7	9,5	5,4	38,2	16,8	9,8
Unemployment, sectoral & regional segmentations and discrimination	9,0	3,6	2,2	25,6	10,5	6,0	40,0	18,1	10,8
Moving only those below the mean (B)									
Sectorial segmentation — step 1	7,9	3,5	2,4	22,3	9,3	5,5	35,5	16,0	9,6
Unemployment and sectoral segmentation — step2	7,2	3,0	1,9	21,3	8,6	5,0	34,4	15,1	8,9
Unemployment, sectoral and regional segmentations	7,1	2,9	1,9	21,1	8,5	4,9	34,0	15,0	8,8
Unemployment, sectoral & regional segmentations and discrimination	7,4	3,1	1,9	21,1	8,7	5,0	33,6	15,1	9,0

Source: Based on PNAD of 1987.

Table A8a

Poverty Level Registred for the Various Stages in Eliminating Underutilization and Underremuneration Northeast and Southeast 1995 (Alternative A)

(%)

	Northeast			Southeast		
	Proportion of poor (P0)	Average income gap (P1)	Average squared income gap (P2)	Proportion of poor (P0)	Average income gap (P1)	Average squared income gap (P2)
R$ 25 poverty line						
Observed values	23,7	10,2	6,9	6,3	3,3	2,8
Simulated values						
Sectorial segmentation	22,2	9,8	6,6	5,7	3,3	2,7
Unemployment and sectoral segmentation	20,2	8,5	5,4	4,1	2,0	1,6
Unemployment, sectoral and regional segmentations	19,5	8,1	5,1	3,4	1,8	1,4
Unemployment, sectoral & regional segmentations and discrimination	21,3	8,9	5,6	3,8	1,9	1,5
R$ 50 poverty line						
Observed values	50,3	23,1	14,8	16,7	6,7	4,5
Simulated values						
Sectorial segmentation	49,0	22,9	14,5	15,2	6,5	4,4
Unemployment and sectoral segmentation	46,5	21,0	13,0	12,8	4,9	3,0
Unemployment, sectoral and regional segmentations	46,4	20,7	12,5	11,4	4,3	2,7
Unemployment, sectoral & regional segmentations and discrimination	47,3	21,8	13,5	12,6	4,7	2,9
R$ 75 poverty line						
Observed values	65,0	34,5	22,9	26,3	11,3	7,1
Simulated values						
Sectorial segmentation	64,8	34,4	22,7	25,6	11,1	6,9
Unemployment and sectoral segmentation	62,4	32,3	20,9	22,6	9,1	5,3
Unemployment, sectoral and regional segmentations	63,1	32,3	20,6	21,8	8,4	4,7
Unemployment, sectoral & regional segmentations and discrimination	64,1	33,3	21,6	23,1	9,1	5,2

Source: Based on PNAD of 1995.

Table A8b

Relative Impact on Poverty of Various Stages in Eliminating Underutilization and Underremuneration Northeast and Southeast — 1995 (Alternative A)

(%)

Impact	Northeast			Southeast		
	Proportion of poor (P0)	Average income gap (P1)	Average squared income gap (P2)	Proportion of poor (P0)	Average income gap (P1)	Average squared income gap (P2)
R$ 25 Line						
Sectorial segmentation	61,5	26,6	20,2	30,0	11,8	6,9
Unemployment and sectoral segmentation	81,6	101,5	90,4	53,1	79,0	87,6
Unemployment, sectoral and regional segmentations	28,9	33,1	25,5	-7,8	-6,8	-3,4
Unemployment, sectoral & regional segmentations and discrimination	-71,9	-61,2	-36,2	24,7	15,9	8,9
Total	100	100	100	100	100	100
R$ 50 Line						
Sectorial segmentation	44,7	17,8	23,1	34,6	7,3	7,3
Unemployment and sectoral segmentation	85,4	144,5	115,7	61,0	83,9	83,7
Unemployment, sectoral and regional segmentations	0,3	25,9	31,3	33,3	30,0	22,0
Unemployment, sectoral & regional segmentations and discrimination	-30,5	-88,1	-70,2	-28,9	-21,2	-13,0
Total	100	100	100	100	100	100
R$ 75 Line						
Sectorial segmentation	20,6	8,7	18,4	22,1	8,9	8,7
Unemployment and sectoral segmentation	258,9	171,3	136,4	92,5	90,2	84,9
Unemployment, sectoral and regional segmentations	-73,0	3,1	21,7	24,3	32,1	28,0
Unemployment, sectoral & regional segmentations and discrimination	-106,5	-83,1	-76,5	-38,9	-31,2	-21,7
Total	100	100	100	100	100	100

Source: Based on PNAD of 1995.

Table A8c

Poverty Level Registred for the Various Stages in Eliminating Underutilization and Underremuneration Northeast and Southeast — 1995 (Alternative B)

(%)

	Northeast			Southeast		
	Proportion of poor (P0)	Average income gap (P1)	Average squared income gap (P2)	Proportion of poor (P0)	Average income gap (P1)	Average squared income gap (P2)
R$ 25 poverty line						
Observed values	23,7	10,2	6,9	6,3	3,3	2,8
Simulated values						
Sectorial segmentation	20,7	9,2	6,3	5,4	3,2	2,7
Unemployment and sectoral segmentation	18,9	7,9	5,2	3,9	1,9	1,5
Unemployment, sectoral and regional segmentations	17,6	7,2	4,7	3,1	1,7	1,4
Unemployment, sectoral & regional segmentations and discrimination	17,9	7,4	4,8	3,2	1,7	1,4
R$ 50 poverty line						
Observed values	50,3	23,1	14,8	16,7	6,7	4,5
Simulated values						
Sectorial segmentation	46,7	21,4	13,5	14,3	6,1	4,2
Unemployment and sectoral segmentation	44,2	19,6	12,1	11,8	4,5	2,8
Unemployment, sectoral and regional segmentations	43,2	18,6	11,2	10,3	3,9	2,4
Unemployment, sectoral & regional segmentations and discrimination	42,4	18,5	11,4	10,4	3,9	2,5
R$ 75 poverty line						
Observed values	65,0	34,5	22,9	26,3	11,3	7,1
Simulated values						
Sectorial segmentation	62,6	32,5	21,3	24,0	10,3	6,5
Unemployment and sectoral segmentation	60,2	30,6	19,6	21,1	8,4	4,9
Unemployment, sectoral and regional segmentations	59,8	29,6	18,7	19,4	7,4	4,3
Unemployment, sectoral & regional segmentations and discrimination	58,9	29,2	18,6	19,0	7,4	4,3

Source: Based on PNAD of 1995.

Table A8d

Relative Impact on Poverty of Various Stages in Eliminating Underutilization and Underremuneration Northeast and Southeast — 1995 (Alternative B)

(%)

	Northeast			Southeast		
	Proportion of poor (P0)	Average income gap (P1)	Average squared income gap (P2)	Proportion of poor (P0)	Average income gap (P1)	Average squared income gap (P2)
R$ 25 Line						
Sectorial segmentation	51,4	35,1	28,0	28,8	11,4	6,8
Unemployment and sectoral segmentation	31,5	45,7	56,0	50,9	76,2	86,1
Unemployment, sectoral and regional segmentations	22,5	25,1	22,3	24,3	14,0	8,0
Unemployment, sectoral & regional segmentations and discrimination	-5,4	-5,8	-6,4	-4,0	-1,6	-1,0
Total	100	100	100	100	100	100
R$ 50 Line						
Sectorial segmentation	45,2	38,0	36,7	38,2	21,7	17,0
Unemployment and sectoral segmentation	32,1	38,7	42,6	38,9	56,6	66,2
Unemployment, sectoral and regional segmentations	12,1	22,3	24,0	23,8	23,1	18,2
Unemployment, sectoral & regional segmentations and discrimination	10,6	0,9	-3,3	-0,9	-1,3	-1,5
Total	100	100	100	100	100	100
R$ 75 Line						
Sectorial segmentation	39,6	36,7	37,1	31,9	25,3	22,0
Unemployment and sectoral segmentation	38,5	37,4	39,3	39,3	49,0	56,3
Unemployment, sectoral and regional segmentations	6,5	17,5	21,0	22,9	24,4	22,2
Unemployment, sectoral & regional segmentations and discrimination	15,5	8,4	2,5	5,9	1,2	-0,4
Total	100	100	100	100	100	100

Source: Based on PNAD of 1995.

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