São Paulo School of
ECONOMICS

Working Paper

8/2012

Oct
2012

CENTER FOR APPLIED MICROECONOMICS

Using occupational structure to measure employability with an application to the Brazilian labor market

Sergio Firpo
Sandro Carvalho
Renan Pieri

Using Occupational Structure to Measure Employability with an Application to the Brazilian Labor Market*

Sergio Firpo† Sandro Carvalho‡ Renan Pieri§

September 29 2012

Abstract

We propose a new look into the widespread but not precisely defined concept of "employability". A worker will be more employable than another if he or she has an easier access to high quality occupations. We provide an occupational quality index measure that can be used to construct a ranking of occupations. The quality index takes into account measures of return and risk of occupations, controlling for the fact that different occupations will be chosen by observationally different workers. We then measure access to occupations by first estimating the conditional probability of a worker being in a given occupation given his/her characteristics. We also construct an individual employability measure that can be understood as an average occupational quality controlling for heterogeneity in occupation premium and in occupation access. Finally, we check how increases in some productive skills, like schooling, affect average employability. We perform Oaxaca-Blinder type decompositions with that purpose. We apply our new methodology to Brazil and find some evidence suggesting that increases in schooling years and changes in returns were the main factors behind the changes in employability of the Brazilian labor force over the past 20 years.

Keywords: Employability, Quality Ranking of Occupations, Access to Quality Jobs, Brazilian Labor Market.

*Part of this work was produced under two World Bank projects "Job Quality and Employability in Brazilian Labor Markets: Methodology and Definitions" and "Enhancing Employability of the Poor". We are indebted to Tito Cordella, Michael Crawford, Wendy Cunningham, Markus Frölich, Jason Hobbs, Bill Maloney, Edmundo Murrugarra, Vladimir Ponczek, André Portela Souza and seminar participants at Sao Paulo School of Economics. Support from CNPq for Firpo was greatly appreciated. The usual disclaimer applies.

†Corresponding author. Sao Paulo School of Economics - FGV, C-Micro - FGV, and IZA. E-mail: sergio.firpo@fgv.br.

‡IPEA/DF - Brazil.

§Sao Paulo School of Economics - FGV, C-Micro - FGV.

1 Introduction

The labor market is perhaps the most wide-spread and effective poverty reduction mechanism that any country has and an important policy question is whether there is a role for the public and private sectors to facilitate workers' access to better jobs. The difficulty that some workers face in accessing quality jobs is often termed as a problem of "employability". This is a concept used in different contexts with no unique and precise definition.[1]

Although the concept has been defined in several different ways, in general the construction of a measure of employability for an individual worker needs that one quantifies how her job opportunities, actual or potential, are distributed and ranked according to some measure of job quality. An operational approach to employability would then make a worker to be highly 'employable' if she has the typical characteristics necessary to have a high chance to get a high quality job.

There are indeed some difficulties in making a job-based notion of employability operational. First difficulty is a practical one: Unless one has data on firms and workers, information on jobs are often rare. In most household data, there is no information on jobs. A second difficulty is that even with a longitudinal data set on firms and workers, which allows computation and ranking of firm-worker fixed effects, it is not clear that interpretation and subsequent policy recommendation is warranted. In other words, although one may be able to rank jobs or the firm-worker match, that does not imply that a worker would maintain the quality of her job in another firm. Also, for unemployed workers, one would be unable to compute job quality. Third difficulty in making the employability concept operational is that workers change jobs several times over their lifetime and an employability measure based on jobs could be easily affected by short-run events. Finally, there is no unique dimension to rank jobs; wages and salary are just one out of many ways to evaluate the quality of a job.

Most of available household data sets have little or no information on jobs and that is a first pragmatic reason for us to focus on *occupations* instead of jobs. That is an nice feature of our approach, as it allows for feasible cross-country, temporal and regional comparisons of employability. More importantly, however, is that 'occupations' is a key concept in both labor economics and sociology of labor markets literatures. Occupations are central to stratification research in sociology, according to which, they capture most of the structure of inequality in the labor market (Grusky and Ku, 2008). In the labor economics literature, occupations have been playing an important role in explaining recent trends in wage inequality as well (Autor, Katz and Kearney, 2008; Goos and Manning, 2007). Another important reason to focus on occupations instead of jobs is the more stable nature of the former, which allows us to have a closer measure of permanent employability of the workforce.

Our approach to employability is inspired in the earlier definitions of employability (McQuaid and Lindsay, 2005), which concentrated on the factors that enhanced employ-

[1] In the next section we present a detailed discussion on how the concept of employability has been used in the literature.

ability. Unlike the previous conceptual literature, we provide an operationally simple and replicable approach to employability, much in line with the most recent contributions to literature on employability.[2]

In this paper, we precisely define a measure of *individual employability* that is based on occupations. We propose a very operable definition of employability that allows policymakers to measure individual employability and to quantify the aggregate employability level of a given economy. For us, an individual worker will be said to be highly 'employable' if she has the typical characteristics necessary to have a high average occupational quality. Given that the average occupational quality is simply a weighted sum of the occupation quality using the occupation probabilities as weights, an individual worker will be said to be highly employable if the occupation distribution she faces, given her characteristics, is skewed towards or concentrated on the highest quality occupations.

Since our individual employability measure is constructed conditioning on observable characteristics, both the occupation quality measure (and the ranking originated by it) and the occupation probability distribution will reflect individual heterogeneity. Hence, we make clear that there are two channels through which policy can increase employability: either by facilitating access to higher quality occupations or by increasing their quality.

An important feature of our proposed measure of individual employability is that it explicitly takes heterogeneity into account. First, our measure allows for occupations to be ranked according to worker's characteristics. For example, an occupation in which a female worker is paid less than a male worker, controlled for all observable characteristics, may be ranked lower for women than it would be for men. Second, in the construction of our employability measure, heterogeneity also enters in the occupation probability distribution. Therefore, occupations that have - controlled for all other factors - fewer women than men will receive lower weights for female workers than for male workers.

The specific steps of our method are the following. We first construct an individual quality measure of occupations and rank them along that measure. The quality measure takes into account measures of return and risk of occupations, which are characterized by occupational attributes. The way we use those attributes is through a hedonic regression setup. By doing that we are able to group several occupational attributes into one monetary measure, addressing therefore the initial difficulty imposed by having many dimensions to rank occupations. We then measure the conditional probability of being in one of these occupations. The probabilities are conditional on observed characteristics that can be grouped into two categories. The first group contains some traditional measures of human capital, while the second group contains some demographic individual characteristics. Both groups of individual characteristics also enter in the first-step hedonic regressions. Finally, given a measure of occupational quality and the conditional probability distribution of being in one of these occupations, we construct our employability measure by calculating the average quality of the occupation of an individual, using as weights the individual occupational probability distribution.

[2] As, for example, Groot and Maasen (2000), Arocena et al (2006), De Grip et al (2004), McQuaid (2006), Finnie and Meng (2007), Ronconi et al (2006), Thomsen (2009) and Card et al (2011).

In this paper, we apply our methodology to the Brazilian labor market and its evolution over time in the past two decades. Brazil is a large economy with a well-known and reliable system of gathering information through its nationally covered household surveys, which have been run for about forty years by the national statistics bureau. But more importantly, Brazil is seen as a leading example of a developing economy whose rapid growth might be constrained by a low employability level of its workforce. In other words, there is a genuine concern among policy-makers that the recent wage inequality reduction in its labor market might be quickly reverted given that some of fast growing sectors and regions will be demanding skilled workers more rapid than the existing supply. Such problem is posed as a problem of low employability of the Brazilian workforce. Of course, the lack of a precise way to measure the Brazilian workforce's overall employability has weakened the policy debate on the topic.

Our operational measure of employability reveals that Brazilian labor market exhibits high regional disparities in terms of their individual employability levels. One explanation is that regional labor markets are very different and workers have very different levels of productive characteristics. We can see that employability has evolved across time, increasing its level and decreasing its dispersion across workers. We investigate the reasons for the change in mean employability. We found that most of that change can be explained by changes in returns to observable characteristics and a remarkable increase in schooling of the labor force.

This paper is divided into six other sections beyond this introduction. In Section 2 we discuss how the term employability has been used in the literature. Section 3 describes the method in detail: How we propose (i) quantifying occupational utility differentials; (ii) ranking occupations; (iii) measuring occupational structure; and (iv) constructing the employability measure. In Section 4 we present and describe data used in our empirical application and in Section 5 we show our results. Given that we found that employability of Brazilian workers have increased over time, we apply in Section 6 a Oaxaca-Blinder type decomposition method to investigate which are the main factors behind that change. Finally, we conclude in Section 7.

2 Employability

The concept of "employability" has been playing a central role in labor market policies in many countries. It also has been pursued as an objective of economic strategies promoted by important supranational institutions (McQuaid and Lindsay, 2005). Nonetheless, despite of being widely used by policy makers, there is no consensus or clarity about what is meant by employability. For Philpott (1999), employability it is little more than a 'buzzword' that is rarely understood.

In this section we present a brief survey on how the employability concept has appeared in the literature. The concept has been presented from somewhat abstract notions to more concrete and operational ones. In fact, Gazier (1998 and 2001) traces back the history of the employability concept to the early 20th century and distinguishes some of its versions since then. According to him, there are two main strands for this concept.

The first one ("initiative employability") argues that the model of lifetime employment with a single employer is no longer relevant for a large part of the population and that has been replaced for a more dynamic model based on 'careers' (see De Grip et al, 2004). A successful career would require (*i*) the development of skills that are transferable from a job to another, such as literacy, numeracy, problem-solving, communication, adaptability, work-process management and team working ability; (*ii*) the flexibility to move between job roles or jobs. The focus is on the individual responsibility, with the onus on workers to develop their skills and networks in the workplace (Hillage and Pollard, 1998).

According to Peck and Theodore (2000), this approach to employability, which locates the problems and solutions on the supply-side of the economy, specifically on individual workers, may not be sufficient to deal with the problems of unemployment, social exclusion and economic inequality. Therefore, a second strand of the concept has been advocated ("interactive employability"), maintaining the emphasis on individual initiative but also acknowledging that the employability of an individual is relative to the employability of others and the opportunities, institutions and rules that govern the labor market. For instance, a person may not be able to get a job due to factors like lack of institutional infrastructure such as suitable childcare or transport; or labor demand involving employer preferences (discrimination); level of local and regional demand; occupational structures of vacancies, where demand is concentrated; accessibility of public services and job-matching technology.

Those approaches to employability are so broad or vague that they have little or no use in practice. Some recent attempts to offer an operational approach to employability focus on providing both a formal definition of what employability means, i.e., what factors affect a worker's employability, and an application of that definition to data. However, most of these studies use data that are very specific and hard to be replicable or obtainable for other labor markets.

Groot and Maasen (2000) estimating the effect of education and training on employability, measure the employability concept in two ways. First, by the extent to which the worker can be assigned to other jobs or departments within the firm. Secondly, employability is measured by the way small problems at work are solved. It is worth mentioning that this definition cannot be measured among unemployed workers. Arocena et al (2006), analyzing the effect of enhancing workers' employability on small and medium firms using a survey of Spanish manufacturing firms, construct an indicator of employability based on tasks assigned to workers. This definition also does not apply to unemployed workers.

De Grip et al (2004) use Dutch aggregate data at industry level to construct an Industry Employability Index based on several worker's soft skills, such as willingness and capacity to be mobile, to participate in training, and to be functionally flexible; and some information on technological and organizational developments, international competition, and demographics.

McQuaid (2006), following the concept of employability presented in McQuaid and Lindsay (2005), proposes that employability should be quantified as representing the success of an individual worker in a given region, sector, and occupation in securing

her employment given vectors of individual factors, personal circumstances and external factors. Applying this model to a sample of unemployed job seekers in Scotland, McQuaid (2006) sets professional qualifications, highest academic qualification level, self-perceived verbal ability, length unemployed, last worked in manual job, age, gender, time spent searching, reservation wage, promotion chances as the 'individual factors'; if the worker has dependent children and the total income per week are the 'personal circumstances'; accessibility to centers of employment is used as external factor.

The main shortcoming of all these approaches this approach is that they depend on the availability of information of particular surveys, limiting comparison with other labor markets and therefore hardening the possibility of unifying the existing definitions of employability.

Some other attempts to measure employability can be replicable to other settings. For example, Finnie and Meng (2007), estimating the effect of literacy on employability, define it as the probability of being employed at the time of the survey, being employed at any time in the past 12 months and having worked mostly full time. In Ronconi et al (2006), studying the impact of workfare programs in Argentina on poverty and employability, a worker is more employable if she is more likely to find a job in the formal sector and earn a higher hourly wage. Smith et al (2000), evaluating the effect of policy and performance of higher education in the UK on graduate employability, use the term to be the graduate's first destination, which could be entering employment or having other alternatives.

Thomsen (2009) addresses a similar question. He estimates the latent employability of short-term and long-term unemployed individuals, measured as the job finding chances of these groups, and decomposes the differences incorporating a large set of observable factors and further unobservable factors. The results obtained are used to provide recommendations for the design of labor market programs.

Finally, Card et al (2011), estimating the impact of youth training in the Dominican Republic, argue that an operational concept of employability is, for the unemployed population, the conditional probability of moving from unemployment to employment and, for the employed population, one minus the conditional probability of moving in the opposite direction. This definition of employability based on transitions into and out of jobs, requires the availability of longitudinal data.

3 Construction of an employability measure

The employability measure is constructed as an individual measure of her average occupational quality. For a given set of individual characteristics, one can assign to each existing occupation an utility value. That value will be larger the higher is the quality of that occupation, measured taking into account earnings, worked hours, security and skill usage. Note that given the same set of individual characteristics, there will be a probability distribution over those existing occupations. We then construct an individual employability measure by calculating, for a given set of worker's characteristics, a weighted average of the occupational utility (quality), summing over the conditional

occupational probability distribution.

Below we describe in details the procedure to construct an individual employability measure. The procedure encompasses four steps.

3.1 Step 1: Quantifying Occupational Utility Differentials

An occupation will be a group of similar professional activities. We say that the worker i is in a occupation o if $D_{oi} = 1$, otherwise, $D_{oi} = 0$, $o = 1, ..., O$. Each occupation will have some characteristics (attributes) M_o. These occupation characteristics will reflect risk and return associated with each occupation. For a given occupation o, we can have heterogeneity across workers in the level of the attribute M_o, so we write M_{oi} for a worker i. We also have a vector X_{oi} for the worker i at occupation o of observable skills, and W_{oi} a vector of demographic characteristics that should not affect directly the productivity (like gender and race). Finally, Y_{oi} is the log (hourly) wage.

Our model to rank occupations is based on the following regression for an occupation $o = 2, ..., O$:

$$Y_{oi} = \alpha + \gamma_o D_{oi} + (\beta_X^\intercal + \theta_{Xo}^\intercal D_{oi}) \cdot X_{oi} + (\beta_W^\intercal + \theta_{Wo}^\intercal D_{oi}) \cdot W_{oi} + (\beta_M^\intercal + \theta_{Mo}^\intercal D_{oi}) \cdot M_{oi} + u_{oi}, \quad (1)$$

where α, β_X, β_W, β_M, γ_o, θ_{Xo}, θ_{Wo}, and θ_{Mo} , are unknown parameters and u_{oi} is a unobserved component that affects log wage.

Note that consistency of OLS estimates of γ_o, θ_{Xo}, θ_{Wo}, and θ_{Mo} is guaranteed by assuming independence between u_o and X, W and M given D_o. Although this is typically a strong assumption to make, it may be more plausible in our context than it usually is. The reason is that such independence is in fact conditional on the occupational choice. Thus, it may not be too strong that within a given occupation, unobservable individual factors that affect an occupation attribute are independent of observable ones. In any case, this is weaker than assuming that u_o is independent of all regressors in Equation (1).

The coefficients β_X and β_W are the expected overall impact of increasing one unit of X and W on Y. The coefficients θ_{Xo} and θ_{Wo} capture the differential impact of such increasing between occupation o and the baseline occupation. The parameters β_M and θ_{Mo} are the shadow prices of occupation attributes: β_M is the overall price paid for one extra unit of M, whereas θ_{Mo} is the difference in this unit price in a occupation o and the baseline occupation. Finally, γ_o is the overall wage differential between occupation o and the baseline. Note that if we were not considering other occupation attributes we would have that a ranking of γ_o should give us a ranking of quality of occupations, measured in terms of expected wage. Because we are considering differences in attributes (as well as in observable workers characteristics, we propose not comparing γ_o, but instead:

$$\delta_o \equiv \alpha + \gamma_o + (\beta_X^\intercal + \theta_{Xo}^\intercal) \cdot E[X] + (\beta_W^\intercal + \theta_{Wo}^\intercal) \cdot E[W] + (\beta_M^\intercal + \theta_{Mo}^\intercal) \cdot E[M_o|o] \quad (2)$$

Such 'compensation' scheme is directly related to the hedonic regression literature, which goes back to the works of Grilliches (1961), Chow (1967), Lancaster (1971) and Rosen (1974, 1987). In that literature, one is typically interested in constructing price

indexes taking into account quality differences in goods. Therefore, they have to assign prices for differential quality or attributes of goods.

The same idea is applied here, as an occupation cannot be seen solely by its expected wage, but by the whole package involving measures of risk and return. For example, in a compensating wage differential model, a worker may prefer to earn less in an occupation that is less risky. We follow the same idea here as wage cannot be the unique measure to establish why an occupation will be preferable. The final term in the sum in 2 uses the expected attribute at a given occupation o and not the overall mean, as we want to obtain a measure (in wage units) of the compensation paid for the better or worse attributes typically found in occupation o.

There are a number of reasons to expect that the coefficients γ_o, θ_{Xo}, θ_{Wo}, and θ_{Mo} are different from zero for some occupations indexed by o. A non-exhaustive list of possible explanations includes not only the already mentioned compensating wage differentials theory, but also adjustment costs; Roy model of wage determination where skills are rewarded differently in different occupations; occupation-specific human capital; and occupation-specific discrimination. All those commonly invoked reasons could explain why wages fail to equalize across occupations, conditional on X and W. We do not take a stand on why wages do not equalize across occupations as we do not have here any economic model that would justify a choice. Instead, we are interested in quantifying those differentials.

Our approach leads to a natural way of ranking occupations: an occupation A will be preferable to occupation B iff ($A \succeq B \Leftrightarrow$)

$$\begin{aligned} 0 \leq \delta_A - \delta_B \equiv \gamma_A + \theta_{XA}^{\intercal} \cdot E[X] + \theta_{WA}^{\intercal} \cdot E[W] + \theta_{MA}^{\intercal} \cdot E[M_o | o = A] \\ - (\gamma_B + \theta_{XB}^{\intercal} \cdot E[X] + \theta_{WB}^{\intercal} \cdot E[W] + \theta_{MB}^{\intercal} \cdot E[M_o | o = B]) \end{aligned}$$

$$\begin{aligned} \Leftrightarrow 0 \leq \gamma_A - \gamma_B + (\theta_{XA}^{\intercal} - \theta_{XB}^{\intercal}) \cdot E[X] + (\theta_{WA}^{\intercal} - \theta_{WB}^{\intercal}) \cdot E[W] \\ + \theta_{MA}^{\intercal} \cdot (E[M_o | o = A] - E[M_o | o = B]) + (\theta_{MA}^{\intercal} - \theta_{MB}^{\intercal}) \cdot E[M_o | o = B]. \end{aligned}$$

Controlling for the same level of productive skills and demographic characteristics (set to be the population averages $E[X]$ and $E[W]$), it is clear that, *coeteris paribus*, the following factors will make occupation A to be preferable to B: (i) $\gamma_A - \gamma_B > 0$, overall payment in occupation A is greater than in B; (ii) $(\theta_{XA}^{\intercal} - \theta_{XB}^{\intercal}) \cdot E[X] > 0$, skills are better paid in A than in B; (iii) $(\theta_{WA}^{\intercal} - \theta_{WB}^{\intercal}) \cdot E[W] > 0$, if there is discrimination against a demographic W, it is less pronounced in A; (iv) $\theta_{MA}^{\intercal} \cdot (E[M_o | o = A] - E[M_o | o = B])$, if a given occupational attribute is valued positively, workers in occupation A have typically more of that attribute than in occupation B; (v) $(\theta_{MA}^{\intercal} - \theta_{MB}^{\intercal}) \cdot E[M_o | o = B]$, if the attribute increases workers' utility more in A than in B.

Finally note that we could also have defined an individual occupation quality that takes into account individual heterogeneity in terms of X and W:

$$\begin{aligned} \delta_o^*(X_i, W_i) &\equiv \alpha + \gamma_o + (\beta_X^{\intercal} + \theta_{Xo}^{\intercal}) \cdot X_i + (\beta_W^{\intercal} + \theta_{Wo}^{\intercal}) \cdot W_i + (\beta_M^{\intercal} + \theta_{Mo}^{\intercal}) \cdot E[M_o | o] \\ &= \delta_o + (\beta_X^{\intercal} + \theta_{Xo}^{\intercal}) \cdot (X_i - E[X]) + (\beta_W^{\intercal} + \theta_{Wo}^{\intercal}) \cdot (W_i - E[W]) \end{aligned}$$

and that measure can be obtained from the parameters presented in 1.

Even for the unemployed workers, for whom we cannot observe M, we are able to predict the individual occupation quality by looking at $\delta_o^*(x, w)$, which can be computed for all workforce. This is an attractive feature of the method, which is exploited in the next steps.

3.2 Step 2: Ranking Occupations

A by-product of the above method is that ranking occupations in terms of their δ_o provides a relative measure of quality across occupations in the population. A feature of this quality measure is that it will not be affected by different worker's characteristics in each occupation. That measure rather reflects the parameters δ and θ and will not be a function of X and W.

Therefore, by ranking occupations only through δ_o we might not capture the heterogeneity that may be important in determining, from an individual perspective, what may be the worker's natural ranking. We can check by ranking occupations through $\delta_o^*(x, w)$ how the ranking would change depending on the worker's vector of characteristics (x, w). Finally, notice that by the linearity implicitly assumed in 1, $\delta_o = E[\delta_o^*(X, W)] = \delta_o^*(E[X], E[W])$.

3.3 Step 3: Occupational Structure

Occupational structure is measured by a simple discrete-choice procedure. In fact, we estimate the probability of a worker i being in a occupation o given X and W, $\Pr[Occup_i = o|X, W]$. We model that probability by a multinomial logit

$$\Pr[Occup_i = o|X_i, W_i] \equiv \frac{\exp(X_i^{\intercal}\lambda_{Xo} + W_i^{\intercal}\lambda_{Wo})}{1 + \sum_h^O \exp(X_i^{\intercal}\lambda_{Xh} + W_i^{\intercal}\lambda_{Wh})}, \quad o = 1, ..., O$$

where the λ's are multinomial logit coefficients and the variables X and W were defined before.[3] For the baseline occupation, we normalize $\lambda_{Xo} = 0$ and $\lambda_{Wo} = 0$. Obviously, the unconditional probability of worker i being in occupation o is given by

$$p_o = \Pr[Occup_i = o].$$

Interpretation of $\lambda' s$ sign is straightforward. The larger an λ_{Xo} (or λ_{Wo}) the easier will be the access to occupation o by someone possessing more of X (or W).

It should be mentioned that when information on current or previous occupation is provided for unemployed workers, then we can also use that subpopulation in our analysis. That will allow us to have an individual employability measure for the whole workforce, as discussed next.

[3] The choice of a multinomial logit specification is made by simplicity only. In fact, estimation of both the hedonic regressions and the choice probabilities could have been implemented through nonparametric methods.

3.4 Step 4: Constructing The Employability Measure

Our employability measure takes into account the current values of human capital and demographic characteristics and can be expressed as

$$\begin{aligned} EMP_i &= EMP\left(X_i, W_i\right) \\ &\equiv \sum_{o=1}^{O} \left\{\delta_o^*\left(X_i, W_i\right) \cdot \Pr\left[Occup_i = o | X_i, W_i\right]\right\}. \end{aligned}$$

The employability measure is in log hourly wage units and for policy comparisons it may be normalized and transformed into an index. In our empirical application we present the measure in its original units.

4 Empirical Application: The Brazilian Case

We use the 1993, 1998, 2003 and 2008 waves of the *Pesquisa Nacional de Amostra por Domicílio* (PNAD), which is the annual Brazilian Household Survey, collected by IBGE (Brazilian Census Bureau). PNAD covers the whole country, with the exception of some rural areas. It is the largest and most important Brazilian household survey, interviewing more than 75,000 households every year, which corresponds to about 300,000 individuals. PNAD collects data every September since 1976, with the exception of Census years.[4] It contains information on labor, demographic, educational and regional variables and has been widely used in many micro-econometric studies. PNAD is not a panel data, so we cannot follow the same individual over the years.

In this study, our yearly sample sizes range from 45,500 in 1993 to 72,811 in 2008. These are workers aged 25-64 sampled from the entire non-rural Brazil. Our sample does not include, however, public servant workers (civil servants and military), self-employed and employers. The sample includes employed and unemployed, formal and informal workers. Unemployment rate in the sample fluctuate little around 6%. For us, an employed worker is someone working at least 20 hours a week. Informal workers are about 35% of the sample of employed workers. Finally, we did not include in our sample workers who did not answer the questions on race/ethnicity, age, education and labor market experience, as well employed workers with zero earnings (earning less than R$50/month in 2008 Reais).

We have constructed several variables from PNAD. In terms of hard and soft skills (X), we have schooling years, experience in the labor market (in years), and if ever migrated. The latter can be seen as a measure of a soft skill, or as a proxy for being capable of migrating, which is in line with some papers in the literature on employability (De Grip et al, 2004). As for demographics (W), we have age, a dummy for white (including Asian descendants), a dummy for male, a dummy for being the household head, a dummy for living in a metropolitan area and regional dummies. We present in

[4] PNAD was not run in the years 1980, 1991, 1994, 2000 and 2010. Except for 1994, all other years were Census years.

Table 1 the temporal evolution for all these variables and in Figures 1 and 2 disaggregated by occupational groups. Table 1. Table A.1 in the Appendix reports the same variables as Table 1 does but for the subpopulation of employed workers. We also report there the unconditional probability estimate of being currently employed.

[**insert Table 1 around here**]

[**insert Figure 1 around here (1a-c)**]

[**insert Figure 2 around here (2a-f)**]

The reason for restricting our attention to employed workers in Table A.1 is that, for all employment characteristics (M), we only have information for that subpopulation of workers. However, given that in our data even unemployed workers report occupation we use in our analysis the entire workforce, unemployed and employed workers. Therefore, we also include in the vector of occupational attributes M the conditional probability of being employed.

We constructed measures on job tenure (in months), weekly hours, monthly salary and dummy for being under a formal work contract. Our dependent variable (Y) in Equation (1) is log hourly wage. The temporal evolution for all these variables can be seen in both Table 2 and in Figure 3, which also presents disaggregated results by occupational groups.

[**insert Table 2 around here**]

[**insert Figure 3 around here (3a-e)**]

The most noticeable pattern emerging from those tables and figures is the decrease in the proportion of white workers, from 59 to 51%; male workers, from 58 to 53%; and household head workers, from 59 to 52%, and the increase in the schooling from 6.19 to 8.36 years of education. Given the relevant increase in its mean, we investigated how the schooling distribution changed over time for our sample. Figure 4 plots the schooling histogram for different years. We can see that the change in mean schooling is basically driven by an increase in the proportion of workers with completed high school (eleven years of schooling), which doubled from 1993 to 2008.

[**insert Figure 4 around here**]

PNAD collects data on occupations using three different questions. The first one is on the actual occupation if individual is currently employed;[5] the second is on the

[5] For employed workers with more than one job, we only used information on their self-reported main activity.

previous occupation if the individual is currently unemployed but left the job within one year from the survey; and the third one is on the previous occupation if the individual is currently unemployed but left the job more than one year from the survey. In this study, we merged these variables into one overall occupation variable.

Given the large number of different occupations, we grouped occupations at one digit level. The grouping procedure for occupations used here is the same proposed by Muendler, Poole, Ramey and Wajnberg (2004). We end up with nine main occupations: managers; professionals; technicians; clerks; service and sales workers; skilled agricultural and fishery workers; craft workers; machine operators and assemblers; other elementary occupations.[6] As we grouped occupations for all years considered, we had to deal with the extra difficulty of having a change in definition of occupations from the 1990's to the 2000's in the Brazilian classification system of occupations. Definition of these groups can be found in Table A.2 in the Appendix.

Annual occupation distributions are presented in Table 3 and Figure 5 (histograms). Those distributions are relatively close to each other revealing few differences in occupational structure over time. The only important change over time is the reduction in the proportion of agricultural workers (group 6). The most important group is formed by elementary occupations (about 20% of the population), which has one of the lowest levels of schooling years, and highest prevalences of non-white female workers. The opposite pattern is found for managers and professionals (groups 1 and 2), which correspond together to about 10% of the population. Figures 1-3 show that the most of the cross-sectional variation in the characteristics are reflected in differences among occupational groups and that over time most of those groups follow the trend found in Tables 1 and 2.

[insert Table 3 around here]

5 Results

5.1 Step 1: Occupational Quality

We run the regression specified in Equation (1) using Y, D_o, X, W and M as specified in the previous section.[7] Given that we observe M and Y only for employed workers, we constructed our employability measure for those workers first and later impute it to the rest of the population. As both a way to address any selectivity concern and to take into account that occupations might have different unemployment rates, we compute first the probability of being employed given covariates X and W and use the fitted value as a component of M in Equation (1).[8]

[6] We excluded all military workers, which would make the tenth occupational group.

[7] D_o is a dummy for occupational group o, $o = 1, ..., 9$, as we have nine main occupational groups. In all regressions we used the full set of regional dummies: South, Southeast, North, Northeast and West Central (ommitted).

[8] Table A.3 in the Appendix reports Probit coefficients by year.

Our OLS regression results are presented in Table A.4 in the appendix. They covered all four years and all occupational groups. We present in Table 4 results for the whole population of employed workers not disaggregated by occupations. We can see that those coefficient regressions change overtime, and in particular that being male and white, as well as being the household head and living in a urban area have a positive impact on the logarithm of the hourly wage. The return to the years of schooling is positive while the returns to experience and age have an inverted U-shape form. Migrant workers are better paid than local ones with the same characteristics. Finally, it shows that individuals who work longer hours have lower hourly wages, workers with higher tenure are slightly better paid and that individuals with a lower probability of being employed are compensated with a higher wage.

[**insert Table 4 around here**]

5.2 Step 2: Ranking of Occupations

We construct two rankings of occupations for each year. The first one is based on our estimate of δ_o, $o = 1, ..., 9.$, which is reported in Table 5. In that same table we report the ranking associate with values of δ_o and another one based on log-hourly wage. We can see that these rankings follow closely each other over the years, but they are not perfectly related. Furthermore, given a decrease in 2008 in the dispersion of δ_o for that year the rankings do differ.

[**insert Table 5 around here**]

5.3 Step 3: Occupational Structure

We now present some results on the determinants of the occupation by a worker. We estimated a multinomial logit model whose results are presented in Table A.5. The main information we can obtain from that table is that skill variables are important characteristics for occupations that appeared in the top positions of the previous rankings.

5.4 Step 4: Employability

Our employability measure was then computed for the entire workforce using the formula from Subsection 3.4. We report some descriptive statistics and graph the cumulative distribution function (cdf) for our employability measure in Table 6 and Figure 6. Our main findings are that employability of the Brazilian workforce, at least as measured as we proposed, has increased over the period 1993 to 2008. In fact, a naked eye inspection of both Table 6 and Figure 6 reveals that the variance has decreased over time especially because of lower quantiles which have moved upward.

[**insert Table 6 around here**]

[**insert Figure 6 around here**]

There are some possible explanations for that pattern. We have noticed from descriptive statistics tables that schooling and some demographic characteristics, such as proportion of male, white and household heads have changed among the workforce.

We plot in Figures 7 and 8, how the regression and multinomial logit coefficients for those four variables evolved over time. One should observe that these coefficients are not only different across occupations in a given point in time but have evolved differently over time. We investigate how these changes account for the observed changes in the mean employability vis-a-vis changes in skills, in particular, schooling years.

[**insert Figure 7 around here**]

[**insert Figure 8 around here**]

6 Decomposing the Employability Measure

In this section we investigate what are the main factors behind the change in employability over the years. We first see how the employability measure is distributed across skills and demographic characteristics for all years. Table 7 shows average employability values for groups of workers. We can see that for all years, employability is higher for workers residing in the Southern and Southeastern regions of Brazil and in metropolitan areas. It is also larger for workers that are between 25-40 years old, male, white, household head and have higher education. It follows an inverse U-shaped pattern with experience and does not seem to differ across migrants and stayers. An important feature of Table 7 is that when we compare 2008 with 1993, for example, we can see the decreasing role of schooling, experience, gender, household headship, age, and geographic location of residence in explaining employability differentials. Interestingly, we also find racial/ethnic employability gap seems to be unaffected over the years.

[**insert Table 7 around here**]

In order to compute the role of several time-varying factors on changes in employability over time, we decompose the differences in mean employability over the three consecutive pairs of years (1993-98, 1998-2003 and 2003-08). We measure how both changes in coefficients and in the distribution of covariates might explain the temporal evolution of employability.

We construct the following counterfactuals: (i) $Emp^{(i)}$: Employability in year $t+1$ if occupational structure had not changed, that is, we fix the coefficients of the multinomial logit to be the same as in t; (ii) $Emp^{(ii)}$: Employability in year $t+1$ if both occupational

and quality structures had not changed, that is, we fix the coefficients of the multinomial logit and of the hedonic regressions to be the same as in t; (iii) $Emp^{(iii)}$: Employability in year $t+1$ if occupational and quality structures and the schooling distribution had not changed, that is, we fix the coefficients of the multinomial logit and of the hedonic regressions and the distribution of years of schooling to be the same as in t; (iv) $Emp^{(iv)}$: Employability in year $t+1$ if occupational and quality structures and the schooling and some demographics characteristics (male, white and household head workers) distributions had not changed, that is, we fix the coefficients of the multinomial logit and of the hedonic regressions as well the distribution of years of schooling and the proportions of male, white and household heads to be the same as in t. [9]

After we construct these counterfactuals, we decompose the difference in mean employability between years $t+1$ and t into five terms:

$$\mathbb{E}\left[Emp|t+1\right] - \mathbb{E}\left[Emp|t\right] = \Delta_i + \Delta_{ii} + \Delta_{iii} + \Delta_{iv} + \Delta_v.$$

Each of these five decomposition terms have their own interpretation. The first term

$$\Delta_i = \mathbb{E}\left[Emp|t+1\right] - \mathbb{E}\left[Emp^{(i)}|t+1\right]$$

measures the impact on employability of keeping the occupational structure unchanged over years. The second term

$$\Delta_{ii} = \mathbb{E}\left[Emp^{(i)}|t+1\right] - \mathbb{E}\left[Emp^{(ii)}|t+1\right]$$

measures the impact on employability of keeping the quality structure unchanged over years. The third term

$$\Delta_{iii} = \mathbb{E}\left[Emp^{(ii)}|t+1\right] - \mathbb{E}\left[Emp^{(iii)}|t+1\right]$$

measures the impact on employability of keeping the distribution of schooling unchanged over years. The fourth term

$$\Delta_{iv} = \mathbb{E}\left[Emp^{(iii)}|t+1\right] - \mathbb{E}\left[Emp^{(iv)}|t+1\right]$$

measures the impact on employability of keeping the proportion of male, white and household heads in the workforce unchanged over years. Finally, the fifth term

$$\Delta_v = \mathbb{E}\left[Emp^{(iv)}|t+1\right] - \mathbb{E}\left[Emp|t\right]$$

measures the impact on employability of keeping the distribution of all other characteristics fixed over time.

Table 8 reports the averages of each counterfactual for each pair of years, as well five decomposition terms.[10] Our main results are that employability differences between

[9] We followed Lemieux's (2002) "unified approach" in generating these counterfactuals. In particular, counterfactuals based on keeping the distribution of covariates fixed were constructing using a reweighing approach, whose implementation details can be found at Fortin, Lemieux and Firpo (2011).

[10] Standard errors were computed by nonparametrc bootstrap. Each original PNAD sample was resampled with repetition 100 times and we repeated all steps for each bootstrapped sample, obtaining 100 results for $\mathbb{E}\left[Emp|t+1\right]$, $\mathbb{E}\left[Emp|t\right]$ and the five decomposition terms.

1993 to 2003 are mostly due to changes in returns of observable characteristics, which are characterized by changes in coefficients of the hedonic regressions. Changes in the occupational structure and in the distribution of covariates have a much less important role in explaining employability changes up to 2003.

Interestingly, from 2003 to 2008, the most important factor explaining changes in mean employability is the observed change in the schooling distribution, whereas returns do not play the same role as in previous time periods.

[**insert Table 8 around here**]

7 Conclusions

We proposed an operational measure of employability that has several nice characteristics. First, it can be interpreted as a occupational quality measure that maps skills and demographics to the expected quality a worker will face over all available occupations. In that sense, it recovers the quality aspect of the term employability that often refers to the capability of obtaining a job. Second, our measure can be easily implemented using regression techniques applied to typical household surveys, dispensing usage of firm-level data. Third it focus on the whole workforce, employed and unemployed, formal and informal.

Our operational measure of employability revealed that although workers in Brazil have been traditionally asymmetrically distributed around a median employability measure, with most of workers concentrated at lower values of that distribution, there has been an important and noticeable change over time. The inequality has decreased, especially at the lower tail of the distribution.

We investigated what were the driving forces that have changed mean employability in Brazil. We found that from 1993 to 2003 most of the changes were related to changes in skill premia, but after that, the rapid qualification of the labor force had direct impacts on average employability. Therefore, at least in principle, policies oriented to increase both workers' skills and the wage premium associated with those skills could be important ways to increase employability levels.

8 References

Arocena, P., I. Nuñez, and M. Villanueva (2006): "The Effect of Enhancing Workers' Employability on Small and Medium Enterprises: Evidence from Spain," *Small Business Economics*, 29, 191-201.

Autor, D., L. Katz, and M. Kearney (2008): "Trends in U.S. Wage Inequality: Revising the Revisionists," *Review of Economics and Statistics,* 90, 300–323.

Card, D., P. Ibarrarán, F. Regalia, D. Rosas-Shady, and Y. Soares (2011): "The Labor Market Impacts of Youth Traning in the Dominican Republic," *Journal of Labor Economics*, 29, 267-300.

Chow, G. (1967): "Technological change and the demand for computers," *American Economic Review*, 57, 1117–1130.

De Grip, A., J. Van Loo, and J. Sanders (2004): "The Industry Employability Index: Taking account of supply and demand characteristics," *International Labour Review*, 143, 211-233.

Finnie, R., and R. Meng (2007): "Literacy and Employment," *Perspectives on Labour and Income*, 8, 5-13.

Fortin, N., T. Lemieux, and S. Firpo (2011): "Decomposition Methods in Economics," in: O. Ashenfelter & D. Card (ed.), *Handbook of Labor Economics*, Elsevier, 4A, 1-102.

Gazier, B. (1998): "Observations and Recommendations," in B. Gazier (Ed) *Employability: Concepts and Policies*, Berlin: European Employment Observatory, 298-315.

Gazier, B. (2001): "Employability: the Complexity of a Policy Notion," in P. Weinert, M. Baukens, P. Bollerot et al (Eds) *Employability: From Theory to Practice*, New Brunswick, NJ: Transaction Books, 3-23.

Goos, M. and A. Manning (2007): "Lousy and Lovely Jobs: The Rising Polarization of Work in Britain," *The Review of Economics and Statistics*, MIT Press, 89, 118-133.

Griliches, Z. (1961): "Hedonic Price Indexes for Automobiles: An econometric Analysis of Quality Change," in *The Price Statistics of federal Government*, New York, the National Bureau of Economic Research.

Groot, W., and H. Maasen (2000): "Education, Training and Employability," *Applied Economics,* 32, 573-581.

Grusky, D., and M. Ku (2008): "Gloom, Doom, and Inequality," in D. B. Grusky, M. C. Ku and S. Szelényi, *Social stratification : class, race, and gender in sociological perspective*. Boulder, Colorado, Westview: 2-28.

Hillage, J., and E. Pollard (1998): "Employability: Developing a Framework for Policy Analysis," Research Report RR85, Department for Education and Employment.

Lancaster, K. (1971): *Consumer Demand: A New Approach*. Columbia University Press, New York.

LEMIEUX, T. (2002): "Decomposing changes in wage distributions: a unified approach," *Canadian Journal of Economics*, 35, 646-688.

MCQUAID, R. (2006): "Job Search Success and Employability in Local Labor Markets," *Annals of Regional Science*, 40, 407-421.

MCQUAID, R., AND C. LINDSAY (2005): "The Concept of Employability," *Urban Studies*, 42, 197-219.

PECK, J., AND N. THEODORE (2000): "Beyond 'Employability'," *Cambridge Journal of Economics*, 24, 729-749.

PHILPOTT, J. (1999): *Behind the Buzzword: Employability.* London: Employment Policy Institute.

RONCONI, L., J. SANGUINETTI, AND S. FACHELLI (2006): "Poverty and Employability Effects of Workfare Programs in Argentina," *PMMA Working Paper* No. 2006-14.

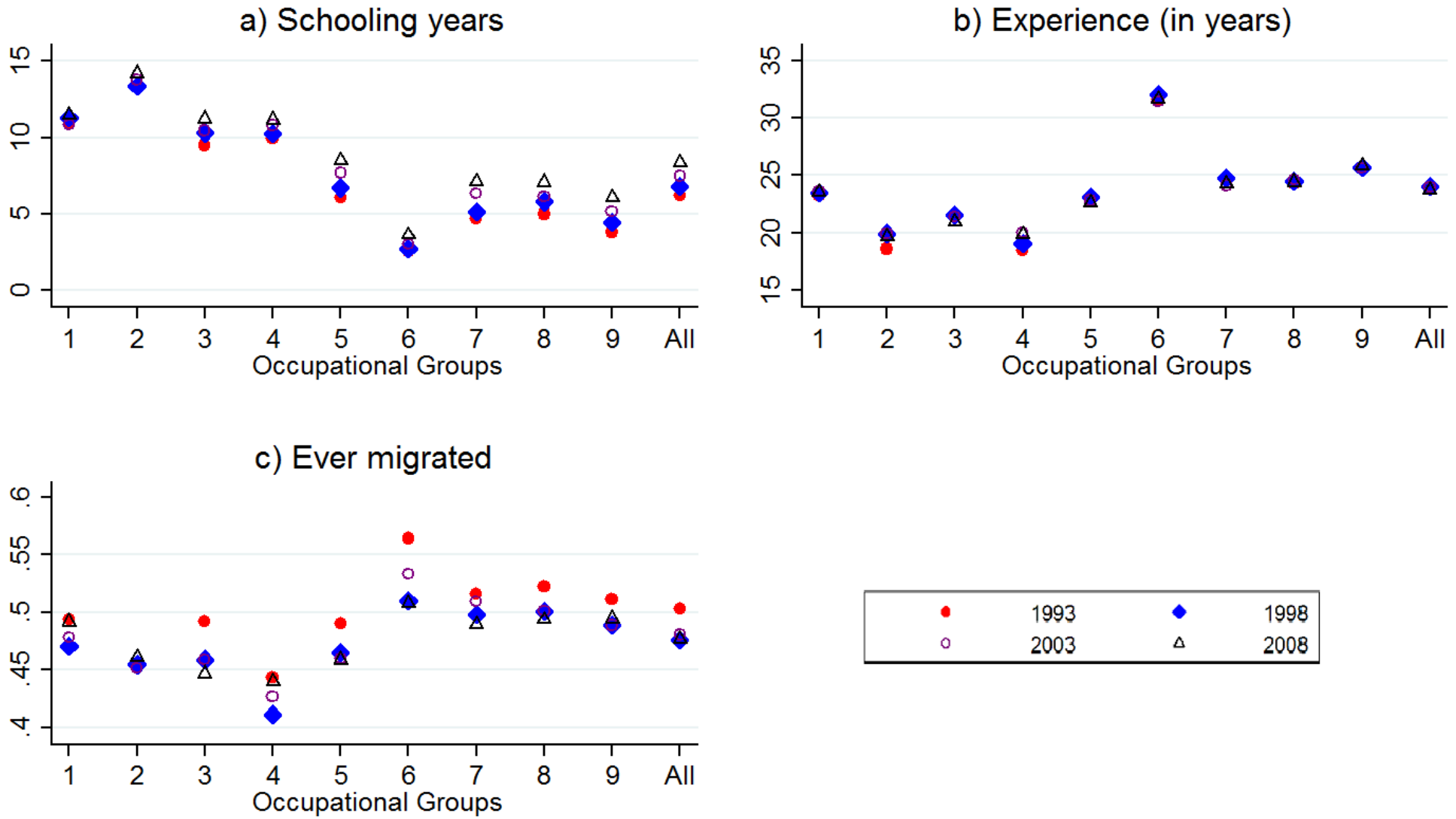
ROSEN, S. (1974): "Hedonic prices and implicit markets: product differentiation in pure competition," *Journal of Political Economy*, 82, 34-55.

ROSEN, S. (1987): "The theory of equalizing differences," in: O. Ashenfelter & R. Layard (ed.), *Handbook of Labor Economics*, Elsevier, edition 1, volume 1, chapter 12, 641-692.

SMITH, J., A. MCKNIGHT, AND R. NAYLOR (2000): "Graduate Employability: Policy and Performance in Higher Education in the UK," *The Economic Journal*, 110, 382-411.

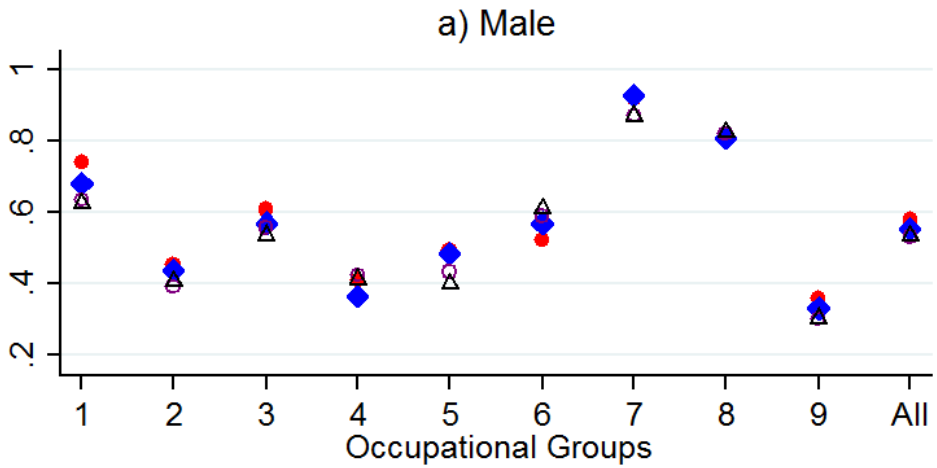
THOMSEN, S. (2009): "Explaining the Employability Gap of Short-Term and Long-Term Unemployed Persons," *Kyklos*, 62, 448-478.

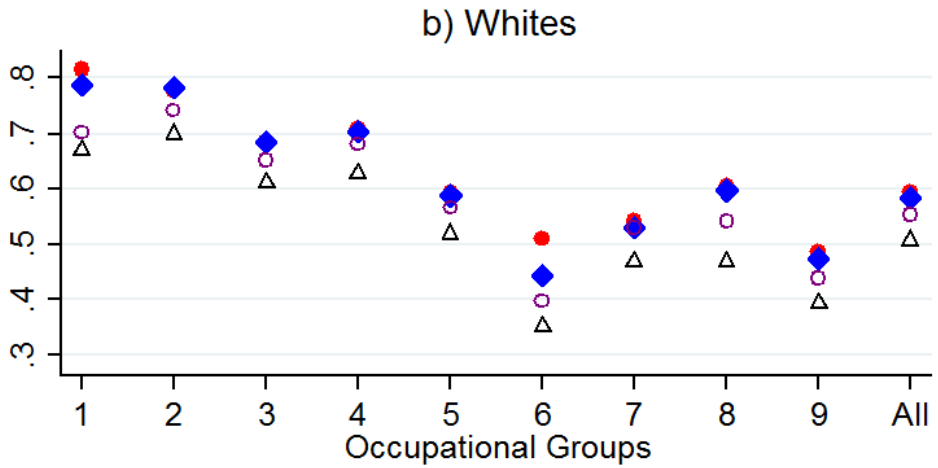
Figure 1: Summary Statistics: Skill Characteristics by year and occupational groups for the entire workforce

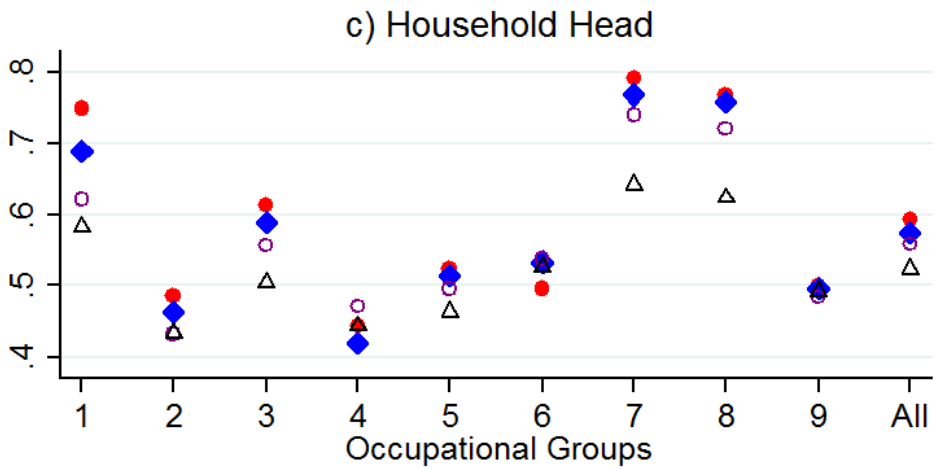


Workers age 25-64 years old, non-rural Brazil. Source PNAD.
Occupational groups labels can be found in Table A.2 in the Appendix.

Figure 2a: Summary Statistics: Demographic Characteristics by year and occupational groups for the entire workforce

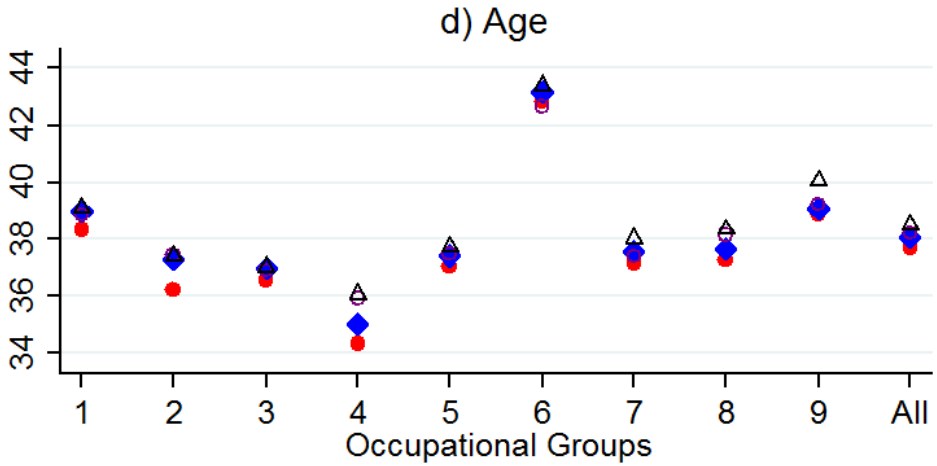


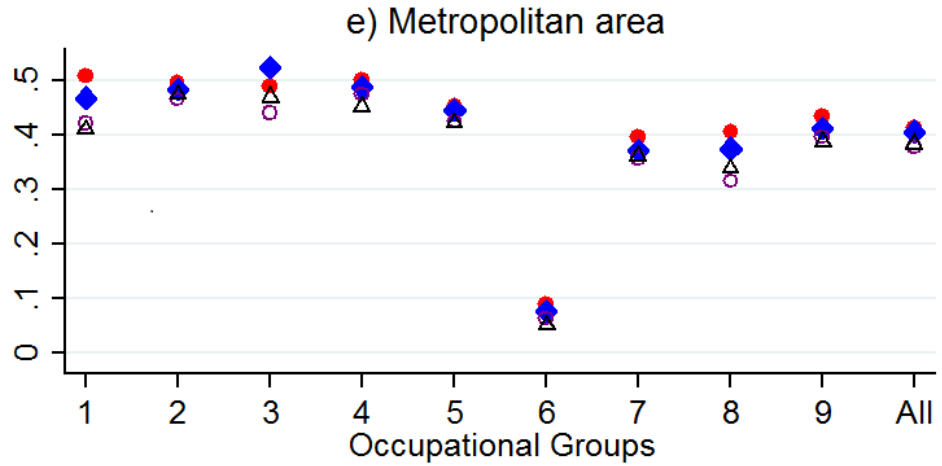


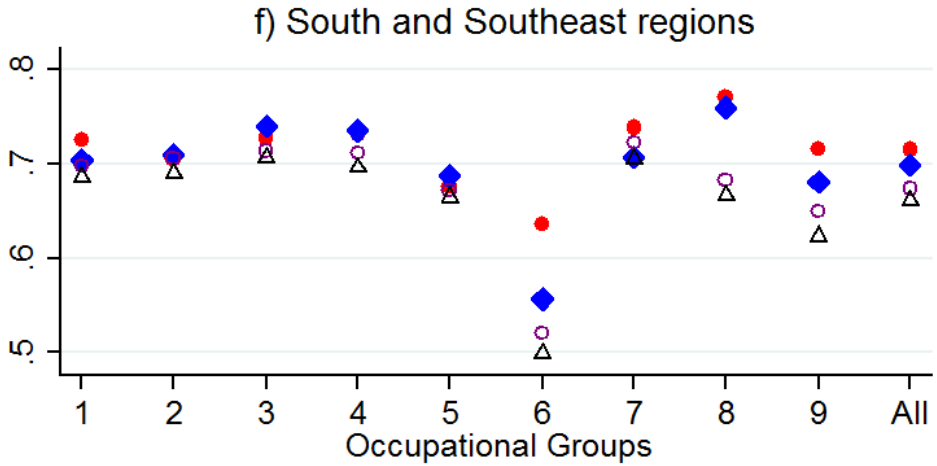


Workers age 25-64 years old, non-rural Brazil. Source PNAD.
Occupational groups labels can be found in Table A.2 in the Appendix.

Figure 2b: Summary Statistics: Demographic Characteristics by year and occupational groups for the entire workforce

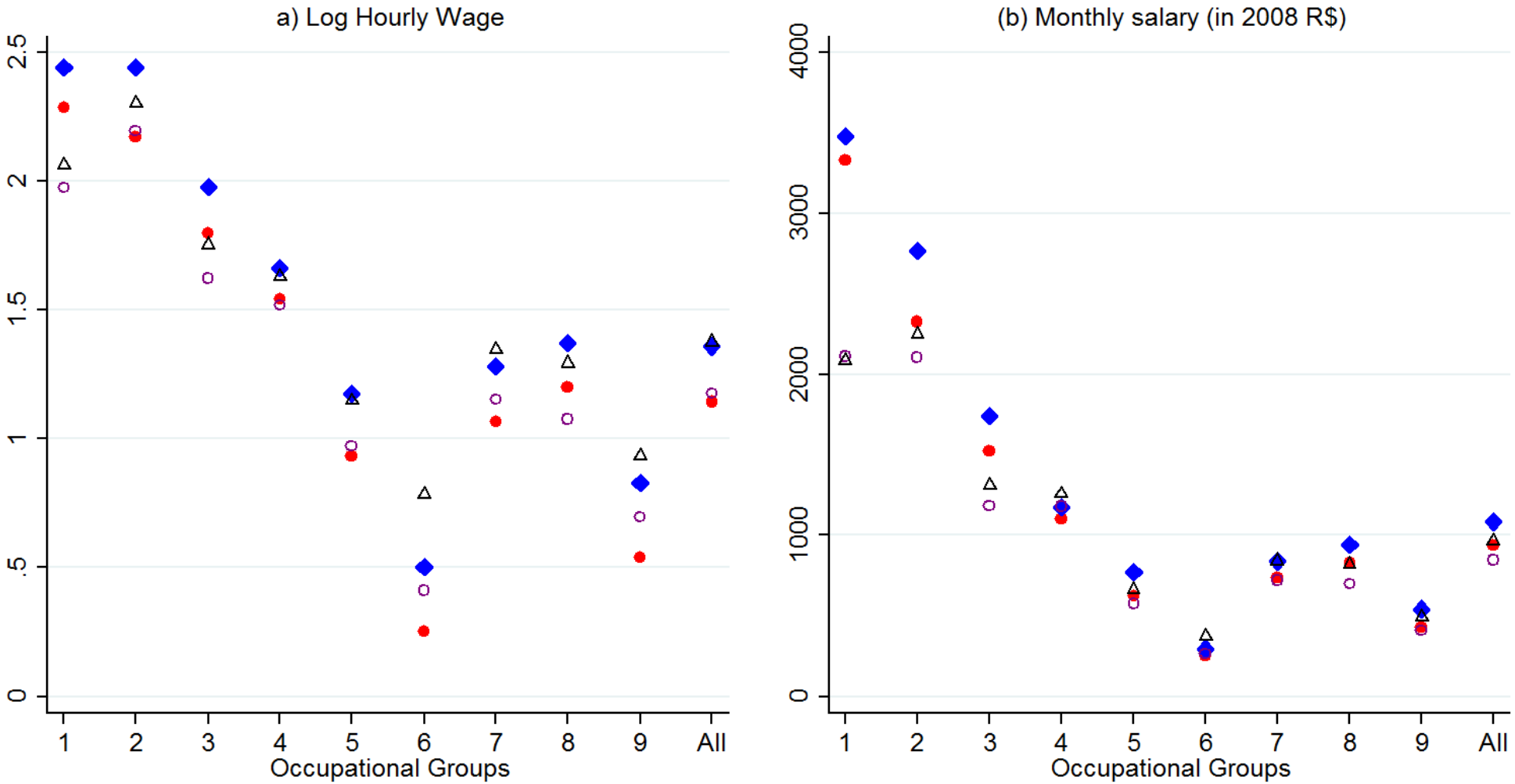






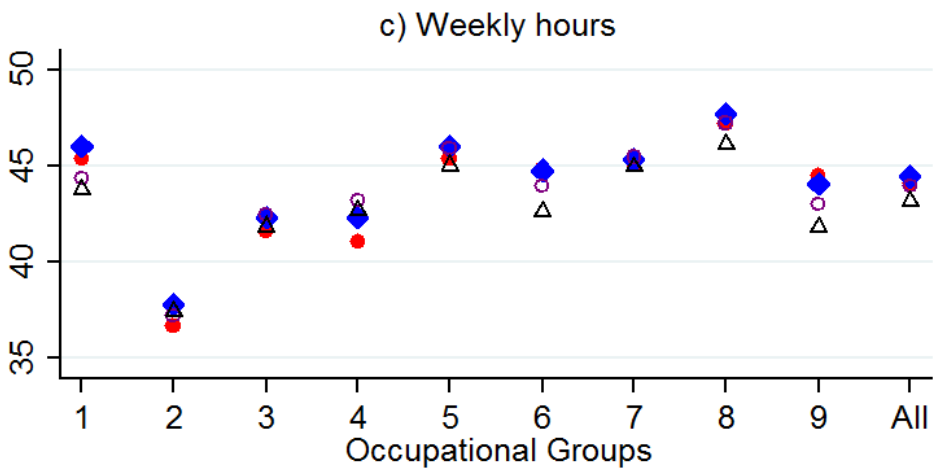
Workers age 25-64 years old, non-rural Brazil. Source PNAD.
Occupational groups labels can be found in Table A.2 in the Appendix.

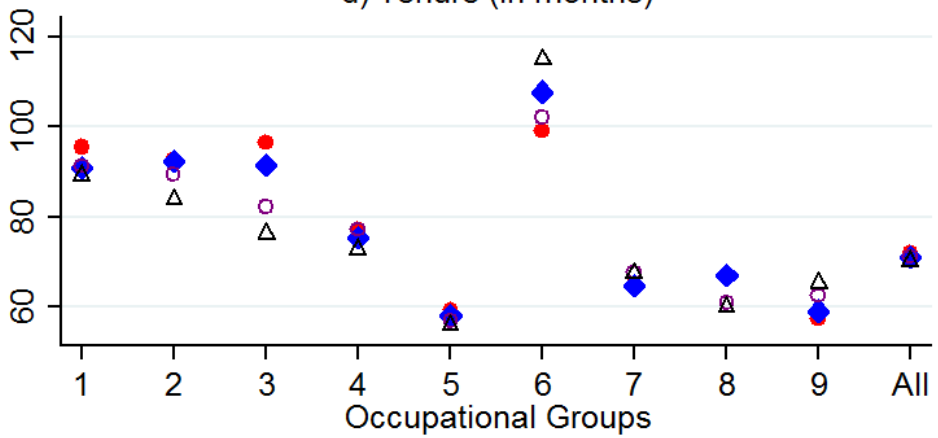
Figure 3a: Summary Statistics: Employment Characteristics by year and occupational groups for employed workers

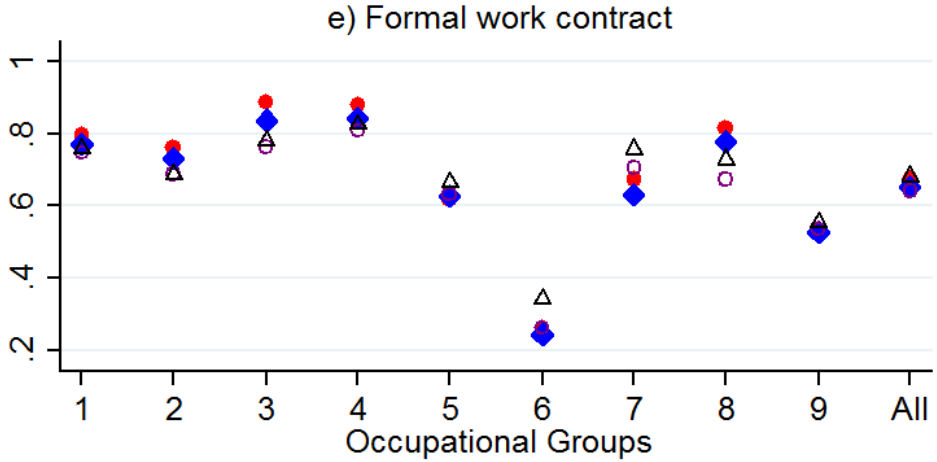


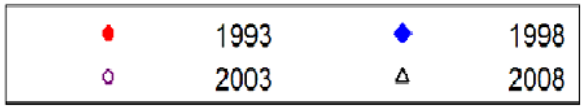
Workers age 25-64 years old, non-rural Brazil. Source PNAD.
Occupational groups labels can be found in Table A.2 in the Appendix.

Figure 3b: Summary Statistics: Employment Characteristics by year and occupational groups for employed workers



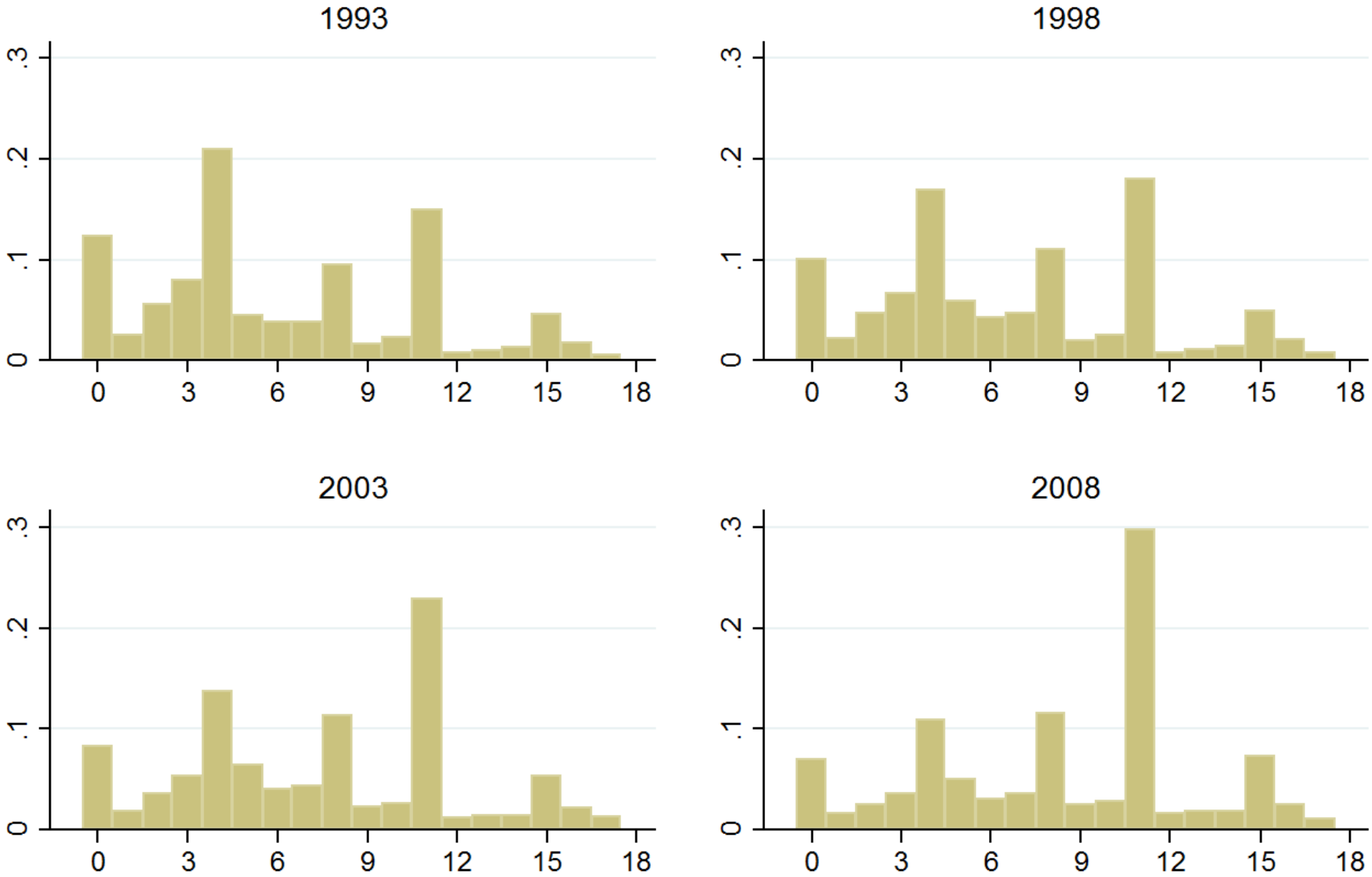






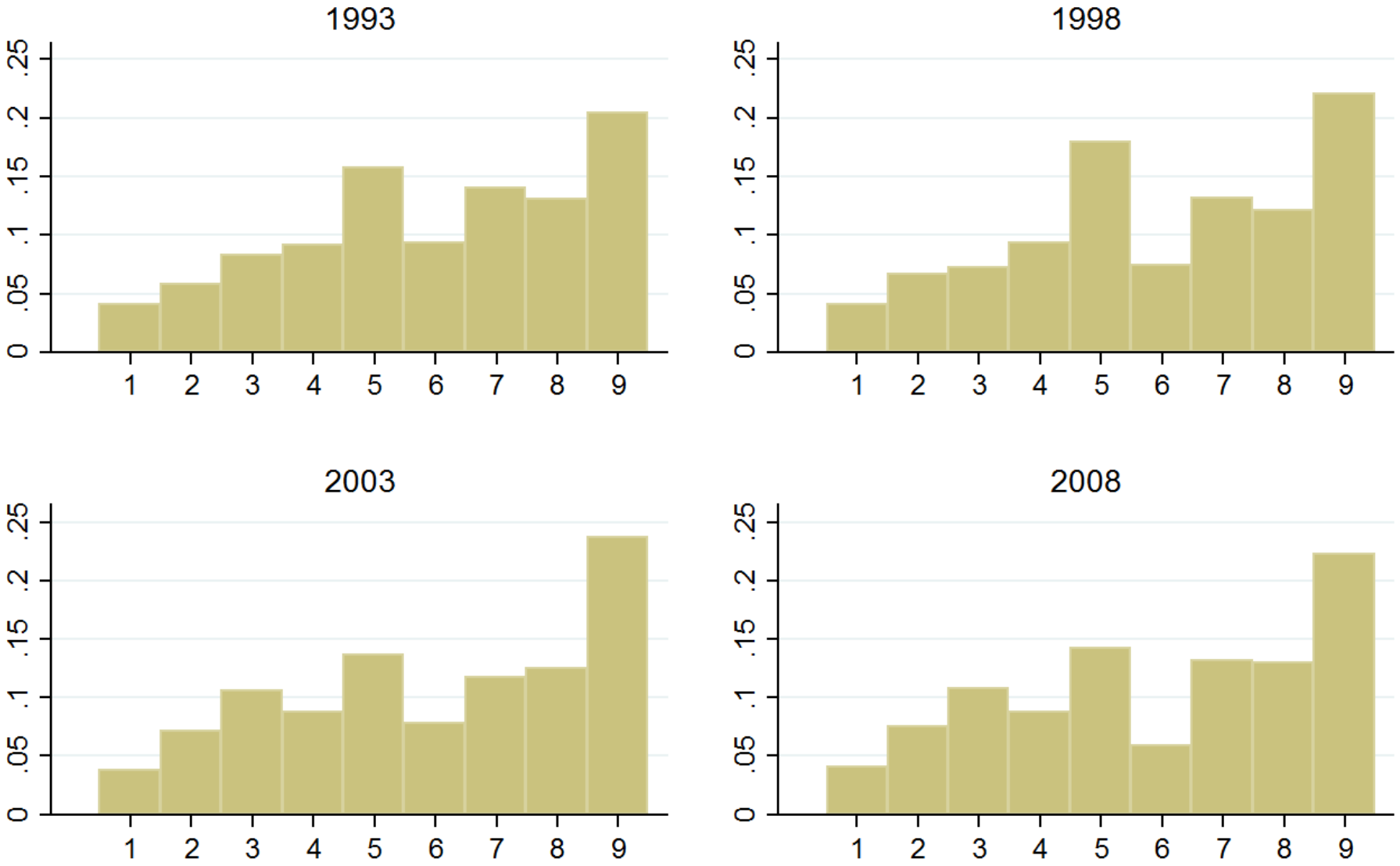
Workers age 25-64 years old, non-rural Brazil. Source PNAD.
Occupational groups labels can be found in Table A.2 in the Appendix.

Figure 4: Schooling Years Histogram by year for the entire workforce



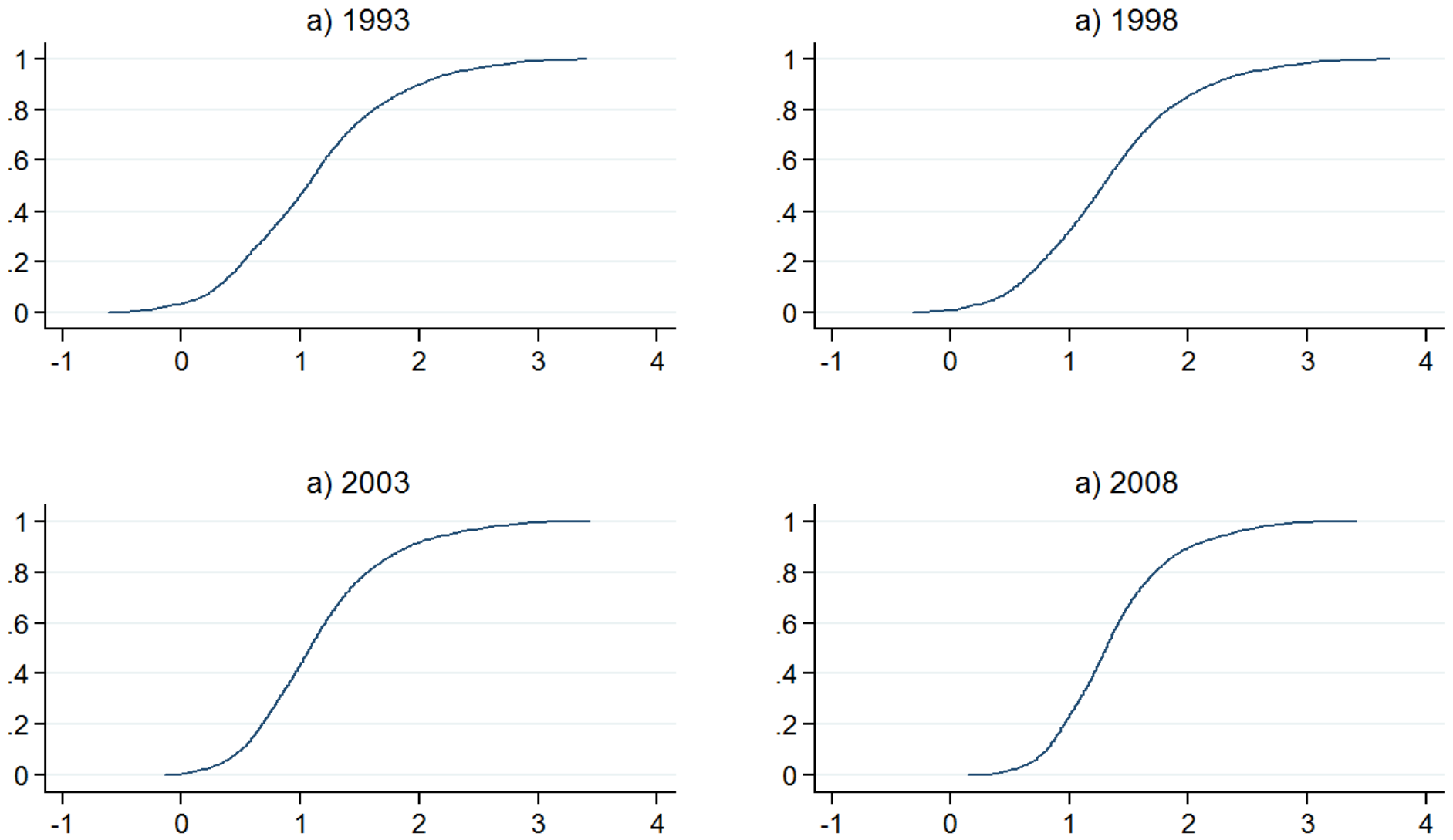
Workers age 25-64 years old, non-rural Brazil. Source PNAD.

Figure 5: Occupational Histogram by year for the entire workforce



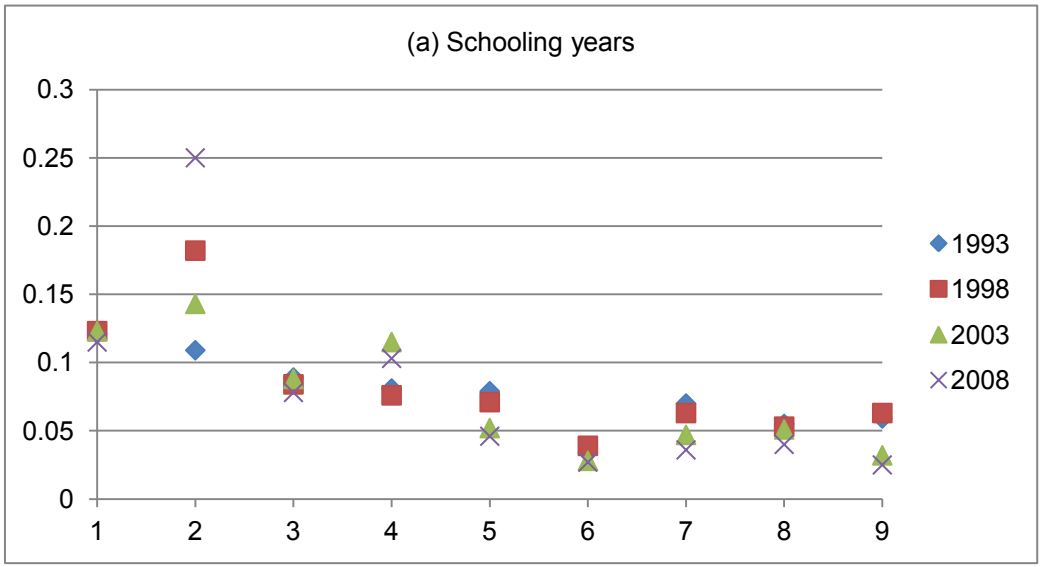
Workers age 25-64 years old, non-rural Brazil. Source PNAD.
Occupational groups labels can be found in Table A.2 in the Appendix.

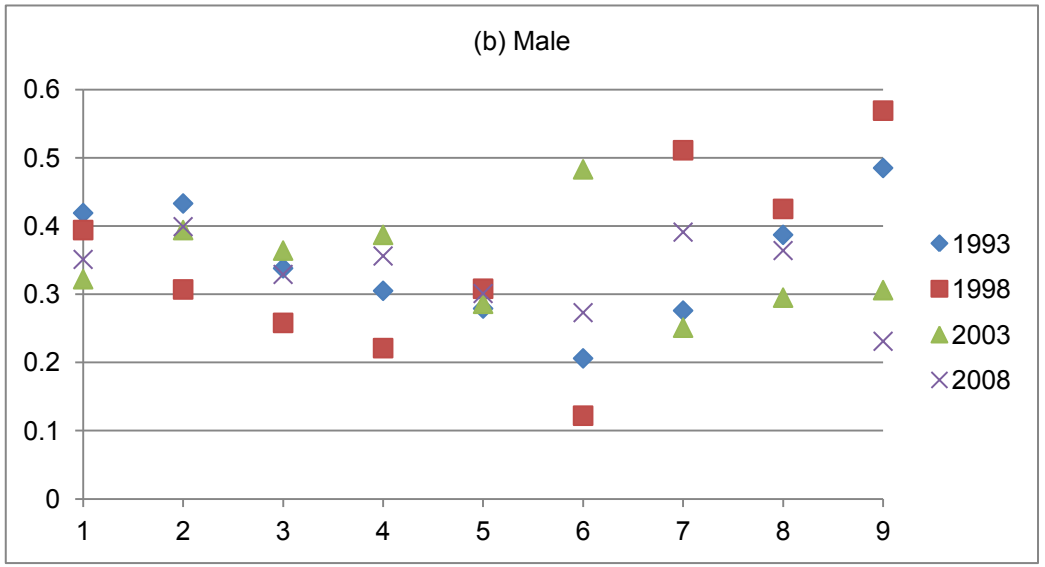
Figure 6: Cumulative Distribution Function of Employability by year for the entire workforce

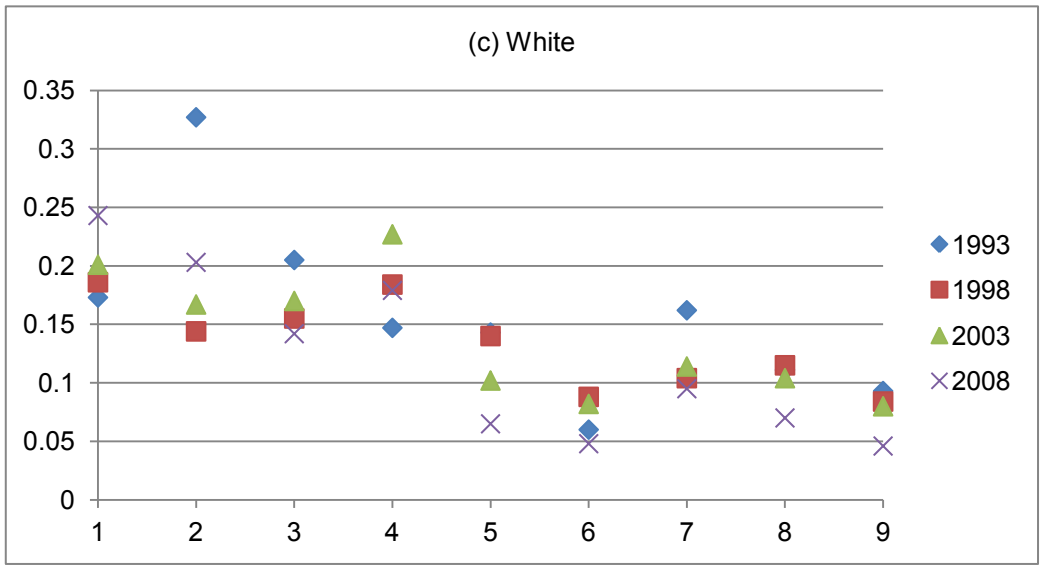


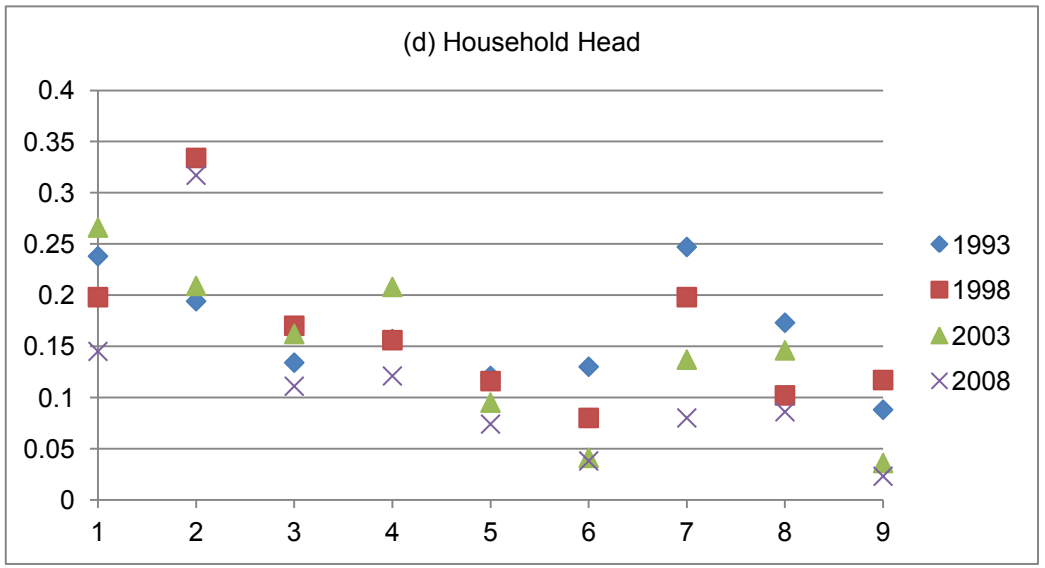
Workers age 25-64 years old, non-rural Brazil. Source PNAD.

Figure 7: Temporal Evolution of Hedonic Regression Coefficients



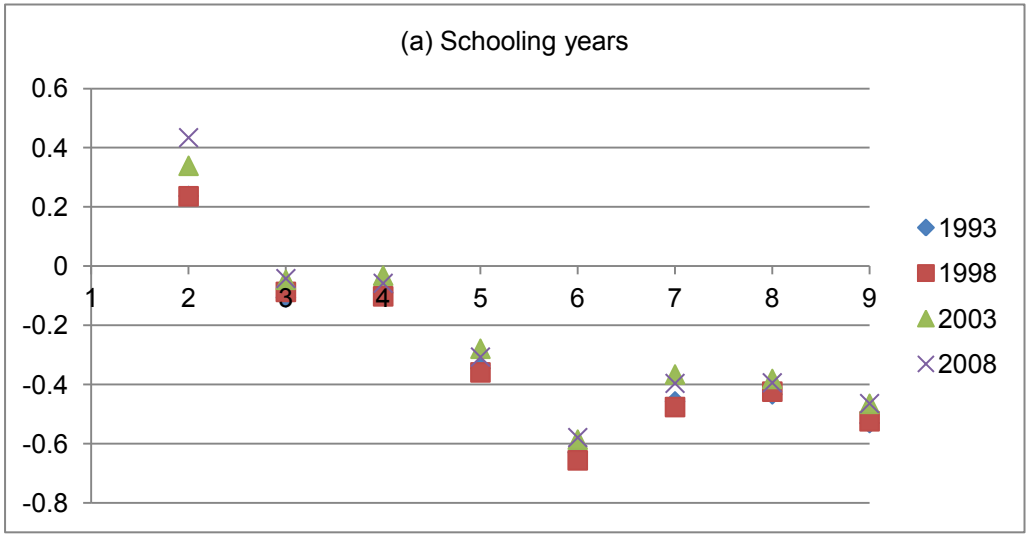


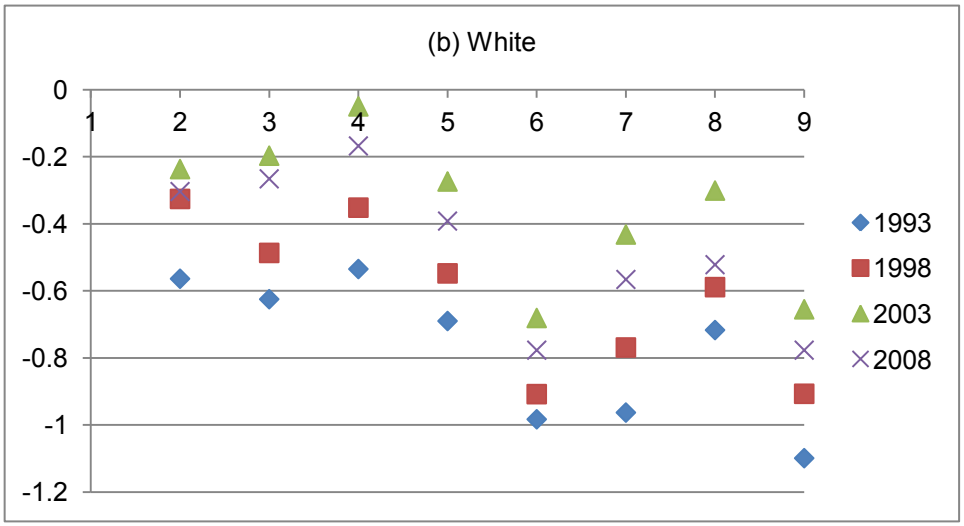


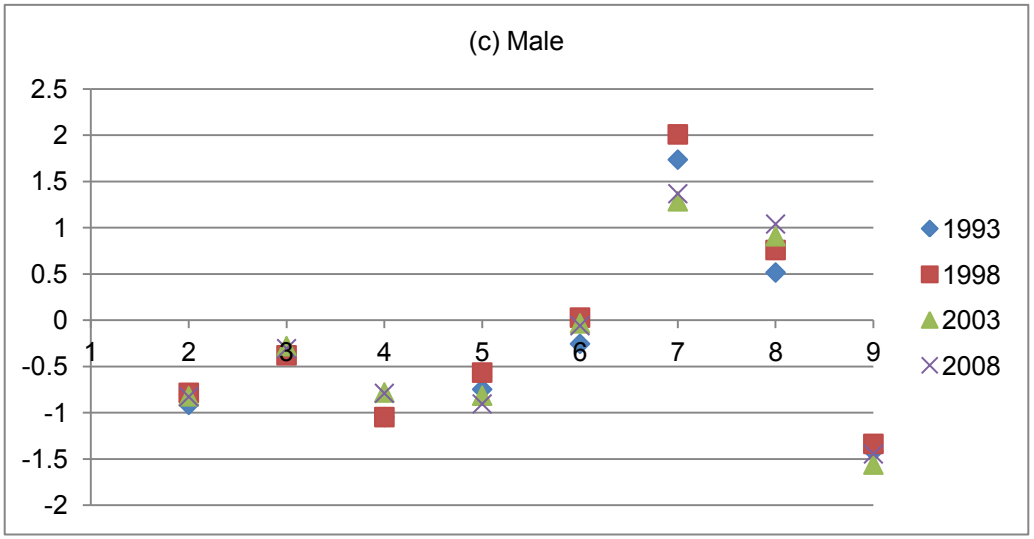


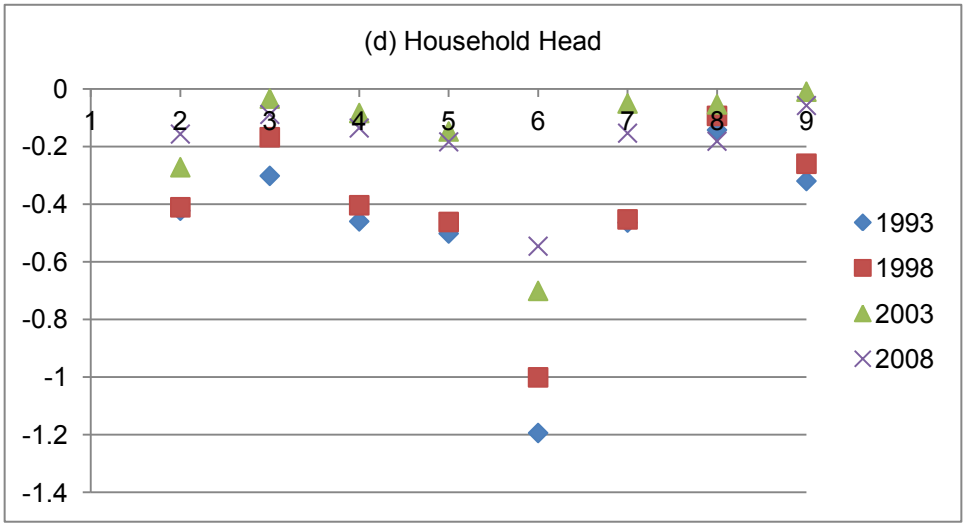
These figures were constructed using Table A.4 results.

Figure 8: Temporal Evolution of Multinomial Logit Regression Coefficients









Baseline group: Group 1

These figures were constructed using Table A.5 results.

Table 1: Summary Statistics: Skill and Demographic Characteristics by year for the entire workforce

	1993	1998	2003	2008
Schooling years	6.194	6.802	7.488	8.361
	(4.469)	(4.461)	(4.465)	(4.412)
Experience (in years)	23.942	24.049	23.957	23.724
	(11.237)	(11.123)	(11.185)	(11.522)
Ever migrated	0.503	0.476	0.481	0.477
	(0.5)	(0.499)	(0.5)	(0.499)
Male	0.58	0.554	0.531	0.534
	(0.494)	(0.497)	(0.499)	(0.499)
White	0.596	0.584	0.553	0.507
	(0.491)	(0.493)	(0.497)	(0.5)
Household Head	0.593	0.574	0.558	0.523
	(0.491)	(0.494)	(0.497)	(0.499)
Age	37.713	38.053	38.224	38.502
	(9.62)	(9.568)	(9.645)	(9.882)
Metropolitan area	0.413	0.405	0.377	0.384
	(0.492)	(0.491)	(0.485)	(0.486)
Southeast	0.538	0.523	0.507	0.504
	(0.499)	(0.499)	(0.5)	(0.5)
South	0.176	0.174	0.166	0.157
	(0.381)	(0.379)	(0.372)	(0.364)
Northeast	0.181	0.189	0.199	0.206
	(0.385)	(0.391)	(0.399)	(0.405)
North	0.042	0.043	0.055	0.059
	(0.201)	(0.204)	(0.228)	(0.236)
Observations	45500	49496	62567	72811

Workers age 25-64 years old, non-rural Brazil.

Source PNAD.

Table 2: Summary Statistics: Employment Characteristics by year for employed workers

	1993	1998	2003	2008
Log Hourly Wage	1.142	1.357	1.174	1.376
	(0.973)	(0.888)	(0.822)	(0.744)
Monthly Salary (in 2008 R$)	941.312	1082.163	847.968	963.658
	(2350.573)	(1645.067)	(1182.918)	(1314.845)
Weekly Hours	44.125	44.453	43.937	43.168
	(10.221)	(10.656)	(10.164)	(9.648)
Tenure (in months)	71.927	71.08	71.327	70.307
	(81.153)	(81.766)	(82.307)	(84.582)
Formal work contract	0.677	0.652	0.641	0.681
	(0.468)	(0.476)	(0.48)	(0.466)
Observations	42755	46768	58651	69072

Workers age 25-64 years old, non-rural Brazil.

Source PNAD.

Table 3: Distribution of Occupations by year for all workers

Group	1993	1998	2003	2008
1	4.15%	4.08%	3.82%	4.12%
2	5.80%	6.66%	7.15%	7.56%
3	8.23%	7.23%	10.67%	10.80%
4	9.19%	9.35%	8.87%	8.80%
5	15.67%	17.95%	13.69%	14.23%
6	9.33%	7.38%	7.86%	5.88%
7	14.10%	13.12%	11.77%	13.21%
8	13.06%	12.13%	12.48%	13.07%
9	20.47%	22.10%	23.69%	22.33%
Observations	45500	49496	62567	72811

Occupational Groups: 1 - Legislators, senior officials and managers; 2- Professionals; 3- Technicians and associate professionals; 4- Clerks; 5- Service workers and shop and market sales workers; 6- Skilled agricultural and fishery workers; 7- Craft and related workers; 8- Plant and machine operators and assemblers; 9- Elementary occupations. Source: Muendler et al (2004)

Workers age 25-64 years old, non-rural Brazil.

Source PNAD.

Table 4: Regression Coefficients of the Hedonic Model by year for the entire workforce

Dependent variable: Log Hourly Wage				
	1993	**1998**	**2003**	**2008**
Formal contract worker	0.392***	0.238***	0.258***	0.234***
	(0.009)	(0.007)	(0.006)	(0.006)
Schooling years	0.104***	0.104***	0.095***	0.082***
	(0.001)	(0.001)	(0.001)	(0.001)
Experience (in years)	0.005**	0.006***	0.000	-0.004***
	(0.002)	(0.002)	(0.002)	(0.001)
Experience squared	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
Ever migrated	0.037***	0.032***	0.025***	0.036***
	(0.007)	(0.006)	(0.005)	(0.005)
Male	0.416***	0.423***	0.398***	0.386***
	(0.014)	(0.013)	(0.011)	(0.011)
White	0.171***	0.158***	0.165***	0.144***
	(0.008)	(0.007)	(0.006)	(0.005)
Age	0.049***	0.041***	0.036***	0.033***
	(0.004)	(0.004)	(0.004)	(0.003)
Age squared	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
Household Head	0.176***	0.159***	0.131***	0.090***
	(0.010)	(0.009)	(0.007)	(0.005)
Metropolitan area	0.192***	0.215***	0.151***	0.109***
	(0.008)	(0.006)	(0.006)	(0.005)
South region	-0.079***	-0.027**	-0.093***	-0.063***
	(0.014)	(0.012)	(0.010)	(0.009)
Southeast region	-0.031***	0.072***	-0.022***	-0.040***
	(0.012)	(0.010)	(0.008)	(0.007)
Northeast region	-0.435***	-0.329***	-0.370***	-0.342***
	(0.014)	(0.011)	(0.009)	(0.008)
North region	-0.054***	-0.068***	-0.123***	-0.140***
	(0.017)	(0.015)	(0.010)	(0.009)
Weekly Hours	-0.017***	-0.017***	-0.016***	-0.016***
	(0.000)	(0.000)	(0.000)	(0.000)
Tenure (in months)	0.002***	0.001***	0.002***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)
Pr(ocup)	-0.184	-0.753***	-0.813***	-0.622***
	(0.137)	(0.168)	(0.126)	(0.141)
Constant	-0.576***	0.293*	0.427***	0.643***
	(0.145)	(0.167)	(0.124)	(0.136)
Observations	40,711	44,752	56,326	66,980
R-squared	0.572	0.585	0.556	0.494

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Workers age 25-64 years old, non-rural Brazil.

Source PNAD.

Table 5: Occupational Quality Measure and Rankings by year for the entire workforce

	1993			1998			2003			2008		
Group	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
1	1.446	1	1	1.686	1	2	1.393	1	2	1.599	1	2
2	1.2	3	2	1.441	3	1	1.156	3	1	1.314	4	1
3	1.269	2	3	1.523	2	3	1.276	2	3	1.454	2	3
4	1.12	4	4	1.342	4	4	1.127	4	4	1.354	3	4
5	0.997	7	7	1.215	6	7	1.013	7	7	1.207	7	7
6	0.671	9	9	0.85	9	9	0.779	9	9	1.058	8	9
7	1.065	6	6	1.214	7	6	1.06	5	5	1.233	6	5
8	1.111	5	5	1.274	5	5	1.041	6	6	1.256	5	6
9	0.86	8	8	1.092	8	8	0.849	8	8	1.053	9	8

(1) δ_0; (2) Ranking based on δ_0; (3) Ranking based on Log Hourly Wage

The Occupational Quality Measure is na estimate of the parameter δ_0 from Equation (2).

Rankings range from 1 to 9, 1 being the highest ranked occupation.

Description of occupational groups available on Table A2

Workers age 25-64 years old, non-rural Brazil.

Source PNAD.

Table 6: Employability Measure: Descriptive Statistics by year for entire workforce

	1993	1998	2003	2008
Mean	1.096	1.326	1.149	1.364
Std. Dev.	0.665	0.648	0.563	0.486
Median	1.058	1.279	1.081	1.307
5th percentile	0.117	0.359	0.356	0.682
95th percentile	2.317	2.519	2.245	2.327
Observations	45379	49461	62515	72811

Workers age 25-64 years old, non-rural Brazil.

Source PNAD.

Table 7: Yearly Average Employability Measure by Skill and Demographic Characteristics for the entire workforce

		1993	1998	2003	2008
Schooling years	0-3 years	0.527	0.726	0.601	0.87
		(0.401)	(0.389)	(0.287)	(0.255)
	4-7 years	0.906	1.089	0.879	1.076
		(0.371)	(0.36)	(0.278)	(0.246)
	8 a 10 years	1.308	1.446	1.147	1.273
		(0.36)	(0.35)	(0.297)	(0.257)
	11 or more	1.884	2.008	1.656	1.697
		(0.522)	(0.54)	(0.511)	(0.455)
Experience	0-15 years	1.227	1.408	1.224	1.423
		(0.631)	(0.601)	(0.531)	(0.46)
	16-22 years	1.17	1.38	1.172	1.369
		(0.653)	(0.625)	(0.54)	(0.46)
	23-31 years	1.129	1.392	1.179	1.384
		(0.671)	(0.662)	(0.577)	(0.493)
	32-59 years	0.847	1.12	1.018	1.276
		(0.64)	(0.66)	(0.58)	(0.517)
Ever migrated	No	1.131	1.357	1.172	1.374
		(0.661)	(0.638)	(0.555)	(0.471)
	Yes	1.061	1.292	1.124	1.354
		(0.666)	(0.658)	(0.57)	(0.502)
Male	No	0.804	1.075	0.972	1.198
		(0.631)	(0.621)	(0.523)	(0.455)
	Yes	1.308	1.527	1.306	1.509
		(0.606)	(0.597)	(0.55)	(0.465)
White	No	0.801	1.041	0.908	1.181
		(0.55)	(0.534)	(0.446)	(0.393)
	Yes	1.296	1.529	1.344	1.542
		(0.661)	(0.646)	(0.572)	(0.502)
Household Head	No	0.868	1.141	1.027	1.288
		(0.631)	(0.624)	(0.532)	(0.461)
	Yes	1.252	1.463	1.246	1.433
		(0.642)	(0.632)	(0.568)	(0.498)
Age	25-40 years	1.15	1.353	1.157	1.365
		(0.631)	(0.6)	(0.523)	(0.45)
	41-64 years	0.99	1.277	1.136	1.362
		(0.715)	(0.724)	(0.624)	(0.538)
Metropolitan area	No	0.926	1.152	1.02	1.268
		(0.62)	(0.599)	(0.523)	(0.457)
	Yes	1.337	1.581	1.361	1.518
		(0.652)	(0.634)	(0.562)	(0.491)
South/Southeast region	No	0.787	0.997	0.884	1.147
		(0.668)	(0.615)	(0.528)	(0.467)
	Yes	1.219	1.469	1.277	1.476
		(0.622)	(0.609)	(0.534)	(0.457)

Workers age 25-64 years old, non-rural Brazil.

Source PNAD.

Table 8: Decomposing Employability Changes over Time						
	1993-1998		1998-2003		2003-2008	
	(1)	(2)	(1)	(2)	(1)	(2)
E[Emp|t]	1.096		1.326		1.149	
	(0.008)		(0.006)		(0.004)	
E[Emp^{i}|t+1]	1.34	0.244	1.159	-0.167	1.376	0.227
	(0.007)	(0.01)	(0.004)	(0.008)	(0.004)	(0.006)
E[Emp^{ii}|t+1]	1.119	-0.221	1.372	0.213	1.229	-0.147
	(0.008)	(0.008)	(0.006)	(0.007)	(0.004)	(0.005)
E[Emp^{iii}|t+1]	1.047	-0.072	1.292	-0.08	1.142	-0.087
	(0.008)	(0.004)	(0.006)	(0.004)	(0.004)	(0.003)
E[Emp^{iv}|t+1]	1.065	0.018	1.313	0.021	1.157	0.015
	(0.008)	(0.002)	(0.006)	(0.002)	(0.004)	(0.002)
E[Emp|t+1]	1.326	0.261	1.149	-0.164	1.364	0.207
	(0.006)	(0.01)	(0.004)	(0.007)	(0.004)	(0.006)
E[Emp|t+1]-E[Emp|t]	0.23		-0.177		0.215	
	(0.009)		(0.007)		(0.005)	

Values in column (1) are described on first column. Each value on column (2) corresponds to the difference between the number on its left size and its above number (both from column (1)).

Standard errors estimated by bootstrap with 100 replications

Workers age 25-64 years old, non-rural Brazil.

Source PNAD.

Table A.1: Summary Statistics: Skill and Demographic Characteristics by year for employed workers

	1993	1998	2003	2008
Schooling years	6.313	6.892	7.622	8.468
	(4.459)	(4.443)	(4.437)	(4.372)
Experience (in years)	23.593	23.783	23.623	23.471
	(10.98)	(10.922)	(10.957)	(11.344)
Ever migrated	0.498	0.472	0.475	0.473
	(0.5)	(0.499)	(0.499)	(0.499)
Male	0.607	0.575	0.555	0.553
	(0.488)	(0.494)	(0.497)	(0.497)
White	0.596	0.587	0.556	0.51
	(0.491)	(0.492)	(0.497)	(0.5)
Household Head	0.613	0.588	0.571	0.531
	(0.487)	(0.492)	(0.495)	(0.499)
Age	37.42	37.818	37.952	38.289
	(9.424)	(9.426)	(9.483)	(9.759)
Metropolitan area	0.424	0.41	0.383	0.389
	(0.494)	(0.492)	(0.486)	(0.487)
Southeast	0.545	0.53	0.512	0.508
	(0.498)	(0.499)	(0.5)	(0.5)
South	0.171	0.17	0.162	0.155
	(0.377)	(0.375)	(0.368)	(0.362)
Northeast	0.179	0.186	0.197	0.203
	(0.383)	(0.389)	(0.398)	(0.402)
North	0.041	0.043	0.055	0.059
	(0.199)	(0.203)	(0.229)	(0.236)
Observations	42755	46768	58651	69072
Employment rate	94.0%	94.5%	93.7%	94.9%

Workers age 25-64 years old, non-rural Brazil.

Source PNAD.

Table A.2 - Definition of Occupational Groups	
Major group	Description
1	Legislators, senior officials and managers
2	Professionals
3	Technicians and associate professionals
4	Clerks
5	Service workers and shop and market sales workers
6	Skilled agricultural and fishery workers
7	Craft and related workers
8	Plant and machine operators and assemblers
9	Elementary occupations

Source: Muendler et al (2004)

Table A.3: Probit Regression Coefficients for the Probability of Being Employed by year for the entire workforce

	1993	1998	2003	2008
Schooling years	0.029***	0.025***	0.038***	0.036***
	(0.000)	(0.000)	(0.000)	(0.000)
Experience (in years)	-0.011***	-0.006***	-0.010***	-0.006***
	(0.000)	(0.000)	(0.000)	(0.000)
Ever migrated	-0.098***	-0.087***	-0.092***	-0.076***
	(0.001)	(0.001)	(0.001)	(0.001)
Male	0.832***	0.673***	0.736***	0.744***
	(0.001)	(0.001)	(0.001)	(0.001)
White	-0.063***	0.035***	0.072***	0.071***
	(0.001)	(0.001)	(0.001)	(0.001)
Household Head	0.325***	0.262***	0.206***	0.162***
	(0.001)	(0.001)	(0.001)	(0.001)
Age	-0.011***	-0.014***	-0.007***	-0.009***
	(0.000)	(0.000)	(0.000)	(0.000)
Metropolitan area	0.255***	0.059***	0.120***	0.094***
	(0.001)	(0.001)	(0.001)	(0.001)
Southeast region	0.007***	0.048***	-0.081***	-0.024***
	(0.002)	(0.002)	(0.002)	(0.002)
South region	-0.180***	-0.188***	-0.273***	-0.159***
	(0.002)	(0.002)	(0.002)	(0.002)
Northeast region	-0.163***	-0.108***	-0.163***	-0.195***
	(0.002)	(0.002)	(0.002)	(0.002)
North region	-0.123***	-0.095***	-0.043***	-0.081***
	(0.003)	(0.003)	(0.002)	(0.002)
Constant	1.728***	1.808***	1.532***	1.568***
	(0.003)	(0.003)	(0.003)	(0.003)
Observations	45,379	49,461	62,515	72,811

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Workers age 25-64 years old, non-rural Brazil.

Source PNAD.

Table A.4a (1993): Regression Coefficients of the Hedonic Model by year and occupational group for employed workers

Dependent variable: Log Hourly Wage									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Formal contract worker	0.192***	0.381***	0.287***	0.364***	0.348***	0.500***	0.417***	0.335***	0.284***
	(0.056)	(0.043)	(0.045)	(0.043)	(0.021)	(0.028)	(0.019)	(0.023)	(0.015)
Schooling years	0.121***	0.109***	0.089***	0.081***	0.079***	0.034***	0.070***	0.055***	0.059***
	(0.006)	(0.010)	(0.004)	(0.004)	(0.003)	(0.009)	(0.003)	(0.003)	(0.003)
Experience (in years)	-0.017	-0.005	0.011	0.003	0.010**	-0.003	0.006	0.008	0.004
	(0.012)	(0.009)	(0.007)	(0.006)	(0.004)	(0.012)	(0.006)	(0.005)	(0.003)
Experience squared	0.000	-0.000	-0.000	-0.000	-0.000**	-0.000	-0.000**	-0.000**	-0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ever migrated	0.127**	0.089	0.043*	0.099***	0.036**	-0.062**	0.007	0.011	0.011
	(0.054)	(0.091)	(0.025)	(0.023)	(0.018)	(0.031)	(0.017)	(0.016)	(0.015)
Male	0.419***	0.433***	0.338***	0.305***	0.279***	0.206	0.276***	0.387***	0.485***
	(0.061)	(0.061)	(0.034)	(0.034)	(0.031)	(0.199)	(0.079)	(0.033)	(0.051)
White	0.173***	0.327***	0.205***	0.147***	0.143***	0.060*	0.162***	0.111***	0.093***
	(0.060)	(0.076)	(0.028)	(0.029)	(0.018)	(0.033)	(0.018)	(0.018)	(0.014)
Age	0.113***	0.057***	0.038**	0.056***	0.026**	0.053**	0.019	0.029***	0.022***
	(0.028)	(0.021)	(0.017)	(0.015)	(0.010)	(0.021)	(0.012)	(0.011)	(0.008)
Age squared	-0.001***	-0.000*	-0.000*	-0.001***	-0.000**	-0.000*	-0.000	-0.000*	-0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Household Head	0.238***	0.194	0.134***	0.157***	0.121***	0.130***	0.247***	0.173***	0.088***
	(0.083)	(0.124)	(0.035)	(0.030)	(0.022)	(0.037)	(0.026)	(0.024)	(0.017)
Metropolitan area	0.228***	0.284***	0.216***	0.180***	0.164***	0.225***	0.126***	0.127***	0.221***
	(0.043)	(0.034)	(0.026)	(0.023)	(0.018)	(0.073)	(0.018)	(0.018)	(0.015)
South region	-0.151**	-0.221***	-0.103**	-0.135***	-0.045	-0.099*	-0.062*	0.013	-0.000
	(0.072)	(0.075)	(0.048)	(0.047)	(0.036)	(0.055)	(0.034)	(0.031)	(0.035)
Southeast region	-0.094	-0.026	-0.071	-0.100**	0.002	-0.078*	0.022	0.095***	-0.025
	(0.065)	(0.056)	(0.044)	(0.041)	(0.030)	(0.043)	(0.031)	(0.028)	(0.022)
Northeast region	-0.432***	-0.434***	-0.382***	-0.487***	-0.383***	-0.560***	-0.323***	-0.278***	-0.550***
	(0.074)	(0.074)	(0.062)	(0.048)	(0.033)	(0.050)	(0.041)	(0.039)	(0.035)
North region	-0.222**	0.006	-0.053	-0.106*	-0.065	-0.093	0.022	-0.060	-0.096***
	(0.091)	(0.084)	(0.062)	(0.060)	(0.041)	(0.064)	(0.042)	(0.044)	(0.034)
Weekly Hours	-0.014***	-0.010***	-0.013***	-0.027***	-0.017***	-0.010***	-0.017***	-0.013***	-0.018***
	(0.003)	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
Tenure (in months)	0.002***	0.001***	0.002***	0.003***	0.002***	-0.000**	0.002***	0.002***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pr(ocup)	1.681	1.447	1.468**	-4.775*	0.720*	0.033	0.890	2.166	-0.660
	(4.127)	(2.983)	(0.626)	(2.640)	(0.395)	(0.472)	(1.726)	(1.342)	(0.708)
Constant	-3.326	-2.536	-1.755***	4.702*	-0.797**	-0.670	-0.845	-2.329*	0.733
	(4.054)	(2.809)	(0.665)	(2.593)	(0.393)	(0.455)	(1.666)	(1.333)	(0.683)
Observations	1,845	2,450	3,621	4,101	6,276	1,909	6,239	5,542	8,728
R-squared	0.506	0.512	0.432	0.424	0.448	0.342	0.422	0.373	0.452

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Occupational Groups: 1 - Legislators, senior officials and managers; 2- Professionals; 3- Technicians and associate professionals; 4- Clerks; 5- Service workers and shop and market sales workers; 6- Skilled agricultural and fishery workers; 7- Craft and related workers; 8- Plant and machine operators and assemblers; 9- Elementary occupations. Source: Muendler et al (2004)

Workers age 25-64 years old, non-rural Brazil.

Source PNAD.

Table A.4b (1998): Regression Coefficients of the Hedonic Model by year and occupational group for employed workers

Dependent variable: Log Hourly Wage									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Formal contract worker	0.091**	0.237***	0.181***	0.163***	0.225***	0.294***	0.248***	0.219***	0.171***
	(0.046)	(0.033)	(0.034)	(0.032)	(0.016)	(0.024)	(0.016)	(0.020)	(0.012)
Schooling years	0.123***	0.182***	0.084***	0.076***	0.071***	0.039***	0.063***	0.053***	0.063***
	(0.006)	(0.016)	(0.004)	(0.004)	(0.003)	(0.007)	(0.003)	(0.003)	(0.003)
Experience (in years)	-0.006	-0.000	0.012*	0.005	0.013***	0.019	0.006	-0.012**	0.011***
	(0.011)	(0.008)	(0.007)	(0.005)	(0.004)	(0.012)	(0.006)	(0.006)	(0.003)
Experience squared	-0.000	0.000	-0.000**	-0.000	-0.000***	-0.000**	-0.000**	0.000	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ever migrated	0.073**	-0.086*	0.127***	0.063***	0.035**	-0.085***	0.013	0.040***	-0.013
	(0.036)	(0.045)	(0.027)	(0.023)	(0.015)	(0.025)	(0.015)	(0.014)	(0.013)
Male	0.394***	0.307***	0.258***	0.221***	0.308***	0.122	0.511***	0.425***	0.569***
	(0.049)	(0.039)	(0.041)	(0.025)	(0.026)	(0.136)	(0.052)	(0.021)	(0.043)
White	0.186***	0.144***	0.155***	0.184***	0.140***	0.088***	0.104***	0.115***	0.084***
	(0.055)	(0.038)	(0.025)	(0.021)	(0.015)	(0.024)	(0.016)	(0.019)	(0.012)
Age	0.078***	0.043**	0.040**	0.030**	0.026***	-0.006	0.034***	0.068***	0.012*
	(0.023)	(0.019)	(0.016)	(0.012)	(0.009)	(0.021)	(0.011)	(0.012)	(0.006)
Age squared	-0.001*	-0.001**	-0.000	-0.000*	-0.000**	0.000	-0.000*	-0.001***	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Household Head	0.198***	0.334***	0.170***	0.156***	0.116***	0.080***	0.198***	0.102***	0.117***
	(0.056)	(0.045)	(0.028)	(0.026)	(0.019)	(0.029)	(0.020)	(0.019)	(0.018)
Metropolitan area	0.204***	0.235***	0.224***	0.210***	0.199***	0.159*	0.126***	0.192***	0.221***
	(0.044)	(0.030)	(0.025)	(0.019)	(0.015)	(0.089)	(0.020)	(0.020)	(0.013)
South region	-0.015	-0.456***	-0.123**	-0.019	-0.011	-0.217***	0.069**	0.049*	-0.064*
	(0.060)	(0.100)	(0.056)	(0.038)	(0.027)	(0.053)	(0.028)	(0.029)	(0.034)
Southeast region	0.039	-0.277***	0.032	0.026	0.069***	-0.029	0.174***	0.112***	0.071***
	(0.054)	(0.084)	(0.041)	(0.032)	(0.024)	(0.039)	(0.025)	(0.028)	(0.017)
Northeast region	-0.277***	-0.602***	-0.349***	-0.334***	-0.381***	-0.406***	-0.223***	-0.193***	-0.360***
	(0.066)	(0.066)	(0.046)	(0.048)	(0.024)	(0.039)	(0.027)	(0.044)	(0.017)
North region	-0.008	-0.015	0.029	-0.083	-0.049	-0.075	-0.056	-0.073*	-0.098***
	(0.083)	(0.064)	(0.061)	(0.055)	(0.034)	(0.059)	(0.038)	(0.040)	(0.024)
Weekly Hours	-0.017***	-0.011***	-0.014***	-0.020***	-0.017***	-0.013***	-0.012***	-0.013***	-0.018***
	(0.002)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Tenure (in months)	0.001***	0.001***	0.002***	0.003***	0.002***	-0.000**	0.002***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pr(ocup)	1.898	-6.171***	9.566***	-2.094	-0.023	0.000	-1.811**	9.385***	-2.685***
	(1.605)	(1.810)	(3.259)	(3.197)	(0.490)	(0.360)	(0.727)	(2.788)	(0.590)
Constant	-2.799*	4.786***	-9.596***	2.398	0.142	0.752**	1.364**	-9.798***	2.947***
	(1.601)	(1.704)	(3.236)	(3.201)	(0.474)	(0.380)	(0.686)	(2.805)	(0.559)
Observations	1,965	2,954	3,539	4,470	7,829	1,744	6,216	5,623	10,412
R-squared	0.522	0.540	0.468	0.459	0.445	0.305	0.426	0.410	0.477

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Occupational Groups: 1 - Legislators, senior officials and managers; 2- Professionals; 3- Technicians and associate professionals; 4- Clerks; 5- Service workers and shop and market sales workers; 6- Skilled agricultural and fishery workers; 7- Craft and related workers; 8- Plant and machine operators and assemblers; 9- Elementary occupations. Source: Muendler et al (2004)

Workers age 25-64 years old, non-rural Brazil.

Source PNAD.

Table A.4c (2003): Regression Coefficients of the Hedonic Model by year and occupational group for employed workers

Dependent variable: Log Hourly Wage									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Formal contract worker	0.076*	0.239***	0.086***	0.168***	0.259***	0.389***	0.308***	0.350***	0.272***
	(0.040)	(0.025)	(0.021)	(0.025)	(0.015)	(0.021)	(0.015)	(0.015)	(0.009)
Schooling years	0.123***	0.143***	0.088***	0.115***	0.052***	0.028***	0.047***	0.051***	0.032***
	(0.005)	(0.009)	(0.003)	(0.004)	(0.003)	(0.005)	(0.002)	(0.003)	(0.002)
Experience (in years)	-0.004	-0.001	0.003	0.001	0.007**	-0.012	0.013**	0.003	-0.001
	(0.010)	(0.005)	(0.005)	(0.006)	(0.003)	(0.010)	(0.005)	(0.004)	(0.002)
Experience squared	-0.000	-0.000***	-0.000	-0.000	-0.000	0.000	-0.000**	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ever migrated	0.037	0.002	0.007	-0.002	0.032**	-0.011	0.010	0.023*	-0.008
	(0.032)	(0.062)	(0.033)	(0.026)	(0.014)	(0.023)	(0.014)	(0.012)	(0.009)
Male	0.322***	0.394***	0.364***	0.387***	0.286***	0.483***	0.251***	0.295***	0.306***
	(0.051)	(0.051)	(0.021)	(0.025)	(0.022)	(0.131)	(0.036)	(0.020)	(0.035)
White	0.201***	0.167***	0.170***	0.227***	0.102***	0.082***	0.114***	0.104***	0.080***
	(0.038)	(0.030)	(0.020)	(0.019)	(0.013)	(0.022)	(0.014)	(0.013)	(0.009)
Age	0.031	0.028**	0.036***	0.050***	0.024***	0.023	0.016	0.032***	0.020***
	(0.021)	(0.013)	(0.011)	(0.013)	(0.008)	(0.017)	(0.010)	(0.008)	(0.005)
Age squared	-0.000	-0.000	-0.000**	-0.000***	-0.000***	-0.000	-0.000	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Household Head	0.266***	0.209***	0.162***	0.208***	0.095***	0.041	0.137***	0.146***	0.036***
	(0.039)	(0.066)	(0.023)	(0.033)	(0.016)	(0.025)	(0.017)	(0.020)	(0.012)
Metropolitan area	0.159***	0.223***	0.176***	0.195***	0.139***	0.096	0.113***	0.120***	0.158***
	(0.036)	(0.022)	(0.032)	(0.022)	(0.014)	(0.064)	(0.015)	(0.015)	(0.008)
South region	-0.098*	-0.129***	-0.081**	-0.199***	-0.040	-0.306***	-0.027	-0.015	0.022
	(0.055)	(0.040)	(0.036)	(0.034)	(0.027)	(0.050)	(0.023)	(0.024)	(0.016)
Southeast region	0.044	-0.033	-0.025	-0.123***	-0.017	-0.131***	0.044**	-0.000	0.055***
	(0.058)	(0.034)	(0.031)	(0.032)	(0.021)	(0.033)	(0.021)	(0.018)	(0.012)
Northeast region	-0.286***	-0.400***	-0.438***	-0.477***	-0.383***	-0.476***	-0.310***	-0.301***	-0.322***
	(0.055)	(0.043)	(0.095)	(0.036)	(0.032)	(0.037)	(0.028)	(0.026)	(0.014)
North region	-0.047	-0.120*	-0.141***	-0.248***	-0.204***	-0.085**	-0.103***	-0.099***	-0.056***
	(0.064)	(0.063)	(0.034)	(0.046)	(0.029)	(0.039)	(0.026)	(0.024)	(0.017)
Weekly Hours	-0.014***	-0.011***	-0.016***	-0.015***	-0.017***	-0.009***	-0.016***	-0.008***	-0.017***
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)
Tenure (in months)	0.002***	0.001***	0.002***	0.002***	0.002***	0.000*	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pr(ocup)	-0.699	-1.096	-4.459	-5.399**	-1.330	-0.625*	1.363	-0.641	-0.352
	(1.835)	(2.251)	(4.345)	(2.205)	(1.111)	(0.347)	(1.115)	(1.111)	(0.297)
Constant	0.305	0.216	4.277	4.526**	1.593	0.659**	-1.014	0.314	0.780***
	(1.787)	(2.106)	(4.272)	(2.171)	(1.082)	(0.311)	(1.092)	(1.100)	(0.268)
Observations	2,289	4,040	6,474	5,301	7,785	2,439	7,035	7,450	13,513
R-squared	0.524	0.560	0.416	0.495	0.396	0.339	0.413	0.385	0.444

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Occupational Groups: 1 - Legislators, senior officials and managers; 2- Professionals; 3- Technicians and associate professionals; 4- Clerks; 5- Service workers and shop and market sales workers; 6- Skilled agricultural and fishery workers; 7- Craft and related workers; 8- Plant and machine operators and assemblers; 9- Elementary occupations. Source: Muendler et al (2004)

Workers age 25-64 years old, non-rural Brazil.

Source PNAD.

Table A.4d (2008): Regression Coefficients of the Hedonic Model by year and occupational group for employed workers

Dependent variable: Log Hourly Wage									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Formal contract worker	0.035	0.236***	0.125***	0.132***	0.253***	0.403***	0.271***	0.279***	0.251***
	(0.037)	(0.022)	(0.019)	(0.023)	(0.013)	(0.023)	(0.013)	(0.014)	(0.008)
Schooling years	0.115***	0.250***	0.078***	0.103***	0.046***	0.027***	0.036***	0.040***	0.025***
	(0.005)	(0.020)	(0.004)	(0.004)	(0.002)	(0.004)	(0.002)	(0.002)	(0.001)
Experience (in years)	0.009	-0.000	-0.001	0.001	0.012***	-0.007	0.002	0.000	-0.002
	(0.008)	(0.007)	(0.004)	(0.004)	(0.003)	(0.007)	(0.003)	(0.004)	(0.002)
Experience squared	-0.000*	-0.000	-0.000	-0.000	-0.000***	-0.000	-0.000	-0.000**	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ever migrated	0.028	-0.045	0.053*	0.066***	-0.008	0.007	0.017	0.032**	0.001
	(0.032)	(0.035)	(0.027)	(0.017)	(0.011)	(0.023)	(0.011)	(0.014)	(0.008)
Male	0.351***	0.399***	0.329***	0.356***	0.301***	0.273**	0.391***	0.364***	0.231***
	(0.035)	(0.026)	(0.015)	(0.021)	(0.021)	(0.108)	(0.019)	(0.029)	(0.033)
White	0.243***	0.203***	0.142***	0.179***	0.065***	0.048**	0.095***	0.070***	0.046***
	(0.046)	(0.022)	(0.016)	(0.017)	(0.011)	(0.024)	(0.013)	(0.012)	(0.008)
Age	0.026	0.033**	0.022**	0.044***	0.003	0.029**	0.029***	0.022***	0.018***
	(0.018)	(0.014)	(0.010)	(0.010)	(0.007)	(0.015)	(0.008)	(0.007)	(0.005)
Age squared	-0.000	-0.000**	-0.000	-0.000**	0.000	-0.000	-0.000***	-0.000	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Household Head	0.145***	0.317***	0.111***	0.121***	0.074***	0.038	0.080***	0.086***	0.023***
	(0.035)	(0.037)	(0.016)	(0.022)	(0.013)	(0.026)	(0.016)	(0.024)	(0.009)
Metropolitan area	0.146***	0.338***	0.132***	0.134***	0.086***	0.070	0.035***	0.081***	0.111***
	(0.030)	(0.038)	(0.019)	(0.016)	(0.011)	(0.073)	(0.011)	(0.012)	(0.007)
South region	-0.161***	-0.234***	-0.177**	-0.089***	0.022	-0.165***	0.024	-0.007	0.040***
	(0.049)	(0.033)	(0.074)	(0.027)	(0.020)	(0.060)	(0.019)	(0.019)	(0.015)
Southeast region	-0.142***	-0.212***	-0.156	-0.074***	-0.028*	-0.129***	0.070***	0.023	0.017
	(0.046)	(0.037)	(0.098)	(0.024)	(0.016)	(0.036)	(0.016)	(0.020)	(0.011)
Northeast region	-0.398***	-0.368***	-0.293***	-0.362***	-0.314***	-0.505***	-0.301***	-0.312***	-0.301***
	(0.066)	(0.036)	(0.062)	(0.027)	(0.022)	(0.036)	(0.021)	(0.021)	(0.013)
North region	-0.202***	0.060	-0.182***	-0.174***	-0.149***	-0.175***	-0.117***	-0.088***	-0.098***
	(0.065)	(0.050)	(0.063)	(0.031)	(0.022)	(0.050)	(0.021)	(0.021)	(0.013)
Weekly Hours	-0.014***	-0.007***	-0.016***	-0.017***	-0.017***	-0.010***	-0.017***	-0.011***	-0.016***
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)
Tenure (in months)	0.002***	0.001***	0.002***	0.002***	0.001***	-0.000**	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pr(ocup)	-4.699	-10.853***	9.289	-1.477	-1.021	-0.181	-0.484	-4.454	0.005
	(4.182)	(2.241)	(9.973)	(1.550)	(0.883)	(0.353)	(1.539)	(4.096)	(0.279)
Constant	4.542	7.812***	-8.641	1.113	1.883**	0.559	0.937	4.693	0.766***
	(4.135)	(1.942)	(9.813)	(1.512)	(0.870)	(0.343)	(1.525)	(4.010)	(0.252)
Observations	2,863	5,068	7,704	6,253	9,729	2,199	9,104	9,082	14,978
R-squared	0.458	0.472	0.370	0.484	0.395	0.342	0.375	0.361	0.386

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Occupational Groups: 1 - Legislators, senior officials and managers; 2- Professionals; 3- Technicians and associate professionals; 4- Clerks; 5- Service workers and shop and market sales workers; 6- Skilled agricultural and fishery workers; 7- Craft and related workers; 8- Plant and machine operators and assemblers; 9- Elementary occupations. Source: Muendler et al (2004)

Workers age 25-64 years old, non-rural Brazil.

Source PNAD.

Table A.5a: Multinomial Logit Regression Coefficients for the entire workforce - 1993								
	2	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Schooling years	0.237***	-0.106***	-0.090***	-0.345***	-0.629***	-0.457***	-0.433***	-0.530***
	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)
Experience (in years)	-0.055***	-0.015***	-0.025***	-0.004***	0.080***	0.022***	0.007***	0.012***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ever migrated	-0.052***	0.019***	-0.100***	-0.071***	-0.062***	-0.067***	-0.019***	-0.096***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
White	-0.564***	-0.625***	-0.535***	-0.690***	-0.983***	-0.963***	-0.717***	-1.099***
	(0.004)	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.003)
Male	-0.916***	-0.374***	-1.048***	-0.748***	-0.256***	1.735***	0.515***	-1.417***
	(0.004)	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)	(0.003)
Age	-0.097***	-0.067***	-0.149***	-0.168***	-0.309***	-0.152***	-0.011***	-0.174***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Age squared	0.002***	0.001***	0.002***	0.002***	0.003***	0.001***	-0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Household Head	-0.423***	-0.302***	-0.460***	-0.502***	-1.194***	-0.464***	-0.143***	-0.320***
	(0.004)	(0.004)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)	(0.003)
Metropolitan area	-0.205***	-0.007***	0.060***	0.100***	-1.786***	-0.074***	-0.106***	0.089***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.003)
Northeast region	0.370***	0.331***	0.302***	0.090***	0.174***	0.243***	-0.029***	-0.058***
	(0.007)	(0.006)	(0.006)	(0.006)	(0.007)	(0.006)	(0.006)	(0.006)
Southeast region	0.386***	0.545***	0.516***	0.192***	0.550***	0.699***	0.682***	0.526***
	(0.006)	(0.006)	(0.006)	(0.005)	(0.006)	(0.006)	(0.005)	(0.005)
South region	0.345***	0.533***	0.577***	0.238***	0.999***	1.220***	0.859***	0.699***
	(0.007)	(0.006)	(0.006)	(0.006)	(0.007)	(0.006)	(0.006)	(0.006)
North region	0.434***	0.299***	0.212***	0.028***	0.204***	0.109***	0.094***	-0.071***
	(0.009)	(0.009)	(0.009)	(0.008)	(0.009)	(0.009)	(0.009)	(0.008)
Constant	0.789***	3.981***	6.339***	9.285***	11.979***	7.438***	5.422***	10.765***
	(0.028)	(0.025)	(0.025)	(0.024)	(0.027)	(0.025)	(0.025)	(0.025)
Observations	45,379	45,379	45,379	45,379	45,379	45,379	45,379	45,379

Baseline occuparional group: Group 1

*** p<0.01, ** p<0.05, * p<0.1

Occupational Groups: 1 - Legislators, senior officials and managers; 2- Professionals; 3- Technicians and associate professionals; 4- Clerks; 5- Service workers and shop and market sales workers; 6- Skilled agricultural and fishery workers; 7- Craft and related workers; 8- Plant and machine operators and assemblers; 9- Elementary occupations. Source: Muendler et al (2004)

Workers age 25-64 years old, non-rural Brazil.

Source PNAD.

Table A.5b: Multinomial Logit Regression Coefficients for the entire workforce - 1998								
	2	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Schooling years	0.236***	-0.087***	-0.102***	-0.359***	-0.656***	-0.476***	-0.424***	-0.524***
	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)
Experience (in years)	-0.033***	0.003***	-0.010***	0.006***	0.103***	0.035***	0.023***	0.027***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ever migrated	0.035***	0.045***	-0.106***	0.004	-0.085***	0.049***	0.070***	-0.007***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
White	-0.326***	-0.487***	-0.352***	-0.548***	-0.908***	-0.769***	-0.589***	-0.907***
	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Male	-0.786***	-0.380***	-1.048***	-0.567***	0.027***	2.008***	0.758***	-1.338***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)	(0.003)	(0.003)
Age	-0.016***	0.012***	-0.061***	-0.101***	-0.239***	-0.038***	0.043***	-0.059***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Age squared	0.000***	-0.000***	0.000***	0.001***	0.001***	-0.001***	-0.001***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Household Head	-0.411***	-0.168***	-0.404***	-0.462***	-1.001***	-0.453***	-0.094***	-0.260***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.003)
Metropolitan area	-0.094***	0.269***	0.140***	0.170***	-1.757***	-0.072***	-0.116***	0.127***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.003)
Northeast region	0.178***	-0.053***	-0.016***	-0.145***	0.245***	0.058***	-0.107***	-0.208***
	(0.006)	(0.006)	(0.006)	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)
Southeast region	0.241***	0.361***	0.414***	0.229***	0.462***	0.570***	0.696***	0.308***
	(0.006)	(0.005)	(0.005)	(0.005)	(0.006)	(0.005)	(0.005)	(0.005)
South region	0.130***	0.275***	0.287***	0.108***	0.697***	0.792***	0.772***	0.291***
	(0.006)	(0.006)	(0.006)	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)
North region	0.190***	0.078***	0.144***	0.197***	0.450***	0.035***	0.265***	-0.165***
	(0.009)	(0.009)	(0.008)	(0.008)	(0.009)	(0.008)	(0.008)	(0.008)
Constant	-0.999***	2.027***	4.657***	8.078***	10.347***	5.212***	4.007***	8.702***
	(0.025)	(0.023)	(0.023)	(0.022)	(0.026)	(0.023)	(0.023)	(0.022)
Observations	49,461	49,461	49,461	49,461	49,461	49,461	49,461	49,461

Baseline occuparional group: Group 1

*** p<0.01, ** p<0.05, * p<0.1

Occupational Groups: 1 - Legislators, senior officials and managers; 2- Professionals; 3- Technicians and associate professionals; 4- Clerks; 5- Service workers and shop and market sales workers; 6- Skilled agricultural and fishery workers; 7- Craft and related workers; 8- Plant and machine operators and assemblers; 9- Elementary occupations. Source: Muendler et al (2004)

Workers age 25-64 years old, non-rural Brazil.

Source PNAD.

Table A.5c: Multinomial Logit Regression Coefficients for the entire workforce - 2003								
	2	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Schooling years	0.339***	-0.046***	-0.032***	-0.279***	-0.586***	-0.366***	-0.381***	-0.465***
	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)
Experience (in years)	-0.046***	-0.012***	-0.016***	0.001***	0.115***	0.025***	0.009***	0.023***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ever migrated	-0.022***	-0.029***	-0.091***	-0.082***	-0.110***	0.033***	-0.003	-0.069***
	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)
White	-0.237***	-0.197***	-0.050***	-0.274***	-0.681***	-0.432***	-0.301***	-0.655***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Male	-0.823***	-0.281***	-0.782***	-0.816***	-0.035***	1.285***	0.907***	-1.561***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Age	0.039***	0.001	-0.013***	-0.049***	-0.250***	0.005***	0.028***	-0.033***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Age squared	-0.000	-0.000***	-0.000***	0.000***	0.001***	-0.001***	-0.001***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Household Head	-0.272***	-0.034***	-0.084***	-0.148***	-0.701***	-0.051***	-0.054***	-0.010***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Metropolitan area	-0.030***	0.084***	0.215***	0.216***	-1.786***	-0.036***	-0.228***	0.248***
	(0.003)	(0.002)	(0.002)	(0.002)	(0.004)	(0.002)	(0.002)	(0.002)
Northeast region	0.339***	0.214***	0.219***	0.191***	1.122***	0.204***	0.120***	0.146***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.005)	(0.005)	(0.005)
Southeast region	0.194***	0.310***	0.270***	0.207***	0.793***	0.610***	0.420***	0.312***
	(0.005)	(0.004)	(0.004)	(0.004)	(0.005)	(0.004)	(0.004)	(0.004)
South region	0.097***	0.349***	0.090***	0.198***	1.155***	0.953***	0.465***	0.194***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.005)	(0.005)	(0.005)
North region	0.202***	0.073***	-0.050***	0.070***	0.644***	0.131***	0.069***	0.055***
	(0.007)	(0.006)	(0.007)	(0.006)	(0.007)	(0.007)	(0.006)	(0.006)
Constant	-3.475***	2.015***	2.324***	5.885***	9.592***	3.710***	3.894***	7.658***
	(0.023)	(0.020)	(0.021)	(0.020)	(0.022)	(0.021)	(0.020)	(0.020)
Observations	62,515	62,515	62,515	62,515	62,515	62,515	62,515	62,515

Baseline occuparional group: Group 1

*** p<0.01, ** p<0.05, * p<0.1

Occupational Groups: 1 - Legislators, senior officials and managers; 2- Professionals; 3- Technicians and associate professionals; 4- Clerks; 5- Service workers and shop and market sales workers; 6- Skilled agricultural and fishery workers; 7- Craft and related workers; 8- Plant and machine operators and assemblers; 9- Elementary occupations. Source: Muendler et al (2004)

Workers age 25-64 years old, non-rural Brazil.

Source PNAD.

Table A.5d: Multinomial Logit Regression Coefficients for the entire workforce - 2008								
	2	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Schooling years	0.434***	-0.042***	-0.058***	-0.307***	-0.579***	-0.396***	-0.394***	-0.464***
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Experience (in years)	-0.048***	-0.021***	-0.019***	0.003***	0.108***	0.028***	0.020***	0.017***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ever migrated	-0.022***	-0.095***	-0.114***	-0.151***	-0.281***	-0.068***	-0.059***	-0.142***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
White	-0.304***	-0.266***	-0.168***	-0.392***	-0.777***	-0.566***	-0.522***	-0.777***
	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)
Male	-0.828***	-0.307***	-0.791***	-0.906***	-0.060***	1.367***	1.039***	-1.447***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)
Age	-0.059***	-0.055***	-0.061***	-0.079***	-0.278***	-0.060***	-0.047***	-0.018***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Age squared	0.001***	0.001***	0.001***	0.001***	0.002***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Household Head	-0.157***	-0.089***	-0.136***	-0.184***	-0.546***	-0.154***	-0.182***	-0.058***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)
Metropolitan area	0.124***	0.225***	0.201***	0.213***	-2.119***	-0.041***	-0.129***	0.187***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.004)	(0.002)	(0.002)	(0.002)
Northeast region	0.331***	-0.007*	-0.011**	-0.064***	0.944***	-0.016***	0.117***	-0.032***
	(0.005)	(0.004)	(0.004)	(0.004)	(0.005)	(0.004)	(0.004)	(0.004)
Southeast region	0.147***	0.162***	0.104***	0.059***	0.604***	0.425***	0.357***	0.045***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)	(0.004)	(0.004)	(0.004)
South region	0.199***	0.247***	0.209***	0.179***	0.788***	0.761***	0.600***	0.145***
	(0.005)	(0.004)	(0.005)	(0.004)	(0.005)	(0.004)	(0.004)	(0.004)
North region	0.272***	-0.086***	-0.055***	-0.047***	0.252***	-0.158***	-0.037***	-0.111***
	(0.006)	(0.005)	(0.006)	(0.005)	(0.006)	(0.005)	(0.005)	(0.005)
Constant	-3.045***	3.179***	3.708***	7.175***	10.642***	5.801***	5.804***	7.802***
	(0.020)	(0.018)	(0.018)	(0.017)	(0.021)	(0.018)	(0.018)	(0.017)
Observations	72,811	72,811	72,811	72,811	72,811	72,811	72,811	72,811

Baseline occuparional group: Group 1

*** p<0.01, ** p<0.05, * p<0.1

Occupational Groups: 1 - Legislators, senior officials and managers; 2- Professionals; 3- Technicians and associate professionals; 4- Clerks; 5- Service workers and shop and market sales workers; 6- Skilled agricultural and fishery workers; 7- Craft and related workers; 8- Plant and machine operators and assemblers; 9- Elementary occupations. Source: Muendler et al (2004)

Workers age 25-64 years old, non-rural Brazil.

Source PNAD.

WORKING PAPER 8/2012 • OCT, 2012 •