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Are Informal Workers Secondary Workers?: Evidence for Argentina

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Abstract

Empirical studies attempting at testing dualism in developing countries often rely on an ex-ante definition of the primary and the secondary sector. Many times this methodology causes biases in the estimation due to sample selection problems. Also, such definitions may be arbitrary sometimes. We use twenty seven years of Household Data in order to test for the existence dual labor markets in Argentina. We estimated an endogenous switching model with unknown regime without defining ex-ante sector attachment. We find evidence of dualism for both periods analyzed. However, the differences between the two sectors have significantly changed over time. Finally, our estimations also corroborate the fact that using the usual ex-ante definition of sector attachment may not be adequate for testing dualism.

1 Introduction

The literature on labor market segmentation and dualism claims that labor markets can be characterized by the existence of two sectors and a rationing mechanism that prevents some workers from entering one sector by non economic barriers. One of the sectors is called "primary sector" in which individuals enjoy higher wages and returns to schooling, longer

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[‡]Data available for replication

tenure and on the job training. The other is named "secondary sector" where wages, returns to schooling, on the job training and tenure are much lower. Moreover, there are some non economic barriers that prevent some of the secondary workers from obtaining primary jobs.

In this sense, such literature is seen as a departure from classical human capital theory where individuals in low paid jobs are considered low productivity workers unwilling to acquire the necessary skills to access better paid jobs. Such individuals may also be unable to acquire such skills due to market imperfections, credit constraints, etc. The principal policy implication of human capital theory is that individuals should have all the tools and incentives available in order to acquire more skills.

In contrast, dual market supporters state that high wage jobs in the primary sector are rationed, and some groups -women, minorities, young workers, etc. - may face non-economic barriers to the entry. If labor markets behave in such way, then training will not eliminate barriers to access to primary sector jobs. In this case, the most direct policy implication would be the provision of income maintenance programs for groups facing rationing. [1]

Finally, another assertion of dual market supporters is that dualism fits the main features of labor markets in developing countries. Testing whether labor markets are segmented or if they behave according to human capital theory is important, since the policy implications for classical human capital theory and dualism differ.

However, such tests are difficult, since they involve proving the existence of two different wage setting mechanisms and barriers to the access to primary sector jobs. There are different approaches for testing dualism: one based on analysis of job-factor characteristics, a second one based on an ex ante definition of sectors and estimation of different wage equations and a third one, where the sector attachment of the worker is not observed but estimated.

The first two approaches have been used extensively both in developed and developing countries. For the case of developing countries, most of the existing work relies on the first two methodologies. When the testing method depends on an a priori definition of the worker's sector, the definition of primary and secondary sector adopted is of great

[1] In the most recent literature about dualism, there is some scope for training and minimizing the extent of the secondary sector, but the main policy implication mentioned above remains valid.

importance for two reasons: in terms of policy implications and because of the bias in the estimation which may arise as a consequence of using a definition which does not match primary and secondary jobs.

The distinction between workers in each sector differs according to different authors. For example, for some developing countries, primary workers are sometimes defined as the ones working in capital intensive sectors while secondary workers are those working in labor intensive jobs as agriculture. In others, like some of the biggest Latin American countries for example, primary jobs tend to be associated with stable employment, bigger firms and the industrial sector. Secondary jobs tend to be concentrated in smaller establishments, generally associated with the underground economy. The former jobs are sometimes labeled as "formal" jobs, while the latter are labeled as "informal".

However, the fact that more low paid workers are concentrated in specific sectors of the economy is not enough to justify that all workers employed in that sector are informal. For example, while construction workers are generally low paid workers in developing countries and can be regarded as secondary workers, the claim that all workers in the construction sector are secondary workers is difficult to sustain.

Argentina represents an ideal case to test the hypothesis of dualism due to three reasons. First, as a developing country and according to dualism's claims, it should fit the dual labor market features. Secondly, its labor market has suffered major transformations in the last decade, so we can inquire about the change in the structure of labor markets and look at what happened to the size of the secondary sector. Finally, there are Household Surveys available for almost three decades with information that allows us to identify workers with lower wages as well as other individual characteristics which could, in principle, be regarded as secondary workers. The survey has information whether the worker is paid social security benefits by its employer (social security benefits include health benefits, pensions, insurance against working hazard, etc.). Enjoying such benefits is highly correlated with the fact that the employer is operating in the underground economy or not, and in principle, could be used as an indicator for an a priori definition of being in the primary sector. Henceforth, we will address the workers who enjoy social security benefits as "formal workers" and "informal" the ones who do not.

This paper attempts at testing the existence of dualism, i.e.: the existence of two wage setting mechanisms and evidence of rationing in the access to jobs in the primary sector, the evolution of primary and secondary sectors over time and finally, whether informal workers can be considered secondary workers.

Using micro data for the main urban area of Argentina between 1975 and 2001, we estimate an endogenous switching model with unknown regimes and then address the problem of rationing. Our results suggest that there is evidence of dualism for the different subperiods considered and that the size of the secondary sector changed over time. Finally we show that there exists some degree of correlation between informal workers and secondary workers, but not all informal workers can be considered secondary workers, which supports the idea that dualism should not be tested using an a priori definition of sectors.

It represents a contribution to the existing literature about dualism in developing countries, both by addressing the issue of rationing and by circumventing the problem of using an a priori definition of sector attachment. Moreover, it provides some insights useful for policy implications.

The paper is structured as follows: section 2 presents a literature review, section 3 presents a test for the existence of dual labor markets in Argentina. Sections 4 and 5 present the description of the data and the estimation procedure respectively. Section 6 presents the results and finally Section 7 concludes.

2 Literature review

Literature on dualism and labor market segmentation is vast both in empirical and theoretical terms. In what follows we focus on the one that is most relevant for this paper. We make a summary of the empirical literature, for the US and also for developing countries.[2] We also make some brief mention to theoretical models which generate a dual economy and may have interesting testable implications.

Literature on dualism started with the seminal work of Doeringer and Piore (1971). The main idea of the authors is the existence of an administrative unit, firm or plant called

[2]For a complete survey of empirical work on dual labor markets, see Dickens and Lang (1992). A summary of theoretical models addressing dualism appears in Saint Paul (1996).

"internal labor market", where both price and allocation of labor is dictated by a set of rules and procedures which can be distinguished from the ones ruling conventional economic theory. Access to internal labor markets is not always available to workers in external labor markets due to the existence of rigidities in the rules governing the pricing and allocation of labor within them. Such rigidities make internal labor markets to have a different dynamic from the one predicted by conventional economic theory. According to the authors internal labor markets "can provide a more efficient form of market organization than competitive markets whenever fixed labor costs and economies of recruitment, screening and training are present". Internal labor markets correspond to what the authors called "primary sector"employment, with high wages, stable employment and on the job training. In contrast, there are other jobs outside internal labor markets called "secondary sector"jobs which are characterized by low wages, bad working conditions, and unstable employment. One key element of their theory is the fact that rationing exists in the primary sector and, in the case of the US, some minorities, women and blacks can be segregated.

After the original work on dualism, literature evolved theoretically and empirically. As far as theoretical models are concerned, dualism was explained by modeling deviations from market clearing which could give rise to it. The basic model explaining dualism is an extension from the Shapiro and Stiglitz (1984) model of efficiency wages. In the Shapiro and Stiglitz model firms pay workers above marginal product of labor because monitoring technology is costly. Wages are higher than marginal product in order for the firm to elicit work effort from their employees. At the market wage level, workers "*shirk*". The higher penalty that a firm can impose on a worker is firing him, the higher the wage, the higher the cost of losing the job will be. If market cleared, the cost of losing a job to the worker would be zero and he would immediately find another job at the same wage. In their efficiency wage model, Shapiro and Stiglitz show that there is involuntary unemployment, since unemployed workers cannot underbid employed ones, the employer knows that they would shirk if paid below efficiency wage levels.

The modification of the basic efficiency wage model in order to account for dualism is done by Bulow and Summers (1986) by extending it to a two sector model, one with monitoring costs -sector one or primary sector- and another one without them -sector 2 or

secondary. While the latter will pay competitive wages, the former one will pay a wage above market clearing level, for the same reasons of the efficiency wage model. To workers, the value of being in the secondary sector equals the value of being unemployed. In this sense, Bulow and Summers do not generate involuntary unemployment, but workers in sector 2 would like to be employed in the primary sector but cannot bid down wages. In equilibrium, wages in sector 1 are higher than wages in sector 2. While jobs in sector 1 are rationed, jobs in sector 2 are not. Moreover, if wages are correlated with some observable characteristics of the workers which are uncorrelated to productivity (women, young workers, workers with higher turnover, etc.), equally productive workers can be allocated in the primary or secondary sector arbitrarily.

The dual model of Bulow and Summers is then extended by Saint-Paul (1996), who collects all the theoretical models which explain the coexistence of "good" (primary sector) and "bad" (secondary sector) jobs within the same economy. Saint-Paul adds a firing cost structure to the Bulow and Summers model and shows that in the presence of firing costs for primary sector workers, the existence of a secondary sector provides "flexibility to the economy". Dualism arises endogenously within the firms in response to demand fluctuations.

In terms of empirical work attempting at testing dualism we can identify two different kind of studies. While one of them assumes that workers in the secondary sector can be identified, the other considers they cannot.

Initially, most analysis took the first approach, either by analyzing job or workers characteristics or by calculating interindustry or inter-occupation wage differentials. Dickens and Katz (1987) survey the existing literature on wage differentials which look at wage premia across industries and also provide their own evidence of such differential, finding correlation of certain attributes such as low wages and bad working conditions. Another set of studies aims at studying the existence of different wage setting mechanisms (Osterman (1976), Wright (1979) and Heckman and Hotz (1986)). As mentioned above, all these studies rely on an ex-ante definition of primary or secondary sectors. In general most of the studies based in an ex-ante definition of primary and secondary sector generally conclude that there are different wage setting mechanisms, some of them could fit the description of

primary jobs, and some others, the secondary one. However, none of this studies provide a sound proof of dualism claims, since the issue of rationing is not present. Two wage setting mechanisms may be consistent with classical human capital theory if rationing does not exist and individuals are free to move from one sector to another. The fact that is more difficult to reconcile with human capital theory is the existence of rationing in jobs in the primary sector, i.e. individuals who would like to work in the primary sector cannot find jobs in it. Finally, an ex-ante definition of sector attachment also presents some potential problems we explain next.

The second approach for testing dualism does not rely on an ex ante definition of sector attachment. The first work of such kind is Dickens and Lang (1985). They state that an ex-ante division of the sample brings about two potential problems. First, the problem of sample selection, since the choice of occupation is not independent of unmeasured characteristics. Second, assuming that all employees within a given industry are either in the primary or in the secondary sector can also generate biases. For example, while fast food chains in the US are associated with secondary employment, it is difficult to argue that top managers in such sector are secondary workers. Their research is innovative in two senses: first the probability of being in each sector is estimated, and second, a test of rationing is conducted.

Dickens and Lang found evidence of segmentation, with a flat wage profile for the secondary sector, i.e.: no returns to education or to experience. They also prove the existence of rationing, showing that workers in SMSA, married, highly educated and white are less likely to work in the secondary sector.

After Dickens and Lang (1985) developed its testing methodology, this methodology has been partially applied to some other countries, but the issue of rationing is often neglected.

The issue of rationing is important, since one of the striking facts about the so called confrontation between classical human capital theory and segmentation is that it implies that when markets do not clear the access to some specific sectors is subject to non price rationing. Yet it is striking that most of the test trying to address the presence of segmentation do not address the rationing issue. Job rationing in the primary sector jobs mean that there are individuals queuing for such jobs.

The existence of two wage setting mechanisms without knowing sector attachment is explored later for the case of Chile by Basch and Paredes (1996). One of the main problems in their analysis is that it does not include any test of rationing and while sector attachment is estimated it is assumed to be uncorrelated with wage setting mechanisms, which may induce biases, since unobserved heterogeneity affecting wage equations in either one or the other sector are probably correlated with the probability of being in such sector.

Huguet Roig (1999) addressed the segmentation issue for Spain, by estimating an endogenous switching model with unknown regime. She finds evidence of two wage setting mechanisms for the case of Spain, but she makes no reference to the existence of rationing. She also provides an accurate account of most of the recent empirical studies trying to test dualism.

For the specific case of Argentina, Pratap and Quintin (2003), use Household data for Argentina from 1993-1995 in order to evaluate semi-parametrically the hypothesis that informal workers should expect higher wages in the formal sector. In order to account for some of the problems which may be present in parametric estimation -such as sample selection or model specification- they estimate a matching estimator and then a D-I-D estimator. They rely on an ex ante definition of sectors, matching formal workers to workers in the primary sector and informal workers to secondary ones.[3]. They find negative wage premium for the formal (after controlling for personal characteristics) and cannot reject the hypothesis of competitive markets. However, such wage premium is not directly related to dualism but more to the problem of social security valuation. Finally, they do not address whether there is any barrier to mobility between sectors or the existence of rationing.

3 A formal test for dualism in Argentina

3.1 Brief characterization of Labor Markets in Argentina

Argentina labor markets suffered major transformations during the last decade. Such transformations were the consequence of profound changes in its economy since 1991, when a stabilization plan together with a huge effort to reform and modernize the state were in-

[3]The same definition of formal and informal workers mentioned in the introduction applies here.

troduced. The country had a long history of macroeconomic instability with high inflation (including two hyperinflation episodes in the late 80's), huge budget deficits, very rigid regulations in the labor markets[4], high real wage volatility, etc.[5] However, unemployment was low due to the fact that low wage employment in the public sector was an important proportion of total employment, accounting for almost 30% of total employment in some regions.

In 1991 a major stabilization plan was introduced, establishing a currency board which pegged the currency to the US dollar. This stabilization plan was followed by trade liberalization, an ambitious privatization program and privatization of the Social Security System. The results were impressive in terms of inflation as it can be observed in Figure 1. Also, the program showed initial success in terms of GDP growth. However, labor markets started showing new features that had been unknown in the country. One of them was a sharp increase in unemployment together with an increase in labor informality, as shown in Figures 2 and 3. We can divide our 1975-2001 data sample in two clear different periods according to the evolution of labor markets. One with low unemployment and low informality which lasts until 1991, and a second one of high unemployment and informality starting in 1992.

3.2 Hypothesis

We want to test two different things:

- the hypothesis that labor markets behave differently in 1975-1991 and from 1992 afterwards, more specifically, they behave as competitive markets in the first period and start fitting dual market claims in the second period.

- whether informal workers, as defined for Argentina, can be considered secondary workers.

In order to test our first hypothesis, we must show the existence of two different wage setting mechanisms, or two wage equations, one for the primary sector with higher returns

[4]Taxes on labor amount 30% of wages, firing cost are very high and accidents in the labor place are costly to the employer because they can be taken to civil courts, where the amount of the compensation has no monetary limit.

[5]Menendez (1999) provides a good account of wage evolution for Argentina.

to schooling, experience and tenure and one for the secondary sector, with lower (or even statistically insignificant) returns to education and experience. Secondly, we have to conduct a rationing test. Lastly, we must measure the degree of correlation between informal jobs and jobs in the secondary sector.

4 Dataset

We used the Permanent Household Survey (PHS) conducted by the National Institute of Statistics and Census (INDEC) for the period 1975-2001. For all the years except for the 1975-1980 period there are two surveys (May-October) per year. Our sample is restricted to the City of Buenos Aires and Greater Buenos Aires area (GBA), since this is the only area where data is available since 1975. The area considered is the biggest Argentine urban area, comprising 34% of population and generating 60% of total income.

The sample is a cross-section until 1994 and a rotating panel afterwards. Working with such a long data span presents both advantages and drawbacks. The main one is the tradeoff between the number of years available to test our model and the quality of data available for each year. On one hand, it allows us to test the model we estimate over a long period of time, looking at trends and changes in the different parameters. On the other hand, the quality of the information is relatively poor before 1994, specially since we do not have information that would be useful in our estimation. For example, information for social security benefits (which allows us to split our sample between formal and informal workers) is only available for salaried workers and not for self employed individuals. Moreover, labor income for the self employed is very badly recorded as well as the number of hours worked. Finally, information about the county where individuals live, which can be correlated to the kind of job they hold, is only available after 1994. To sum up, the only variables that are available throughout the whole sample are: labor income for the "main occupation" (more than 15 hours per week), hours worked, years of education, age, social security benefits and tenure in the occupation[6].

In order to maximize the amount of information available we restricted the sample to

[6]This last information refers to the time they have been working in the same occupation.

salaried workers employed in the private sector, between the ages of 15 and 65. Also, we just consider the workers' primary occupation, for people working between 15 and 80 hours per week. Finally, the sample only comprises male workers, since female participation on the labor force changed significantly over the period under consideration.

The descriptive statistics of the sample appear in Tables 1 and 2 in the appendix.

5 Estimation

5.1 Endogenous switching model with unknown regime

We will estimate the following system of equations which comprises two wage equations, one for the primary sector (p) and other for the secondary sector (s) and a third equation, the switching (w) equation which measures the probability of being in the primary sector.

$$W_{ip} = X_i'\beta_p + u_{ip} \tag{1}$$

$$W_{is} = X_i'\beta_s + u_{is} \tag{2}$$

$$D = X_i'\beta_w + u_{iw} \tag{3}$$

$$W_i = \begin{cases} W_{ip} \text{ if } D > 0 \\ W_{is} \text{ if } D \leq 0 \end{cases} \tag{4}$$

where the W_{ij} are individuals log of hourly wages for $j = p, s$, X_i' are are non stochastic regressors, β_j are coefficients for $j = p, s, w$ and $u_i'j$ are normally distributed error terms. Equation (1) corresponds to the wage equation if the individual is in the primary sector, equation (2) is the wage if the individual is in the secondary sector and (3) is the switching equation. W_{ip}, W_{is} and D are latent variables, and, if $u_{iw} > -X_i'\beta_w$ the individual's wage is determined by equation (1) while if $u_{iw} \leq -X_i'\beta_w$ the individual's wage is determined by (2).

The variance covariance matrix for this system is:

$$\Sigma = \begin{bmatrix} \sigma_p^2 & \sigma_{ps} & \sigma_{pw} \\ \sigma_{sp} & \sigma_s^2 & \sigma_{sw} \\ \sigma_{pw} & \sigma_{sw} & 1 \end{bmatrix} \tag{5}$$

where σ_w^2 has been normalized to one.[7]

The likelihood function of this problem is given by:

$$Pr(u_{iw} > -X_i'\beta_w \mid X_i, u_{ip}) \cdot f(u_{ip}) + Pr(u_{iw} \leq -X_i'\beta_w \mid X_i, u_{is}) \cdot f(u_{is}) \tag{6}$$

$f()$ is the density function of u_{ip} and u_{is}.

Under normality assumption for u_{ip}, u_{is} and u_{iw}, the log likelihood becomes:

$$\ln L = \sum_{i=1}^{n} \{ln[1 - \Phi(\frac{-X_i\beta_w - \frac{\rho_{pw}}{\sigma p}(W_{pi} - X_i\beta_p)}{(1-\rho_{pw}^2)^{1/2}})] \cdot \frac{1}{\sigma_p}\phi(\frac{(W_{pi} - X_i\beta_p)}{\sigma p}))+ \Phi(\frac{-X_i\beta_w - \frac{\rho_{sw}}{\sigma s}(Y_{si} - X_i\beta_s)}{(1-\rho_{sw}^2)^{1/2}}) \cdot \frac{1}{\sigma_s}\phi(\frac{(Y_{si} - X_i\beta_s)}{\sigma s}))\} \tag{7}$$

where $\Phi(\cdot)$ and $\phi(\cdot)$ are, respectively, the distribution function and the density of a standard normal, ρ_{pw} and ρ_{sw} are the correlation coefficients between (u_p, u_w) and (u_s, u_w). We normalized σ_w^2 to one, as mentioned above.[8]

We can estimate $(\beta_j, \gamma, \Sigma, \rho_{j,w})$, $j = p, s$ by maximum likelihood using search algorithms.

The variables used as regressors in the three equations were: schooling level, tenure, dummy for married, potential experience (calculated as age - years of schooling -6), experience squared and year dummies. D is also estimated, since we do not use any a priori definition of sectors.

We performed different sets of estimations: standard Mincer equations using OLS for every year of the sample, pooling the data into two periods and then one estimation for the whole sample. Then we estimated a model of endogenous switching with unknown regime

[7] In this model we cannot identify simultaneously the coefficients of the switching equation and its error variance. For a discussion on this issue see Nelson (1972), Maddala (1979).

[8] Since the likelihood function does not depend explicitly on σ_{ps}, this is not identified.

as in Maddala and Nelson (1975)[9]. Unfortunately, we did not achieve convergence in the year by year estimation. We estimated the results for the whole sample and then for the different sub periods. We performed estimations restricting the schooling coefficients to remain constant (restricted model) within each period and allowing then to vary year by year (unrestricted model). We then conducted rationing test for each period.

6 Results

Tables 3 and 4 present the results for the estimation of the OLS and the unrestricted switching model for the dual market hypothesis for the first and the second period respectively. For the first period considered (Table 3) the returns to schooling for the OLS estimation are 6% for the first two years and then they increase afterwards, averaging 9%. Being married and tenure have a positive effect on wages and potential experience and experience squared have the usual signs observed in standard Mincer equations. Holding all the other factors constant in the sample means, married individuals earn 6% more and an extra year of tenure increases wages by 2%.

In terms of the switching model, we present the results for the unrestricted version. The restricted estimation, which states that the schooling coefficient is constant across years is rejected. (Twice the difference between the constrained and the unconstrained model is 568,873.8, which rejects the hypothesis of constant schooling coefficient across the years.) For the sample average, individuals in the secondary sector earn 19% less than their primary peers.[10]

The schooling coefficient for the primary sector is higher for some years with respect to that of the secondary sector. In 1975, returns to schooling are 5.6% and 3.4% in the primary and secondary sector respectively. Over the period, returns to education increase in the primary sector, reaching 8% in the last year of the period. In the secondary sector, returns also increase, but less than in the primary sector (4.1% in 1988). An extra year of education with respect to the sample mean raises wages by 5% in the primary sector and

[9] A detailed explanation of the estimation procedure can be seen in the appendix.

[10] All the calculations are for the means of 1975 and 1992 in each period, but the magnitude of the results do not change if another year is used.

3% in the secondary sector.

An extra year of tenure increases wages by 1% and 2.6% in the primary and in the secondary sector respectively. Wages corresponding to married individuals are 20% higher in the primary sector. Also, being married also raises wages more in the primary sector: a married individual earns 19% more in the primary sector and just 12% in the secondary sector. The coefficients of the switching equation -which indicates the probability of being in the primary sector- indicate that being married, having a longer job tenure, education and experience increase the probability of being in the primary sector.

For the first period considered we reject the null of only one wage setting mechanism in favor of the two wage setting mechanisms by conducting a likelihood ratio test.

When we look at the OLS estimation for the second period (Table 4), returns to schooling increased with respect to the OLS estimation for the previous period. Also, after 1994 returns to education increase, peaking 10.8% in 2001. All the rest of the coefficients have the conventional signs.

Married individuals have wages 5% higher than non-married individuals. Besides, an extra year of tenure increases wages by only 1%.

Again, we focus our comments on the unrestricted version of the switching model for the dual market, since a likelihood ratio test also rejected the hypothesis of constant coefficients for schooling. The primary sector shows higher returns to education with respect to both the OLS estimation and the secondary sector in the switching model. Returns for 1992 are 13%. In the secondary sector, returns to schooling are lower (3.3%). While by the end of the period, returns in the primary sector are 16%, they are 8.2% in the secondary one. While the latter are just half of the value for the primary sector they doubled with respect to the ones observed in the beginning of the period. An extra year of education with respect to the sample mean raises wages by 5.3% in the primary sector and only 0.7% in the secondary sector. While - conditional on being in one sector- wages are higher for married individuals, the differential between married individuals from switching from the secondary to the primary sector is 14%. For unmarried individuals this differential is similar (13%). Average wages are 14% higher in the primary sector.

As far is the switching equation is concerned, schooling, tenure and being married in-

crease the probability of being in the primary sector.

For the second period, our estimations also support the existence of two different wage setting mechanisms, as evidenced by a likelihood ratio test.

The endogenous switching models estimated confirm the hypothesis of two wage setting mechanisms for each period considered. The differences between the returns to schooling for each sector are significantly higher for the second period than for the first one. However, while in the second period the wage differential between the primary and the secondary sector is always positive, for the second period is negative for lower level of schooling (whenever years of schooling is lower than 7 years (which in Argentina corresponds to elementary education).

As far as the switching equation for both periods, the signs or the estimated coefficients are the same, but its magnitude cannot be compared between periods because of the normalization we imposed. We move on to explore if there is evidence of rationing.

6.1 Rationing tests

The second claim of dual market theory is that there is rationing to primary sector jobs, a fact which cannot be accounted for using standard human capital theory. In order to test the existence of rationing or non economic barriers to primary jobs, we have to define first a rule for allocating workers in the primary or secondary sector when there is no rationing.

In this section, we follow closely Dickens and Lang (1985). They perform a rationing test for the US. As they do, we assume that experience in one sector raises wages in such sector, more than it does in the other one. Workers behave as utility maximizers over their lifetime. With perfect information about job characteristics and constant non-pecuniary tastes for jobs, one individual should choose one sector and remain there his entire working life.

In the absence of rationing, a worker chooses primary sector if (assuming that non pecuniary aspects of employment do not change over time) $NPV_{ip} > NPV_{is}$, i.e. the net present value of working in the primary sector exceeds a compensating differential k.

We can write the probability that a worker is on the primary sector as:

$$P = Pr[ln(NPV_{ip}) - ln(NPV_{is}) > k] \tag{8}$$

where the subscripts p and s are primary and secondary sector respectively. We approximate $ln(NPV_{ij})$ by W_{ij}. We write again our two wage equations (one for each sector):

$$W_{ip} = X_i'\beta_p + u_{ip} \tag{9}$$

$$W_{is} = X_i'\beta_p + u_{is} \tag{10}$$

where W_{ij} are log of hourly wages in each sector, X_i is a vector of individual characteristics already used and u_{ij} are normally distributed error for each sector.

$$Pr\{X_i'(\beta_p - \beta_s + \beta_w) + u_{ip} - u_{is} + u_{iw} > -k'\} \tag{11}$$

k' can be considered a constant plus a normally distributed error term if we assume that individuals' tastes with respect to non-pecuniary aspects of employment do not vary with observable characteristics.

We may test that people choose their sector of employment to maximize their utility. We estimate an equation for sector membership by testing restrictions on coefficients on the switching equation and test whether β_w is equal to zero.

$$X_i'(\beta_p - \beta_s + \beta_w) + k' + u_{ip} - u_{is} + u_{iw} \tag{12}$$

We test if the coefficients for β_w corresponding to schooling is equal to zero and to the difference between the corresponding coefficients in the primary and secondary wage equations.[11]. We are imposing constraints in all the schooling coefficients: 12 constraints for the first period and 10 for the second period, but we relax the normalization of $\sigma_w^2 = 1$. The degrees of freedom are 11 and 9 respectively for each period.

[11] Preferences for non pecuniary aspects of primary sector employment may be related to some workers characteristics (for example, married or older male workers may have a greater taste for primary employment, while females and young workers may prefer to enter the secondary sector), it may be the case that some coefficients in the switching regression are different from zero even in the absence of rationing

Using likelihood ratio tests, both hypothesis are rejected (Twice the difference between the log likelihood between the constrained and the unconstrained model is 508.003,6 and 569.896 for each period respectively when we test the restrictions that the coefficients of the switching equation are zero and 894.021,8 and 965.874 when we test whether the difference between the coefficients of the primary and secondary sector equals the coefficients of the switching equation), rejecting the our null hypothesis.[12]

We have different explanations for our results. For the first period, the wage differential between the primary and the secondary is always positive regardless the educational level of the individuals. Our results suggest that the fraction of workers in the primary sector rises with education more rapidly than expected. This implies that either workers with low education are rationed or highly educated workers are more averse to secondary employment.

For the second period, our results of the previous section indicated that the wage differential between the primary and secondary sector is negative for individuals with less than seven years of schooling, which in Argentina corresponds to incomplete elementary education. This latter fact makes the rationing argument for low educated people less compelling, since wages in the secondary sector are higher than in the primary one for less educated people./par In order to venture some explanation for our results, we will calculate the size of the secondary sector and check which is the composition of such sector.

6.2 Predictions of the model

If the hypothesis of dual labor model is accepted for both periods, the model can be used to test the composition of the secondary sector. Applying Bayes' theorem, we can calculate the probability that a worker i is in the primary sector as:

$$\frac{Pr(u_{iw} > -X_i'\beta_w \mid X_i', u_{ip})}{Pr(u_{iw} > -X_i'\beta_w \mid X_i', u_{ip}) + Pr(u_{iw} \leq -X_i'\beta_w \mid X_i', u_{is})} \tag{13}$$

which gives us the probability that a worker is in the primary sector conditional on the observed wages and personal characteristics. The percentage of workers is calculated by computing the average of primary sector attachment for all workers. Using this formula we

[12]Some of the parameters under the null for a test of a single vs. dual markets are not identified, which invalidates the likelihood ratio tests.

can calculate the ex-post probability of being in the secondary sector conditional on different individual characteristics and observed wages and also, the percentage of secondary workers for a given category.

Tables 5 and 6 allow us to calculate such values for each sector for the first and the second period respectively.

According to our calculations, 35% and 72% of male workers are in the secondary sector in each period. [13]

The first remarkable fact is that the percentage of secondary workers predicted by the model is different from the number of informal workers observed in the sample for both periods considered.

Also, some other interesting facts are observed: the percentage of married workers in the secondary sector is lower than the percentage of married workers in the whole sample. Moreover, the proportion of secondary workers who are married is much lower than the percentage of married workers in the sample for both periods considered. Secondary workers tend to have less education than the proportion of workers in the complete sample, and most of the secondary workers have incomplete high-school or less years of education. The same applies for ages of workers. The proportion of young workers in the secondary sector is higher than for the whole sample.

One interesting aspect to mention is that of formal workers and the secondary sector: the proportion of formal workers among secondary workers is lower than for the whole sample in both periods (41% vs. 83% for the first period and 32% vs. 70% for the second period). Additionally, the proportion of secondary workers who are formal is lower, but it is positive and far from negligible. This gives us some idea of why it may not appropriate to resort to an ex-ante definition of sector attachment when we are interested in testing for the existence dualism.

6.3 Informal workers vs. secondary workers.

The switching model we estimated supports the hypothesis of the existence of two sectors primary and secondary for Argentina for both periods analyzed and rejects the hypothesis

[13] Standard error for these values have not been calculated

of free choice of sector. As mentioned before, the different estimations were conducted without assuming any ex-ante sector attachment -the separation in the switching regime was unknown- and so D has to be estimated. The information available in Argentina about formality of the workers could be used in principle as an ex-ante definition of sector attachment. In general, informal workers are paid lower wages,[14] and have higher rotation in their jobs. The indicator of formality could be used to split the sample and test for the presence of dual labor markets in the Argentine economy by means of an ex-ante definition of sectors and then compare both models.

However, we would like to use the information available about informality in order to see to which degree secondary workers are informal workers.

As we observed before in tables 5 and 6, the proportion of formal workers is lower in the secondary sector with respect to the percentage of formal workers in the sample for each period considered. Moreover the proportion of formal workers as a proportion of secondary workers is much lower. This gives an idea that while there is less formality in secondary jobs, its value is not zero. Based on the predictions of the probabilities calculated using 13, using an ex-ante definition of formal-informal workers to study market dualism is not entirely correct.

In order to explore this relationship further we estimate again the same endogenous switching model with unknown separation regime for both periods with the only difference that an indicator for formality in both wage equations and in the switching equation as well was added. Results can be observed in tables 7 and 8.

The indicator of formality is positive and significant in both wage equations and also affects positively the probability of being in the primary sector. The effect of formality on wages in the secondary sector is higher than in the primary sector.

However, this estimation encounters the problem of endogeneity of formality, since it is hard to argue that the decision of working in the primary sector has no effect on formality.

In order to overcome such problem we attempted a joint estimation of a modified switching model, trying to obtain the probabilities of being formal/informal conditioned on being

[14] Most studies show that after controlling from selection and individual characteristic the compensating differential between informal and formal workers for Argentina is negative. See Brassiolo et al. (2003).

in the primary or secondary sector.[15] Unfortunately, we did not achieve convergence of the the algorithms used to estimate this models.

7 Conclusions

The paper had two main objectives. First, to test dual labor market claims for two different historical periods in Argentina between 1970 and 1990 and between 1991 and 2000 and then to check if informal workers (defined as workers who do not receive social security benefits) can be considered secondary workers for the same periods (or, in other words if it was appropriate to test dualism using an a priori definition of sector attachment).

For the first purpose, we tested two different things: first, whether two wage equations (one for the primary sector and other for the secondary sector) fit the data better than one and secondly, whether primary sector jobs are rationed. We started by estimating an endogenous switching regime with an unknown separation regime for each period. Results provide evidence of segmentation in both periods, against our priors of perfect competition in labor markets for the first period. These results are achieved without resorting to an ex-ante definition of sector attachment for conducting the estimations. This proves the first claim of dual labor market theory. As regards the issue of rationing, we are able to reject the hypothesis of free choice for the schooling coefficient. Unfortunately, the fact that we are restricting the sample to males only does not allow us to test women segregation or any other issues related to rationing. However, for individuals with less than elementary schooling, wages in the secondary sector are higher than in the primary sector for the second period, so rationing may be affecting people with intermediate levels of education.

In order to see to what extent informal workers in Argentina can be regarded as secondary workers, we observed that while the proportion of formal workers in the secondary sector and the number of formal workers in it are smaller than in the sample, this number

[15] We attempted the estimation of the following likelihood function:

$$p_f * (Pr(u_{iw} > -X_i'\beta_w \mid X_i, formal, u_{ip}) \cdot f(u_{ip})) + p_i * (Pr(u_{iw} > -X_i'\beta_w \mid X_i, informal, u_{ip}) \cdot f(u_{ip})) + \\ + (1-p_f) * Pr(u_{iw} \leq -X_i'\beta_w \mid X_i, formalu_{is}) \cdot f(u_{is}) + (1-p_i) * Pr(u_{iw} \leq -X_i'\beta_w \mid X_i, formalu_{is}) \cdot f(u_{is})$$

where p_f and p_i are the probabilities of being formal and informal respectively, and we assumed them constant.

is not zero, so as a first approximation to the issue of using an ex-ante definition of sector we can conclude that such classification may not be adequate.

In terms of exploring the possible ways of causation between informality and secondary jobs, we did not obtain any conclusive answer, since our estimations faced the problem of endogeneity of the indicator for formality. We tried an estimation which took care of this problem but could not obtain results.

The paper represents a contribution to the labor market literature in developing countries in two different areas. First, it is the first study of segmentation available for developing countries using such a long data span, since most of existing studies are restricted to cross sectional data for some specific years, which can be problematic when we are working with countries subject to large demand volatility, as it may be the case with some developing countries. Secondly, it provides some evidence of segmentation that does not rely on an ex-ante definition of primary and secondary jobs and further supports the evidence that such divisions may be inappropriate (at least for the case of Argentina).

In terms of policy implications, it provides some interesting insights, since the model predicts the existence of formal and informal workers both in the primary and secondary sector. However, formal and informal workers earn less in the secondary sector, which may support the idea that it may be more important to look at the wage levels and provide income support for low income individuals than to focus on labor informality.

On the possible extensions of this work, the issue of rationing should be further explored for both the literature about dualism and for the specific case of Argentina. In the later case, it is also worth exploring the effects of labor demand volatility, inflation and labor market rigidities and their interaction with the informal and secondary sector.

References

[1] Acemoglu, Daron, "A Microfundation for Social Increasinf Returns in Human Capital Accumulation. ", *Quarterly Journal of Economics,* August 1996, *111*, 779-804.

[2] Basch, Michael and Ricardo D. Paredes-Molina, "Are There Dual Labor Markets in Chile?: Empirical Evidence. ", *Journal of Development Economics,* 1996, *50*, 297-312.

[3] Becker, Gary S., *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education.* National Bureau of Economic Research, **1964**

[4] Bulow, Jeremy I. and Lawrence H. Summers, "A Theory of Dual Labor Markets with Application to Industrial Policy, Discrimination and Keynesian Unemployment. ", *Journal of Labor Economics,* July 1986, *4*, 376-414.

[5] Berndt, E.K., B.H. Hall, R.E.Hall, and J.A. Hausman,"Estimation and Inferences in Nonlinear Structural Models.", *Annals of Economic and Social Measurements,***1974**,*3*, 653-665.

[6] Brassiolo, Pablo, Guillermo Mondino and Hernan Ruffo,*Reforma de la Seguridad Social y Estructura del Mercado Laboral: El caso de Argentina.* Evaluacin de las Reformas. Informe de la Seguridad Social en Amrica 2003, Captulo IV. Conferencia Interamericana de Seguridad Social (CISS).**2003**.

[7] Corbo, V. and M. Stelcner, "Earning Determination and Labor Markets: Gran Santiago, Chile, 1978 .", *Journal of Development Economics,* 1983, *12*.

[8] Dickens, Williams T. and Lawrence Katz, "Interindustry Wage Differencials and Indsutry Characteristics.", *National Bureau of Economic Research,* September 1986, Working Paper Nr.2014

[9] Dickens, Williams T. and Kevin Lang, "A Test of Dual Labor Market Theory.", *American Economic Review,* September 1985, *75*, 792-805.

[10] Dickens, Williams T. and Kevin Lang, "Labor Market Segmentation Theory: Reconsidering the Evidence.", *National Bureau of Economic Research,* June 1987, Working Paper Nr.4087

[11] Doeringer, Peter B. and Michael J. Piore, *Internal Labor Markets and Manpower Analysis.*, Heath Lexington Books, **1971**

[12] Gasparini, Leonardo G., "Microeconomic Decompositions of Aggregate Variables: an Application to Labor Informality in Argentina.", *Applied Economics,* 2002, *34*, 2257-2266.

[13] Gould, William, Jeffrey Pitblado and William Sribney, *Maximum Likelihood Estimation with Stata 2nd edition*, Stata Press, **2003**

[14] Hopenhayn, Hugo A. and Pablo A. Neumeyer,*The Argentine Great Depresion 1975-1990.* Working Paper, UTDT, **2003**

[15] Huguet Roig, Ana, "Testing Spanish Labor Market Segmentation: An Unknown Regime Approach.", *Applied Economics,* 1999, *31*, 293-305.

[16] Jorgenson D., "The Development of a Dual Economy.", *Economic Journal,***1961** *71*, 309-334.

[17] Lewis, W.A., "Economis Development with Unlimited Supply of Labor.", *The Manchester School of Economic and Social Studies* **1954** *22*, 139-191.

[18] Maddala, G. S. and F. Nelson, "Switching Regression Models with Exogenous and Endogenous Regimes.", *Proceedindgs of the American Statistical Association,*1975, 423-425.

[19] Menendez, Alicia,*The Effects of Inflation on Relative Wages: Argentina 1974-1993.* Working Paper, Princeton University, **1999**

[20] Pratap, Sangeeta and Erwan Quintin,*Are Labor Markets Segmented in Argentina? A Semiparametric Approach.* Working Paper, Federal Reserve of Dallas, **2003**

[21] Saint Paul, Giles. *Dual Labor Markets: A macroeconomic Perspective*, MIT Press, **1996**

[22] Shapiro, Carl and Joseph E. Stilgitz, "Equilibrium Unemploymentas a Worker Discipline Device.", *American Economic Review,* June 1984, *74*, 433-444.

[23] Sen, A.K., "Peasants and Dualism With or Without Surplus Labor.", *Journal of Political Economy,* **1966** *74*, 425-450.

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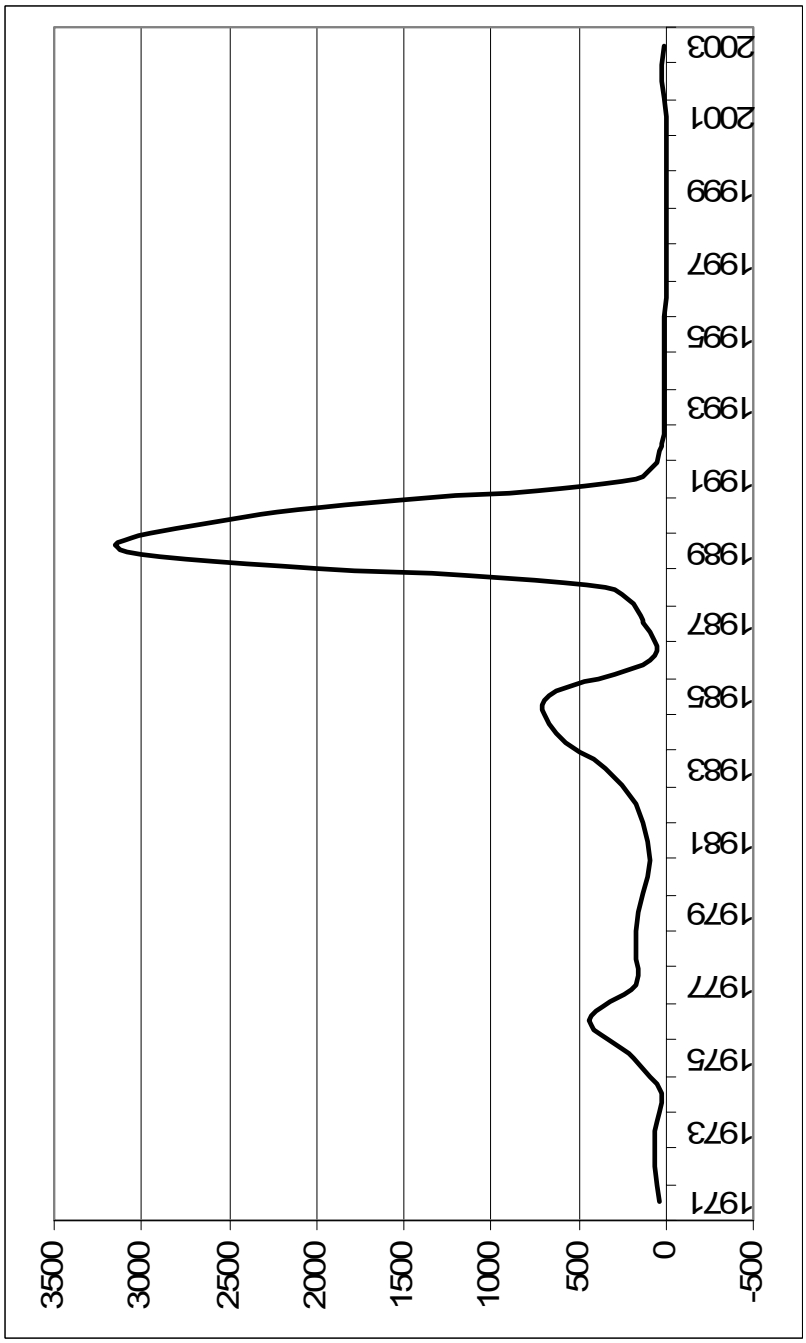
A Estimation

We conducted the estimation of the endogenous switching model with unknown regime using standard Maximum Likelihood Search algorithms. The non linearity of the system and the fact that the log likelihood function is not globally concave made convergence difficult. While it would have been ideal to conduct year by year estimation of the switching model, convergence was not achieved for most of the years. For that reason, results are not presented, even for the few years that converged. Instead an estimation pooling the data for each period was conducted. We added year dummies and also allowed the schooling coefficient to vary over time. We present the results pooling the data for each period with the year dummies and allowing the school coefficient to vary each year. We also estimated a restricted version where the schooling coefficient was forced to be constant across years within each period. A likelihood ratio rejects the null that the restrictions are valid.

Since the function is not globally concave, it had several local maxima. That is why we estimated it using different algorithms and trying different starting values. Given the difficulties that arose in the estimation, we tried different algorithms to check if results were robust to the change in them. The algorithms used in the Maximum Likelihood estimation were Berndt et al. and Newton-Raphston. We found several local maxima and had to experiment different starting values until we found a maximum. As mentioned above, achieving convergence was difficult even for the pooled periods. First OLS regressions were estimated and the coefficients obtained were used as starting values in a second step of estimation, that of an exogenous switching model (covariances between wage and switching equations were set to zero). Finally, we used the coefficients of the exogenous switching regime as starting values for our endogenous switching regime estimation. The starting vector for the dependent variable in the switching equation was set to zero. The results we are presenting are estimated using the Newton-Raphston algorithm and the sequences specified above. The number of iterations until convergence was 25 (restricted model for the nineties), 85 (restricted model for the 70's and 80's), 96 (unrestricted model for the 70's and 80's) and 143 (unrestricted model for the 90's).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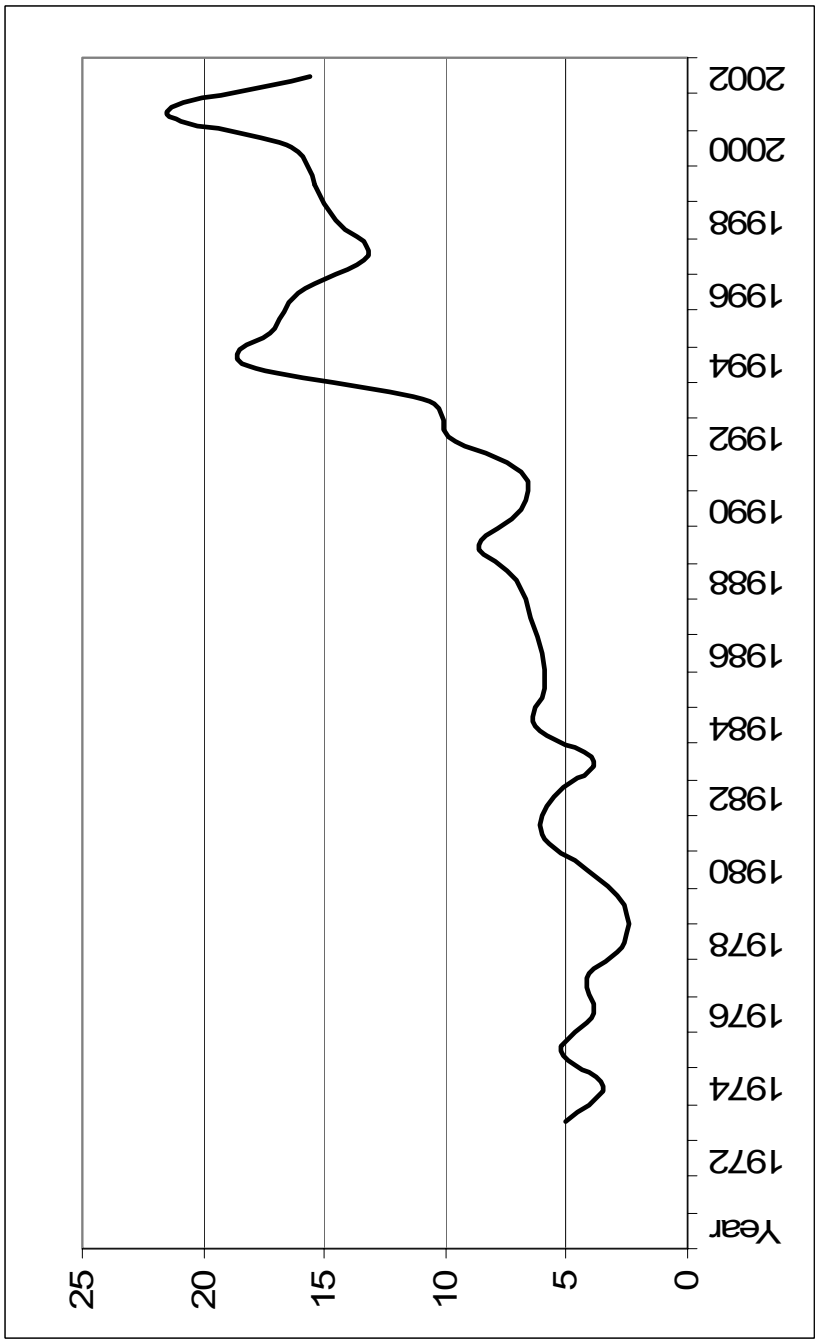
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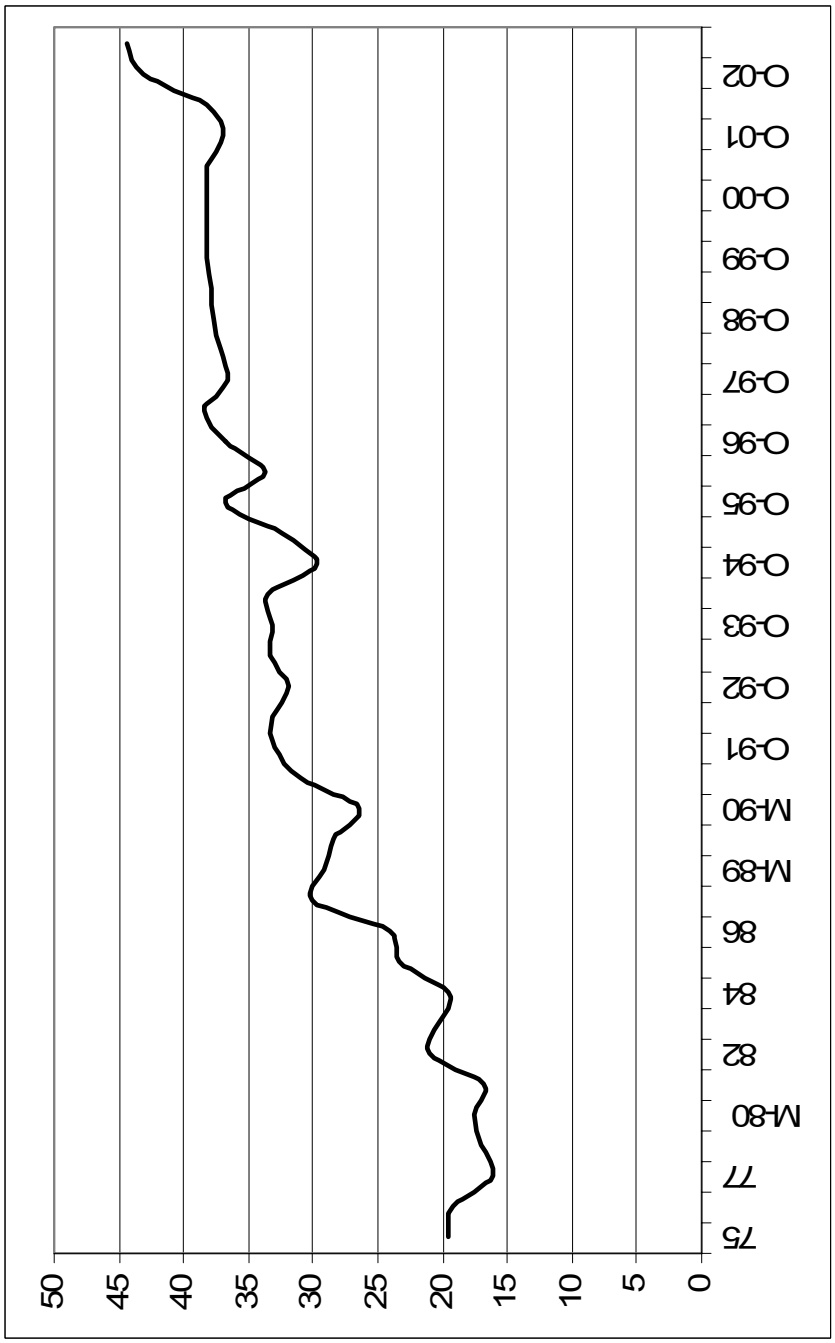
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Table 1: Description of Variables

	Sample size	Mean	SD		Sample size	Mean	SD
1975				1982			
married	4244	0.79	0.40	married	1668	0.80	0.39
school	4086	7.63	3.70	school	1646	8.56	3.79
experience	4086	21.9	13.20	experience	1646	23.1	1.35
tenure	4230	6.17	2.14	tenure	1655	6.24	2.10
1976				1983			
married	2089	0.80	0.39	married	1180	0.80	0.39
school	2012	7.60	3.80	school	1169	8.80	3.84
experience	2012	22.5	1.30	experience	1169	22.9	1.35
tenure	2074	6.18	2.17	tenure	1173	6.26	2.10
1977				1984			
married	2016	0.08	0.41	married	1284	0.08	0.39
school	1931	4.65	3.68	school	1269	0.89	3.81
experience	1931	22.4	1.33	experience	1269	22.1	1.35
tenure	2007	6.08	2.22	tenure	1283	0.63	2.10
1978				1986			
married	1953	0.79	0.41	married	2273	0.75	0.43
school	1894	7.86	3.69	school	2248	9.21	4.02
experience	1894	22.8	1.36	experience	2248	21.7	0.14
tenure	1939	6.03	2.23	tenure	2272	8.20	0.93
1981				1988			
married	1805	0.79	0.40	married	2584	0.74	0.44
school	1775	8.61	3.82	school	2546	9.32	3.79
experience	1775	22.7	1.36	experience	2546	21.2	1.39
tenure	1797	6.26	2.14	tenure	2574	8.38	0.97

Source: *Author's calculations based on PHS - INDEC*

Table 2: Description of Variables (continued)

	Sample size	Mean	SD		Sample size	Mean	SD
1992				1997			
married	4454	0.73	0.45	married	4387	0.72	0.45
school	4425	9.94	3.86	school	4375	10.65	0.00
experience	4425	20.5	0.14	experience	4375	19.8	1.38
tenure	4400	8.11	0.09	tenure	4381	7.07	0.87
1993				1998			
married	4636	0.72	0.45	married	4508	0.73	0.45
school	4611	10.14	3.95	school	4489	10.67	4.02
experience	4611	20.0	1.37	experience	4489	19.9	1.36
tenure	4517	7.81	0.92	tenure	4502	7.03	0.87
1994				1999			
married	4550	0.73	0.44	married	4377	0.73	0.45
school	4531	10.21	3.93	school	4362	10.74	4.02
experience	4531	20.0	1.36	experience	4362	20.1	1.35
tenure	4538	7.59	0.92	tenure	4374	7.00	0.86
1995				2000			
married	4260	0.73	0.44	married	4279	0.73	0.44
school	4236	10.43	4.06	school	4266	10.89	0.40
experience	4236	20.0	1.35	experience	4266	20.1	1.34
tenure	4088	7.82	0.90	tenure	4269	7.24	0.87
1996				2001			
married	4240	0.72	0.45	married	4033	0.73	0.44
school	4218	10.54	4.07	school	4016	11.04	4.06
experience	4218	20.0	1.36	experience	4016	20.0	1.34
tenure	4119	7.33	0.86	tenure	4026	7.47	0.87

Source:*Author's calculations based on PHS - INDEC*

Table 3: Estimation Results for the 1970s and 1980s

	OLS	Switching model		
		Primary Sector	Secondary Sector	Switching Prob (being in PS)
married	0.152	0.201	0.111	0.062
	(12.54)**	(4.26)**	(6.47)**	(0.63)
tenure	0.021	0.008	0.026	0.049
	(20.89)**	(2.04)*	(9.01)**	(1.51)
school	0.057	0.056	0.034	0.231
	(20.95)**	(2.27)*	(5.36)**	(9.33)**
y76school	0.009	-0.035	-0.002	-0.035
	(2.07)*	(1.47)	(0.17)	(0.69)
y77school	0.02	-0.032	-0.009	0.009
	(4.28)**	(1.30)	(0.89)	(0.21)
y78school	0.035	-0.01	-0.004	-0.007
	(7.38)**	(0.40)	(0.37)	(0.15)
y80school	0.035	-0.014	-0.005	0.004
	(9.06)**	(0.65)	(0.53)	(0.11)
y81school	0.039	0.003	0.011	-0.077
	(7.91)**	(0.12)	(1.09)	(2.03)*
y82school	0.043	0.013	-0.008	0.005
	(8.52)**	(0.56)	(0.71)	(0.13)
y83school	0.041	0.014	0.013	-0.049
	(7.06)**	(0.51)	(1.24)	(1.13)
y84school	0.031	-0.033	-0.005	0.006
	(5.73)**	(0.99)	(0.49)	(0.12)
y85school	0.032	0.00	0.005	-0.049
	(7.37)**	(0.01)	(0.54)	(1.24)
y86school	0.035	0.016	0.017	0.052
	(8.23)**	(0.74)	(2.06)*	(0.74)
y88school	0.046	0.024	0.007	0.061
	(10.86)**	(1.17)	(0.64)	(0.90)
experience	0.032	0.027	0.024	0.015
	(24.43)**	(5.34)**	(11.32)**	(1.54)
experience2	-0.001	-0.001	0.00	0.00
	(20.73)**	(4.93)**	(11.79)**	(1.37)
Constant	1.675	2.275	1.961	(3.87)
	(65.28)**	(4.84)**	(39.76)**	(10.61)**
Cov with switching eq		-0.533	-0.222	(a)
		(3.43)**	(5.95)**	
Log likelihood	-9896160.1		-9104295.2	
Observations	18223		18163	

t statistics in parentheses, dependent variable is log hourly wage
* significant at 5%; ** significant at 1%
(a) normalized to 1
Year Dummies were included in the estimation

Table 4: Estimation Results for 1990s

	OLS	Switching model		
		Primary Sector	Secondary Sector	Switching Prob (being in PS)
married	0.128	0.150	0.140	0.102
	(13.74)**	(9.79)**	(5.03)**	(2.15)*
tenure	0.015	0.011	0.022	0.001
	(31.98)**	(9.94)**	(5.09)**	(0.15)
school	0.086	0.131	0.033	0.077
	(31.04)**	(22.60)**	(3.51)**	(3.65)**
y93school	-0.002	0.002	0.003	0.005
	(0.46)	(0.35)	(0.21)	(0.19)
y94school	0.002	0.005	0.024	0.017
	(0.52)	(0.66)	(2.02)*	(0.68)
y95school	0.01	0.008	0.022	0.028
	(2.67)**	(1.21)	(1.81)	(1.16)
y96school	0.008	0.014	0.024	0.042
	(2.20)*	(1.98)*	(2.11)*	(1.77)
y97school	0.011	0.026	0.029	0.05
	(2.98)**	(3.78)**	(2.53)*	(2.03)*
y98school	0.017	0.025	0.040	0.049
	(4.73)**	(3.65)**	(3.33)**	(1.65)
y99school	0.011	0.018	0.029	0.040
	(2.99)**	(2.44)*	(2.55)*	(1.51)
y100school	0.02	0.032	0.040	0.085
	(5.24)**	(4.51)**	(3.24)**	(3.06)**
y101school	0.022	0.029	0.049	0.085
	(5.91)**	(3.68)**	(4.15)**	(1.77)
experience	0.025	0.028	0.015	0.007
	(26.33)**	(16.38)**	(4.17)**	(1.04)
experience2	0.000	0.000	0.000	0.000
	(20.50)**	(9.96)**	(5.26)**	(0.70)
Constant	1.088	0.392	1.241	-0.434
	(35.78)**	(4.70)**	(19.09)**	(2.39)*
Cov with switching eq		0.550	0.762	(a)
		(51.41)**	(16.97)**	
Log likelihood	-24203742		-22470939	
Observations	29074		29074	

t statistics in parentheses, dependent variable is log hourly wage
* significant at 5%; ** significant at 1%
(a) normalized to 1
Year Dummies were included in the estimation

Table 5: Composition of Sample and Secondary Sector-70's and 80's

	% in the sample in category	% secondary workers in category	% of workers in each category in secondary sector
Married	78.3	71.6	33.8
Schooling			
Incomplete primary	22.0	43.0	83.1
Primary	37.3	42.0	47.8
Incomplete highschool	19.7	10.4	22.4
Complete highschool	10.8	2.5	9.8
Incomplete college	6.2	1.5	10.5
College and more	4.1	0.7	6.9
Formal Workers	82.9	55.2	41.0
Age			
under 25	17.6	25.0	59.1
25-29	12.4	14.1	47.3
30-39	25.4	25.0	27.5
40-49	22.5	19.2	13.3
50-59	18.1	13.5	31.0
60 and over	4.1	3.0	31.0
Tenure			
less than a year	3.3	5.0	63.3
1 to 5	35.6	44.1	51.7
6 to 10	56.2	85.2	36.5
more than 10	4.9	1.7	13.2
Total			35.0

Table 6: Composition of Sample and Secondary Sector-90's

	% in the sample in category	% secondary workers in category	% of workers in each category in secondary sector
Married	72.6	74.9	73.2
Schooling			
Incomplete highschool and less	59.9	2.4	96.8
Complete highschool	17.9	24.7	58.7
Incomplete college	11.4	37.3	2.3
College and more	10.8	35.6	0.9
Formal Workers	69.1	44.7	32.8
Age			
under 25	18.9	11.0	82.6
25-29	13.4	12.1	73.1
30-39	24.6	23.1	81.9
40-49	22.7	28.2	86.2
50-59	15.8	19.6	63.1
60 and over	4.7	6.1	61.4
Tenure			
less than a year	19.9	12.5	81.0
1 to 5	39.4	38.5	70.5
6 to 10	16.2	18.3	65.9
more than 10	24.6	30.6	64.1
Total			72.3

Table 7: Estimation Results for the 1970s and 1980s

	Switching model		
	Primary Sector	Secondary Sector	Switching Prob (being in PS)
married	0.214	0.116	0.135
	(8.07)**	(4.50)**	(1.84)
formal	0.142	0.255	0.378
	(3.91)**	(8.35)**	(2.79)**
tenure	0.017	0.051	0.045
	(10.89)**	(8.61)**	(5.53)**
school	0.139	0.046	0.138
	(33.54)**	(13.13)**	(11.89)**
experience	0.034	0.017	0.013
	(13.04)**	(4.65)**	(1.31)
experience2	0.000	0.000	0.000
	(8.55)**	(4.63)**	(0.64)
Constant	0.402	1.774	-2.233
	(4.66)**	(27.64)**	(9.56)**
Cov with	0.583	0.530	(a)
switching eq	(43.99)**	(15.40)**	
Log likelihood	-8186782		
Observations	16846		

t statistics in parentheses, dependent variable is log hourly wage
* significant at 5%; ** significant at 1%
(a) normalized to 1
Year Dummies were included in the estimation

Table 8: Estimation Results for the 1990s

	Switching model		
	Primary Sector	Secondary Sector	Switching Prob (being in PS)
married	0.151	0.127	0.136
	(9.36)**	(6.31)**	(2.95)**
formal	0.124	0.333	0.544
	(7.24)**	(15.23)**	(10.11)**
tenure	0.01	0.022	0.006
	(8.86)**	(7.22)**	(1.18)
school	0.156	0.059	0.14
	(53.81)**	(21.84)**	(15.74)**
experience	0.028	0.015	0.01
	(15.65)**	(6.82)**	(1.67)
experience2	0.00	0.00	0.00
	(8.82)**	(7.34)**	(1.13)
Constant	-0.025	1.616	-1.631
	(0.44)	(35.33)**	(14.50)**
Cov with	0.544	0.574	(a)
switching eq	(44.81)**	(25.93)**	
Log likelihood		-21200716	
Observations	28679		

t statistics in parentheses, dependent variable is log hourly wage
* significant at 5%; ** significant at 1%
(a) normalized to 1
Year Dummies were included in the estimation

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