Is There Rent Sharing In Developing Countries? Matched-Panel Evidence from Brazil*

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Abstract: We provide evidence about the determinants of the wage structures of developing countries by examining the case of Brazil. Our specific question is whether Brazil's dramatic income and wage differentials can be explained by the division of rents between firms and their employees, unlike in competitive labour markets. Using detailed individual-level matched panel data, covering a large share of manufacturing firms and more than 30 million workers between 1997 and 2002, we consider the endogeneity of profits, by adopting different measures of profits and different instruments and by controlling for spell fixed effects. Our results, robust to different specifications and tests, indicate no evidence of rent sharing. This conclusion contrasts with findings for most developed countries, even those with flexible labour markets. Possible explanations for the lack of rent sharing include the weakness of labour-market institutions, the high levels of worker turnover and the macroeconomic instability faced by the country.

Keywords: Wage Bargaining; Instrumental Variables; Matched Employer-Employee Data; Developing Countries.

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1. Introduction

Although 80% of the world's population lives in developing countries, there is considerably less empirical evidence about the labour markets of these countries than about the labour markets of developed countries. Moreover, such lack of evidence may be something particularly important to address, as the high levels of inequality present in developing countries indicate that a considerable share of their populations endure particularly low levels of welfare (see Behrman, 1999).

Brazil is an important case in point, as it is a large developing country that exhibits one of the highest levels of income inequality in the world. According to the World Bank (2005), Brazil's Gini index in 2001 was 59.3, the eighth highest in a list of 123 countries, and the second highest outside of Africa, even if it has been decreasing moderately since 1993 (Ferreira et al, 2006). Moreover, while Brazil's inequality may be influenced by the informality of its labour market (28% of the workforce, when excluding the self-employed, according to World Bank and IPEA, 2002), and also by its disparate levels of human capital, inequality is also extremely high inside the formal sector (Arbache and De Negri, 2004).

In this paper, we focus on wage inequality in the formal labour market and seek to assess what may be the role of rent sharing. Our motivation for this specific analysis is driven by the evidence that the division of rents between employers and their employees is an important component of the explanation of wage differentials, certainly in developed countries (Abowd and Lemieux, 1993; Blanchflower et al, 1996; Van Reenen, 1996; Bronars and Famulari, 2001; Arai, 2003; Estevão and Tevlin, 2003; Martins, 2004; etc)[1] and maybe also in developing countries (Teal, 1996, Revenga, 1997, and Bigsten et al, 2003). Moreover, rent sharing is also typically related to other sources of inequality, including gender and racial discrimination (Black and Strahan, 2001), which may also be relevant in the case of developing countries.

However, there are also reasons to expect that employers in developing countries would be particularly immune to wage bargaining pressures exerted by their employees. Amongst other factors, unions are typically not particularly strong outside the developed world; minimum wages are low or not enforced; and unemployment benefits do not exist in many countries. Moreover, as suggested before, the size of the informal labour market may imply that firms face flatter labour supply curves, thus weakening the bargaining power of workers in the formal sector. On the other

[1] Margolis and Salvanes (2001) is, in part, an exception to this stylised fact.

hand, Brazil's relatively stringent employment law may increase the workers' bargaining power, although possibly at the cost of increased informality.[2] However, the fragmentation of collective bargaining and the employment law's (unintended) incentives for worker turnover (related to the fact that social insurance individual accounts are remunerated at below-market rates (Gonzaga, 2004)), may also make it more difficult for workers to bargain over rents.

Another motivation point in our study is that we are able to draw on particularly detailed data, better than that available for many developed countries, which allow us to tackle some econometric problems that arise when estimating rent sharing. The data result from three different individual- and/or firm-level panels covering the period 1997-2002. In particular, one of the data sets includes several variables for *all* individual workers of *all* manufacturing sector firms with more than 30 employees (plus a sample of smaller firms), resulting in an extremely large coverage.

Finally, Brazil's economic and political history over the period we study also offers a number of complementary identification strategies. In particular, we use different instruments based on several macroeconomic shocks, related to sudden and sharp movements in exchange and interest rates, which are likely to affect different firms differently (namely depending on their export propensities). Following an approach similar to Martins (2004), we also proxy rents using "gross profits" (i.e. profits before subtracting the wage bill), in order to have a measure closer to the Marshallian quasi-rents needed and to avoid the bias that arises from the fact that firms that share more rents will also have lower net profits (the standard measure of rents used in the literature). Finally, we also account for (time-invariant) worker and firm heterogeneity using spell fixed effects.

Our evidence, robust to different checks, indicates that, once endogeneity and/or heterogeneity are addressed, rent sharing is not an important explanation for wage differentials in Brazil. This is a result that can be considered surprising given the previous findings in the literature, although not so much when taking into account some of the specific characteristics of the Brazilian labour market mentioned before.

[2] Botero et al (2004) classify Brazil as the 32nd most rigid employment legislation and the 23rd highest firing costs in their ranking of 85 countries. See also Almeida and Carneiro (2005) for a study of informality in the Brazilian labour market and World Bank, IPEA (2002) for a detailed study of different aspects of the Brazilian labour market, and Menezes-Filho et al (2005) for an analysis of wage differences across firms and workers in the state of São Paulo.

The structure of the remaining of the paper is as follows: Section 2 presents the data and some descriptive statistics, Section 3 presents the results under different econometric assumptions and our robustness tests, and Section 4 concludes.

2. Data

The data set used in this paper is derived from two main data sources, RAIS and PIA, which we use to cover the period 1997 to 2002. RAIS (Annual Social Information Report) is an annual census of all firms and their employees in Brazil. There is detailed information about each employee (wages, hours worked, education, age, tenure, gender, etc) and each firm (industry, region, size, establishment type, etc), including a unique identifier for each employee, each firm and each establishment. The second data source is PIA (Yearly Industrial Research), which covers all manufacturing sector firms with at least 30 employees and a random sample of 10% of firms with between 5 and 30 employees. From PIA we use firms' profits and also additional data about revenues and costs.[3]

Tables 1a and 2a report more information about the data size. There are on average more than 5 million workers per year and almost 25,000 firms per year. At the firm level, there are more than 40,000 different firms, of which more than 12,000 are present in all six years covered. Tables 1b and 2b present information about the subset of exporting firms, defined here as firms that export a non-zero share of their output in at least one year over the period 1997-2002. It can be seen in the tables that more than half of all employees in the data are in firms that export, although the number of these firms is much smaller – as one may expect, exporting firms are bigger than non-exporting firms.

We also report some descriptive statistics of the main variables in Table 3. All financial variables are converted to 2002 prices. One important point relates to the steep decline of the real hourly wage, of more than 20%, a fact documented in many other analyses of the manufacturing sector in Brazil. At the same time, workers schooling increased by about one year while (Mincer) experience and tenure both fall. These events are most likely related to the process of economic reforms introduced in the late 1980s in Brazil, when tariffs were reduced substantially. The adjustment to

[3] Each data set is described in more detail in Appendix 1. We also use CCBB (Foreign Capitals Census), which has detailed information about the foreign ownership structure of firms based in Brazil. We use these data to identify foreign firms, defined as those in which at least 50% of their equity is owned by foreign investors.

these reforms involved substantial reallocation and marked declines in the employment levels in the manufacturing sector. This decline is mirrored in the declining number of workers present in our data up to 1999 (or up to 1998 in the case of exporting firms), after which the employment level increases, although real wages keep falling.[4] Tenure is also relatively low, which may be related to high levels of turnover that are characteristic of the Brazilian labour market. Tenure also increases up to 1999 (when employment is falling) and falls after that (when employment is increasing).

Similarly to the case of wages, wage bills also exhibit a downward trend, except for 2002. These wage bills are derived directly from information provided by each firm, and include, on top of net wages, also taxes, overtime pay, 13^{th} and 14^{th} month pay, etc. All these additional components correspond to about 100% of net wages, a result that emphasises the heavy burden faced by firms that hire from the formal labour market and that may help explaining the large size of the informal labour market .

The net profits variable is also testimony to the difficult years of the Brazilian economy: average profits are negative in 1999 and 2002, when interest rates were increased in order to sustain the currency, while gross profits (i.e. net profits plus the wage bill) are always positive.

The descriptive statistics also indicate the importance of the external market for our sample of Brazilian firms, as, on average, more than 10% of sales are exported. Only about one fifth of these exports go to Mercosul, while less than 2% is exported to Mercosul is 2002, after the Argentinean peso was devalued by more then 50%. One can also see that, when focusing only on workers whose firms export, many differences arise. For instance, this subset of workers are paid higher wages, they are more educated and have higher tenure. Moreover, the profit levels of exporting firms are also higher than the entire set of manufacturing firms in our sample (except for 2002).

3. Results

As indicated in the introduction, our analysis is based on a standard wage equation, augmented by a measure of profitability. (More details on the derivation of this equation from a model of firm and

[4] See Ribeiro et al (2004) for more evidence on the process of job reallocation in Brazilian manufacturing over this period. Arbache et al (2004) and Gonzaga et al (2006) present (partly contradictory) evidence on the impact of trade liberalisation upon education wage differentials.

worker bargaining are available in Appendix 4.) Following from equation (8) in that Appendix, we can consider the following wage equation:

$$\ln w_{it} = \beta_0 + \beta_1 X_{it} + \beta_2 F_{it} + \beta_3 \frac{\pi_{Lit}}{n_{it}} + u_{it} \quad (1)$$

$\ln w_{it}$ is the log of the hourly wage of worker *i* in period *t*, X_{it} is a vector of worker *i* variables in period *t*, F_{it} is a vector of firm variables (the firm that employs worker *i* in period *t)*, π_{Lit} is the net profit of the firm that employs that worker, and n_{it} is the number of employees of the same firm. The parameter β_3 indicates the bargaining power of workers.

3.1. Gross and Net Profits

Our initial results, presented in Table 4, are obtained using pooled OLS. In this and the following tables, we present the coefficients on a selected group of regressors and their t-statistics (corrected for worker clustering). On top of the regressors presented (schooling, gender, experience, tenure, foreign firm and log firm size), we also consider in all specifications a quartic in experience; a quadratic in tenure; year, occupation, region and industry dummies; and interactions between all human capital variables and the gender dummy. All of these variables, in all models, present similar results to those that have been obtained for other countries.

Column 3 of Table 4 presents the results for net profits, indicating a significant β_3 of 0.0374. When considering instead gross profits, we find again a significant β_3 but this time about ten times bigger, at 0.349. As expected, the use of a measure of profits that predates the payment of the wage bill (gross profits) indicates that the more common net profits measure generates a downward bias on the estimates of rent sharing.

A useful measure of the implications of these parameters in terms of generating wage differences is the Lester Range (Lester, 1952). This range corresponds to four times the product of the rent sharing parameter and the standard deviation of profits (per worker). This formula can be interpreted as indicating the wage increase, in percentage terms, of a worker that would move from a firm with low profits (more precisely, a firm whose profitability is two standard deviations below the mean profitability of the firms in the sample) to a firm with high profits (a firm placed two

standard deviations above mean profitability). The Lester ranges for these two estimates in Table 4 are 5.4% and 49.9%.

Taking these numbers at face value, the gross profits estimate (our preferred estimate for reasons explained before) suggests that rent sharing is indeed an important factor in the Brazilian labour market. These values are also comparable (if not higher than) those figures obtained for different developed countries: Blanchflower et al (1996) finds a Lester range of 24% for the US; Arai (2003) documents ranges between 12% and 24% for Sweden; Hildreth and Oswald (1997) find a figure of 16% for the UK; and Martins (2004) presents a range of 56% for Portugal.

3.2. Instrumental Variables

An additional concern present in the estimation of rent sharing relates to the endogeneity of profits. For instance, if one considers an efficiency wage model, profits (even gross profits) and wages will be simultaneously determined. Variation of profits across firms may also capture worker unobserved characteristics that also affect those workers wages.

Our first approach at dealing with endogeneity involves the use of instruments. The first set of instruments we use is made of different components of revenues and costs, namely those related to financial investments, participations in other firms, and non-operational activities. Our identification assumption is that these six components of profits do not affect directly wages, although they are correlated with profits. We believe that this is likely to be true because bargaining over wages is typically related to profits in the firm's mainstream activities, e.g. car sales in the case of a car manufacturer. If that firm happens to benefit from a bump in profits driven by activities unrelated to the production of cars, e.g. selling off a different company, we believe that unions will tend be less likely to bargain over those profits than over profits directly related to car manufacturing.

An additional source of variability can be derived from the macroeconomic instability of Brazil over the period covered. The first important episode of such instability occurred in January 1999 when the central bank was forced to move from a fixed to a floating exchange rate. At the same time, inflation targeting is adopted and interest rates are increased substantially as a way to counteract inflationary expectations that may have been induced by the depreciation of the Real.

There is a second episode of interest rate hikes in 2002, following the exchange rate pressure induced by the Brazilian presidential elections. These two events imply that firms will see their profitability negatively affected, in particular if they have engaged in large financial investments, implying that they will face higher interest rate payments. We thus expect that financial losses will be an important determinant of profits while, as argued before, without having a direct impact on wages.

Table 5 presents our results, using the 2SLS method, considering either net or gross profits and either only the financial instruments or all instruments (financial and exchange rate instruments). Following Bound et al (1995) and Shea (1996), we start by investigating the strength of the instruments in the first-stage equation, as measured by the values of the partial R^2 and the joint F-test of the instruments. In Table 2.1 (Appendix 2), we find reassuring results, as all coefficients of the instruments are highly significant and generate at least reasonable partial R^2's. Consistent with our view of the role of macroeconomic instability upon profits, the role of financial losses in explaining net or gross profits is not only of the expected sign but also particularly large.

In terms of the main equation, we find that, unlike before, the coefficients are now negative, ranging between -0.0548 and -0.0420, and again precisely estimated**.** These negative findings indicate that rent sharing is not an important feature of the Brazilian labour market, unlike was suggested by the approach which ignored endogeneity. The Lester ranges are also particularly small, ranging between -8% and -6%.

Having established one of the main results of the paper, we now test the robustness of our findings to different instruments and to controls for other sources of bias. We start by considering exchange rate fluctuations as another dimension of the period of macroeconomic instability faced by Brazil. As indicated before, the country sustained considerable pressure upon its currency over those years; on top of that, the currencies of some of its neighbours – in particular Argentina, an important trade partner under Mercosul - also faced adjustments. These currency shocks can also be used as instruments, as a cheaper *Real* in terms of dollars or euros translates into cheaper exports and thus higher profits for exporting firms.

Figure 3.1 (Appendix 3) describes the evolution of the three different exchange rates over the period. As indicated before, the main depreciations take place in January 1999 and then in the second half of 2002. Before that, in December 2001, Argentina also replaced its currency board

with a floating system, leading to a massive depreciation of their currency with respect to the *Real* and other currencies. Figure 3.2 describes the evolution of the interest rate: one can observe the large instability in 1997 and 1999 and the subsequent increasing trend since the mid/late 2001, as the 2002 elections campaign progressed.

In order to exploit these events in terms of our estimation of the rent sharing parameter, we merge into our data information from the PIA data set about the shares of sales which are exported either to Mercosul or to the rest of the world. We then also multiply these shares by the exchange rates of the real with respect to the Argentinean Peso or a weighted average of the dollar and the euro (the weights being the exports from Brazil to either the US or the European Union, in each period.)

Columns 4 and 5 of Table 5 present the results for the sub-sample of exporting firms and their workers. We find that the new estimates of the β_3 parameter are still negative and of a magnitude similar to the case of the previous set of instruments. These estimates are -0.0746 and -0.0504, for net and gross profits, respectively, each coefficient again statistically significant. Lester ranges are -11.2% and -7.5%, respectively. Regarding the first-stage results, we again find that our instruments are statistically significant and of the predicted positive sign (Table 2.2, Appendix 2). This positive sign means that, the higher the share of sales that is exported, the greater the impact of a depreciation of the real in terms of the firms profitability. It is also interesting to notice that the role of exports to the rest of the World (ie other countries than those in Mercosul) is much bigger than that of the exports to Mercosul.

We conclude from our instrumental variable analysis that the evidence of rent sharing documented in simple models that do not account for the endogeneity of profits can be misleading. The higher wages of employees of more profitable firms are artificially driven by the simultaneous determination of profits and wages. When using shocks to profits that are arguably unrelated to the forces that directly determine wages, then no evidence can be found that wages increase with profits.

3.4 Spell Fixed Effects

One additional source of bias concerns the heterogeneity across firms and workers. Up until now, this heterogeneity was assumed to be uncorrelated with profits. Moreover, different observations of

the same individual or the same firm over time were not treated differently from different observations of different individuals or different firms.

In this sub-section we address this issue by incorporating into our instrumental variables approach controls for worker and firm heterogeneity. Given that we are not interested in estimating the heterogeneity itself (as in Abowd et al, 1999) but only in controlling for its possible biases, we adopt a spell fixed effects method. This corresponds to conducting a within-spell estimation, each spell being defined as a firm-worker match, as indicated by the following equation:

$$\ln w_{it} = \beta_0 + \beta_1 X_{it} + \beta_2 F_{it} + \beta_3 \frac{\pi_{Lit}}{n_{it}} + \nu_{it} + u_{it} \quad (2)$$

where ν_{ij} denotes the worker-firm spell fixed effect. Then, by mean-differencing equation (2) with respect to the spell means, one obtains:

$$\ln w_{it} - \overline{\ln w_s} = (X_{it} - \bar{X}_s)\beta_1 + (F_{it} - \bar{F}_s)\beta_2 + \beta_3(\pi_{j(i,t),t} - \bar{\pi}_{j(i,t),s}) + (u_{it} - \bar{u}_s),$$

in which each barred variable represents the mean of that variable for each spell (defined as a worker-firm match) over time. Since both worker and firm heterogeneity are controlled for in this equation, the rent sharing parameter (β_3) can be estimated consistently, which was not necessarily the case in the previous sections.

Table 6 presents the results for models that include spell fixed effects, first disregarding the endogeneity of profits and then instrumenting profits as before. We find in both specifications, and similarly to the previous results, very small bargaining parameters and correspondingly small Lester ranges, between -3.8% and -0.4%.[5] These results strengthen our earlier findings that Brazilian workers do not receive any share of the rents earned by their employers.

3.5 Robustness Analysis

One possible explanation for the lack of evidence of rent sharing documented so far in the paper is that many firms are facing losses, not profits. To the extent that rent sharing applies only when firms have profits, then one should not expect a positive correlation between profits and wages in

[5] We have also run these models for net profits and the results were again qualitatively and quantitatively very similar. These results are available upon request.

our data. Moreover, as in other countries, the Brazilian labour law makes it very difficult that firms cut their workers' nominal pay. While this constraint was obviously of little practical importance during the period of high inflation, prices have largely been under control since the Real plan was introduced in 1994. In this context, because of either an intrinsic asymmetry in the process of rent sharing or because of the downward nominal wage rigidity constraint in the law, rent sharing could remain a feature of the labour market, but one which would only emerge during periods of economic expansion or, more specifically, when firms increased their profits.

In order to test this alternative interpretation of our results, we repeat our previous analysis for the subset of workers employed by firms with at least 30 employees and covered during the years of 1999, 2000 and 2001. This was a period of uninterrupted economic growth in which the economy was not affected by major shocks, growing at reasonable rates (the growth rates of GDP per capita were 0.8%, 4.3% and 1.3%, respectively). If the hypothesis in the previous paragraph is correct, this would necessarily be a period in which rent sharing would be documented. By focusing on larger firms, we also hope to bias our results towards higher levels of rent sharing, as smaller firms may be affected by greater instability.

Tables 7a and 7b present information about the sample size of the new data set and equivalent descriptive statistics to those of Table 3. It can be seen that more than 80% of workers are employed by firms with 30 or more employees (either when compared to all firms or only firms that export). In total, there are about 4.5 million workers per year, of which about 2.5 million are employed by exporting firms.

Our regression results (based on the models considering gross profits, spell fixed effects and instruments – financial variables only or financial and export/exchange rate variables) – see Table 8 – indicate that there is indeed only some very mild evidence that, in periods of economic growth, firms are likely to share some of their profits with their employees. The largest Lester range found (for the specification based on exporters and the complete set of instrumental variables) is positive, but not bigger than 4%.

In order to be even more stringent in our analysis, we also consider a sub-sample of the firms present in the 1999-2001 period and whose profits increased over each year (i.e. in 2000 with respect to 1999 and in 2001 with respect to 2000). Consistent with our predictions, we find larger Lester ranges than in our previous estimates (see Tables 9 and 10 in Martins and Esteves, 2006).

However, our rent sharing parameter is never large enough so that the corresponding Lester range exceeds 14%. This Lester range is also particularly small when comparing it to figures from other countries: in similar analysis (i.e. considering only firms whose profits increase) and covering the labour markets of Sweden and Portugal, Arai and Heyman (2001) and Martins (2004), respectively, find much larger Lester ranges, ranging between 50% and 60%.

Another possible concern is that our main data set, RAIS, does not include all wage variables that refer to the sharing of profits between employers and employees, as the questionnaire taken by firms may be ambiguous in this specific aspect.[6] In order to check the support for this explanation, we repeated our analysis using the PIA data set, which is only available at the firm-level but which explicitly requests firms to include information about all profit-sharing schemes in their wage data. In results not shown but available upon request, we again do not find any evidence of rent sharing.

Finally, we also tried to study possible differences in the magnitude of rent sharing that may exist across different types of workers. According to our simple theoretical model, one could expect that subgroups of workers with different bargaining power will benefit differently from their firm's profitability. We considered subgroups defined in terms of the workers' gender, tenure, occupation (blue- or white-collar), and education. Also in these analyses, we find no evidence of rent sharing, regardless of the specific subgroup examined (results not shown but available upon request).[7]

4. Concluding remarks

This is one of the first papers that examines rent sharing in a developing country (see also Teal, 1996, and Bigsten et al, 2003, who focus on African countries) and is the first that does so exploiting particularly rich matched panel data, of the type typically only available in some

[6] Incidentally, we also noticed that most papers in the rent sharing literature do not explicit mention whether their wage data does include such profit-sharing information. Differences across countries in this respect may impair international comparisons of the magnitude of rent sharing.

[7] We also trimmed our data in different ways, in case the results were driven by outliers, namely in the profits variable. We also obtained the same results as in the main sections. Moreover, we also conducted a specific analysis of rent sharing across three of the main foreign car manufacturing firms located in São Paulo's industrial area (the so-called "ABC" region). Our motivation for that analysis is, in part, derived from the fact that the unions of the car manufacturing industry in that region are known by their strong bargaining power, possibly the strongest in Brazil. However, even for this very specific industry/region, and across different specifications, we found Lester ranges which never exceed 9%. Finally, we do not pursue models of person and firm fixed effects, which are based on the assumption that workers mobility between firms is exogenous (conditional on workers observables). We do not carry out this analysis not only due to computational constraints but also because we believe that untested assumption about randomly mobility may be particularly strong.

developed economies. Moreover, the quality of our data, together with the variability of the macroeconomic environment, also allows us to pay particular attention to a number of econometric problems that may have affected previous research.

We study the case of Brazil, a large country characterised by huge income disparities, and examine a period in which the economy was hit by different macroeconomic shocks (1997-2002). Exploiting these shocks as exogenous shifters in profitability, and also tackling other econometric problems, we find what we believe is particularly robust evidence that rent sharing is not a feature of the Brazilian labour market. Across almost all specifications, we find precisely estimated parameters indicating virtually zero rent sharing. Even when selecting a relatively small subset of our data that would, in our view, bias the results towards high levels of rent sharing, we still find very small results, about one third of the corresponding findings for developed countries.

Regarding possible explanations for our evidence of no rent sharing, we believe that an important role is played by the relative weakness of different labour market institutions in Brazil. For instance, unions are relatively segmented and weak and central bargaining tends to be fragmented. Employment law may also indirectly foster excessive worker turnover and thus hurt rent sharing, as relatively long periods of tenure may be necessary for workers to gain significant bargaining power in their firms. For instance, only after investing in firm-specific skills may workers benefit from some of the rents generated by those investments. Finally, the large informal labour market will also not help the bargaining power of workers with respect to their employers, as the former become more easily replaceable with respect to case of countries with smaller levels of informality.

Besides contributing to a better understanding of the labour markets of Brazil and of other similar developing countries, our results may also help the analysis of the reasons for and the policies against the extremely high levels of income inequality documented for Brazil. For instance, to the extent that firms do not share rents, gender and racial discrimination may become less likely determinants of inequality. On the other hand, our evidence shifts emphasis towards differences in observable and/or unobservable individual human capital levels and in convexities in the returns to those assets as possible sources of income dispersion.

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Table 1. Number of Workers and Firms (All Firms or Only Exporting Firms)

	All Firms		Exporting Firms	
Year	**Workers**	**Firms**	**Workers**	**Firms**
1997	5,507,887	21,642	2,926,827	5,033
1998	5,048,225	22,904	2,692,923	5,273
1999	4,971,535	23,678	2,705,760	5,623
2000	5,266,867	23,967	2,802,242	5,688
2001	5,474,064	25,819	2,987,354	6,086
2002	5,726,771	27,225	3,117,915	6,322

Table 2. Distribution of firm appearances in data

	All Firms	Exporting Firms
1 year	9,096	2,795
2 years	6,737	1,702
3 years	5,447	1,327
4 years	4,053	1,007
5 years	3,35	949
6 years	12,227	2,512

Table 3a: Descriptive Statistics: Mean and (Standard Deviation)

	1997	1998	1999	2000	2001	2002
Log hourly wage	1.45 (0.94)	1.47 (0.94)	1.36 (0.91)	1.24 (0.89)	1.22 (0.89)	1.14 (0.83)
Hourly wage R$	4.26	4.35	3.90	3.46	3.38	3.13
Schooling	7.00 (3.68)	7.29 (3.68)	7.57 (3.67)	7.74 (3.63)	7.90 (3.62)	8.04 (3.60)
Gender (1 if male, 0 if female)	0.75 (0.43)	0.75 (0.43)	0.74 (0.43)	0.74 (0.43)	0.73 (0.44)	0.74 (0.43)
Experience (years)	18.17 (10.95)	18.13 (10.86)	17.85 (10.79)	17.44 (10.80)	17.35 (10.86)	17.30 (10.93)
Tenure (months)	50.05 (63.56)	51.76 (63.89)	51.63 (63.80)	48.43 (62.28)	47.38 (62.19)	46.88 (62.07)
Ratio Mercosul exports/sales	0.022 (0.55)	0.024 (0.62)	0.027 (0.69)	0.025 (0.65)	0.023 (0.64)	0.018 (0.56)
Ratio rest of the world exports/sales	0.100 (0.215)	0.096 (0.210)	0.106 (0.224)	0.107 (0.223)	0.116 (0.231)	0.136 (0.250)
Ratio equity/number of workers	7,178 (16,916)	7,894 (17,706)	7,937 (21,021)	7,116 (54,322)	6,135 (14,796)	6,596 (24,881)
Net profits per worker	3,366 (81,919)	1,812 (86,458)	(67) (75,978)	5,351 (24,185)	6,807 (122,718)	(3,212) (337,383)
Wage bill (pw)	29,433 (34,348)	29,407 (29,373)	25,277 (25,911)	23,245 (85,141)	21,864 (22,266)	23,379 (136,165)
Gross profits (pw)	32,798 (92,120)	31,219 (94,453)	25,210 (80,979)	28,595 (169,194)	28,671 (127,017)	20,166 (287,223)
Financial revenues (pw)	170,78 (1,760)	270,63 (3,127)	215,87 (2,659)	134,02 (1,319)	215,46 (3,730)	212,56 (3,301)
Profits in other firms (pw)	5,572 (16,203)	6,860 (20,0507)	9,195 (33,336)	4,966 (21,395)	5,426 (31,723)	6,911 (48,851)
Non-operation profits (pw)	2,928 (19,190)	2,967 (16,773)	3,612 (24,198)	3,181 (19,037)	3,169 (19,888)	4,362 (30,716)
Financial losses (pw)	2,062 (9,551)	2,363 (23,490)	2,640 (27,708)	2,217 (13,063)	2,153 (22,514)	1,920 (20,828)
Losses in other firms (pw)	1,066 (3,658)	1,257 (3,714)	1,281 (7,294)	1,097 (3,976)	1,318 (6,212)	1,270 (7,678)
Non-operation losses (pw)	10,635 (22,859)	11,944 (32,704)	15,375 (47,207)	11,311 (56,853)	12,115 (63,334)	14,876 (147,098)
Log firm size	6.26 (1.69)	6.16 (1.74)	6.13 (1.74)	6.12 (1.73)	6.10 (1.77)	6.13 (1.81)

Table 3b: Descriptive Statistics (exporting firms only): Mean and (Standard Deviation)

	1997	1998	1999	2000	2001	2002
Log hourly wage	1.62 (0.98)	1.66 (0.98)	1.54 (0.95)	1.42 (0.93)	1.39 (0.94)	1.31 (0.88)
Hourly wage R$	5.05	5.25	4.66	4.13	4.01	3.70
Schooling	7.24 (3.83)	7.60 (3.84)	7.89 (3.84)	8.07 (3.78)	8.20 (3.80)	8.35 (3.79)
Gender (1 if male, 0 if female)	0.77 (0.42)	0.77 (0.41)	0.77 (0.42)	0.76 (0.42)	0.76 (0.42)	0.76 (0.42)
Experience (years)	18.25 (10.80)	18.14 (10.67)	17.78 (10.57)	17.34 (10.59)	17.25 (10.68)	17.19 (10.76)
Tenure (months)	60.77 (71.47)	62.25 (71.89)	61.87 (71.74)	58.15 (70.07)	56.31 (70.23)	55.91 (70.39)
Ratio Mercosul exports/sales	0.042 (0.07)	0.045 (0.08)	0.050 (0.08)	0.046 (0.08)	0.042 (0.08)	0.033 (0.07)
Ratio rest of the world exports/sales	0.190 (0.261)	0.181 (0.260)	0.196 (0.273)	0.201 (0.274)	0.214 (0.277)	0.250 (0.294)
Ratio equity/number of workers	9,921 (20,493)	11,194 (21,689)	11,517 (25,641)	10,469 (73,632)	8,758 (17,089)	9,602 (30,091)
Net profits per worker	5,785 (100,524)	3,385 (99,786)	2,031 (76,860)	9,181 (328,807)	12,687 (149,554)	(5,020) (442,201)
Wage bill (pw)	35,596 (38,052)	36,287 (34,928)	31,199 (28,382)	29,918 (115,577)	27,388 (24,430)	29,978 (181,222)
Gross profits (pw)	41,381 (111,935)	39,672 (110,583)	33,230 (40,238)	39,099 (28,008)	40,076 (40,929)	24,958 (371,872)
Financial revenues (pw)	7,505 (18,757)	9,687 (22,699)	3,660 (40,238	7,590 (28,008)	8,564 (40,929)	10,293 (32,469)
Profits in other firms (pw)	4,321 (17,786)	4,443 (18,954)	4,662 (18,811)	5,059 (23,008)	5,186 (40,029)	7,983 (32,469)
Non-operation profits (pw)	2,629 (10,930)	2,520 (8,841)	3,393 (26,438)	2,798 (14,757)	3,077 (29,794)	2,565 (25,138)
Financial losses (pw)	13,530 (25,541)	15,439 (27,205)	21,458 (46,635)	16,039 (72,826)	17,089 (67,595)	22,110 (181,532)
Losses in other firms (pw)	1,614 (10,800)	1,662 (9,225)	2,179 (14,314)	1,385 (12,241)	1,716 (10,372)	2,476 (20,021)
Non-operation losses (pw)	3,286 (13,786)	2,428 (13,626)	3,636 (29,873)	2,671 (15,341)	3,292 (23,713)	2,593 (22,385)
Log firm size	7.06 (1.53)	7.01 (1.57)	6.98 (1.57)	6.98 (1.57)	6.99 (1.58)	7.05 (1.63)

Table 4: OLS Regressions
Dependent variable: log hourly wage

	(2)	(3)	(4)
Schooling	0.0683	0.0683	0.0671
	(1003.05)	*(1003.01)*	*(991.03)*
Gender	0.1245	0.1241	0.1261
	(92.79)	*(92.53)*	*(94.71)*
Experience	0.0432	0.0432	0.0430
	(238.22)	*(238.46)*	*(239.13)*
Tenure	0.035	0.035	0.0344
	(397.99)	*(398.02)*	*(394.34)*
Foreign firm	0.1413	0.1419	0.1209
	(485.52)	*(487.52)*	*(415.94)*
Log firm size	0.06462	0.06439	0.05781
	(888.54)	*(884.32)*	*(792.34)*
Net profit (pw)		**0.0374**	
		(62.12)	
Gross profit (pw)			**0.3490**
			(653.14)
R^2	*0.6444*	*0.6445*	*0.6494*
Adj. R^2	*0.6444*	*0.6445*	*0.6494*
F	*326,444*	*324,554*	*331,673*
Lester Range		*5.43%*	*49.8%*

All regressions include 6 year dummies, 105 industry dummies, 9 job dummies, 27 region dummies and human capital x gender interactions, Robust standard errors, allowing for worker clustering,

Table 5: 2SLS regressions
Dependent variable: log hourly wage

	(2) Financial IV	(3) Financial IV	(4) All IV	(5) All IV
Schooling	0.0665	0.0666	0.0714	0.0716
	(891.5)	*(892.22)*	*(631.86)*	*(632.43)*
Gender	0.1532	0.1526	0.1905	0.1899
	(105.01)	*(104.46)*	*(84.75)*	*(84.40)*
Experience	0.0431	0.0432	0.0471	0.0472
	(224.52)	*(224.72)*	*(154.83)*	*(155.09)*
Tenure	0.0357	0.0358	0.0356	0.0357
	(366.74)	*(367.15)*	*(257.07)*	*(257.47)*
Foreign firm	0.1561	0.1595	0.1377	0.1423
	(454.98)	*(464.16)*	*(324.73)*	*(334.14)*
Log firm size	0.0707	0.0707	0.0409	0.0402
	(806.10)	*(803.03)*	*(276.93)*	*(272.43)*
Net profit (pw)	**-0.0548**		**-0.0746**	
	(-115.85))		***(-79.64)***	
Gross profit (pw)		**-0.0420**		**-0.0504**
		(-80.14)		***(-41.46)***
R^2	*0.6075*	*0.6069*	*0.6399*	*0.6393*
Adj. R^2	*0.6075*	*0.6069*	*0.6399*	*0.6393*
F	*238,681*	*238,067*	*126,646*	*126,336*
Lester Range	*-7.95%*	*-6.03%*	*-11.21%*	*-7.49%*

All regressions also include a quartic in experience, a quadratic in tenure, 6 year dummies, 105 industry dummies, 9 job dummies, 27 region dummies and human capital x gender interactions, Robust standard errors, allowing for worker clustering,

Table 6: Spell Fixed Effects and Spell Fixed Effects 2SLS Regressions
Dependent variable: log hourly wage

	(2) No IV	(3) Financial IV	(3) All IV
Schooling	0.050	0.056	0.03
	(50.84)	*(50.44)*	*(23.09)*
Experience	0.0280	0.0288	0.031
	(156.85)	*(151.90)*	*(119.03)*
Tenure	0.018	0.019	0.014
	(194.88)	*(191.80)*	*(110.59)*
Log firm size	0.0155	0.014	0.024
	(90.02)	*(79.35)*	*(86.16)*
Gross profit per worker	**-2.71E-3**	**-8.92E-3**	**-5.19E-4**
			(-18.04)
R^2	*0.031*	*0.030*	*0.0308*
Adj. R^2	*0.031*	*0.030*	*0.0308*
F	*24,363*	*23,884*	*13,049*
Lester Range	*-1.1%*	*-3.8%*	*-0.44%*

All regressions include a quartic in experience, a quadratic in tenure, 6 year dummies, and human capital x gender interactions, Robust standard errors, allowing for worker clustering,

Table 7: Number of Workers and Firms (sample of firms with more than 30 workers present in 1999-2001)

	All Firms		Exporting Firms	
Year	**Workers**	**Firms**	**Workers**	**Firms**
1999	4,282,851	17,535	2,420,956	5,090
2000	4,498,212	17,535	2,524,928	5,090
2001	4,616,837	17,535	2,747,058	5,090

Table 8: Spell Fixed Effects and Spell Fixed Effects 2SLS Regressions (Large firms present in 1999-2001 period); Dependent variable: log hourly wage

	(2) No IV	(3) Financial IV	(4) All IV
Schooling	0.022	0.022	0.023
	(126.74)	*(126.39)*	*(93.41)*
Experience	0.0433	0.0432	0.0557
	(119.84)	*(119.55)*	*(98.56)*
Tenure	0.011	0.011	0.004
	(70.70)	*(70.87)*	*(22.19)*
Log firm size	0.02	0.02	0.03
	(61.70)	*(79.11)*	*(67.51)*
Gross profit per worker	**-0.0208**	**0.0147**	**0.0124**
	(-1.18)*	***(56.59)***	***(48.18)***
R^2	*0.0249*	*0.0251*	*0.0262*
Adj. R^2	*0.0249*	*0.0251*	*0.0262*
F	*8,904*	*8,988*	*5,282*
Lester Range	*-0.025%*	*1.82%*	*3.13%*

All regressions also include a quartic in experience, a quadratic in tenure, 6 year dummies, 105 industry dummies, 9 job dummies, 27 region dummies and human capital x gender interactions, Robust standard errors, allowing for worker clustering, * - not significant at the 1% level.

Appendix 1 – Data Sets

1.1. RAIS ("Relatório Anual de Informações Sociais"- Annual Social Information Report),

RAIS is an administrative report filed by all tax registered Brazilian establishments. Since the information may be used for investigation about labor legislation compliance, firms that do not comply with it do not file in *RAIS*. Thus, this data set can be considered a census of the *formal* Brazilian labor market (State-owned enterprises, public administration and non-profit organizations are also required to file the report). Firms that do not provide accurate information will be committing an offense sanctioned by law, a threat that is likely to lead to very high standards of data quality.

RAIS covers the whole country and is carried out annually and the information is collected every year in the first quarter, referring to the previous year. Every tax registered enterprise receives a unique tax number, the CNPJ. This number is composed by a specific firm part and a complement for each unit (local plant or establishment) that the firm operates.

The main variables available from the survey at the establishment level are:

- *Geographic location*: State, metropolitan region, county;
- *Activity sector*: CNAE (National Economic Activity Classification); sector Level (10 categories); activity (42 categories); sub-activity (about 560 categories);
- *Establishment Size*: number of workers, number of wage earners, number of owners;
- *Establishment Type*: Private enterprise, private foundation, State-owned enterprise, State foundation, joint public-private enterprise, non-governmental organization, government, nonprofit enterprise, notary;

At the employee level, the following information is available:

- *Occupation*: occupation classes (CBO-Brazilian Occupation Classification system – about 350 categories); subgroup (84 categories); group (11 categories);
- *Personal Characteristics*: schooling (9 classes), age, gender, nationality;
- *Contract Information*: month of admission, month of separation, December wage rate (13^{th} monthly salary), average yearly wage, tenure, separation cause (fired with/without fair reason, separation with/without fair reason, retiring, transfer to other units or firm), contract type (work card, civil service, isolated worker, temporary worker), contract status (in activity or paid leave, leave without paid, occupation accident, military service, maternity leave, sick leave, inactive), admission type (first placement in firm, re-employment, transferred), contract hours (exclusive overtime);

With the establishment identification number (CNPJ) it is possible to follow all establishments that file the *RAIS* survey. Moreover, with the worker's national insurance number, it is possible to follow all workers that remain in the formal sector and to match the worker's characteristics with those of the establishment. Therefore, we can create a panel that matches workers to their establishments and follow each of them over time. It was using the firm identification numbers that we have merged the three data sets described in this appendix.

1.2. PIA ("Pesquisa Industrial Anual"- Yearly Industrial Research)

Our secondary data source is a yearly establishment survey covering the entire country, conducted by IBGE (Brazilian Statistics Office). *PIA* is a longitudinal survey of a stratified sample of

manufacturing establishments employing five workers or more. The panel covers all establishments (census) with 30 or more workers, plus a random sample of establishments whose size ranges from 5 to 29 workers. This random sample represents about 10% of the establishment population with these characteristics.

The survey collects information on labour inputs, labour costs, turnover, production level and a few other variables. The information on labour inputs covers both employment and the total number of hours paid. With respect to labour costs, the information available is: (a) total value of contractual wages (i.e., value of wages and salaries as specified in labour contracts) and (b) total value of payroll. In addition to contractual wages, payroll contains information on the payment for overtime, severance payments and other firing penalties, all payments due to commissions and other incentive schemes, such as productivity premium, all fringe benefits, additional payments due to hazardous activities, night shifts and other compensating schemes, and paid vacations.

1.3. "Censo de Capitais Estrangeiros" (Foreign Capital Census)

This census is conducted by the Brazilian Central Bank and is composed of all establishments situated in Brazil with 10% or more foreign capital participation. Establishments' information (accountability, foreign participation of capital, composition of capital, exports, imports, location, activity sector, number of employees, and establishment type) are available for 1995 and 2000. We assumed that foreign ownership, the single variable we used from CCBB, remain unchanged from 1995 to 1999 (1995 data) and from 2000 to 2002 (2000 data).

Appendix 2. Pooled 2SLS Auxiliary Regressions

Table 2.1: Auxiliary regressions
Dependent variables: Net (2) or gross (3) profits per worker

	(2)		(3)	
	Beta	**Partial R2**	**Beta**	**Partial R2**
Financial revenues	0.682	0.007	1.1967	0.00209
	(-651)		(1.065)	
Revenues from other firms	0.437	0.0006	0.5297	0.00277
	(-397)		(-448)	
Non-operational revenues	0.305	0.0068	0.373	0.00174
	(-435)		(-497)	
Financial losses	-0.828	0.3798	-0.679	0.25752
	(-4.096)		(-3.137)	
Losses from other firms	-0.699	0.0216	-0.682	0.02089
	(-951)		*(-866)*	
Non operation losses	-0.462	0.0171	-0.438	0.01466
	(-893)		(-790)	
R^2	*0.4531*		*0.3528*	
Adj. R^2	*0.4531*		*0.3528*	
F	*154,832*		*101,001*	

All regressions also include all variables used in the second stage equation, Robust standard errors, allowing for worker clustering.

Table 2.2: Auxilliary regressions
Dependent variable: Net (2) or gross (3) profits per worker

	(2)		(3)	
	Beta	**Partial R2**	**Beta**	**Partial R2**
Financial revenues	0.703	0.00840	1.035	0.00278
	(-400)		(-557)	
Revenues from other firms	0.423	0.00068	0.453	0.00316
	(-262)		(-226)	
Non-operational revenues	0.321	0.0116	0.328	0.00499
	(-287)		(-278)	
Financial losses	-0.715	0.19167	-0.422	0.0696
	(-1.636)		(-914)	
Losses from other firms	-0.804	0.02814	-0.789	0.0268
	(-656)		*(-609)*	
Non operation losses	-0.486	0.02814	-0.481	0.02344
	(-652)		(-612)	
Ratio exports to Mercosul/total sales times Exchange rate peso/real	0.188	0.000004	0.086	0.00002
	(-24)		(-10)	
Ratio exports to rest of the world/total sales times Exchange rate peso/real	0.44	1130	0.263	0.00209
	(-109)		*(-62)*	
R^2	*0.3181*		*0.2195*	
Adj. R^2	*0.3181*		*0.2194*	
F	*39,790*		*23,735*	

All regressions also include all variables used in the second stage equation, Robust standard errors, allowing for worker clustering.

Appendix 3. Brazilian Real exchange rates

Figure 3.1: US Dollar, Euro and Argentinean Peso Exchange Rate Indices

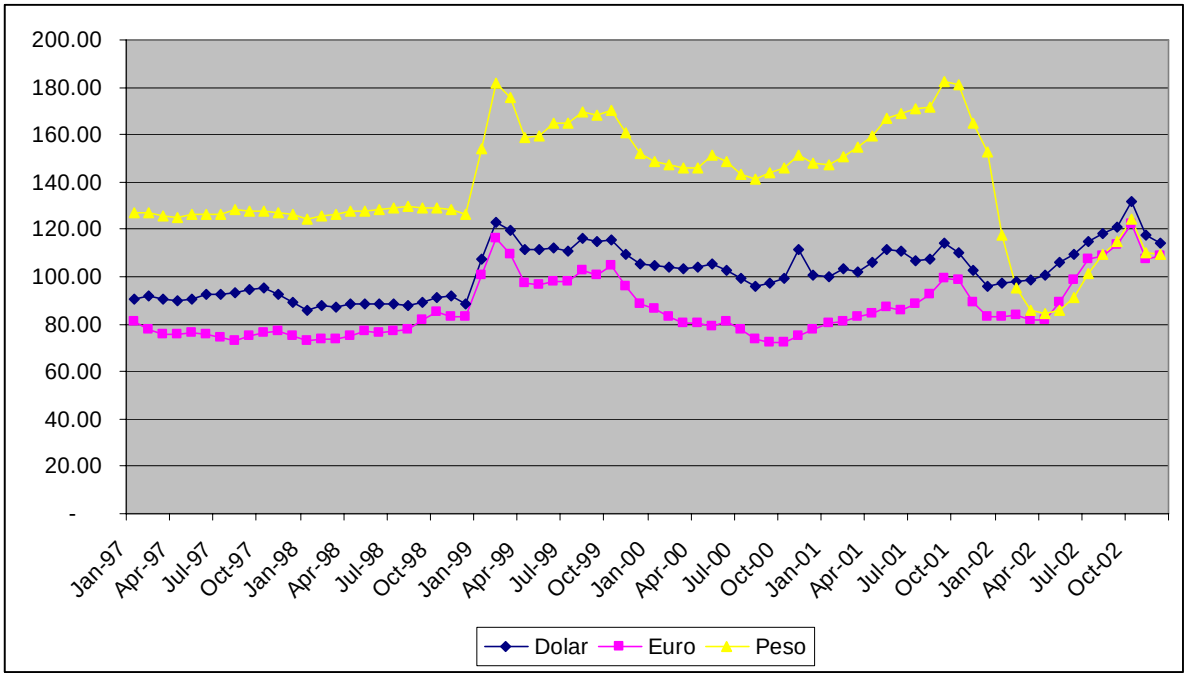
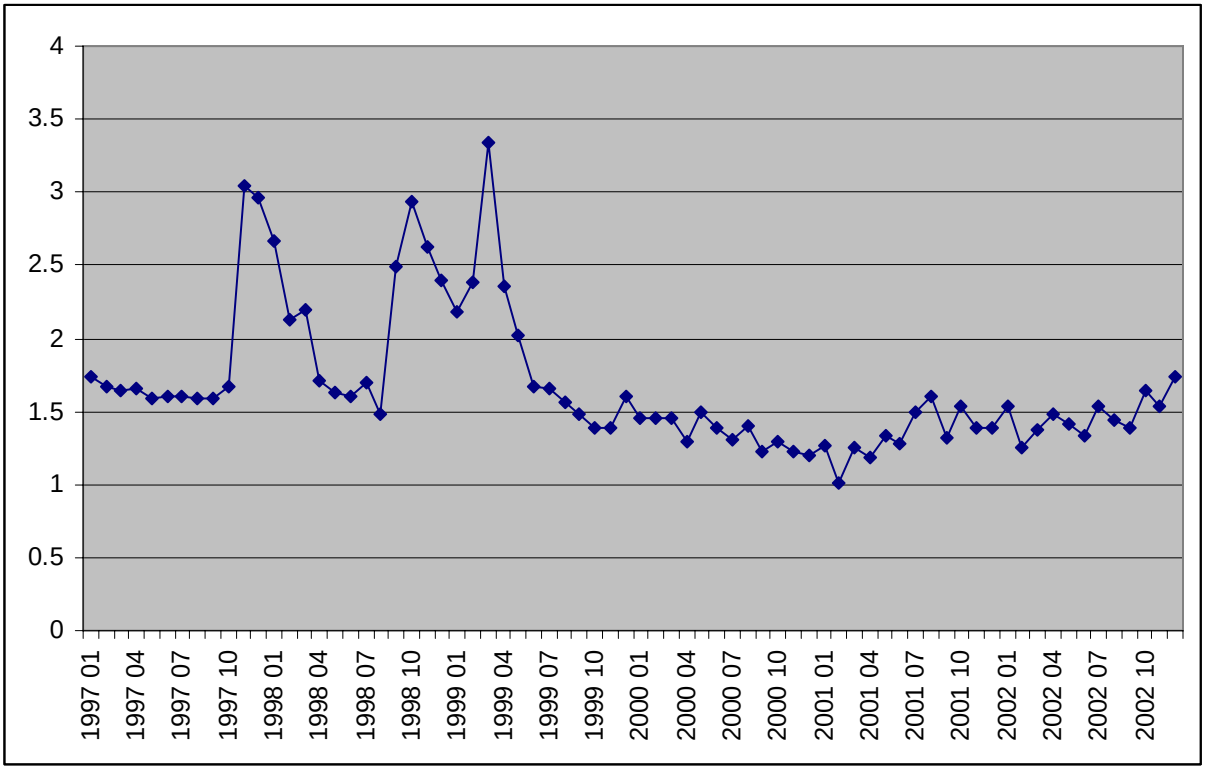


Figure 3.2: Monthly Interest Rate (%; SELIC)



Appendix 4. Theory

This theoretical analysis follows closely Blanchflower et al (1996). It is assumed that wages are determined following a bargain process that corresponds to the following expression:

$$\max \phi \log\{[u(w)-u(\overline{w})]n\}+(1-\phi)\log\Pi \quad (1)$$

Φ represents the workers bargaining power; *u(w)* represents the workers utility from their wages; w^- represents the outside earnings workers will get if not employed in their current firm; n indicates the employment level and π denotes profits.

If bargaining breaks down, the employer will receive zero profits and workers will receive w^- wages. Profits are defined as *f(n)-wn*, in which *f* is a concave function in *n*.

The first order conditions are:

$$w: \quad \frac{\phi u'(w)}{[u(w)-u(\overline{w})]n}-\frac{1-\phi}{\Pi}=0 \quad (2)$$

$$\text{n}: \quad \frac{\phi}{n}+\frac{(1-\phi)[f'(n)-w]}{\Pi}=0 \quad (3)$$

(2) can be rewritten as:

$$\frac{u(w)-u(\overline{w})}{u'(w)}=\left(\frac{\phi}{1-\phi}\right)\frac{\Pi}{n} \quad (4)$$

Given that:

$$u(\overline{w})\cong u(w)+(\overline{w}-w)u'(w) \quad (5)$$

From (4) and (5) we find:

$$w\cong\overline{w}+\left(\frac{\phi}{1-\phi}\right)\frac{\Pi}{n} \quad (6)$$

Equation (6) establishes that the equilibrium wage is determined by the outside option of the worker, the relative bargaining power of each party ($(\Phi/(1-\Phi)$) and the profit per worker (π/n).

The workers outside option can also be characterised as:

$$\overline{w} = c\left(w^{0}, b, U\right) \qquad (7)$$

In which w^0 is the outside wage in other firms, b is the income level of unemployed workers and U is the unemployment rate of workers from that firm. Equation (6) can thus be written as:

$$w = c\left(w^{0}, b, U\right) + \left(\frac{\phi}{1-\phi}\right)\frac{\Pi}{n} \qquad (8)$$

This equation establishes a wage equation in which profits per worker are an explanatory variable. Positive values for *Φ/(1-Φ)* are then understood as providing support for the rent sharing hypothesis. The bigger is *Φ/(1-Φ)*, the bigger is share of profits captured by workers via bargaining.