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

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Abstract: This paper examines empirically whether manufacturing firms in Brazil share rents with their employees. We use detailed individual-level matched data, covering the 1997-2002 period, based on our merging of three different data sets: RAIS, PIA and "Censo de Capitais". We also seek to account for the possible endogeneity of profits, using better measures of profits and using instruments based on financial accounting variables and/or exchange rates and firms export propensities. In our preferred specifications, we do not find evidence of rent sharing.
Keywords: Rent Sharing; Instrumental Variables; Matched Employer-Employee Data;
JEL codes: J31, J41.

Resumo: O objetivo deste trabalho é testar empiricamente a hipótese de *rent sharing* (divisão de rendas/lucros) para as indústrias brasileiras. Para testar a hipótese de *rent sharing*, o presente trabalho utiliza um *matching* composto por dados da RAIS (Relatório Anual de Informações Sociais), PIA (Pesquisa Industrial Anual) e Censo de Capitais do Banco Central do Brasil para os anos de 1997-2002. Controles para uma possível endogeneidade dos lucros foram efetuados através de medidas alternativas de lucros e instrumentos baseados em variáveis contábeis, taxas de câmbio e propensões a exportar das firmas. Em nossas especificações preferidas não foram encontradas evidências de *rent sharing* para a economia brasileira.
Palavras-Chaves: Divisão de Rendas Econômicas; Variáveis Instrumentais, Base de dados trabalhador-empresa;
Códigos JEL: J31,J41

ANPEC área: Area 12, Economia do Trabalho

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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 developing countries are usually characterised by high levels of inequality, suggesting that a considerable share of their populations endure particularly low levels of quality of life (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 large evidence that the division of rents between employers and their employees is an important component of the explanation of wage differentials, not only in developed countries (Abowd and Lemieux, 1993; Blanchflower et al, 1996; Van Reenen, 1996; Bronars and Famulari, 2001; Arai, 2003; Estevão and Tevlin, 2003; Kramarz, 2003; Martins, 2004; etc)[1] but 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 are also deemed relevant in the Brazilian case.

However, there are also reasons to expect that employers in developing countries would be particularly immune to any possible wage bargaining pressures arising from 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 hand, Brazil's relatively stringent employment law may increase the workers' bargaining power, although possibly at the cost of increased informality and other inefficiencies.[2] However, 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.

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

[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.

Another motivation point in our study is that we are able to draw on particularly detailed panel data, which allow us to tackle many troublesome econometric problems that arise when estimating rent sharing effects. The data are driven 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 sample coverage, about half the entire population.

Finally, Brazil's economic and political history over the period we cover also offers a number of complementary identification strategies. In particular, we use different instruments based on several macroeconomic shocks faced by the country, 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 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 force in explaining wage differentials in Brazil. This is a result that we find surprising given the previously-mentioned findings in the literature, although not so much when taking into account some of the specific characteristics of the Brazilian labour market mentioned before. However, the inexistence of rent sharing in Brazil suggests that other factors, possibly involving unobservable differences across workers, are driving the country's inequality.

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 three different data sources: RAIS, PIA and CCBB 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) 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 extract the information concerning firms' profits and also additional data about revenues and costs. Finally, we also use CCE (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.

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 expected, 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%. 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, when tariffs were reduced substantially. The adjustment to these reform 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 kept falling.[3] 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).

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.

Similarly to the case of wages, the 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, 13th and 14th month pay, etc. These latter 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 helps explaining the large size of the informal labour market .

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%.

When focusing only on workers whose firms export, there are many differences that can be mentioned. For instance, this subset of workers are paid higher wages, they are more educated and have higher tenure. Their firms' levels of equity per worker are also higher. Export levels are obviously higher (in which abut 4% of sales reach other Mercosul countries while about 21% concern the rest of the world).

The profit levels of exporting firms are also higher than the entire set of manufacturing firms in our sample (except for 2002). Moreover, these profits are also more variable over time: they range between approximately 7,000 and -3,000 reais per worker (in 2001 and 2002, respectively), while the same average annual profits for the entire set of firms range between approximately 12,000 and -5,000 reais per worker (also in 2001 and 2002, respectively). Given the higher wages paid by exporting firms, their wage bills and gross profits are also higher.

[3] 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. Interestingly for our purposes, Arbache et al (2004), who find evidence that trade liberalisation increased the education premium, also suggest that the lower wages in the traded sector after liberalisation are a consequence of reduced rents (page F93).

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 worker bargaining are available on 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[4], 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 generate a downward bias on the estimates of rent sharing.

An useful measure of the implications of these parameters in terms of generating wage differences is the Lester Range (Lester, 1952). This range corresponds to 4 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.

[4] For convenience of presentation, all profit variables have been multiplied by 100,000.

3.2. Instrumental Variables

An additional concern present in the estimation of rent sharing related 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 thus 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. cars for a car manufacturer. If that firm happens to benefit from a bump in profits driven by activities unrelated to the production of cars, unions are less likely to want to extract a share of those profits.

An additional important aspect concerns the macroeconomic instability of Brazil over the period covered. The first important episode of such instability occurs in January 1999 when the central bank is 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. We thus expect that financial losses will be an important determinant of profits while, as argued before, we believe it should have no 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). Unlike before, we now obtain negative coefficients, ranging between -0.0548 and -0.0420, both of which are precisely estimated**.** Following the results of Shea (1996) and Bound et al (1995), we also investigate the strength of the instruments in the first-stage or auxiliary 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. Consistently with our view of the role of macroeconomic instability upon profits, the role of financial losses in explaining net or gross profits is particularly large.

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%. We now will test the robustness of our results to different instruments and to controls for other sources of bias.

Exchange rate fluctuations are another dimension of the period of macroeconomic instability faced by Brazil. As indicated before, Brazil 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 (measured in the Brazilian currency) for exporting firms.

Figure 3.1 (Appendix 3) describes the evolution of the three different exchange rates over the period. As indicated before, these are the depreciations that 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: it can be seen 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 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.)

Columns 4 and 5 of Table 5 present the results for the sub-sample of exporting firms. 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 the simple models that do not account for the endogeneity of profits is misleading. The higher wages of employees of more profitable firms is artificially driven by the simultaneous determination of profits and wages. When using shocks to profits that are arguably unrelated to the forces that determine wages, then no evidence can be found that wages increase with profits.

3.4 Spell Fixed Effects

Our 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 (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 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:

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

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, consistently with the operation of a competitive market, 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 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.

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 our previous discussion 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 the equivalent descriptive statistics as 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 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 not bigger than 4%.

[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.

In order to be even more stringent in the analysis, we also consider a sub-sample of the set of firms present in the 1999-2001 period, in which we focus only on firms whose profits increased over each year (i.e. in 2000 with respect to 1999 and in 2001 with respect to 2000). Tables 9a and 9b present the descriptive statistics, where it becomes clear that the imposition of the profits constraint leads to a much smaller sample: about 500,000 workers per year and 1,600 firms (all firms) and about 350,000 workers per year and 600 firms (exporting firms only).

Table 10 presents our results using these second sub-samples. Consistently with our predictions, we find larger Lester ranges than in our previous estimates. However, our rent sharing parameter is never big enough so that the corresponding Lester range would exceed 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%.

Moreover, in Martins and Esteves (2006), is also conducted a specific analysis of rent sharing across four of the main foreign car manufacturing firms located in São Paulo's industrial area (the so-called "ABC"). The motivation for this analysis is, in part, derived from the fact that the unions of the car manufacturing industry in the ABC 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, it is founded Lester ranges which never exceeded 26%.

4. Concluding remarks

This is one of the first papers that examines rent sharing in a developing country (see Teal, 1996, and Bigsten et al, 2003, who examine the case of four African countries) and is the first that does so exploiting particularly rich matched panel data. 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. Exploiting these shocks as sources of exogenous shifters in profitability, and tackling also other econometric problems, we find what we believe is 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 lead, in our view, to the strongest possible evidence 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 tend to increase pay of the most qualified workers only, thus even promoting further inequality (Arbache, 2002). Employment law may also indirectly foster excessive worker turnover and thus hurt rent sharing, as relatively long periods of tenure are typically required for workers to gain significant bargaining power in their firms. For instance, only after investing in firm-specific skills may workers benefit from the rents generated by such investments.[6]

[6] In current research, we are investigating if there are differences across different types of industries and firms (profits, worker turnover, export propensities) or workers (tenure, education, hierarchy, gender), regarding the rent sharing

Besides contributing to a better understanding of the labour markets of Brazil and of other developing countries, our results may also help the analysis of the reasons for and the policies against the large levels of income inequality documented for Brazil. For instance, to the extent that firms do not share rents, racial and gender discrimination may become less likely determinants of inequality. On the other hand, our evidence puts more weight on differences in observable and/or unobservable individual endowments and in convexities in the returns to those endowments as possible sources of income dispersion.[7]

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process. We have also considered the role of the informal labour market (Almeida and Carneiro, 2005) but found no evidence that a greater prevalence of informal workers drives down the rent sharing across formal workers.

[7] The case for unobservable differences (and our evidence of no rent sharing) are also strengthened when taking into account the results of Arbache et al (2004). These authors present evidence that the Brazilian inter-industry wage structure remained largely unchanged from 1981 to 1999, although the country went through considerable economic liberalisation over that period. To the extent that liberalisation leads to lower rents, then the explanations based on no unobservable differences and/or on rent sharing would imply that industry premia would become more compressed, unlike what happened.

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Table 1a. Number of Workers and Firms

Year	Number of Workers	Number of Firms
1997	5.507.887	21.642
1998	5.048.225	22.904
1999	4.971.535	23.678
2000	5.266.867	23.967
2001	5.474.064	25.819
2002	5.726.771	27.225

Table 1b. Number of Workers and Firms (exporting firms only)

Year	Number of Workers	Number of Firms
1997	2.926.827	5.033
1998	2.692.923	5.273
1999	2.705.760	5.623
2000	2.802.242	5.688
2001	2.987.354	6.086
2002	3.117.915	6.322

Table 2a. Distribution of firm appearances in data

Number of years	Number of firms
Only 1 year	9.096
2 years	6.737
3 years	5.447
4 years	4.053
5 years	3.350
6 years	12.227

Table 2b. Distribution of firm appearances in data (exporting firms only)

Number of Years	Number of Firms
Only 1 year	2.795
2 years	1.702
3 years	1.327
4 years	1.007
5 years	949
6 years	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 (34.348,89)	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 (38.052,89)	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	035	035	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*

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	0357	0358	0356	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*

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	050	056	03
	(50,84)	*(50,44)*	*(23,09)*
Experience	0,0280	0,0288	0,031
	(156,85)	*(151,90)*	*(119,03)*
Tenure	018	019	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*
Standard deviation of profit per worker	*108.712*	*108.712*	*221.772*
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 7a. Number of Workers and Firms (sample of firms with more than 30 workers present in 1999-2001)

Year	Number of Workers	Number of Firms
1999	4.282.851	17.535
2000	4.498.212	17.535
2001	4.616.837	17.535

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

Year	Number of Workers	Number of Firms
1999	2.420.956	5.090
2000	2.524.928	5.090
2001	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	011	011	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*

Standard deviation of profit per worker	*31.011*	*31.011*	*63.207*
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.

Table 9a. Number of Workers and Firms (sample of firms with more than 30 workers present in 1999-2001 and with increasing profits)

Year	Number of Workers	Number of Firms
1999	482.833	1.625
2000	511.184	1.625
2001	528.043	1.625

Table 9b. Number of Workers and Firms (sample of exporting firms with more than 30 workers present in 1999-2001 and with increasing profits)

Year	Number of Workers	Number of Firms
1999	333.528	595
2000	347.523	595
2001	377.020	595

Table 10: Spell Fixed Effects and Spell Fixed Effects 2SLS Regressions (Large firms present in 1999-2001 period, with increasing profits); Dependent variable: log hourly wage

	(2) No IV	(3) Financial IV	(4) All IV
Schooling	0,013	0,013	082
	(23,72)	*(23,67)*	*(11,37)*
Experience	0,042	0,042	0,056
	(34,24)	*(34,18)*	*(31,02)*
Tenure	014	014	010
	(28,53)	*(28,35)*	*(16,92)*
Log firm size	0,12	0,12	0,16
	(135,78)	*(137,99)*	*(154,53)*
Gross profit per worker	**0,0147**	**0,0165**	**0,022**
	(59,48)	***(64,04)***	***(80,92)***
R^2	*0,0464*	*0,0468*	*0,0648*
adj. R^2	*0,0464*	*0,0468*	*0.0648*
F	*1.775*	*1.791*	*1.669*
Standard deviation of profit per worker	*84.118*	*84.118*	*152.824*
Lester Range	*4,94%*	*5,55%*	*13,45%*

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.

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 (651,62)	07	1,1967 (1.065,9)	0209
Revenues from other firms	0,437 (397)	006	0,5297 (448,40)	0277
Non-operational revenues	0,305 (435,88)	068	0,373 (497,70)	0174
Financial losses	-0,828 (-4.096)	0,3798	-0,679 (-3.137)	0,25752
Losses from other firms	-0,699 *(-951,25)*	0,0216	-0,682 *(-866,30)*	0,02089
Non operation losses	-0,462 (-893,83)	0,0171	-0,438 (-790,29)	0,01466
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 (400,33)	0840	1,035 (557,77)	0278
Revenues from other firms	0,423 (262,54)	0068	0,453 (226,23)	0316
Non-operational revenues	0,321 (287,68)	0,0116	0,328 (278,15)	0499
Financial losses	-0,715 (-1.636)	0,19167	-0,422 (-914,29)	0.06960
Losses from other firms	-0,804 *(-656,21)*	0,02814	-0,789 *(-609,04)*	0,02680
Non operation losses	-0,486 (-652,71)	0,02814	-0,481 (-612,01)	0,02344
Ratio exports to Mercosul/total sales times Exchange rate peso/real	0,188 (24,88)	00004	0,086 (10,80)	0002
Ratio exports to rest of the world/total sales times Exchange rate peso/real	0,440 *(109,61)*	01130	0,263 *(62,17)*	0209
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

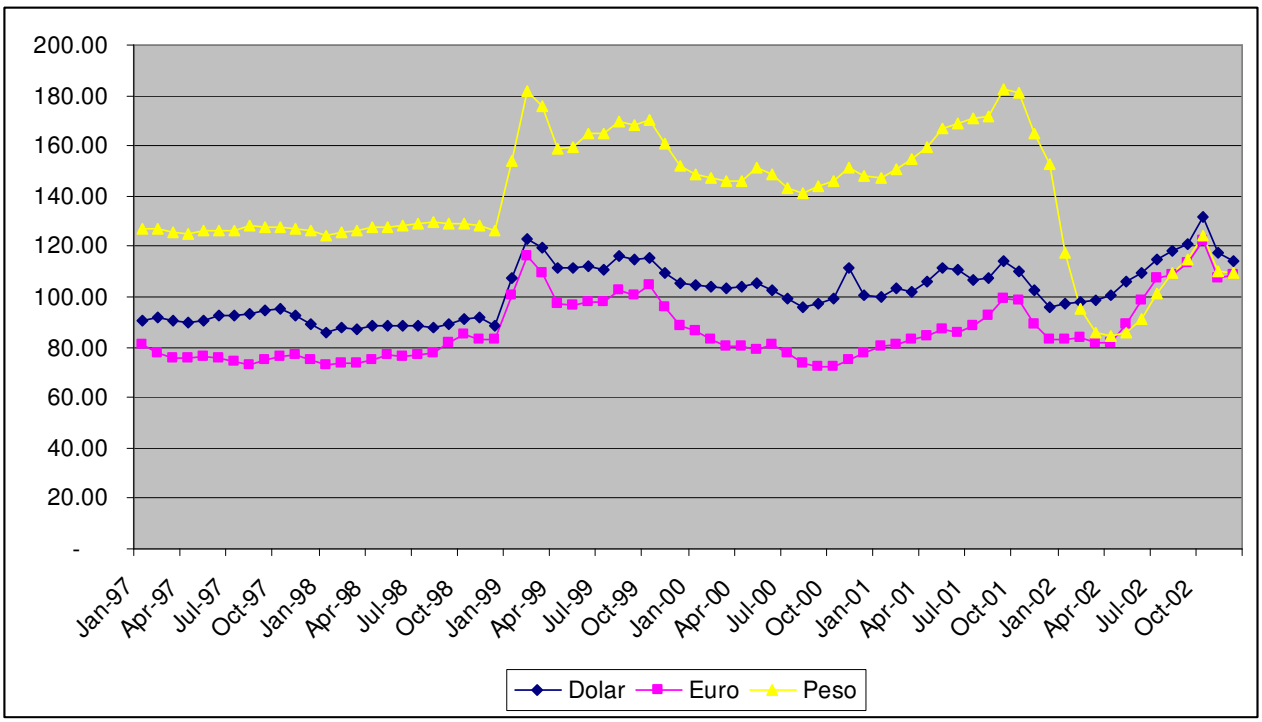

Figure 3.2: Monthly Interest Rate (%; SELIC)