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## UNIONS AND THE ECONOMIC PERFORMANCE OF BRAZILIAN ESTABLISHMENTS

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## **Abstract**

Using a pooled sample, this paper indicates that unions seem to affect the economic performance of Brazilian establishments, especially in terms of profitability, employment and productivity. Unions tend to reduce profitability, whereas the relationship between union density and productivity, employment and average wages seems to be concave. These performance indicators first rise with union density up to a certain density level (usually about 50 percent) and then start to decline. These results indicate that some unionism may be good for the plants' economic performance, although too much unionism may start having negative effects.



## 1. Introduction

There have been many studies investigating the economic impact of unions in the economics literature. These studies have examined the impact of union presence and density on economic performance and efficiency variables, measured at the plant, firm or industry level. The outcomes examined reflect either static performance, such as profitability and productivity, or dynamic efficiency, such as physical capital and R&D investments.

In the U.S., for example, Mishel and Voos (1992) and Hirsh (1991) provide comprehensive surveys of the economic impact of unions, with the general finding that unions adversely affect economic performance. Menezes-Filho (1997) used panel data to find that unions have a negative impact on profitability in the United Kingdom, but that this effect declined over the 1980s, a period of harsh anti-union legislation. Moreover, Menezes-Filho, Ulph and Van Reenen (1998) found a negative correlation between unions and R&D spending in the United Kingdom, but this correlation basically disappeared when they controlled for cohort dummies and technological opportunities. Gregg, Machi and Metcalf (1993) found that unionized firms experienced faster productivity growth in the U.K. in the late 1980s. Finally, Fallick and Hasset (1999) found that union certification significantly reduces a firm's investment, whereas Black and Lynch (1997) found that unionized establishments that have adopted new industrial relations practices have higher productivity than otherwise similar non-union plants.

In Latin America, there are very few econometric studies of the economic effect of unions. This is very surprising, given their recognized importance in shaping various economic and political outcomes in these countries. There have been some studies examining the effect of unions on wages, such as Arbache (1999), who found that unions increase wage dispersion in Brazil, contrary to almost all studies in the developed world. This highlights the need for research on the effect of unions on firms' economic performance in Latin America, so that the role of unions can be better understood and economic policies devised to improve the relationship between workers and managers.

Brazil (like other Latin American countries) has recently been subject to a dramatic trade liberalization process, with trade tariffs declining from an average of 57.5 percent in 1988 to about 15.6 percent in 1998. The literature on unions and international trade shows that increasing imports and the removal of trade barriers may have a negative impact on union wages

(see Driffill and Van der Poeg, 1995 and Gaston and Teffler, 1995). One important research and policy question that can also be addressed with this research is what happened to the union impact on the firms' economic performance after the rapid trade liberalization process, which brought more competition to the market.

To anticipate the results, this paper indicates that unions seem to affect the economic performance of Brazilian establishments, especially in terms of profitability, employment and productivity. The results using the pooled sample indicate that unions tend to reduce profitability, whereas the relationship between union density and productivity, employment and average wages seems to be concave. These performance indicators first rise with union density up to a certain density level (usually about 50 percent) and then start to decline. These results indicate that some unionism may be good for the plants' economic performance, although too much unionism may start having negative effects.

## **2. A Brief History of Union Activity in Brazil**

The main hypothesis that this paper will investigate is whether trade unions have had a negative impact on the economic performance of Brazilian firms, measured in terms of profitability, productivity and capital investment. The paper also seeks to examine the conjecture that changes in Brazilian trade policy in the early 1990s, which increased competition in the product market, affected the power of trade unions to affect these measures.

The data available seem adequate to test these hypotheses, since information was collected on many economic variables at the establishment level over time and establishments were surveyed on unionization and other industrial relations policies throughout the 1990s. It was therefore possible to summarize the main changes that occurred in the industrial relations policies of the firms in the sample and relate those changes in the competitive environment and to the division of rents inside each firm.

Brazil is one of the few countries that have not signed Convention 87 of the ILO. This Convention is regarded as the most important by the ILO, as it establishes the principle of freedom to organize. According to it, workers are entitled to decide on matters of union organization and structure without any interference from the other actors in the system. In particular, under the principle of freedom to organize, workers are the ones who should decide if the union structure should either be unified by one single union, or organized with more than one

organization. In Brazil, the structure of workers' representation is a matter of law and of the Constitution. Since the matter is regulated by the law and by the Constitution, Brazilian workers do not have the freedom to organize unions of their own. In order for Brazil to become a signatory of Convention 87, the country's Constitution would need to be changed, at least in this respect.

Until 1988, the Labor Code was very restrictive about union organization in Brazil. Unions were subject to interference and even to intervention by the government. The law restricted the size of the union board of directors, limiting it to 25 members. To exist, the union needed a formal authorization from the Labor Secretary, known as the "Union Letter" (Carta Sindical). Unions could organize workers belonging to "categories," as they were defined in the law. If a "category" was not listed in the Labor Code, there could not exist a union to represent these workers. The law has never recognized the right to organize and to represent workers at the plant level. The smallest representing unit is the city, and, consequently, the smallest bargaining unit is supposed to be the city, too.

Together with restrictions on union activities, the law also conceded some rights to the unions. The most important is exclusive jurisdiction. Once recognized by the government, the union becomes the single representative of the workers. In addition, the law created the "Union Tax," a compulsory fee deducted from the pay of all workers belonging to the "category," even non-members. The "Union Tax" corresponds to the value of one day's work and is deducted annually, in March. The revenue is distributed in the following proportions: 60 percent to the local (city) union, 15 percent to the state federation, 5 percent to the national confederation, and 20 percent to the Labor Department.

Brazilian Labor law complemented union regulation by offering some personal opportunities to union officers. For instance, within the Labor Department, there were many tripartite structures in which some positions were reserved for labor union officers. The Labor Court system was also a tripartite structure, with hundreds of positions to be filled. The appointment decisions to the positions were the outcomes of political processes and were used by governments as a means of co-opting labor leaders. With this legal apparatus, the government has been able to control the labor movement since the 1930s. Repression and co-optation were combined for decades, to allow the industrialization of the country with minimal industrial conflict. In this sense, the model may be regarded as a success.

The 1988 Constitution changed some of the old provisions, and created a situation similar to that prevailing in the United States and Canada. On the one hand, the 1978 Constitution eliminated all forms of government interference and intervention in union affairs. On the other hand, it retained the monopoly of representation, with the single union principle. It also kept the “Union Contribution” and created a second compulsory contribution, whose value is to be decided by the “workers’ assembly,” organized by the union.

After 1988, union representation became a Constitutional matter. The old problems of lack of legitimacy were not solved. The old system was repressive, but it was consistent, combining elements of restrictions with some compensating privileges. The system that has emerged from the new Constitution, however, is very ambiguous. Unions have achieved more freedom, since they are not subject to government intervention. However, rather than assuming risks and responsibilities which should come with freedom, unions have managed to keep the old privileges. As a result, today, Brazilian unions have the legal guarantee of monopolistic representation, and, at the same time, have the right to collect compulsory fees. They are free to define “categories” of workers but cannot represent at the plant level.

The union structure that has emerged from the 1988 Constitution is very curious. Because of the maintenance of both the “Union Contribution” and the union monopoly, there are many incentives to create new unions. At the same time, however, union officers are still relatively insulated from rank-and-file pressures to represent workers’ interests. Figures of the Brazilian Labor Department indicate that there are about 18,000 unions in the country. It would not be correct to say that all are led by non-representative, illegitimate officers. In fact, there is an important part of the Brazilian labor movement, within CUT (the largest peak organization), which advocates the signing of Convention 87. Some Brazilian unions give back to the workers they represent the fees collected by the Government (the “Union Contribution”). Some unions fight to establish formal representation at the plant level, through Works Councils, and to establish direct negotiations with management.

In sum, *all Brazilian workers working in formally organized firms, are formally represented by a trade union.* The union engages in collective bargaining at least once a year. Bargaining outcomes are automatically extended to all workers in the industry, regardless of the membership status of individual workers. This means that, for instance, wage increases negotiated at the bargaining table, apply to all workers in the industry, even to non-members.

Moreover, all workers in a firm are entitled to the wage increase, even if there are no union members within the firm's labor force.

However, trade unions do negotiate, on a firm-by-firm and even plant-by-plant basis, about working conditions and practices, employment levels, shifts, introduction of new machinery, etc. Therefore, this paper tests the hypothesis that the wages and practices defined at the industry level act as a floor (outside option) for the workers' demands within a firm, and that a second-round bargaining process takes place within each establishment, that will affect various performance measures, depending on the relative bargaining power of its workers. This bargaining power depends on the presence of unionized workers and of a workers' council in the firm, and also on whether the firm recognizes the union for bargaining purposes.

The period covered by the data used in this study is 1990-2000. As mentioned before, the legal framework that regulates union activity in Brazil was reformed in 1988, with the new Constitution, and has not changed during the period. Consequently, variations in union effects, eventually captured, cannot be attributed to changes in the legal and institutional framework. They should be related to other structural changes, mainly to the economic reforms initiated in the Collor Administration, since 1990.

In the 1990s, with Presidents Itamar Franco and Fernando Henrique Cardoso, Brazil started a process of opening its domestic markets, restructured many industries, privatized state-owned enterprises, deregulated some industries, and transferred to the private sector many services that had previously been performed by the state.<sup>1</sup> Thus, in the period under study, there were a number of important changes in the Brazilian markets of goods and services. The reforms have impacted the labor market, and very probably have changed the elasticity of demand of labor. Changes in union impacts should be attributed to those changes, rather to regulation of union activity.

In sum, trade unions have played a very important role in the Brazilian society, especially in recent times, since the democratization process that took place in the early 1980s. Despite this important role played by unions in society, no econometric study has attempted to assess the impact of unions on static and dynamic efficiency. This paper aims to fill this gap.

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<sup>1</sup> For an overall view of privatization process that took place in Brazil, see Annex 2.

### **3. Theory and Econometric Methodology**

#### ***3.1 Theoretical Issues***

Models of union-firm bargaining are generally applications of a class of game theoretical models first described by Nash (1953). Bargaining models can be either static and axiomatic (as formulated by Nash, 1953), or dynamic and strategic (first analyzed by Rubinstein, 1982). Binmore (1982) describes the conditions under which the two types of models generate identical solutions. The differences and correspondences between these two types of models were also examined in details by Binmore, Rubinstein and Wolinsky (1986).

In order to describe a game, one needs to specify its form, the players' preferences and strategies, and the status quo points. In the games to be examined in this project, the bargaining process takes place over time, consisting of a sequence of bargaining periods. At each point in time, one of the players suggests one agreement and the other can either accept or reject it. If the other player accepts the proposition, the game ends. If she rejects, the game goes on to the next bargaining period and it is now her turn to propose an agreement. The players' strategies are sequences of rules that will govern the behavior of each player at each stage of the game, and that may or may not depend on the entire history of the game.

In order to fully describe the bargaining process, one has to specify the firm and union's utility functions, the disagreement pay-offs of both parties and the scope of the bargaining. Bargaining can be over wages only (right-to-manage model), over wages and employment (efficient bargaining, see MacDonald and Solow, 1981) or over wages, employment and investment (see Grout, 1984). The division of rents and the equilibrium level of investment will depend on the union's relative bargaining power and the disagreement pay-offs.

Some studies introduce competition in the product market, assuming that there are two firms and that each firm bargains over wages with the union representing its workers in the first stage. In the second stage, each firm sets its output and employment to maximize profits for a given wage level (the right to manage model). The product market competition (second stage) takes place only between the two firms (both produce a homogeneous product) and takes the form of a Cournot-Nash model (see Dowrick, 1992, Davidson, 1988, Dobson, 1994 and Menezes-Filho, 1997).

### 3.2 Econometric Methodology

Based on the theoretical ideas and the data availability described above, our objective is to estimate simple panel data econometric models such as:

$$Y_{it} = \alpha_i + \beta Union_{it} + \theta Competition_{it} + \gamma X_{it} + \delta_t + \varepsilon_{it} \quad (1)$$

where  $i$  indicates a firm observed in year  $t$ ,  $Y$  is the dependent variable of interest (profitability, productivity, investment or wages),  $\alpha_i$  is the unobserved firm fixed effect,  $Union$  is a proxy for union power (e.g., union density),  $Competition$  proxies for local and foreign product market competition, and the vector  $X$  represents econometric controls potentially correlated with unionization and with performance indicators, such as market share.

If the coefficient on unionism is found to affect wages, investment, productivity and/or profitability, this would give empirical support for the proposition, described in the sub-section above, that the division of rents and the equilibrium level of investment of a firm will depend on the union's relative bargaining power.

As panel data is available, there are many possible estimation strategies. First, the data over the years will be pooled and simple Ordinary Least Squares models will be estimated. The aim is to have an idea of the size of the union impact on different indicators of economic performance in Brazil and compare them with available estimates in the developed and less developed world. The sample will then be split and separate regressions run for the periods before and after trade liberalization, to check whether the coefficient on union density is stable over time. Finally, it would be very interesting to interact the union variable with product market competition, to check whether the union impact varies with the degree of monopoly power enjoyed by the firm (see Stewart, 1993).

In a second stage, time-varying (retrospective) information on union density, together with the firm level performance variables, will be used to estimate equation (1) in first-differences, to eliminate the unobserved firm level heterogeneity that is constant over time. This is intended to check whether the union impact estimated using the pooled sample is biased due to omitted variables that are constant over time. It is also desirable to run separate first-differences equations for the beginning and end of the decade to test for temporal parameter stability.

Finally, information on new industrial relations practices, also gathered by the survey, will be used to check whether the introduction of these practices have improved efficiency and whether their effect on performance differed according to union status.

## 4. The Data

### 4.1 Annual Industrial Survey – PIA

The data used in this paper come from two different sources. The first source is a firm-level survey, the “Pesquisa Industrial Anual” (Annual Industrial Survey), conducted every year from 1988 to 1998 by the Brazilian Census Bureau. (For budgetary reasons no survey was conducted in 1991.) The survey covers a sample of firms operating in the manufacturing sector of the economy. The average number of firms is 10,000 per year, and the sample structure is as follows:

- i) all firms with more than 1,000 employees were surveyed;
- ii) a random sample of firms with less than 1,000 were surveyed.

The variables to be used from the surveys are: Payroll, Fringe Benefits, Sales Revenue, Cost of Raw Materials and Energy, Value Added, Investments in Machines, Plants and Buildings, Number of Employees and Capital Stock. With these variables the following performance indicators were constructed:

- **Profitability** = ((Sales Revenue – Wages and Salaries – Fringe Benefits – Raw Materials)/Sales Revenue)
- **Productivity** =  $\log$  (Value Added (Sales Revenue – Cost of Raw Materials – Capital Depreciation – Energy and other inputs)/ **Employment** (Number of Employees))
- **Investment Rate** = (Investments in Machines/Capital Stock)
- **Employment Level** =  $\log$  (Number of Employees)
- **Average Wages** =  $\log$  (Amount paid in Annual Wages)/ total number of employees)

### 4.2 Union Survey

Unfortunately, there is no information on unionism in the Industrial Surveys. Therefore, as in Menezes-Filho (1997) and Menezes-Filho, Ulph and Van Reenen (1998), a retrospective survey was carried out survey among the manufacturing firms, seeking information about the present

and past union status of the workforce, as well as proxies for the strength of the union's bargaining power and new industrial relation policies. The firms were also asked about the degree of competition that they face, both internally and from abroad, now and during the trade liberalization process. A copy of the questionnaire is included in the Annex.

About 1,100 manufacturing plants from different regions were surveyed, mainly of medium to large size in terms of employment, from a mailing list available at FIPE-USP. The information from this industrial relations survey was then matched to the data from the industrial surveys (PIA). The interviews were conducted by telephone, which guaranteed a high response rate; in fact, the response rate was 95 representing 946 establishments. Of those plants, 650 were matched to the Industrial Surveys conducted by IBGE.

Unfortunately, when the sample is restricted to those establishments with valid information on the main variables for at least four consecutive years, the total dropped to 285 establishments, which will be the sample size from now on. Moreover, there was a change in the PIA methodology in 1996, so that many firms that were surveyed before 1996 were not followed afterwards and new firms were included from 1996. In order to maximize the information on the time dimension, the sample was restricted to those firms that were observed before and after the change. However, some robustness tests using the whole sample were conducted, and the results will be reported where pertinent.

Table 1a presents the number of establishments surveyed every year and Table 1b the balance of the panel. One can see that the number of establishments is reasonably constant over time and the most plants are followed for 9 or 10 years, that is, almost the whole period.

**Table 1a. Sample Size**

<b>Years</b>	<b>88</b>	<b>89</b>	<b>89</b>	<b>92</b>	<b>93</b>	<b>94</b>	<b>95</b>	<b>96</b>	<b>97</b>	<b>98</b>	<b>Total</b>
<b>Establishments</b>	232	227	234	262	263	279	268	276	221	275	2537

**Table 1b. Balance of the Panel**

<b>Years</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>Total</b>
<b>Establishments</b>	13	13	10	23	11	69	149	288

**Table 2. Descriptive Statistics**

<b>Years</b>	<b>Employment</b>	<b>Real Wage (R\$ 1998)</b>	<b>Productivity (R\$ 1998)</b>	<b>Investment (1.000.000 R\$ 1998)</b>	<b>Profitability (% Revenue)</b>
<b>1988</b>	1,184	669	47,106	7.84	0.29
	<i>1,127</i>	<i>696</i>	<i>48,671</i>	<i>7.36</i>	<i>0.29</i>
<b>1989</b>	1,104	737	48,023	10.38	0.32
	<i>1,181</i>	<i>789</i>	<i>51,650</i>	<i>11.84</i>	<i>0.33</i>
<b>1990</b>	1,093	636	41,225	5.27	0.29
	<i>1,066</i>	<i>656</i>	<i>43,114</i>	<i>5.34</i>	<i>0.29</i>
<b>1992</b>	871	715	63,876	3.67	0.41
	<i>964</i>	<i>746</i>	<i>67,969</i>	<i>4.24</i>	<i>0.45</i>
<b>1993</b>	845	780	67,972	3.96	0.40
	<i>918</i>	<i>788</i>	<i>70,415</i>	<i>4.69</i>	<i>0.45</i>
<b>1994</b>	951	750	66,865	3.67	0.42
	<i>967</i>	<i>761</i>	<i>58,787</i>	<i>4.10</i>	<i>0.43</i>
<b>1995</b>	912	867	51,331	4.44	0.26
	<i>888</i>	<i>915</i>	<i>46,750</i>	<i>4.78</i>	<i>0.27</i>
<b>1996</b>	634	1,017	59,107	4.41	0.32
	<i>670</i>	<i>1033</i>	<i>54,112</i>	<i>4.76</i>	<i>0.32</i>
<b>1997</b>	600	1,043	64,660	5.19	0.32
	<i>634</i>	<i>1040</i>	<i>60,871</i>	<i>5.95</i>	<i>0.32</i>
<b>1998</b>	577	1,068	63,879	5.82	0.31
	<i>606</i>	<i>1120</i>	<i>60,723</i>	<i>7.58</i>	<i>0.30</i>
<b>88-98</b>	<b>870</b>	<b>832</b>	<b>57,813</b>	<b>5.35</b>	<b>0.34</b>
	<b>902</b>	<b>854</b>	<b>56,406</b>	<b>6.07</b>	<b>0.34</b>

Source: PIA-IBGE.

Notes: For definitions of the variables, see text. Total number of observations is 2,437. Numbers in italics are for the balanced panel, 1,410 obs.

Table 2 describes the main variables to be used in the empirical exercises. The data in the sample accord well with the stylized facts of the Brazilian economy in the 1980s and 1990s.

Employment suffered a drastic reduction between 1990 and 1992,<sup>2</sup> although it is still a matter of debate whether this was due to the trade liberalization process or to the deep recession that took place in 1991 and 1992. The further reduction between 1996 and 1998 could be due to sample selection, as many firms dropped out of the sample by 1995, when there was a change in PIA methodology (see above). Real wages were largely stable between 1988 and 1994, rising continuously afterwards. Productivity rose abruptly between 1990 and 1992, remaining somewhat constant between 1992 and 1998. The fact that labor productivity falls in most typical recessions suggests that the rise in productivity between 1990 and 1992 was driven by trade liberalization.<sup>3</sup> Investment fluctuated a great deal over the period, whereas mark-ups rose quite a lot between 1990 and 1992, but were reduced after 1994. The figures in brackets refer to the balanced panel, and they show that the figures are not qualitatively different, so that they are not driven by changes in the sample composition.

Table 3 tabulates the results of the survey in terms of union presence and importance over our sample period. About half of the establishments have less than 25 percent of their workforce unionized, with the other half roughly equally divided among the other quartiles of union density. There is consequently enough variation in union density to attempt to identify its effects on economic performance.

With respect to changes over time, it is also the case that many firms experienced changes in union density among their employees, with 10 percent reporting a rise in union density between 1995 and 2000, 58 percent reporting stability and 32 percent reporting a reduction. The numbers in 1990 and 1995 are approximately the same, which raises suspicions of measurement errors in the answers for this period. In terms of union recognition, about 81 percent of establishments recognized unions for bargaining purposes in 2000, and this percentage was roughly constant over time. Finally, only about 24 percent of plants reported the presence of union representatives in their workforce, and this percentage varies very little over time. As plants did not report many changes in union recognition or the presence of a workers' council over time, identification of the long-differences specification will have to rely on the changes in union density.

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<sup>2</sup> As noted above, for budgetary reasons no survey was conducted in 1991.

<sup>3</sup> We thank Peter Kuhn for pointing this out to us.

**Table 3. Description of Union Variables**

<b>Plant Union Density</b>							
<b>Density – 2000</b>		<b>Changes in Union Density over time</b>					
Den ≤ 25%	50%						
25% < Den ≤ 50%	23%						
50% < Den ≤ 75%	13%	↑ 90-95	= 90-95	↓ 90-95	↑ 95-00	= 95-00	↓ 95-00
Den > 75%	14%	11%	61%	28%	10%	58%	32%
<b>Union Recognition</b>							
<b>Level – 2000</b>		<b>Changes in Union Recognition over Time</b>					
<b>NO</b>	<b>YES</b>	↑ 90-95	= 90-95	↓ 90-95	↑ 95-00	= 95-00	↓ 95-00
19%	81%	1%	98%	1%	1%	98%	1%
<b>Workers Council</b>							
<b>Level – 2000</b>		<b>Change in the Presence of a Workers Council over Time</b>					
<b>NO</b>	<b>YES</b>	↑ 90-95	= 90-95	↓ 90-95	↑ 95-00	= 95-00	↓ 95-00
76%	24%	3%	96%	1%	4%	94%	2%

Number of firms = 288.

Table 4 compares the means of the economic variables described above in more and less unionized establishments. In terms of employment, average wages and capital investments, one can note that there is a non-linear (concave) relationship between these variables and the percentage of workers that are unionized in 2000.<sup>4</sup> All of them rise with unionization up to certain level, decreasing afterwards. With respect to productivity and profitability, one can note a continuous decline with unionization. In terms of union recognition, all performance measures, except for capital investments, are lower in establishments that explicitly bargain with trade unions. The presence of a workers' council, on the other hand, is associated with more employment, wages and capital investments, but with lower mark-up and productivity.

<sup>4</sup> It should be noted that this level of unionization is an end of period measure and the level of unionization has changed over the sample period, as Table 2 makes clear.

**Table 4. Average Performance by Union Status**

<b>Variable</b>	<b>Employment</b>	<b>Wages</b>	<b>Productivity</b>	<b>Investment</b>	<b>Profitability</b>	<b>N</b>
<b>Density</b>						
Den≤ 25%	608	783	63,844	3.37	0.36	1,254
25%>Den≤50%	1,236	991	57,005	8.48	0.34	581
50%>Den≤75%	1,169	886	49,337	8.29	0.31	338
Den>75%	911	696	46,193	3.23	0.29	364
<b>Recognition</b>						
No	871	978	66,741	5.32	0.38	487
Yes	870	797	55,692	5.36	0.33	2,050
<b>Workers' Council</b>						
No	747	820	59,832	4.56	0.34	1,913
Yes	1,246	869	51,621	7.79	0.34	624

Source: Pesquisa Industrial Anual, PIA-IBGE.

## 5. The Results

### 5.1 Pooled Sample

Moving on to the regressions,<sup>5</sup> Table 5 presents the results of the levels regressions, using the 1988 to 1998 pooled data. All models were estimated using a random effects model that takes into account the presence of serial correlation induced by persistent firm-specific effects.<sup>6</sup> In the first column, the results of using profitability or mark-up as the dependent variable are set forth. First, it seems that union density is negatively associated with profitability, even after controls are allowed for market share, market concentration,<sup>7</sup> employment, capital intensity and 22 sector dummies. The estimated coefficient implies an elasticity, evaluated at mean profitability and

<sup>5</sup> The results of these regressions should perhaps be better interpreted as conditional correlations, since no controls are allowed for firm fixed effects or other endogeneity issues. The industry fixed effect is included, however.

<sup>6</sup> For long-differences specifications that control for fixed effects, see below.

<sup>7</sup> The concentration measure we use is based on our survey. The managers were asked whether they face more or fewer than five competitors in their market (see Annex).

density, of about -0.06. It is interesting to note that both market share and market concentration positively impact profitability, suggesting the importance of efficiency and market power in the Brazilian industry.

**Table 5. Levels Regressions, 1988-1998**

<b>Controls</b>	<b>Profitability</b>	<b>Employment</b>	<b>Investment</b>	<b>Value Added</b>	<b>Wages</b>
Union Density	-0.063* (0.032)	0.392** (0.141)	-0.020 (0.042)	-0.315** (0.138)	0.120 (0.082)
Market Share	0.812** (0.247)	8.068* (0.810)	0.067 (0.439)	8.093** (0.986)	3.370** (0.406)
Concentration	0.037* (0.019)	0.037 (0.087)	-0.054** (0.026)	0.045 (0.085)	0.035 (0.051)
Capital /Sales	-0.013** (0.002)	-0.047** (0.004)	-		-0.011 (0.003)
Ln(employment)	-0.010 (0.008)	-	-0.008 (0.015)	0.779** (0.034)	0.881** (0.013)
Ln (capital)	-	-	-	0.110** (0.024)	-
Mark-up	-	-	0.061** (0.014)	-	-
Observations = 2529 ; Number of groups = 288					
Industry Dummies: yes					
Time Dummies: yes					

Source: PIA-IBGE.

Note: Random Effects Regression. Standard Errors in brackets.

In terms of employment, a positive and significant coefficient is reported in column (2), which implies an elasticity of 0.13, suggesting the unionized plants employ more people, even conditional on the industry in which they operate, their market share, concentration and capital intensity. It appears from the results in column (3) that unions do not affect the plants' investment decisions. The only impact that was precisely measured in the investment equation

was a negative market concentration, which suggests that market power is not very good for growth.

In terms of value added, the results indicate that more unionized plants produce less output, with the same levels of employment and capital, than less unionized ones. The elasticity is -0.11, at mean density, which is a significant number. It is also interesting to note that market share has a positive and substantial impact on productivity, but that concentration does not, implying a cost-based interpretation for the market share effect. In terms of average wages, the impact of union density is positive but not significant at conventional levels. It is interesting to point out, however, that both market share and employment have positive and significant estimated coefficients in the wage equations. This provides evidence of a non-competitive wage determination process, in particular of rent-sharing.

The models so far imposed the restriction that the relationship between unionization and performance is linear (or log-linear), but both the descriptive statistics presented in Table 4 and the results of Menezes-Filho, Ulph and Van Reenen (2000) suggest a non-linear relationship between union density and the performance indicators. Table 6 therefore includes union density squared as an additional explanatory variable in all the models estimated in Table 5.<sup>8</sup>

**Table 6. Levels Regressions, Non-linear Density, 1988-1998**

<b>Controls</b>	<b>Profitability</b>	<b>Employment</b>	<b>Investment</b>	<b>Value Added</b>	<b>Wages</b>
Density	-0.032 (0.110)	1.889** (0.485)	-0.021 (0.147)	0.836* (0.437)	1.262** (0.288)
Density Squared	-0.013 (0.115)	-1.580** (0.510)	-0.005 (0.154)	-1.200** (0.501)	-1.253** (0.302)
Share	0.824** (0.246)	7.997** (0.609)	0.043 (0.440)	7.956** (0.986)	3.289** (0.405)
Concentration	0.037 (0.019)	0.001 (0.085)	-0.052** (0.026)	0.038 (0.085)	0.015 (0.050)
Capital /Sales	-0.013 (0.002)	-0.046** (0.004)	-	-	-0.011 (0.003)

<sup>8</sup> It is important to note that two indicators of change in union density were included in all columns.

**Table 6., continued**

<b>Controls</b>	<b>Profitability</b>	<b>Employment</b>	<b>Investment</b>	<b>Value Added</b>	<b>Wages</b>
Ln(employment)	-0.011	-	-0.006	0.775**	0.876**
	(0.008)		(0.015)	(0.034)	(0.013)
Ln (capital)	-	-	-	0.107**	-
				(0.024)	
Mark-up	-	-	0.060	-	-
			(0.047)		
Observations = 2,529 ; Number of groups = 288					
Industry Dummies: yes					
Time Dummies: yes					

*Source:* PIA-IBGE.

*Notes:* Random Effects GLS Regression. Standard Errors in brackets. All columns include indicators of change in union density between 1988-1998.

The results of the random effects specifications show that, in general, the linear restriction does not seem to fit well with the data. The exception to this rule is the profitability equation, where the inclusion of density squared inflated the standard errors, because of multicollinearity, without adding more information to the specification. It seems therefore, that more unionized plants tend to have lower profits, period.

In term of employment however, Table 6 shows clearly that employment grows only up to a certain level of unionization, thereafter declining. Employment reaches a maximum when union density reaches 60 percent, with about 24 percent of plants having densities higher than that. In terms of investment, the results remain the same as in the linear case, that is, with no union effects on growth. The results using value added as a dependent variable are quite significant, however. The relation seems to be concave, with the marginal impact reaching its maximum at mean union density (34 percent). In establishments where more than 80 percent of the workers belong to a trade union, productivity is actually lower than in non-unionized ones. A similar phenomenon happens with average wages, but the impact reaches its maximum when half of the plant's workforce is unionized and it never leads to lower wages than in non-unionized settings.

The results as a whole imply that unionism always reduces profitability, that is, the share of total sales that goes to shareholders or is re-invested. However, some unionism is actually good for the plants' performance in terms of value added, and it also leads to increases in wages and employment. When union density reaches about 35 percent of the plant's workforce, the impact in terms of productivity starts to reverse, and after 50 percent of employees are unionized, further rises in unionism lead to lower employment and wages. If wages and employment depend on the plant's performance, the presence of trade unions may facilitate communication between workers and managers, increasing efficiency and productivity, which translate into higher compensation and job security. However, when unions have too much power, they seem to impede progress and lead to the deterioration of all performance indicators.

#### ***4.3 Union Effect over Time***

In a period of significant changes in the economic environment, as described above, it is important to test for the time stability of the estimated coefficients. To accomplish this, the data was grouped by periods and Table 7 reports the estimated coefficients of the union density variable in OLS regressions using the various performance indicators as dependent variables. It must be emphasized that union density as reported by managers in 2000 is used as the main independent variable in the regressions, but that controls are included for the plants whose managers report changes in density between 1990 and 2000.

The grouping was chosen according to changes in the Brazilian economy. The period between 1988 and 1990 was a period of high inflation and slow growth. Moreover, trade liberalization, with a big reduction in trade tariffs, began in 1988. Between 1992 and 1994 inflation reached its peak and the trade liberalization process was completed, and in 1994 the *Real* stabilization plan was implemented. Between 1995 and 1998, inflation was quite low and stable, a program of mass privatization was implemented and the economy was growing.

**Table 7. The Union Effect over Time**

<b>1988-90</b>	<b>Profitability</b>	<b>Employment</b>	<b>Investment</b>	<b>Value Added</b>	<b>Wages</b>
Density	-0.310** (0.138)	1.676** (0.336)	-0.152 (0.560)	0.209 (0.367)	1.224** (0.237)
Density2	0.279** (0.136)	-1.598** (0.350)	0.101 (0.443)	-0.668* (0.392)	-1.190** (0.232)
<b>1992-1994</b>					
Density	-0.232** (0.113)	1.242** (0.346)	0.001 (0.050)	-0.187 (0.302)	1.253** (0.194)
Density2	0.180* (0.113)	-1.017** (0.376)	-0.005 (0.053)	-0.070 (0.317)	-1.256** (0.197)
<b>1995-98</b>					
Density	0.269** (0.086)	2.224** (0.272)	-0.027 (0.053)	1.329** (0.475)	0.802** (0.187)
Density2	-0.323** (0.091)	-2.045** (0.294)	0.011 (0.055)	-1.790** (0.480)	-0.819** (0.199)
Industry Dummies: yes					
Time Dummies: yes					

Source: PIA-IBGE.

Note: Standard Errors (robust to heteroskedasticity) in brackets. All controls of Tables 5 to 9 are included in the regressions.

Column (1) reports the results of the profitability regressions, which show that the estimated parameters behave differently across periods, especially before and after the Real stabilization plan (1994). Before that, rises in union density led to lower profitability, but this relationship was reversed when around half the workers in the establishments were unionized. After stabilization, the situation was turned around, with unionization first increasing, then decreasing the plants' mark-ups. One possible explanation for these findings is that in periods of very high and growing inflation, the concept of relative prices lost most of its meaning and the distributive conflict between unions and managers could always be solved through price increases (see Amadeo and Pero, 2000). After 1994, profitability followed the behavior of other indicators, rising and then declining with unionization (see below).

The behavior of the relationship between employment and unionization is quite stable over time, as column (2) shows. The intensity of this relationship varies somewhat, with the biggest effects after stabilization. In terms of investment, no effect was found in any of the sub-

periods. With respect to value added, a negative relationship with union density is noticeable before 1994, whereas after stabilization the non-linear pattern is evident. Finally, the concave relationship between density and wages is evident in all periods, although a bit less intense in the final period.

### ***5.3 Long-Differences Equations***

Tables 8 and 9 report the results of regressions that use the change in union density<sup>9</sup> as an explanatory variable for changes in our performance measures over the same period. The aim of these exercises is to test the robustness of the results after the elimination of plant-specific effects.<sup>10</sup> The results of the profitability regressions for the 1995-1998 period (Table 8, first column) indicate that a decline in union density tends to raise mark-ups, though the effect is imprecisely estimated. In terms of employment, the result of the levels' specification is reproduced, with a decline in density leading to a decline in employment. This is an important result, as it confirms that trade unions tend to increase employment in Brazil.<sup>11</sup>

In terms of investment, once again no significant results were obtained, but declines in union density tend to increase productivity, and significantly so, as the results of the fifth column reveal. The relationship between wages and unionization all but vanishes in the long-differences specifications, which indicate that plant fixed effects might be contaminating the levels results. With respect to the other controls, it is noticeable that the positive (and significant) market share and employment coefficients in the wage equations indicate that these relationships are robust to fixed effects.

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<sup>9</sup> As reported by the manager that answered the survey. The omitted variable is “constant union density” throughout.

<sup>10</sup> It must be said at the outset that unions effects are notoriously difficult to captured in first-differences specifications (see Hirsh, 1991 and Bronars and Deere, 1990).

<sup>11</sup> Interactions between rise in density and density were with to capture non-linearities in the long-differences specifications, but with no significant results.

**Table 8. Long-Differences: 1998-1995**

	$\Delta$ Profitability	$\Delta$ Employment	$\Delta$ Investments	$\Delta$ Value Added	$\Delta$ Wages
Rise in Density	-0.004 (0.054)	0.094 (0.133)	0.027 (0.039)	0.321 (0.282)	0.002 (0.073)
Decrease in Density	0.056 (0.040)	-0.202** (0.093)	0.008 (0.024)	0.526** (0.234)	-0.002 (0.054)
Rise in Local Competition	0.045 (0.075)	-0.021 (0.223)	-0.023 (0.044)	0.205 (0.208)	0.077 (0.093)
Constant local competition	0.048 (0.078)	-0.003 (0.231)	-0.020 (0.048)	0.204 (0.229)	0.074 (0.097)
Rise in Foreign Competition	0.187** (0.062)	0.043 (0.139)	0.014 (0.036)	0.249 (0.227)	0.021 (0.095)
Constant foreign Competition	0.156** (0.058)	0.117 (0.145)	0.020 (0.039)	0.387 (0.231)	0.071 (0.093)
$\Delta$ Market Share	0.233 (0.847)	6.836** (2.378)	0.642 (0.634)	2.865 (2.195)	1.719* (0.939)
$\Delta$ Employment	0.024 (0.030)	-	0.019 (0.018)	0.997** (0.110)	0.838** (0.056)
$\Delta$ Capital/Sales	-0.016 (0.004)	-0.078** (0.018)	-	-	-0.027 (0.008)
$\Delta$ Capital	-	-	-	-0.084 (0.146)	-
$\Delta$ Profitability	-	-	-0.006 (0.035)	-	-
N	255	255	255	255	255

Source: PIA-IBGE.

Note: Standard Errors (robust to heteroskedasticity) in brackets.

The results for the 1990 to 1995 period are much less significant. This may be the result of the big changes in the macroeconomic environment surrounding the establishments, or driven by measurement errors in managers' answers on conditions further in the past.

**Table 9. Long Differences: 1995-1990**

	$\Delta$ profitability	$\Delta$ employment	$\Delta$ Investments	$\Delta$ Value Added	$\Delta$ Wages
Rise in Density	-0.112 (0.071)	0.053 (0.086)	0.022 (0.050)	-0.033 (0.217)	0.086 (0.074)
Decrease in Density	-0.019 (0.056)	-0.051 (0.067)	-0.023 (0.057)	-0.045 (0.153)	0.122** (0.063)
Rise in local competition	0.011 (0.071)	0.282 (0.191)	-0.024 (0.049)	-0.131 (0.198)	-0.078 (0.151)
Constant local competition	0.088 (0.072)	0.221 (0.187)	0.056 (0.047)	-0.012 (0.201)	-0.112 (0.152)
Rise in Foreign competition	-0.084 (0.119)	0.298** (0.089)	-0.071 (0.061)	-0.394 (0.325)	-0.295** (0.105)
Constant Foreign	-0.064 (0.118)	0.368** (0.111)	-0.145** (0.066)	-0.424 (0.312)	-0.326** (0.110)
$\Delta$ Market share	1.236 (1.320)	2.728** (0.958)	1.236 (1.064)	7.153** (2.758)	3.253** (0.758)
$\Delta$ Employment	-0.002 (0.058)	-	-0.042 (0.076)	0.276** (0.135)	0.647** (0.088)
$\Delta$ Capital/Sales	0.004 (0.012)	0.048** (0.016)	-	-	0.000 (0.017)
$\Delta$ Capital	-	-	-	0.089 (0.071)	-
$\Delta$ Profitability	-	-	-0.438 (0.357)	-	-
N	221	221	221	221	221

Source: PIA-IBGE.

Note: Standard Errors (robust to heteroskedasticity) in brackets.

#### ***5.4 The Introduction of Profit Sharing***

The managers of the establishments were also asked about the introduction of other industrial relation policies to improve the relationship between employees and managers so that productivity can rise. The indicators used were the introduction of profit sharing, a program of “quality and productivity,” and increasing employees’ voice. In order to save space, the only results presented here are for profit sharing, the variable for which the results look most interesting.

**Table 10. Profit Sharing: Long Differences, 1998-1995**

	$\Delta$ Profitability	$\Delta$ Employment	$\Delta$ Investment	$\Delta$ Value Added	$\Delta$ Wages
Introduction of Profit Sharing	0.123** (0.036)	0.117 (0.102)	0.032 (0.026)	0.732** (0.225)	0.086 (0.056)
N	255	255	255	255	255

Source: PIA-IBGE.

Note: Standard Errors (robust to heteroskedasticity) in brackets; all controls of Table 9 are also included.

**Table 11. Profit Sharing and Unionization, Long Differences: 1998-1995**

	$\Delta$ Profitability	$\Delta$ Employment	$\Delta$ Investment	$\Delta$ Value Added	$\Delta$ Wages
Union Density (2000)	-0.070 (0.086)	0.071 (0.246)	-0.048 (0.047)	-0.785 (0.846)	0.002 (0.134)
Introduction of Profit Sharing	0.066 (0.050)	0.105 (0.126)	0.026 (0.028)	0.550** (0.187)	0.071 (0.071)
Profit Sharing * Union Density	0.166 (0.122)	0.029 (0.306)	0.019 (0.066)	0.564 (0.739)	0.041 (0.170)
N	255	255	255	255	255

Source: PIA-IBGE.

Note: Standard Errors (robust to heteroskedasticity) in brackets; all controls of Table 9 are also included.

The results from Table 10 indicate that the introduction of profit sharing is associated with a rise in all performance indicators, with significant effects on profitability and value added, and imprecisely estimated impacts on employment and average wages. The results must be interpreted with caution, however, since attributing a causal interpretation to this relationship requires a relatively strong assumption about the correlation between the introduction of profit sharing and the structure of the error term.

The results from Table 11 indicate that the effects of the introduction of profit sharing may depend on degree of unionization in the establishment (Black and Lynch, 1997). Columns (1) and (4) show that more unionized firms had a trajectory of lower profitability and productivity on average than less unionized ones, but that this was counter-weighted by the introduction of profit sharing, although interactive terms were not precisely estimated. One possible interpretation of the results is that profit sharing was introduced as a way to successfully

counteract the decline in economic performance that took place in the more unionized establishment in the late 1990s.

## **6. Conclusions**

The results of this paper indicate that unions seem to affect the economic performance of Brazilian establishments, especially in terms of profitability, employment and productivity. The results using the pooled sample indicate that unions tend to reduce profitability, whereas the relationship between union density and productivity, employment and average wages seems to be concave. These performance indicators first rise with union density up to a certain density level (usually about 50 percent) and then start to decline. These results indicate that some unionism may be good for plants' economic performance, although too much unionism may start having negative effects.

The profitability effect varies a great deal over time, especially before and after the hyperinflation period, but the union impacts on wage, employment and productivity are quite robust over time. Moreover, these effects are also captured in long-differences specifications, which use changes of unionization as explanatory variables to control for establishment fixed effects, with the exception of the union effect on wage.

There is also evidence that the introduction of profit sharing schemes was associated with an improvement in performance, both in terms of productivity and profitability. Moreover, it seems that this effect was somewhat stronger in more unionized establishments, as compared to the less unionized ones. This may indicate that unions, by improving communication between managers and employees, make the introduction of profit sharing more efficient. Finally, unionized establishments that did not introduce new industrial relation policies experienced a downward trend in performance in the 1990s.

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## Annex 1. Questionnaire

Company Name:

Address:

State:

ID:

Phone:

Fax:

Contact:

Position:

E-mail address:

Sector of Activity

FIPE is undertaking a research to investigate the impact of trade unions on the economic performance of Brazilian Firms. The main aim is to verify the changes that may have taken place in the relationship between workers (trade unions) and firms after the trade liberalization process that took place in the late 1980s and early 1990s. You will notice that some of the questions refer to three points in time: 1988, 1995 and 2000. We realize that it may take some time and effort for you to check the data to reply accurately. We thank you for this and assure you that all information will be treated confidentially and that you will gain access to the final results from April 2001 through the site ([www.fipe.com/mediar](http://www.fipe.com/mediar)).

### Questionnaire

1. When was this establishment set up?

before 1990

between 1990 and 1995

after 1995

2. How many employees did this establishment have in December 2000?

3. Between 1995 and 2000 (1990 and 1995) has the number of employees:

declined

stayed the same

risen

4. Is there direct negotiation between the managers and the union the represent the majority of workers in this establishment?

5. In 1995 (1990) was there direct negotiation between the managers and the union the represent the majority of workers in this establishment?

6. In December 2000, what percentage of employees were affiliated with trade unions?

7. Between 1995 and 2000 (1990-1995) the percentage of employees affiliated with unions:

declined

- stayed the same
- risen

8. How do you evaluate the power and influence of the trade unions that represent the workers in this establishment:

- none
- weak
- medium
- strong
- very strong

9. Between 1995 and 2000 (1990-1995) the power and influence of the trade unions:

- declined
- stayed the same
- risen

10. Is there a workers' council in this establishment?

11. In 1995 (1990) Is there a workers' council in this establishment?

12. Does this establishment have a profit sharing scheme?

- no
- yes, introduced between 1995 and 2000?

13. Does this establishment have a "quality and productivity" scheme?

- no
- yes, introduced between 1990 and 1995?
- yes, introduced between 1995 and 2000?

14. Does this establishment have a program to increase the "employees' voice"?

- no
- yes, introduced between 1990 and 1995?
- yes, introduced between 1995 and 2000?

15. How many direct competitors does this establishment face in the product market?

- none
- less than 5
- more than 5

16. The competition from local producers between 1995 and 2000 (1990-1995) has:

- declined

- stayed the same
- risen

=====

17. The competition from foreign producers between 1995 and 2000 (1990-1995) has:

- declined
  - stayed the same
  - risen
- =====