THE IMPACT OF LABOR MARKET INSTITUTIONS ON MARKUPS AND MARKDOWNS

EVIDENCE FROM MANUFACTURING AND SERVICE SECTORS IN URUGUAY

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Abstract

In 2005, after a leftist coalition won the national election for the first time, significant changes took place in labor institutions in Uruguay, including the establishment of sector-level wage bargaining councils with active government participation. This paper estimates the impact of these institutional changes on price markups and wage markdowns using firm-level data for the period 2002-2016. It reports markdowns that decrease and firm-level markups that increase slightly rather than sharply (as has been reported for developed countries). This paper finds statistically significant impacts of mandated wage changes on markups and markdowns and statistically significant effects of unions on wage markdowns (but not price markups). The evidence suggests that firms operate in monopsonistic labor markets, but that the degree of their bargaining power has decreased over time as a result of the wage councils. In response, firms were able to pass part of the increases in labor costs to consumers.

JEL Code: E2, J2, J3, J2
Keywords: Markups, markdown, wage councils, unionization, Uruguay
1. Introduction

A broad discussion on measurement and changes in firm-level markups is presently developing in the economics literature. This phenomenon has important implications since market competition is the main driver of firm selection, productivity growth and welfare. It affects resource allocation between consumers and firms, and its evolution has profound macroeconomic consequences apart from the obvious effects on antitrust and tax policy design. The recent literature also emphasizes the need to empirically disentangle firm-level markup estimations from wage markdown, i.e. the ratio between price to marginal cost from the ratio of marginal revenue to wages. This paper contributes to this literature by considering the impact of labor market institutional changes on firm performance along such dimensions.

De Loecker and Warzynski (2012) and De Loecker et al. (2020) document a generalized rise in markups in the developed world since the 1980s. Using data from the United States, they report that markups do not increase for most firms, but that there is a sharp increase for those in the upper tail, which also gain market share. This produces an average markup increase. They also argue that this leads to a decline in the labor share. Autor et al. (2017) discuss explanations for the fall in the labor share in the US economy that are in line with the findings of De Loecker and Warzynski (2012) about the impact of very large firms.

The magnitude and evolution of markups in developing countries, and its relationship to the labor share and wage markdowns, have been less studied. This paper explores the data for 2002-2016 from Uruguay, a small Latin American economy that experienced a 15-year period of economic growth coincident with changes in labor market wage-setting institutions; wage councils were set up to handle sector-level, centralized negotiation, with active government participation, and sector-level minimum wages increased substantially.

Methodologically, this paper follows De Loecker and Warckziysnki (2012), which can be in turn traced back to Hall (1988). They propose a suitable alternative to microlevel firms’ databases to obtain firm-level indicators of price markup over marginal cost. Hershbein et al. (2020) stress the importance of considering firm wages as not completely exogenous to firms, but firms with some monopsonic power face an upward sloping labor supply schedule. If that is so, the estimated De Loecker markups—usually interpreted as a broad measure of market power and using labor as the flexible input—confound the effects of firm markups in the output market and firm markdowns in the labor market.

This paper contributes to the literature in several ways. First, it documents the evolution of firm-level markups and markdowns for a less-developed country and goes beyond manufacturing to include service sectors. The results show a different pattern than research for developed countries. There is evidence of increasing labor share of revenue and a decreasing trend in this compound firm power indicator. These trends are common to all firms and not exclusive to large firms.¹

Second, the paper decomposes the change in firm market power into a true output market markup and a labor market markdown. It shows that the decrease in a compound firm pow-

¹To put this in context, Autor et al. (2019) refer to “superstar” firms, i.e. the largest in the US market, each selling billions of dollars. In Uruguay, firms with annual sales larger than US$50 million are considered large according to the INE sampling criteria.
er indicator is not related to changes in firm power in the final goods market, but rather is produced by changes in labor market markdowns. This suggests that most firms operate in monopsonistic environments.

Third, it addresses the impact of mandated wage levels imposed by wage councils on firms’ market power. Changes in the labor market institution substantially decreased wage markdowns. This paper finds an elasticity of mandated wages to firm markdown of -0.35 and an elasticity of mandated wages to firm markups of 0.16. This means that for every 1 percent increase in wage council mandated wages, firm markdown decreases by 0.35 percent and markups increase by 0.16 percent. Thus, firms were only able to pass part of their increased labor costs to consumers.

Fourth, this paper estimates the impact of union density and find no effects on markups. However, there is a small, statistically significant effect on markdowns, with a union to markdowns elasticity of -0.05. This means that whatever effects the unions produced, it was mostly channeled by what happened in the wage councils.

2. The Uruguayan economy and labor market institutions

2.1. Employee and employer representatives

In Uruguay, a single trade union central had been formed in the 1960s (National Workers’ Convention, CNT). With the advent of the dictatorship in 1973, it was outlawed. In 1983, with the country still under a dictatorship, a group of unions organized a Labor Day demonstration, giving rise to the Plenario Intersindical de Trabajadores (PIT). On 1 May 1984, the symbolic union of both movements took place, constituting a single trade union central (PIT-CNT). This brought together all public and private sector unions in all activities in the country.

After 2005, changes in centralization and coordination of wage bargaining, together with the supportive stance of the government, strengthened incentives for unionization across the board, and affiliation to unions increased. Mazzuchi (2009) cites union leaders reporting of the emergence of more than 400 trade unions in firms and an increase in total membership of 150,000.

Employer associations representing specific sectors (for instance, the Clothing Chamber or Metallurgy Chamber) usually group themselves into larger chambers for major sectors of activity (Chamber of Industry, Chamber of Commerce and Services, Mercantile Chamber of Domestic Products, etc.).

Most firms do not participate actively in their respective chambers. Thus, for most firms, whatever is negotiated at the chamber level is exogenous to them.

2.2. Before 2005

Act 10449 of 1943 created the wage councils as tripartite wage negotiations to be held periodically between employers’ chambers, sector-level trade unions and government delegates. They established categories of workers by sector of activity and minimum wages for each of them. After 1992, the government stopped summoning the wage councils and
withdrew from public negotiations. Collective bargaining became voluntary and bipartite. When it occurred, most of it was carried out at the firm level with some exceptions at more aggregate levels.

After the Brazilian devaluation of 1999, Uruguay entered a recession that lasted for four years. In 2002, the Uruguayan economy underwent the deepest crisis in its history. Large-scale financial distress with a run on banks ended in an abrupt 100 percent devaluation of the peso against the dollar. Subsequently, the government had to provide support to some public financial institutions, and several failing private-sector banks required intervention. Arrangements were also made for market-friendly restructuring of sovereign debt.

The huge recession led to an accumulated 20 percent fall in GDP, along with two-digit unemployment rates. A vigorous recovery followed in the fourth quarter of 2003, with the Uruguayan government regaining access to international capital markets and extremely favorable external conditions, including a boom of international prices for natural resource-based exports. This led to continuous growth for the next 16 years. Unemployment fell to a low of 6 percent in 2011, though afterwards it started to increase again, approaching 10 percent in the late 2010s.

### 2.3. After 2005

In 2004, the left-leaning heterogeneous coalition *Frente Amplio* won national elections for the first time. The winning party, which had been the main political opposition since the return to democracy in 1985, won more than 50 percent of voter support and obtained an absolute majority in the Senate and the Chamber of Deputies. In 2009 and 2014, it won the elections again and maintained control of both houses. In fulfillment of election promises, the *Frente Amplio* administrations enacted important changes in labor relations institutions, including the reinstatement of the wage councils. The legal basis remained Act 10449 of 1942, which had never been repealed, despite not being used in the previous decade. In September 2009, the government approved the Collective Bargaining Act, which reformed the 1943 law.

**Figure 1.** Institutional background changes timeline

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Minimum wage hike</td>
<td>New union rights law</td>
<td>Days off legislation for private sector</td>
</tr>
<tr>
<td>Wage councils summoned</td>
<td>Labor claims period lengthened</td>
<td>Institute of Employment and Voc. Training (INEFOP) reformed</td>
</tr>
<tr>
<td>New domestic work regulation</td>
<td>Law regulating work outsourcing by public sector</td>
<td></td>
</tr>
<tr>
<td>Frente Amplio govt. in office</td>
<td>Workday regulation of rural workers</td>
<td>New collective Bargaining Law approved</td>
</tr>
<tr>
<td>March 2005</td>
<td>Dec 2008</td>
<td></td>
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<tr>
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Source: Gandelman (2009); Alaimo and Rucci (2009).
Other changes directly related to the labor market involved the protection of union rights; extension of the time period for labor claims; days off work for study, parenting, marriage and mourning; control of outsourcing; creation of the national Institute of Employment and Vocational Training; modifications to unemployment insurance and the extension of unemployment insurance to specific sectors and firms; and limitations on working hours in rural labor. A useful summary of labor market institutions in Uruguay can be found in Pagés (2005), later updated by Gandelman (2009) and Alaimo and Rucci (2009).

In the absence of incentives to negotiate at the firm level, most negotiations were carried out at an aggregate level, formally coordinated by the union confederation, and the employer chamber and with wage agreements legally enforced by the government. The Ministry of Labor webpage provides a description of the 20 groups (sectors of activity) who were summoned for negotiations. Within these groups are about 50 subgroups and more than 200 sub-subgroups. Agreements are carried out and minimum wages set in this last level (sub-subgroup).²

According to former Secretary for Labor and Social Security Dr. Jorge Bruni, by the end of 2004, only 20 percent of workers were covered by labor agreements. By late 2007, after the inclusion of rural and domestic service, 100 percent of private employees were covered by collective agreements. To be precise, all sectors are covered by collective agreements, but informality remains. Data from the National Statistics Institute of Uruguay’s (INE) household survey show that 28 percent of private sector wage employees were not covered by social security in 2005, and this proportion fell to 12 percent in 2016. Also using household surveys, Cabrera et al. (2013) analyze wage council non-compliance on the lower tail, i.e. workers in firms paying below the mandated levels for the sector. In 2011, 14 percent of individual wages were found to be below the minimum mandated wage council level.

Mandated sector wages are understood as minimum levels, but wage councils also determine proportional increases in wages throughout the firm’s wage structure.

2.4. Labor market overview

To show the policy at work, Figure 2 plots the evolution of average wages (computed as firms’ wage bill over employment) and the average mandated wage index in real terms. The same graph also plots average revenue per worker as a proxy for labor productivity, where the index is equal to 100 in 2005.³

Although labor productivity remained stagnate for most of the period, average wages increased steadily after 2005 following mandated wage increases set by the wage councils. The same pattern is observed by firm size and by sector of activity: wages evolve substantially above labor productivity and in line with mandated increases.

The growth rate differential of wages and labor productivity arithmetically translates to an increasing labor share of revenue (the labor share $wL/Y$ is equal to the ratio between aver-

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³ Given the changes in composition of the sample of firms, for robustness the results of the same statistics calculated for firms present in all the sample years, which are termed “continuers”, are presented alongside the whole sample (see the data section for a more accurate description).
wage and labor productivity: \( w / (Y / L) \). Such results can be observed for all firms in the sample as well as for the continuers subset. Figure 3 shows the labor share of revenue increasing steadily after 2005 from 24 percent to 42 percent for the whole sample and from 22 percent to 36 percent for the continuers set.

**Figure 2.** Firm and mandated wage indexes and labor productivity

![Graph showing firm and mandated wage indexes and labor productivity](image-url)

*Source: Own elaboration based on Annual Economic Activity Survey of the INE and mandated wages from the Labor Ministry.*

**Figure 3.** Average labor share in revenue

![Graph showing average labor share in revenue](image-url)

*Source: Own elaboration based on Annual Economic Activity Survey of the INE.*
The change in the labor share is pervasive and is also present in data by firm size and sector of activity. Figure 4 shows the firm labor share distribution for 2002, 2009 and 2016. The kernel density moves to the right and accumulates a larger area for higher labor share values.

Figure 4. Labor share in revenue distribution (kernel density)

![Kernel density distribution of labor share over time](image)

Source: Own elaboration based on the Annual Economic Activity Survey of the INE.

3. Literature review

This section tries to put this paper in the context of the larger literature. This includes the revival of the production approach to measuring markups by De Loecker and coauthors, the labor share of income, wage bargaining and the effects of minimum wages and, finally, past research on the Uruguayan labor market specifically.

De Loecker et al. (2020) investigate firms’ markups for the US economy using firm-level data. They document a rise in markups between 1980 and 2020, mainly driven by sharp increases in the upper tail of the distribution, while median markups remain stable. High markup firms also gain market share. They conclude that one of the most important macroeconomic effects of this increase is the decline in the labor share. De Loecker et al. (2020) do not propose an explanation for the observed reallocation of economic activity towards high-markup firms, though they point to technological change and changes in market structure due to weaker antitrust enforcement as possible suspects in a different paper (De Loecker et al. 2018).

De Loecker and Eeckhout (2018a) analyze data from 134 countries. The average global markup was estimated to have risen from around 1.1 in 1980 to 1.6 in 2016. The regions that show the largest markup increases are North America and Europe. Although Uruguay is not part of the sample, it is interesting that Latin American countries do not display a clear pattern in the evolution of average markups.

Several papers have analyzed markups in relation to different dimensions of firm behavior and performance indicators. For instance, De Loecker and Warczynski (2012) analyze the relationship between markups and export behavior and find that, on average, larger markups are observed in exporters, and that markups increase when firms start to export. De Loecker et al. (2016) study trade liberalization in India and conclude that it lowers firm prices and is
associated with pro-competitive effects. They find, however, that price declines are small when compared to the falls in marginal costs due to input tariff liberalization.

This paper is also related to the literature on the labor share in GDP, summarized in Autor et al. (2017). Decades-long stability of the labor share in advanced economies was a well-established fact, but a noticeable decline began in the United States in the 1980s. Several explanations have been advanced, including trade shocks and changes in relative factor costs. Autor et al. (2017) propose a *superstar firm* explanation. If production uses a fixed amount of overhead labor plus a size-dependent variable labor input, or if markups in the product market correlate positively with firm size, then large firms would have lower labor shares. They document that concentration of sales among firms within an industry increases across the US private economy, and that industries with larger increases in concentration show a larger decline in the labor share.

Autor et al. (2020) formally develop the superstar firm model and analyze US micropanel data. They conclude that the fall in the labor share is explained by reallocation between firms and not by a fall in the unweighted mean labor share across all firms. They also claim that there is evidence that the aggregate markup increases more than the typical firm’s markup, and that such patterns are present not only in US firms, but elsewhere.

A previous paper (Autor & Salomons, 2018) analyzes the effects of capital-labor substitution on aggregate labor demand and identifies four responses: own-industry output effects, cross-industry input–output effects, between-industry shifts and final demand effects. Their conclusion is that automation displaces employment and reduces the labor share of value added in the industries where it is initially produced, but that own-industry employment losses are reversed by indirect gains in customer industries and in aggregate demand. This is not the case for labor share losses.

Elsby et al. (2013) also analyze the downward trend of the labor share in the United States. They find that offsetting industry changes are behind the aggregate stability before the 1980s. They find that data do not support explanations based on substitution of capital for unskilled labor, and institutional factors such as the decline in unionization do not have a conclusive influence. However, they find that the offshoring of the labor intensive component of firms’ supply chains could be a potential explanation.

Within the production approach to markup estimation, Hershbein et al. (2020) extend the proposal of De Loecker and coauthors to explicitly identify markups and markdowns separately. Wage markdowns are defined as the wedge between the value of labor marginal revenue and the wage paid by the firm. It is particularly relevant in the context of this paper, since the institutional changes in the Uruguayan labor market point to a strengthening of the bargaining power of workers vis-à-vis firms.

During the period of study, the main environmental change in Uruguay was the new wage setting institutional conditions introduced by the wage councils in 2005. An initial effect of these changes is sector-level negotiation to establish a minimum wage for each sector. Chapter 12 of Cahuc et al. (2014) summarizes the large minimum wage effects literature. It is generally argued that the employment effects vary according to the initial minimum wage, i.e. when starting from a low, non-binding level, increases may not harm employment, but the effect becomes negative on hiring for larger initial values. In the labor share of revenue, there are two (potentially opposite) effects: the wage and the employment effects. The minimum wage policy targets specific subpopulations of workers, particularly the young, women and the less skilled. It is generally established that while the competitive labor market model yields an
unequivocally negative employment effect for a minimum wage increase, a labor market monopsonist may not reduce hiring at least in a range of starting minimum wage values.

In Uruguay, Borraz and González-Pampillón (2017) analyze whether the large 2005 minimum wage increases had an impact on the wage inequality decrease observed in the following years. They detect a contribution to the reduction of wage inequality mainly for formal workers, as well as a negative impact on employment outside the capital of Montevideo and a reduction in working hours.

In fact, beyond sector minimums, wage councils affect all wages since negotiated increases are meant to apply to all workers, in spite of the negotiation being carried out at the sector level—beyond the limits of the firm.

A summary of the literature on the effects of sector level collective bargaining can be found in chapter 7 of Cahuc et al. (2014). Models try to describe the participants’ objective functions as well as the bargaining process in itself, usually resorting to non-cooperative game theory. In general, economic models would predict a positive effect of unions on wages; however, their effect on employment can be positive or negative depending on additional conditions.

A key dimension in the bargaining process is the scope of the negotiation or what the parties are bargaining over. Different models generate diverse employment effects. This spans a literature contrasting the employment effects of negotiated wages to check whether they are consistent with monopoly unions, right-to-manage and diverse varieties of efficient contract models.

DiNardo and Lee (2004) use firm-level data to obtain the effect of unions on several employment and wage outcomes. They do not find a significant wage impact of unionization using a regression discontinuity identification strategy.

Allen et al. (1996) and Cassoni et al. (2000) analyze Uruguayan labor market data from a previous reunionization experience 20 years before, as wage councils were reinstated in 1985 by the first democratic government to take office after more than a decade of military dictatorship. Using repeated cross sections of industry-level data, they find that wages increased more in union than in non-union sectors, but that employment grew more in non-union sectors. The economic environment strikingly mirrors the period analyzed in this paper, since Uruguay went through a deep contraction after a financial crisis and devaluation in 1982, and centralized wage council negotiation was reinstated coincident with the economic recovery.

Allen et al. (1996) also analyze data on the reunionization process. It bears resemblance to what this paper observes in the data after 2005: after an initial surge, the ratio of affiliates to sector employment tends to stabilize and decline, presumably due to the employment increases also present in the period. They regress employment and wages on unionization data and controls and conclude that data are consistent with strongly efficient bargaining.

This research is also related to the rent sharing literature, of which Card et al. (2018) provides a useful summary. It is generally accepted that product market competition limits the ability of unions to obtain gains for their members. Also, wage differentials across firms have been found to be correlated with differences in productivity. However, they may not be interpreted directly as rent sharing because of difficulties in measuring worker quality. A number of papers have tried to measure the extent to which quasi rents and product market conditions influence wages paid by firms; see for instance Abowd and Lemieux (1993), Barth et al. (2016), Crépon et al. (2005), Hildreth and Oswald (1997), Estevão and Tevlin (2003) and Van Reenen (1996).
However, most of the older literature is focused on some kind of monopoly power on the part of workers, or at least in a negotiated outcome in which workers and firms exercised some measure of bargaining power. Some recent literature stresses a different angle: monopsony power on the part of firms, i.e. firms do not face an infinitely elastic labor supply curve. In competitive models, equilibrium is reached through perfect mobility, so wage gaps between firms vanish. Monopsonistic models can be justified on the basis that workers face substantial costs when moving between firms: searching, moving, training, etc. Manning (2020) provides a review of the literature on estimation of labor supply elasticity and the potential of the monopsony perspective for understanding labor market issues and inequality.

4. Data

This paper assembles a unique data set by matching multiple sources of information, including firm-level surveys from the National Institute of Statistics, sector mandated wage council indexes from the Ministry of Labor and sector unionization rates constructed by merging data from the Uruguayan trade union central and household surveys.

4.1. Annual economic activity survey

This data set uses annual firm-level data for manufacturing and services sectors from the Annual Economic Activity Survey by the INE for the years 2002-2016.

Within each four-digit ISIC sector, all existing firms above a given employment or sales threshold (compulsory range) are included in the sample, while a probabilistic sample is drawn from the set of firms below the threshold. The INE periodically revises sample coverage and includes new firms using listings from the social security institute and tax authority. The resulting unbalanced panel includes consistent annual data on sales, production, labor (number of workers), capital and intermediate inputs (such as electricity, fuel, water and materials). Firm prices are not available and nominal values are deflated using sector-level price indexes.

The Annual Economic Activity Survey has attempted to enhance its sector coverage over time. It aims to represent all firms in the local economy, though some sectors have not yet been included, such as agriculture, banking, construction, household work and extraterritorial organizations.

As shown in Table 1, there are considerable variations in sample sizes by year. Before 2006, the reference population for sampling was firms with 5 or more employees. In 2006, this was changed to firms with 10 or more employees. For comparability, observations with fewer than 10 employees are dropped. Before 2006, the employment threshold for the compulsory range was set to 50 employees, while the sales threshold was equivalent to US$1.2 million. Between 2006 and 2010, the employment threshold was raised to 100 employees, while the annual sales threshold was set to an equivalent of $5 million. In 2006, the INE only surveyed firms in the compulsory sample segment. As a result, about 600 firms were excluded from the sample and some were excluded temporarily, while others were added. The compulsory range sample fell from around 2000 firms in 2005 to approximately 1000 in 2006. In general, the random sample segment tends to increase from year to year. A very large increase in the random sampling segment of the sample is observed particularly between 2007 and 2008. The compulsory range threshold was lowered again in 2011 to 50 or more employees, and the sales threshold was kept around $5 million. Now the compulsory sampling stratum ex-
panded from around 1000 firms to more than 2500. This continued in 2012; the random sampling range expanded again, linked to an update of national statistics for a change of base year of National Accounts. After this extraordinary effort, the total sample size was reduced, maintaining the compulsory range employment threshold and updating the sales threshold to account for inflation. Since 2013, the Annual Economic Activity Survey has maintained a rotating panel plus firm births. The random sample range firms are kept in the sample for a minimum of three consecutive years. After three years, a third of the firms in the stratum are substituted. The appendix includes a table from the INE with sampling details for each year.\(^4\)

Overall, there are 41,238 observations corresponding to 5,715 different firms. Each firm was observed seven times on average within the 15 years window covered in this study.

<table>
<thead>
<tr>
<th>Year</th>
<th>Firms</th>
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<tbody>
<tr>
<td>2002</td>
<td>2,540</td>
</tr>
<tr>
<td>2003</td>
<td>2,574</td>
</tr>
<tr>
<td>2004</td>
<td>2,615</td>
</tr>
<tr>
<td>2005</td>
<td>2,709</td>
</tr>
<tr>
<td>2006</td>
<td>957</td>
</tr>
<tr>
<td>2007</td>
<td>1,414</td>
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<tr>
<td>2008</td>
<td>1,758</td>
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<tr>
<td>2009</td>
<td>1,768</td>
</tr>
<tr>
<td>2010</td>
<td>2,135</td>
</tr>
<tr>
<td>2011</td>
<td>3,768</td>
</tr>
<tr>
<td>2012</td>
<td>4,265</td>
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<tr>
<td>2013</td>
<td>3,847</td>
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<tr>
<td>2014</td>
<td>3,581</td>
</tr>
<tr>
<td>2015</td>
<td>3,717</td>
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<tr>
<td>2016</td>
<td>3,590</td>
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<tr>
<td>Total</td>
<td>41,238</td>
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</tbody>
</table>

Source: Annual Economic Activity Survey.

There are 439 firms present in the sample every year, which this paper terms “continuers.” Note that non-continuation does not necessarily mean exiting the market. The 439 continuing firms are those that survived the whole period and were always included by the INE in their sampling. In order to verify that the results are not driven by composition effects due to resampling, and that they hold in general and not only for a specific set of firms, the results are presented for all firms and for the set of continuers.

\(^4\) The effective sample might change with respect to the INE figures since this paper eliminates firms with less than five employees and imposes consistency requirements on data. Also, the INE would not make available for research microdata from sectors where there are three or fewer firms for anonymity reasons.
4.2. Wage council data

The Labor and Social Security Ministry of Uruguay (MTSS) compiles a database—known as Consejos de Salarios - Ajustes (CSA)—that records sector agreements by negotiation group, subgroup and sub-subgroup (for simplicity, these will be referred to as “groups”). The broader wage councils differentiate between the private sector, the public sector, rural activities and domestic work. Within the private sector, one group is the “leather clothing and footwear industry”. Within this group, there is a subgroup for tanneries, another for footwear, another for leather clothing, and another for leather goods with industrial process for animal consumption, etc.

Wage councils produce agreements on wage levels and wage increases for a broad set of job categories. Records of each agreement are signed by the parties and posted on the MTSS web page. Job categories established by wage councils differ between negotiation groups according to working conditions and technology in each sector. The MTSS-CSA database calculates four wage indexes, all with base January 2005=100 (as wage councils were inactive before then), and each of them follows increases for different worker categories. The MTSS-CSA computes indexes following the mandated variations mandated workers that earn the minimum and maximum job-category levels. It also separately computes two additional indexes for in-between categories. In 60 percent of cases, the four indexes are identical over the whole period of study.

The maximum and minimum job-category indexes are useful to describe the agreement outcomes. In January 2005, all indexes equal 100. In 2016, after 10 years, the ratio between maximum and minimum indexes has a median of 0.977, while 90 percent of the observations are between 0.785 and 1. Though they are very close, maximum levels increased less than minimum levels, which can be seen as evidence of an explicit aim to compress wage inequality within firms. This paper follows the minimum category index to describe the negotiated wage council increases.

There is not a one-to-one correspondence between ISIC sectors and wage council negotiation groups. If a given firm in the database has clearly differentiated activities, it may be subject to one or more groups. For instance, supermarket workers’ wages are determined in the retail group, but if the supermarket bakes bread, the bakery workers’ wages could be established in a different group.

To match wage council negotiation groups and ISIC Rev 4 classification (4 digits), this paper uses code tables provided by the MTSS. In general, more than one wage council group is matched to a single ISIC code. For each ISIC code in the database, the average of the mandated wage indexes for groups linked to that ISIC code is computed. Then each firm in the Annual Economic Activity Survey is matched to the mandated wage index corresponding to the 4-digit ISIC sector in which it is classified. The resulting database matches 89 percent of firms’ observations with a mandated wage.
4.3. Unionization data

This paper constructs a new unionization density measure. This required defining the disaggregation level for this indicator. Unions are not defined strictly by ISIC sector, although they are organized within economic activities in a broad sense. Sometimes a given union covers workers from more than one ISIC code. In other cases, more than one union has affiliates in the same ISIC category. To overcome this difficulty, broad sectors that do not exactly match ISIC two digit or three-digit codes but are consistent over time had to be considered.

Data from household surveys and data on affiliates of the central union PIT-CNT were combined, starting with household survey data from 2007, when the INE included a specific question that recorded individual affiliation to unions. This produced a cross section indicator of unionization density by broad sector of activity (percent of unionized employees). However, this question was not kept in the household survey questionnaire after 2007.

Data on delegates to central congresses provided by the trade union central PIT-CNT give an estimate of the absolute number of trade union affiliates. Congresses were held every two to three years. The membership figures were linearly interpolated to obtain an annual measure of union members across the period.

Membership figures are divided by yearly employment from the Uruguayan Household Survey and obtain a variable with sector and time variability. Although delegate participation in congresses is related by a fixed factor to affiliates to each sector union, observed figures are sometimes affected by idiosyncratic union decisions (sub declaration or over declaration).

This measure of unionization combines the previous two indicators. Changes over time to the 2007 INE indicator of union density at the broad sector level are updated using variations in the ratio of union affiliates (congress participants) to employment. This procedure was able to determine the sector unionization density for 75 percent of the observations in the firms-level database.

The union density measure results from the net effect of changes in affiliation and employment. For instance, periods of stagnant union membership with decreasing employment such as the years after the 2002 crisis are associated with increases in unionization rates. Employment recovery after 2004 produces the opposite effect. After 2005, there is a clear increase in membership. However, this does not translate to an increase in unionization density after the initial years, because employment growth may have exceeded the increase in affiliations. However, this is not the case for construction, which grew throughout this period.

Over the whole period, the index captures an increase in union density in the private sector from 18 percent to 23 percent, and also shows that within sectors of activity there is considerable variation in both the level of unionization and its evolution over time (Figures 5 and 6).
Figure 5. Union density - all sectors

Source: Own elaboration based on Unions affiliation to PIT-CNT and household surveys from the INE.

Figure 6. Union density - selected sectors

Source: Own elaboration based on Unions affiliation to PIT-CNT and household surveys from the INE.

5. Methodology

5.1. Markup and markdown measurement

This paper’s empirical strategy is based on Hershbein et al. (2020), which allows for a separate estimation of firm product market mark ups and labor market markdowns.
It starts with the De Loecker and Warzynski (2012) markup expression, which is derived from cost minimization. For firm $i$ at period $t$ it assumes a production technology given by:

$$Q_{it} = Q_{it}(L_{it}, M_{it}, K_{it}, \omega_{it})$$  \hspace{1cm} (1)

where $L_{it}$ and $M_{it}$ are labor and materials respectively (variable inputs), $K_{it}$ is capital, $\omega_{it}$ is a scalar productivity term and $Q_{it}$ is gross output. For cost minimization, the following Lagrangian can be written:

$$L = w_{it}(L_{it})L_{it} + pm_{it}M_{it} + r_{it}K_{it} + \lambda_{it}(Q_{it} - Q_{it}^*)$$  \hspace{1cm} (2)

where $w_{it}$, $pm_{it}$ and $r_{it}$ are prices for labor, materials and capital respectively.

De Loecker and Warzynski (2012) assume perfect competition in all input markets. Therefore, $w_{it}(L_{it}) = w_{it}$. The first order condition for labor input is given by:

$$\frac{\partial L}{\partial \omega_{it}} = w_{it} - \lambda_{it} \frac{\partial Q_{it}}{\partial \omega_{it}} = 0$$  \hspace{1cm} (3)

where $\lambda_{it}$ represents the marginal cost at a given level of output. Rearranging and multiplying both sides by $\frac{1}{\lambda_{it}}$ produces:

$$\frac{\partial Q_{it}}{\partial \omega_{it}} = \frac{w_{it}}{\lambda_{it}} \frac{L_{it}}{Q_{it}}$$  \hspace{1cm} (4)

So the relation between the output elasticity of labor of a firm $\theta_{it}^L$ and its markup over marginal cost $\mu_{it}$ can be derived, defined straightforwardly as $\mu_{it} = \frac{w_{it}}{\lambda_{it}}$.

$$\theta_{it}^L = \frac{\frac{\delta \omega}{\delta \omega} \frac{L_{it}}{Q_{it}}}{\frac{\delta \omega}{\delta \omega} \frac{L_{it}}{Q_{it}}} = \frac{P_{it} w_{it} L_{it}}{\lambda_{it} P_{it} Q_{it}} = \frac{\mu_{it} w_{it} L_{it}}{\lambda_{it} P_{it} Q_{it}}$$  \hspace{1cm} (5)

In other words, the expression for the markup could be written as:

$$\mu_{it} = \theta_{it}^L \frac{\alpha_{it}^L}{\alpha_{it}^L}^{-1}$$  \hspace{1cm} (6)

where $\alpha_{it}^L$ is the share of labor expenditures on total sales. De Loecker and Warzynski (2012) exposition is derived in general for any variable input. Empirically, they show estimates based on labor and materials that are relatively close. This paper’s empirical estimation shows that this does not hold in Uruguay.

If instead of an exogenously given wage, firm monopsony power is assumed in the labor market, i.e., $w_{it}(L_{it})$ is a positively sloped labor supply function, then the first order condition for labor input would be given by:

$$\frac{\partial L}{\partial \omega_{it}} = \frac{\delta w}{\delta \omega} \frac{L_{it}}{w_{it}} + w_{it} - \lambda_{it} \frac{\partial Q_{it}}{\partial \omega_{it}} = 0$$  \hspace{1cm} (3')

Rearranging it produces:

$$\left[\mu_{it}^{-1}\theta_{it}^L = \left[\frac{\delta w}{\delta \omega} \frac{L_{it}}{w_{it}} + 1\right] \alpha_{it}^L = \left[\frac{\epsilon_{it}}{\epsilon_{it}}^{-1} + 1\right] \alpha_{it}^L$$  \hspace{1cm} (4')

where $\epsilon_{it}^{-1}$ is the inverse elasticity of labor supply. Hershbein et al. (2020) define the expression $\tilde{\nu} = \epsilon_{it}^{-1} + 1$ as precisely the firm markdown, equal to the ratio of the marginal revenue of labor and the wage.

Then using $\left[\mu_{it}^{-1}\theta_{it}^L = \tilde{\nu} \alpha_{it}^L$ and $\mu_{it}$ could be measured, $\tilde{\nu}$ could also be estimated, being $\alpha_{it}^L$ directly observable in firm data. In turn, if the “markup” $\theta_{it}^L \left[\alpha_{it}^L\right]^{-1}$ were estimated in these
conditions, the product market markups would not be obtained, but rather the product of wage markdown and product market markup, $\psi_{it}$ instead. The expression of equation (6) is a general compound firm power indicator that combines markup and markdown.

Hershbein et al. (2020) argue that, if data on a truly flexible input were available, then the estimation resulting from an expression analogous to (6) would indeed reflect product market markups. As they do, this paper assumes that materials are such input and thus, the firm markup $\mu_{it}$ can be recovered from $\theta_{it}^{M} \left[ \alpha_{it}^{M} \right]^{-1}$, where $\theta_{it}^{M}$ and $\alpha_{it}^{M}$ are the analogous product elasticity and expenditure share with respect to material inputs. Measurement of $\mu_{it}$ in turn, produces an estimation of $\psi$. Summarizing, they propose to compute the wage markdown as $\psi = \theta_{it}^{L} \left[ \alpha_{it}^{L} \right]^{-1} \alpha_{it}^{M} \left[ \theta_{it}^{M} \right]^{-1}$.

The bottom line is that this will present a compound firm power indicator:

$$\mu_{it} = \theta_{it}^{L} \left[ \alpha_{it}^{L} \right]^{-1} \tag{7}$$

a measure of firms’ price markups:

$$\mu_{it}^{*} = \theta_{it}^{M} \left[ \alpha_{it}^{M} \right]^{-1} \tag{8}$$

and a measure of firms’ wage markdowns:

$$\psi_{it} = \theta_{it}^{L} \left[ \alpha_{it}^{L} \right]^{-1} \alpha_{it}^{M} \left[ \theta_{it}^{M} \right]^{-1} \tag{9}$$

To estimate the output elasticity requires a consistent estimation of the production function parameters. This paper follows Levinsohn and Petrin (2003) and starts from a log version of equation (1):

$$q_{it} = h(l_{it}, m_{it}, k_{it}) + \omega_{it} \tag{10}$$

In these estimates, the production function coefficients are taken to be common within each 2-digit ISIC code.

6. Results

6.1. Markups and markdowns

To illustrate the estimation procedure, the graph of averages of the compound firm power indicator using labor as the flexible input is first shown. They correspond to the sample counterparts of parameter $\mu_{it}$ in equation (7).

Figure 7 shows large values particularly at the beginning of the sample period, suggesting that the estimations are effectively a mixture of firm-level product market markups and labor market markdowns. A clear decreasing path over the period is also evident.
Next, an estimation of firm-level markups is made using material inputs as the flexible input. This corresponds to the assumption that these markets are less affected by monopsonic power. The estimates correspond to the sample counterparts of parameter $\mu_l^t$ from equation (8), and results are shown in Figure 8.

A magnitude of 1.5 for $\mu_l^t$ would indicate that a firm is able to price its product 50 percent above its marginal cost. The average markup estimations are procyclical and tend to follow the recovery of output after the 2002 crisis, but have ups and downs through the sample period. Though initially they decrease, markup levels are higher in 2016 than in 2005 for both continuers and the whole sample (15 percent and 32 percent respectively). The appendix presents additional evidence of firm-level product market markups.
Figure 9 shows average firm markdowns in the sample across time. They correspond to the sample counterparts of parameter from equation (9). A decreasing path of wage markdowns during the period is generally to be expected in a context of decreasing “compound firm power index” with relatively constant average product market markups (i.e. workers’ wages get closer to the value of marginal product of labor along the period). The appendix includes separate plots by firm size and sector, showing a very consistent decreasing tendency.

*Figure 9. Average wage markdowns*

![Figure 9](image)

Source: Own elaboration based on the Annual Economic Activity Survey of the INE.

The 2002 markdowns above 2 imply that workers earn less than 50 cents of each peso they generate. By the end of the sample study, 2016 markdown estimates (1.36 for the sample with all firms and 1.13 for continuers) imply that workers earn between 74 and 88 cents of each peso they generate. Hershbein et al. (2020) estimate an average markdown of 1.53 for US firms.

### 6.2. Heterogeneity

De Loecker et al. (2020) find that a relatively small number of large firms drive the increase in the average markup, while there are no changes in the median firm markup. Figure 10 plots the kernel density for estimates for 2002, 2009 and 2016. This paper finds that, in that data, there are no significant shifts in the distribution of markups across firms, but a clear leftward shift of the compound firm power indicator produced by a similar leftward shift in markdowns.
Figure 10. Kernel densities for continuers

Source: Own elaboration based on the Annual Economic Activity Survey by the INE.

To further explore heterogeneity in markdowns, this paper follows Hershbein et al. (2020) and computes a simple decomposition of markdown variance based on the multiplicative expression for $\psi$, which can be expressed in logarithms as:

$$\ln \psi_{it} = \ln \theta_j^L + \ln \alpha_i^L - \ln \mu_{it}$$

(11)

This gives:

$$V(\ln \psi_{it}) = V(\ln \theta_j^L) + V(\ln \alpha_i^L) + V(\ln \mu_{it}) - 2[COV(\ln \theta_j^L, \ln \alpha_i^L) - COV(\ln \alpha_i^L, \ln \mu_{it}) + COV(\ln \theta_j^L, \ln \mu_{it})]$$

(12)

Table 2

<table>
<thead>
<tr>
<th>Variance in firm-level markdowns</th>
<th>Variance</th>
<th>Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\text{Var}(\psi)$</td>
<td>1.265</td>
<td>1.000</td>
</tr>
<tr>
<td>$\text{Var}(\theta^L)$</td>
<td>0.266</td>
<td>0.210</td>
</tr>
<tr>
<td>$\text{Var}(\alpha^L)$</td>
<td>0.642</td>
<td>0.510</td>
</tr>
<tr>
<td>$\text{Var}(\mu)$</td>
<td>0.410</td>
<td>0.324</td>
</tr>
<tr>
<td>$\text{Cov}(\theta^L, \alpha^L)$</td>
<td>0.171</td>
<td>-0.270</td>
</tr>
<tr>
<td>$\text{Cov}(\alpha^L, \mu)$</td>
<td>0.112</td>
<td>0.177</td>
</tr>
<tr>
<td>$\text{Cov}(\theta^L, \mu)$</td>
<td>-0.033</td>
<td>-0.052</td>
</tr>
</tbody>
</table>

Source: Own elaboration based on the Annual Economic Activity Survey by the INE.

It can be appreciated from Table 2 that variance in output elasticities contributes significantly to the overall variance, though given the estimation procedure, there is only between-sector variation. Variance in labor shares and markups explains a large fraction of markdown variance.
6.3. The impact of mandated wages and union density

Table 3 separately regresses the firms’ compound firm power indicator and the firms’ markups and markdowns on a set of year dummies and fixed effects with the 2005 year dummy as the omitted category. The decreasing pattern in wage markdowns is revealed by the increasing coefficients (in absolute value) of the time dummy variables in markdowns’ estimates across the years. By 2016, firm markdowns had decreased more than 50 percent on average with respect to the 2005 values.

Table 3. Compound firm power indicator, markups and wage markdowns over time

<table>
<thead>
<tr>
<th></th>
<th>In compound indicator</th>
<th>In firm markup</th>
<th>In wage markdown</th>
</tr>
</thead>
<tbody>
<tr>
<td>d2002</td>
<td>-0.061***</td>
<td>0.057***</td>
<td>-0.122***</td>
</tr>
<tr>
<td></td>
<td>(0.009)</td>
<td>(0.009)</td>
<td>(0.014)</td>
</tr>
<tr>
<td>d2003</td>
<td>0.040***</td>
<td>0.006</td>
<td>0.031**</td>
</tr>
<tr>
<td></td>
<td>(0.009)</td>
<td>(0.009)</td>
<td>(0.014)</td>
</tr>
<tr>
<td>d2004</td>
<td>0.102***</td>
<td>-0.009</td>
<td>0.113***</td>
</tr>
<tr>
<td></td>
<td>(0.009)</td>
<td>(0.009)</td>
<td>(0.014)</td>
</tr>
<tr>
<td>d2006</td>
<td>-0.049***</td>
<td>0.095***</td>
<td>-0.147***</td>
</tr>
<tr>
<td></td>
<td>(0.013)</td>
<td>(0.013)</td>
<td>(0.020)</td>
</tr>
<tr>
<td>d2007</td>
<td>-0.068***</td>
<td>0.117***</td>
<td>-0.191***</td>
</tr>
<tr>
<td></td>
<td>(0.012)</td>
<td>(0.011)</td>
<td>(0.018)</td>
</tr>
<tr>
<td>d2008</td>
<td>-0.158***</td>
<td>0.119***</td>
<td>-0.276***</td>
</tr>
<tr>
<td></td>
<td>(0.011)</td>
<td>(0.011)</td>
<td>(0.017)</td>
</tr>
<tr>
<td>d2009</td>
<td>-0.257***</td>
<td>0.138***</td>
<td>-0.397***</td>
</tr>
<tr>
<td></td>
<td>(0.011)</td>
<td>(0.011)</td>
<td>(0.017)</td>
</tr>
<tr>
<td>d2010</td>
<td>-0.311***</td>
<td>0.158***</td>
<td>-0.471***</td>
</tr>
<tr>
<td></td>
<td>(0.010)</td>
<td>(0.010)</td>
<td>(0.016)</td>
</tr>
<tr>
<td>d2011</td>
<td>-0.359***</td>
<td>0.117***</td>
<td>-0.475***</td>
</tr>
<tr>
<td></td>
<td>(0.009)</td>
<td>(0.009)</td>
<td>(0.014)</td>
</tr>
<tr>
<td>d2012</td>
<td>-0.409***</td>
<td>0.149***</td>
<td>-0.559***</td>
</tr>
<tr>
<td></td>
<td>(0.009)</td>
<td>(0.009)</td>
<td>(0.014)</td>
</tr>
<tr>
<td>d2013</td>
<td>-0.444***</td>
<td>0.152***</td>
<td>-0.598***</td>
</tr>
<tr>
<td></td>
<td>(0.009)</td>
<td>(0.009)</td>
<td>(0.014)</td>
</tr>
<tr>
<td>d2014</td>
<td>-0.467***</td>
<td>0.171***</td>
<td>-0.642***</td>
</tr>
<tr>
<td></td>
<td>(0.009)</td>
<td>(0.009)</td>
<td>(0.014)</td>
</tr>
<tr>
<td>d2015</td>
<td>-0.502***</td>
<td>0.166***</td>
<td>-0.672***</td>
</tr>
<tr>
<td></td>
<td>(0.009)</td>
<td>(0.009)</td>
<td>(0.014)</td>
</tr>
<tr>
<td>d2016</td>
<td>-0.536***</td>
<td>0.168***</td>
<td>-0.711***</td>
</tr>
<tr>
<td></td>
<td>(0.009)</td>
<td>(0.009)</td>
<td>(0.014)</td>
</tr>
<tr>
<td>Constant</td>
<td>0.347***</td>
<td>0.080***</td>
<td>0.269***</td>
</tr>
<tr>
<td></td>
<td>(0.007)</td>
<td>(0.007)</td>
<td>(0.010)</td>
</tr>
</tbody>
</table>

Observations 41,262 41,238 41,218
R-squared 0.210 0.024 0.159
Number of id 5,715 5,715 5,715

Standard errors in parentheses  *** p<0.01, ** p<0.05, * p<0.1
Source: Own estimation based on the Annual Economic Activity Survey by the INE.

5 This section uses all firms available in the sample. The appendix presents results (very similar in magnitude and sign) for the subset of firms for which unionization and wage council data are available.
6 Since the dependent variable is in logs, the estimated coefficient for the 2016 dummy indicates that markdown decreased by e−0.711−1=−50.8%.
On the other hand, a slight increase is observed in the estimation for firm markups. In fact, in 2005-2010, they seem to increase and stabilize afterwards. Over the whole period from 2005-2016, there is an increase in markups of 18 percent.

Therefore, while firms were losing bargaining power in the labor markets, they seemed to have been able to pass part of their increased labor costs to consumers.

Now the paper turns to consider the question of whether, how, and to what extent institutional changes affected wages, markups and markdowns at the firm level. The environmental changes affecting firms that seem most interesting in the data are mandated wage changes and unionization.

The growth rates of mandated wages (defined at sector level) and of firm-level wages were computed to measure the impact of mandated wages at the firm. The firm wage growth rates were simply regressed on the sector mandated wage growth rates, interacted with year dummy variables. The regression output (Table 4) provides simple (uncontrolled) year coefficients that (plus the regression constant) measure pass through from wage council mandated increases to firm wages. Pass through was generally high most years, but short of being complete.

<table>
<thead>
<tr>
<th>Year</th>
<th>Coefficient</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006 × % change in mandate wage</td>
<td>0.978***</td>
<td>(0.079)</td>
</tr>
<tr>
<td>2007 × % change in mandate wage</td>
<td>0.832***</td>
<td>(0.091)</td>
</tr>
<tr>
<td>2008 × % change in mandate wage</td>
<td>0.922***</td>
<td>(0.061)</td>
</tr>
<tr>
<td>2009 × % change in mandate wage</td>
<td>1.102***</td>
<td>(0.056)</td>
</tr>
<tr>
<td>2010 × % change in mandate wage</td>
<td>0.953***</td>
<td>(0.068)</td>
</tr>
<tr>
<td>2011 × % change in mandate wage</td>
<td>0.646***</td>
<td>(0.042)</td>
</tr>
<tr>
<td>2012 × % change in mandate wage</td>
<td>1.049***</td>
<td>(0.060)</td>
</tr>
<tr>
<td>2013 × % change in mandate wage</td>
<td>0.943***</td>
<td>(0.049)</td>
</tr>
<tr>
<td>2014 × % change in mandate wage</td>
<td>0.623***</td>
<td>(0.100)</td>
</tr>
<tr>
<td>2015 × % change in mandate wage</td>
<td>0.754***</td>
<td>(0.082)</td>
</tr>
<tr>
<td>2016 × % change in mandate wage</td>
<td>0.468***</td>
<td>(0.055)</td>
</tr>
<tr>
<td>Constant</td>
<td>0.041***</td>
<td>(0.002)</td>
</tr>
</tbody>
</table>

Observations: 21,709
R-squared: 0.065

Standard errors in parentheses  *** p<0.01, ** p<0.05, * p<0.1
Source: Own estimation based on the Annual Economic Activity Survey by the INE.

Now the paper turns to the impact evaluation of the wage council policy on firm performance. Identification is based on the assumption that both mandated wage increases and unionization are exogenous to firms.
Both impact variables of interest are measured at the sector level. Most firms are not even represented in wage council negotiations, which are carried out by sector-level chambers. Also, by construction, union density can only be measured at a broad sector of activity level, not at the firm level. Then by definition it is a sector effect in both cases, and for any given firm can be taken to be exogenous.

Wage councils and mandated wages interact with unionization in complex ways. Wage councils might have channeled wage increases above labor productivity increases, inducing a sizeable shift in the distribution of revenue between labor and other factors of production. At a sector level, differences can be driven by union bargaining power. In sectors in which unions were already strong, workers had extra bargaining power in wage negotiations.

The estimated equations are the following:

\[
\begin{align*}
\ln \upsilon_{it} &= \beta_0 + \beta_1 \ln(mw)_{it} + \beta_2 \ln(union)_{jt} + \beta_3 \exp_{it} + \beta_4 \ln(L)_{it} + \beta_5 \ln(K/L)_{it} + \epsilon_{it} \quad (13) \\
\ln \mu_{it}' &= \gamma_0 + \gamma_1 \ln(mw)_{it} + \gamma_2 \ln(union)_{jt} + \gamma_3 \exp_{it} + \gamma_4 \ln(L)_{it} + \gamma_5 \ln(K/L)_{it} + \zeta_{it} \\
\end{align*}
\]

where \( \ln \upsilon_{it} \) and \( \ln \mu_{it}' \) are the firm-level indicators of wage markdown and firm markup (in logs) respectively, \( \ln(mw)_{it} \) is the log sector mandated wage, \( \ln(union)_{jt} \) is the log sector union density, \( \exp_{it} \) is an exporter dummy variable, \( \ln(L)_{it} \) is log employment and \( \ln(K/L)_{it} \) is the log of firm capital-labor ratio.

Table 5 reports the regression of log markups and markdowns on sector mandated wages and sector union density plus controls.\(^7\)

The controlled estimation finds no statistically significant effects of union density, but implies a markup elasticity of mandated wages between 0.15 and 0.18. Given that the average real mandated wages doubled between 2005 and 2016, this elasticity accounts for all (or almost all) of the 18 percent increase in the markups reported in Table 3. This result can be interpreted to mean that union density has no further effects on markups beyond those that come through the wage councils’ negotiated wages.

With respect to markdowns, there is a significant negative effect of mandated wages on firm-level markdowns (elasticities between 0.28 and 0.41). Again, given that real mandated wages doubled, this implies that markdowns were reduced by wage councils between 28 percent and 41 percent. This is half of the markdown reduction previously reported.

Sector unionization has an additional impact on wage markdown reduction with an elasticity of 0.05. Between 2005 and 2016, the unionization measure increased from 22 percent to 24 percent. This implies that unionization has a very small direct impact on wage markdowns and whatever impact they have must have been channeled through the wage councils.

---

\(^7\) In regressions including mandated wages and union densities, the number of observations decreases for two reasons: First, there were no sector-level mandated wages for 2002-2004. Second, union density data is matched for 75 percent of sectors.
### Table 5. Impact of wage council mandated wages and unionization

<table>
<thead>
<tr>
<th></th>
<th>ln Markups</th>
<th></th>
<th>ln Markdowns</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ln council mandated</td>
<td>0.161*** (0.055)</td>
<td>0.169*** (0.055)</td>
<td>-0.352*** (0.084)</td>
<td>-0.375*** (0.084)</td>
</tr>
<tr>
<td>wages</td>
<td></td>
<td>0.151*** (0.055)</td>
<td>-0.278*** (0.083)</td>
<td>-0.409*** (0.082)</td>
</tr>
<tr>
<td>ln unionization</td>
<td>0.007 (0.012)</td>
<td>0.005 (0.012)</td>
<td>-0.050*** (0.019)</td>
<td>-0.045** (0.019)</td>
</tr>
<tr>
<td>density</td>
<td></td>
<td>0.007 (0.012)</td>
<td>-0.049*** (0.019)</td>
<td>-0.056*** (0.018)</td>
</tr>
<tr>
<td>Exporter dummy</td>
<td>-0.022** (0.010)</td>
<td></td>
<td>0.082*** (0.016)</td>
<td></td>
</tr>
<tr>
<td>ln capital</td>
<td>0.034*** (0.008)</td>
<td></td>
<td>-0.250*** (0.012)</td>
<td></td>
</tr>
<tr>
<td>to labor ratio</td>
<td></td>
<td>-0.04 (0.003)</td>
<td></td>
<td>0.030*** (0.005)</td>
</tr>
<tr>
<td>Constant</td>
<td>-0.609** (0.256)</td>
<td>-0.646** (0.257)</td>
<td>1.712*** (0.393)</td>
<td>1.810*** (0.393)</td>
</tr>
<tr>
<td>ln employment</td>
<td>0.690** (0.257)</td>
<td>-0.649** (0.254)</td>
<td>2.291*** (0.390)</td>
<td>2.610*** (0.385)</td>
</tr>
<tr>
<td>ln capital to labor</td>
<td></td>
<td>-0.690** (0.257)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ratio</td>
<td></td>
<td>-0.649** (0.254)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Source: Own estimation based on the Annual Economic Activity Survey by the INE.

### 7. Conclusions

The authors of this paper assembled a firm database that produced firm-level price markup estimates along with wage markdown measurements. A set of recent papers (De Loecker et al., 2020; Hershbein et al., 2020) provides estimation strategies derived from simple microeconomic foundations to obtain them. The main issue is whether any input to firm production can be considered flexible. In fact, De Loecker and Warzynski (2012) argue that their methodology can be implemented for different inputs, provided they are flexible to the firm. This paper analyzes a period during a very strong institutional change in which wage negotiation was institutionalized, hence providing a prima facie case to study to what extent labor could be considered fully flexible. Older literature on wage negotiation tended to study the problem from a perspective of market power on the part of workers or unions (to be exercised in the context of a bargaining process). More recent approaches take a different road, i.e. thinking that firms do not take wages as given and face a positively sloped labor supply curve, hence exercising some degree of monopsony power in the labor market.

If labor is not a fully flexible input and its price is not exogenous to the firm, then markups computed as if labor was flexible confound the measure of firm markup in the goods market and of wage markdown in the labor market (an indicator of firms’ joint market power in a wider sense). This paper follows Hershbein et al. (2020) and obtains markups and markdowns separately.

The data show how price markups and wage markdowns clearly follow different paths. First, if the compound firm market power index is estimated (using labor as the flexible input), it
follows a decreasing path across the period, with implausible values given the absence of any relevant market or regulatory changes that would indicate a large decrease in output prices. When estimating separately, using materials as a flexible input to identify markups, they experience a slight increase over the period. However, this is much less dramatic than the sharp increases reported in the literature for developed economies. At the same time, there is a decreasing trend of average firm-level wage markdowns.

Average firm wages follow the increases set in the wage councils. This evolution is matched by an increasing labor share of gross output driven by a drift of average wages increase above labor productivity increases. Labor productivity remained mostly stagnating over the period under study.

The strong institutional changes help to devise a strategy to identify how centralized negotiation and union density can have effects on firm-level markups and markdowns. The key identification assumption is the exogeneity of the sector-level measures due to most firms not being represented on wage councils.

This paper finds a significant positive effect of council mandated wages on firm markups, while they have a strong, negative effect on firm wage markdowns. The interpretation is that wage councils reduced firm bargaining power in labor markets, but firms succeeded in passing to consumers a sizeable part of the increased labor costs.

Union density reinforces the effect of mandated wages in depressing wage markdowns at the firm level but the effect in the estimations is quantitatively small. This means that most of unions’ effects on wages is being channeled through the wage councils. However, no evidence was found of an additional effect associated with unions in firm product market markups.
References


Appendix

Table A1. INE Annual Economic Activity Survey Sample characteristics

<table>
<thead>
<tr>
<th>Year</th>
<th>Reference population (no. of firms)</th>
<th>Total sample size</th>
<th>Compulsory stratum sample</th>
<th>Random stratum sample</th>
<th>Excludes</th>
<th>Sales threshold compulsory (Mill. pesos)</th>
<th>Employment threshold compulsory</th>
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<td>2002-2003</td>
<td>12,928</td>
<td>3226</td>
<td>2226</td>
<td>1000</td>
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<td>50+</td>
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<td></td>
<td></td>
<td>Less than 5</td>
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<td>50+</td>
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<td>3451</td>
<td></td>
<td></td>
<td>Less than 5</td>
<td>27</td>
<td>50+</td>
</tr>
<tr>
<td>2006</td>
<td>1036</td>
<td>1036</td>
<td>--</td>
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</tr>
<tr>
<td>2007</td>
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<td>1075</td>
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<td></td>
<td>Less than 10</td>
<td>120</td>
<td>100+</td>
</tr>
<tr>
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<td>2825</td>
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<td>100+</td>
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<td>2009</td>
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<td></td>
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<td></td>
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<td>2015</td>
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<td>2016</td>
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<td>Less than 10</td>
<td>50+</td>
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Source: INE EAAE Methodology, various issues.
Table A2. Compound firm power indicator, markups and wage markdowns over time, firms with wage council and unionization data

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<th>In firm markup</th>
<th>In wage markdown</th>
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<tr>
<td></td>
<td>ln</td>
<td>ln</td>
<td>ln</td>
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<tr>
<td>d2006</td>
<td>-0.051***</td>
<td>0.110***</td>
<td>-0.164***</td>
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<tr>
<td></td>
<td>(0.014)</td>
<td>(0.014)</td>
<td>(0.021)</td>
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<tr>
<td>d2007</td>
<td>-0.065***</td>
<td>0.136***</td>
<td>-0.204***</td>
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<tr>
<td></td>
<td>(0.013)</td>
<td>(0.012)</td>
<td>(0.019)</td>
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<tr>
<td>d2008</td>
<td>-0.152***</td>
<td>0.130***</td>
<td>-0.281***</td>
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<tr>
<td></td>
<td>(0.012)</td>
<td>(0.012)</td>
<td>(0.018)</td>
</tr>
<tr>
<td>d2009</td>
<td>-0.248***</td>
<td>0.147***</td>
<td>-0.396***</td>
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<tr>
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<td>(0.012)</td>
<td>(0.012)</td>
<td>(0.018)</td>
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<tr>
<td>d2010</td>
<td>-0.301***</td>
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<td>-0.475***</td>
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<tr>
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<td>(0.011)</td>
<td>(0.011)</td>
<td>(0.017)</td>
</tr>
<tr>
<td>d2011</td>
<td>-0.345***</td>
<td>0.129***</td>
<td>-0.474***</td>
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<td>(0.010)</td>
<td>(0.016)</td>
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<td>d2012</td>
<td>-0.403***</td>
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<td>(0.010)</td>
<td>(0.010)</td>
<td>(0.015)</td>
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<tr>
<td>d2013</td>
<td>-0.443***</td>
<td>0.148***</td>
<td>-0.592***</td>
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<td>(0.010)</td>
<td>(0.010)</td>
<td>(0.015)</td>
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<tr>
<td>d2014</td>
<td>-0.475***</td>
<td>0.163***</td>
<td>-0.641***</td>
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<td></td>
<td>(0.010)</td>
<td>(0.010)</td>
<td>(0.015)</td>
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<tr>
<td>d2015</td>
<td>-0.511***</td>
<td>0.159***</td>
<td>-0.674***</td>
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<td>(0.010)</td>
<td>(0.010)</td>
<td>(0.015)</td>
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<tr>
<td>d2016</td>
<td>-0.574***</td>
<td>0.164***</td>
<td>-0.745***</td>
</tr>
<tr>
<td></td>
<td>(0.015)</td>
<td>(0.015)</td>
<td>(0.023)</td>
</tr>
<tr>
<td>Constant</td>
<td>0.322***</td>
<td>0.158***</td>
<td>0.165***</td>
</tr>
<tr>
<td></td>
<td>(0.008)</td>
<td>(0.008)</td>
<td>(0.012)</td>
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Observations 21,667 21,696 21,667
R-squared 0.207 0.020 0.149
Number of id 3,921 3,922 3,921

Standard errors in parentheses  *** p<0.01, ** p<0.05, * p<0.1
Source: Own estimation based on the Annual Economic Activity Survey by the INE.

Figure A1. Average markups, by size

Source: Own elaboration based on the Annual Economic Activity Survey of the INE.
**Figure A2.** Average markups, by sector

Source: Own elaboration based on the Annual Economic Activity Survey of the INE.

**Figure A3.** Average wage markdowns, by size

Source: Own elaboration based on the Annual Economic Activity Survey of the INE.
**Figure A4.** Average wage markdowns, by sector

![Figure A4](image-url)

Source: Own elaboration based on the Annual Economic Activity Survey of the INE.
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