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LABOR CONFLICT AND SECTORAL WAGE SETTING IN ARGENTINA

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Labor conflict and sectoral wage setting in Argentina

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Abstract

We contribute to the analysis of the macroeconomic and labor market impact of labor conflict in two ways: we introduce a Labor Conflict Index (LCI), built at both the aggregate and the sectoral level, and estimate the effect of union bargaining power, as captured by the LCI, on real wage determination. We find that, in the short run, conflict pays off: Across sectors, a 1% increase in bargaining power, as measured by the LCI, leads to a 0.5% – 2% increase in the average real wage.

Keywords: labor conflict, unions, wages, bargaining.

1 Introduction

Labor conflict has been broadly disregarded by economists as a sociological issue with limited real impact. In this paper, we provide sector-level evidence that the incidence of labor conflict in its diverse forms is associated with the business cycle and that conflict may indeed affect labor market variables, particularly real wages. We do that in two steps.

First, we build a new Labor Conflict Index (LCI) for Argentina applying machine-learning techniques to media reports, a methodology that can be easily

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replicated for other economies or industries. Our LCI benefits from being considerably longer than the available official data, as well as from being a summary statistic of many dimensions of labor conflict (the official data is typically comprised of several indicators). Reassuringly, we find a robust correlation between the LCI and official indicators. We also find that labor conflict, as measured by the LCI, is procyclical: it correlates positively with the level of economic activity measured as the cyclical component of GDP, both for the aggregate economy and at the sector level.¹

Second, we construct sector-level LCIs for four large sectors (ground transportation, construction, manufacturing industries, and retail, which includes hotels and restaurants) that, put together, represent about 57% of formal employment in Argentina (Figure 1), and whose bargaining dynamics are widely reported in media and the public arena². We estimate sector-level wage determination equations, augmented with labor conflict (or union action, proxied by the LCIs), and measure its influence in wage setting (measured by the mean real wage). We estimate an ARDL (autoregressive distributed lags) model for sector-level wage setting and find labor conflict (the LCI) to have a positive short-term effect on the mean real wage in the four main economic sectors –a fresh result for a middle-income country that is in line with the traditional view in economics that maintains that union bids pay off in the short run, but fail to influence long-run trends.

In what follows, we summarize the related literature, describe the methodology of the LCI and the main features of the Argentine labor market, present the empirical results, and conclude with final remarks.

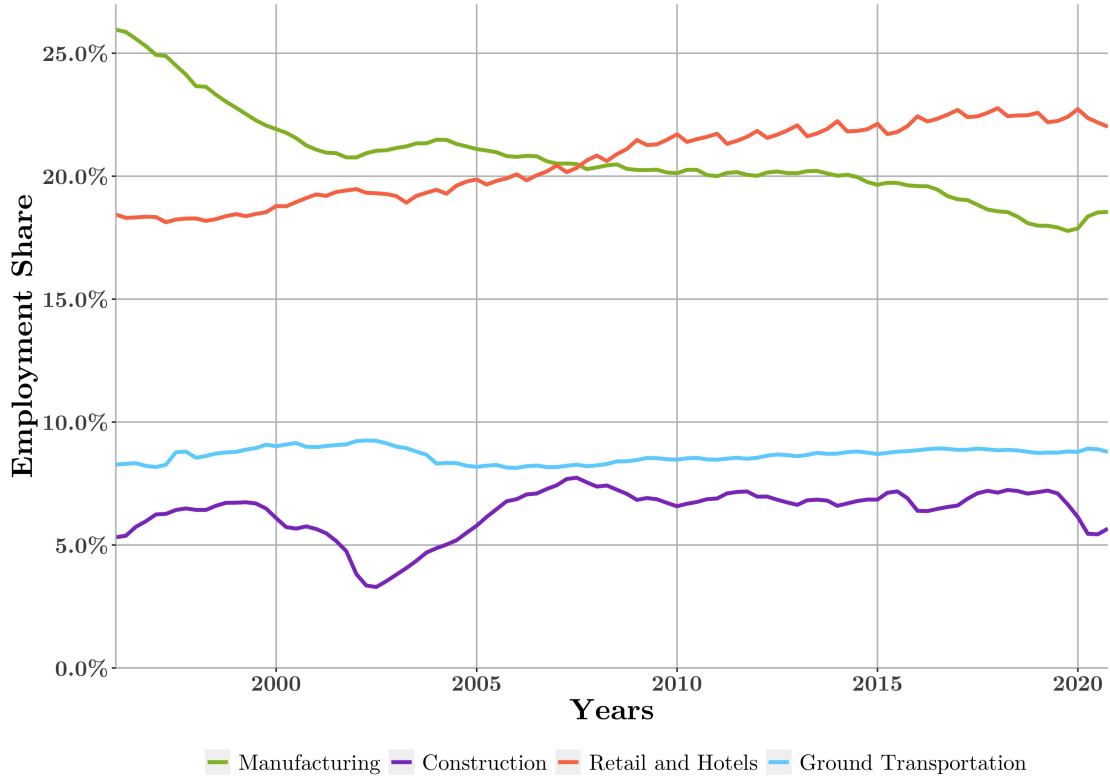
2 Related Literature

There is a long-lasting debate regarding the economic influence of trade unions. While they a priori may impose a cost on the production process (e.g., through higher wages and restrictions on dismissals), the magnitude of this cost is still

¹Additionally, the correlation shows a likely pattern for labor market dynamics in Argentina: labor conflict is more strongly correlated with sector-level economic activity in construction.

²It makes sense to measure labor conflict by sectors in countries where, as in Argentina, collective bargaining happens at the sector level, driven by powerful but and heterogeneous unions by sector.

Figure 1: Employment Share



Employment shares of the industries analyzed in this paper. Source: IN-DEC.

controversial (DiNardo and Lee (2004)). From a policy perspective, the relevant question is how this cost compares with the socioeconomic benefits of labor protection: Is the burden on the economy offset by the associated gains in aggregate welfare.

Empirically, the existing evidence on the role of unions and labor conflict on macroeconomic outcomes is mixed. An important body of research is summarized in a meta-analysis by Doucouliagos et al. (2018). They find that the aggregation of results shows that trade unions have no effect on productivity in manufacturing but may have a significant positive effect on industries like construction. They also find that unions reduce investment in physical and intangible capital and argue that sector-level (small) productivity gains associated with unions do not compensate for union-related relative wage increases. However, individual empirical studies

offer heterogeneous results and a range of possible conclusions.

In line with this heterogeneity, researchers have found that the way the duration and incidence of labor conflictivity vary with the economic cycle is ambiguous and depends on specific circumstances. Devereux and Hart (2011) argue that one can find analytical rationales to support both a procyclical and a countercyclical pattern³. A plausible conjecture for this apparent ambiguity points to the fact that the incidence of labor conflictivity may be procyclical (Devereux and Hart report in their empirical analysis that labor conflict increases with higher economic activity and aggregate demand) whereas its duration may be countercyclical -because it tends to take longer for a strike to exert an impact.

The procyclicality of labor conflict has an intuitive rationale: conflict increases with aggregate production because in periods of economic expansion there are higher stakes –i.e., more wealth to distribute, or to forego in case of a protracted conflict– and, as a result, labor tightens its end of the distributional struggle. In the same vein, an expansion lowers the cost of unemployment (as unemployment spells get shorter) and rises the opportunity costs of a strike for the firm (as replacements get harder to find), thus strengthening the bargaining power of unions, and the chance that a conflict pays off in terms of wage or labor conditions. Note that one could build a similarly convincing argument for countercyclicality by arguing that a recession, to the extent that it lowers workers’ opportunity cost (due to lower outside real wages and longer unemployment spells), and strike-related losses, emboldens firms to push workers closer to their reservation threshold (for example, by adjusting real wages or cutting payroll) at the risk of facing a strike, thereby making conflicts more likely in a down cycle.

At any rate, this remains an empirical question; hence, the criticality of the selection of the conflict proxy and the value added of the new empirical evidence reported in this paper, relevant for labor policy, mainly labor relations regulation, to balance efficiency and protection in a welfare improving fashion.

From a macroeconomic perspective, Judzik and Sala (2013) unionization (prox-

³Kennan (1985) for the U.S. and Harrison and Stewart (1989) for Canada find that the duration of strikes are strongly countercyclical, whereas McConnell (1990) finds little cyclical variation in strike duration for the US. In turn, studies based on North American data tend to support the view that incidence of strokes is procyclical (Harrison and Stewart (1994); Kennan (1986); Vroman (1989)).

ied by trade union density) remains a significant wage-push factor in OECD countries. In this light, the LCIs could be regarded as a quantitative proxy for union bargaining power. Dreger and Reimers (2010) stress that there are common and idiosyncratic elements in each sector that affect the mechanism of wage bargaining: they find evidence (for European countries) that the common component in the wage determination is higher for the manufacturing than for services sectors. This suggests that manufacturing versus other sectors like transportation, construction or retail and hotels are worth examining separately, as we do in this paper to estimate sector-level wage equations.

Conflicts may be triggered by pay- (e.g., wage) and non-pay issues (e.g., labor conditions, schedules, etc.) that may vary over differently the cycle, and they may be influenced by the political setup.⁴ However, here we are interested in the connection between labor-related conflictivity and the business cycle as a whole (in turn, the economic conditions on both sides of the labor market), and whether there is a (wage) reward to labor conflict and the extent to which that reward relates to the cycle.

3 Data and methodology

3.1 A labor conflict index

Methodologically our contribution is twofold. On the one hand, we construct an index for labor conflict incidence as a measured of union bargaining power and to estimate its impact on the real wage, both in the short and long run. On the other hand, we use a text and data mining methodology, a growing but still novel approach in empirical research in social sciences.

⁴For example, Etchemendy (2019) presents a hypothesis on how some South American labor union representation systems work and how they connect to macroeconomic affairs. Collective bargaining is usually tripartite (between firms, unions and the public administration), and in this scheme unions are as autonomous as the degree of incidence of labor conflict they are capable of generating, even when they are friendly with the incumbent government. So the acceptance of, for example, inflation targeting and other monetary policy goals, is a crucial matter in the degree of conflict one can expect. The same can be said about fiscal policy, government debt and public employment or wage increases. Hence this conflict will be intertwined with monetary and economic consequences.

The construction of the index profits from the tagging of news made by a major national multimedia content and news producer *La Nación*. From 2012 onwards, *La Nación* implemented a tag system that assigns one or more tags to each of the news they post in their online newspaper. Among all these tags, three of them proved useful to capture labor conflict: “*Paritarias*”, “*Conflicto gremial*” and “*Paro nacional*”, which can be translated, respectively, as “collective bargaining”, “union conflict” and “nation-wide strike”. We scraped over one million news articles from *La Nación* and optimized the parameters of an eXtreme Gradient Boosting (XGB) model to classify news from *La Nación* in the period 2012-2016, based on the full text of the news pieces.

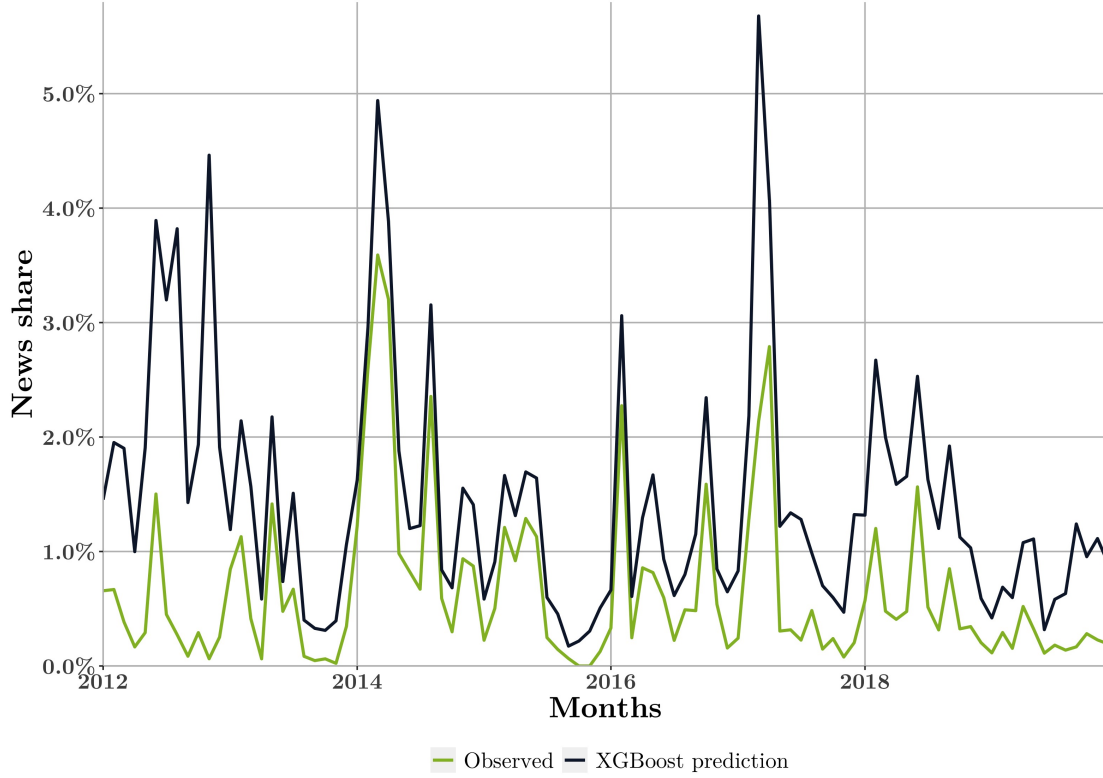
Our methodology can be summarized as follows. First, we removed classic stop words and, more importantly, time-specific relevant politicians and renowned labor union leaders. We believe that as they are heavily quoted in news related to labor conflict, this could lead to prediction problems when they lose political exposure and stop being quoted. Second, we constructed a Bag of Words (BoW) matrix, in which each row represents specific news, the columns are the unique words, and the cells represent the frequency that the j word (column) had in the i news (row). Third, we performed a l1 or “row-wise” normalization of the matrix. It replaces the count of the specific word by the percentage of the total word count of the news it represents. For example, if there are 20 words and “*paritarias*” appears 3 times, we transform the actual absolute count into 15%⁵. Finally, we optimized the eXtreme Gradient Boosting’s parameters using as the training set all the news between 2012 and 2016 and the 2017-2019 period as the testing set (see Figure 2).⁶

After we optimized the parameters, we classified the news from other major newspapers such as *Telam* and *Pagina12*. It is important to stress that we proactively gathered news from newspapers and news agencies that have explicitly opposite editorial lines in order to control for any reporting or covering bias that they may have. Figure 3 shows the percentage of news associated with these tags

⁵We chose not to use the td-idf transformation since it further weights the word weight by the frequency of the word in all the documents. Since our aim is to predict retrospectively we think that there could be changes in the use of language that could bias our predictions.

⁶We proceeded in this way because that is exactly what we aim to do: identify the relationship between the variables during a fixed period and try to classify the news in another time span.

Figure 2: Accuracy of the prediction model



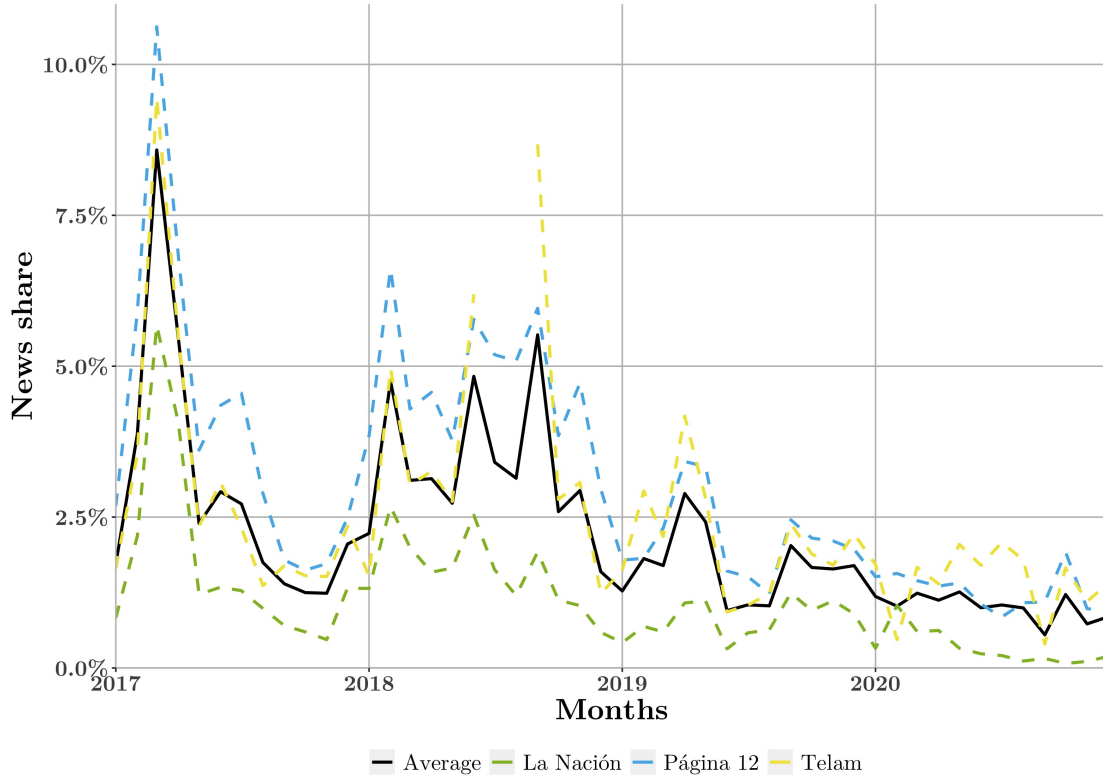
Comparison between the real share of news and the prediction of our model for the training and test set (News from *La Nación*, between 2012 and 2019). Source: LCI (CEPE-UTDT).

since 2017 for all three newspaper media. Levels differ, but the peak-and-trough patterns key to our analysis are comparable. The final LCI is the average of these sources.

Once the aggregate LCI is ready, we develop sector-level LCIs for four main sectors. We use this index at the sectoral level to explore patterns and differences in the role played by bargaining in wage dynamics in those industries. Our main questions are about the relevance of conflict in wage setting at the sector level and, if relevant, the timing and shape of this relationship.

The construction of the sector-level index profits methodologically from the construction of the aggregate index. We take all news of *La Nación* from 2012 to 2019 and classified the archive into two categories: “Labor conflict” and “Other

Figure 3: Labour Conflict Index by newspaper



The individual series of the LCI of each newspaper for the period 2017-2020. There is no values for June and August of 2018 for the Telam series, because of a workers strike. They do not upload the news to the webpage. Source: LCI (CEPE-UTDT).

News”. In the former, we group news that have at least one of these three tags; “*Paritarias*” (collective bargaining), “*Conflicto gremial*” (union conflict), and “*Paro Nacional*” (nation-wide strike) and at least contains two words of a vector of words specially designed for each sector (see the Appendix with complete vectors of words). We train an eXtreme Gradient Boosting (XGB) model with this classified news from the four different sectors and use the same calibration (hyperparameters) from the XGB model that was used at the aggregate level for consistency.

The rest of the procedure is analogous to the aggregate LCI: We remove stop words in Spanish and time-specific relevant politicians and renowned labor union

leaders to avoid sources of prediction bias; we construct a Bag of Words (BoW) matrix in the same way as before and, finally, we perform a “row-wise” normalization of the matrix. After we train the model with news from the training set, we classify the *La Nación* pieces that had been left out of the set with news from the two other news sources we worked with: *Telam* and *Pagina12*. This results in four separate indexes for ground transportation, construction, manufacturing industries and retail (which includes hotels and restaurants).

3.2 Dataset

In addition to the generated LCI series, we construct our own dataset from different sources. The dataset consists of several macroeconomic variables from 1996 to 2020. For each sector, we gathered time series for output, employment, and wages.⁷ Wages are expressed in constant prices by adjusting the mean nominal wage with the consumer price index. The frequency of the series is quarterly. The proxy used for labor productivity is the ratio between the sectoral output and the number of employees in that sector for each quarter. All variables in the empirical model are expressed in logs.

The variables are all obtained from official sources. The series of employment and wages by sector is administrative data processed by the Ministry of Labor, Employment, and Social Security (MTEySS). The sectoral output series is taken from the National Institute of Statistics and Census (INDEC). The consumer price index used to get the real value of wages is also retrieved from the National Institute of Statistics and Census (INDEC), except for the period from 2007 to 2015, when INDEC was intervened by the national government and the statistics published were not reliable, for which we use alternative sources of consumer price levels (consulting firms and provincial statistical agencies).

⁷The International Standard Industrial Classification has separate categories for “retail” and “hotels and restaurants”, so we took the average wage between the two, the sum of employment, and the sum of output.

3.3 The Labor Market in Argentina

Argentina has a dual, insider-outsider labor market and, for that reason, is a relevant case study for the debate on labor issues in the developing world, which typically reflects the tension between these two sectors: i) traditional salaried, protected employment, and ii) autonomous or informal, salaried or self-employed workers, which comprises both liberal high-skilled professionals and, to a considerably larger degree, low-skill workers.

Conflictivity is usually framed within a bargaining process (for higher wages and better labor conditions) that eventually leads to strikes or other forms of active protest. In countries with dual labor markets, this bargaining affects only a part of the workforce. Specifically, the formal employment represented by Argentina's LCI is roughly half of the country's labor force -a fraction that has long been on a declining trend.

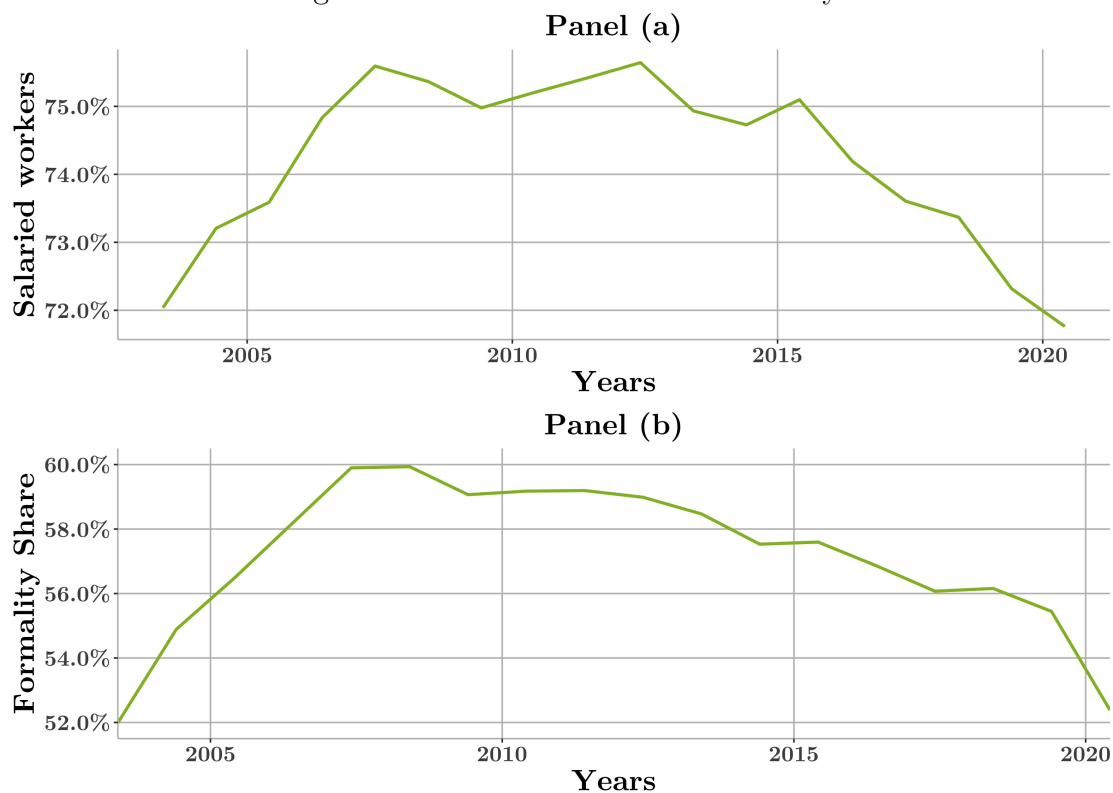
Not only does the connection between labor unrest and its "return" in terms of wages and working conditions differ across time and industries (Silver (2003)); it is also predominantly asymmetric in dual labor markets: when there is a clear divide between (at least) two groups of workers and only one of them (the "insiders") is protected by labor law and union action, the perceived effects from labor conflictivity should accrue primarily to the insiders. Thus, while there may be positive externalities of union bargaining for substitutive (particularly informal salaried) workers, most, if not all of the reward from union action is reaped by the insiders.⁸

Salaried work is the most frequent labor relationship in Argentina, above the mean for Latin America and the Caribbean (71,9% against 62,5% in 2019, according to the World Bank's World Development Indicators), roughly in line with its relative economic development. That said, the share of salaried workers that are registered and subject to collective bargaining, and are therefore relevant to the LCI (that is, the direct beneficiaries from labor demands) is barely over half of the total work force, and around three quarters of total salaried workers. 3.3 presents this share for the period of 2003-2020. According to Argentina's Household Survey in 2020 out of the 71.8% salaried workers only 51.9% (32.6% in the private sector)

⁸It is important to recall that Argentina has had significant stagflation most of the time since 2009, and that a contractionary and inflationary environment tends to both raise the frequency of collective bargaining and widen the insider-outsider wage gap.

are registered under labor law and subject to collective bargaining. Remaining workers include those informally employed (19.8%), and the self-employed or independent workers (28.2%), which in turn include a majority of low-skilled informal workers and a minority of high-skilled liberal professionals (estimated at 21.5% and 6.8% respectively). This composition is critical for our analysis, as labor conflict might be focusing exclusively on registered salaried workers, if not solely on those heavily unionized. Additionally, it is worth mentioning that Argentina has a declining share of salaried workers under collective bargaining. Table 5, in the Appendix presents additional data about the main trends in these proportions for Argentina in recent years.

Figure 4: Salaried workers and formality



Panel (a) shows the evolution of Salaried workers as a share of labor force and Panel (b) shows the evolution of the Proportion of Formal Salaried Workers from the economically active population. Source: INDEC.

Another important aspect of the Argentinian labor market is that the bar-

gaining space is constrained by a Collective Labor Agreement (CCT, for Spanish acronym), a tripartite agreement between the unions representing formal workers in a specific sector, institutions representing the employers of that sector (typically a sector chamber), and the public sector (usually the ministry of Labor). For example, in Retail, the agreement is first negotiated between the trade union of commerce employees (SEC) and the Argentine Chamber of Commerce (CAC) integrated by retail industry firms, and the Labor Ministry gives legal form to the agreement. This bargaining structure is generally repeated across sectors, exception being the case of public employees, where national, provincial, or municipal governments are directly responsible for negotiating with the unions.

The CCT informs a number of characteristics of the labor relation besides the monetary aspect, such as holidays, health coverage, and labor-related rights and benefits, and may be seen as an improvement over the minimum working conditions imposed by Law for all formal workers in a particular sector, and applies to all employees regardless of whether they are unionized. Indeed, because of that, whereas in Argentina trade union density is relatively low, union coverage is very broad due to this universality of these labor agreements, which in many cases include mandatory contributions out of gross wages from workers under the CCT, in addition to the membership fees paid by unionized workers. Thus, most formal workers are tied to a union in some way or another.⁹

4 Argentina's LCI

Official data on labor conflict for Argentina starts in 2006 in the form of three time series: number of conflicts, workers involved, and workdays lost. Reassuringly, our LCI presents a large, positive and significant correlation with workdays lost to conflict and the amount of workers involved -an important robustness check for our LCI based on data mining (see Table 1), which is ten years longer (as it starts in 1996) and more succinctly informative of the intensity of labor market conflictivity¹⁰

Table 2 presents the dynamic correlations between the LCI and the business cycle. The estimated coefficients indicate that labor conflict in Argentina is pro-

⁹Self-employed and informal workers are not covered by collective bargaining agreements and,

Table 1: Correlation of the LCI with official labor conflict series.

Series	Frequency	Correlation with LCI	Obs
Strike duration (work days lost)	Quarterly	0.44 (0.00)	180
Workers involved in strikes	Quarterly	0.49 (0.00)	180

Person's p-value in parentheses.

Source: LCI (CEPE-UTDT) and Ministry of Labour, Employment and Social Security (MTEYSS).

cyclical. The LCI shows a significant correlation with lagged economic activity: economic expansions are positively correlated with a higher incidence of labor conflict a few months later, in line with the international evidence reported by Devereux and Hart (2011). This correlation is higher for the 2003-2020 period (see Figure 5) due to core economic changes around 2003/2004, including the re-introduction of collective bargaining (resumed under new regulations) and a change in the monetary regime with a gradual resurgence of inflation that became critical in wage negotiations.

This procyclicality holds at sector level (see table 3). Interestingly, the estimated coefficient in construction is higher than in the other sectors included in this study, and the correlation is lagged as far as a full year, longer than with the other sectors, which can be associated with the cyclicity and “time to build” typical the construction activity.

4.1 Conflict and wages at the sector level

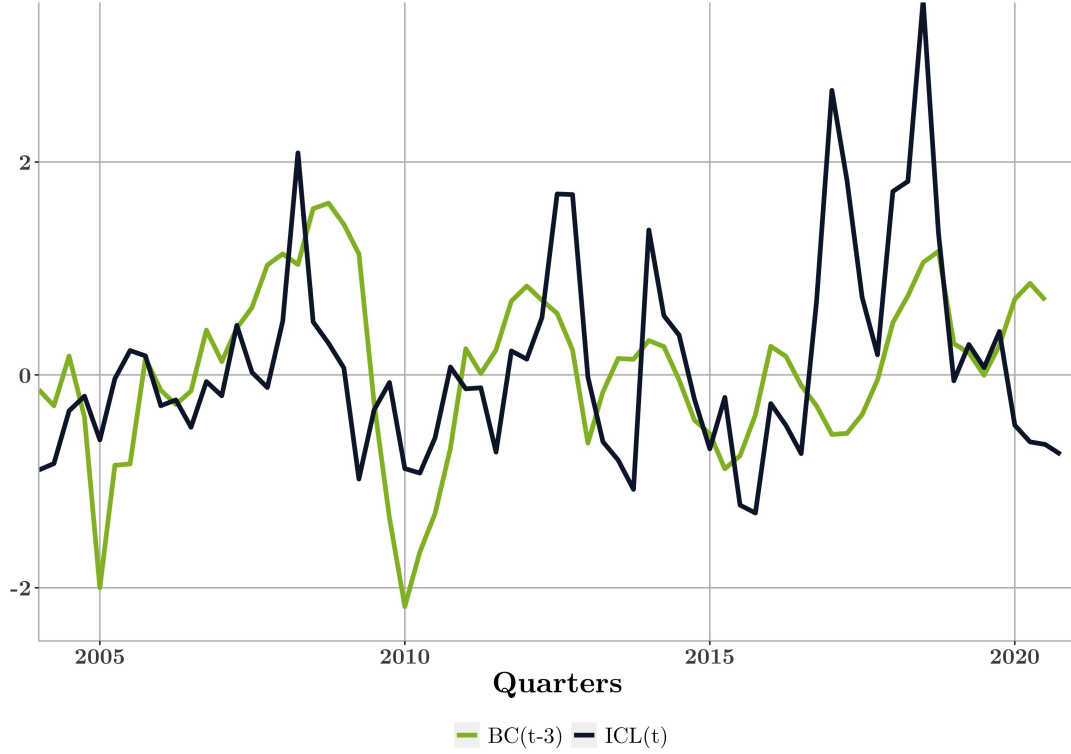
In this section, we analyze the effect of labor conflict and union action, as measured by the LCI, on the average real wage at the sector level. We estimate four individual wage-setting equations augmented with the LCI for ground transportation, construction, manufacturing and retail sectors. Ground transportation is quite

as noted, remain unprotected in addition to facing a negative wage premium.

¹⁰The number of conflicts has a non-significant correlation with the LCI, possibly because it does not weights the size and duration of these conflicts and is therefore a poor measure of incidence.

Figure 5: Procyclicality of the Labour Conflict Index

9



Business Cycle (lagged by three quarters) and the Labour Conflict Index. The Business Cycle is presented as the cyclical component of the GDP series (obtained by Hodrick–Prescott filtering). Both series are standardized (i.e., we subtract the mean and divide by the standard deviation). Sources of data: LCI (CEPE-UTDT) and INDEC.

relevant in Argentina: the union for freight truck drivers is one of the most active in the country, a main reference in political discussions and wage bargaining. Their role in the transportation of merchandises from production sites to cities and ports gives them a central economic role and extraordinary bargaining power which, for the benefit of our study, is often at odds with other unions. Construction workers and manufacturing industries, especially the metallurgical industry's workers union, also have a distinctive history in labor politics and distributional struggles and often play a leading role in wage bargaining. Finally, retail, hotels and restaurants, an important sector in terms of employment (22% of formal work-

Table 2: Dynamic correlation of the LCI with economic activity.

Sample	Correlation	Highest correlation (lag)	N
1996 – 2020	0.20 (0.05)	$t - 4$	96
2003 – 2020	0.41 (0.00)	$t - 3$	71

Person's p-value in parentheses.

The economic activity is the cyclical component of the GDP after passing the Hodrick–Prescott filter.

Source: LCI (CEPE-UTDT) and INDEC.

ers), lack the bargaining clout of the previous three and, because of that, provides robustness to our results in terms of a variety of union profiles.

The empirical model is based on a standard wage equation, where wage evolution is explained by labor productivity and wage-pressure factors, augmented with the LCI as a proxy for the bargaining process. Some specifications incorporate further macroeconomic control such as the real effective exchange rate (official rate published by Argentina's central bank). The equation coefficients are estimated using an ARDL approach, which allows for both the endogenous and exogenous variables' lags to be included as regressors, selected based on the Akaike information criterion. Judzik and Sala (2013) provide a conceptual framework and an application of this estimation methodology for wage equations in OECD countries. Equation 1 expresses the empirical model of wage dynamics analytically for each individual sector.

$$w_t = \sum_{j=1}^{m_1} w_{t-j} + \sum_{j=0}^{m_2} prod_{t-j} + \sum_{j=0}^{m_3} LCI_{t-j} + \sum_{j=0}^{m_4} reer_{t-j} + e_t \quad (1)$$

where w is the real wage, $prod$ is labor productivity (measured as the ratio of the sector's value added over its of employees), LCI is the sectoral Labor Conflict Index, $reer$ is the real effective exchange rate, and the subindex t indicates time (quarters). The estimation method includes lags of both the regressors and the endogenous variable (real wage).

There are two specifications for each sector: (I) full sample 1996-2020, (II) the

Table 3: Dynamic correlation of sector-level LCI with sectoral economic activity.

Sector	Correlation	Highest correlation (lag)	N
Transportation	0.23 (0.05)	$t - 1$	72
Construction	0.46 (0.00)	$t - 4$	72
Manufacturing	0.27 (0.02)	$t - 3$	72
Retail	0.28 (0.02)	$t - 2$	72

Person's p-value in parentheses.

The economic activity is the cyclical component of the GDP of each industry after passing the Hodrick–Prescott filter. Sample 2003 - 2020.

Source: LCI (CEPE-UTDT) and INDEC. (MTEYSS).

2003-2020 period. This difference is due to the official re-instauration of collective bargaining discussions in Argentina in the post-convertibility macroeconomic and policy scene after the 2001-2002 economic crash.

Table 4 presents the main results.¹¹ The first observation is that the mean real wage in all four sectors is quite sluggish. This is to be expected: as discussed above, formal employment in the private sector is heavily regulated and protected. Real wages are also affected positively by short-run variations in labor productivity, which has a positive and statistically significant coefficient in all specifications.

What is the role of labor conflict? In most of the specifications, the first lag of the LCI is positive and statistically significant for the determination of the sectoral mean real wage in the following quarter. Not surprisingly, the highest coefficient is found in manufacturing industries, where trade unions such as the metallurgical industries workers' union have well-known bargaining power. Since the impact of their actions reflects on the sectoral real wage, they are a reference and guide to be followed in terms of bargaining targets by several other manufacturing and construction unions.

¹¹The usual tests on the estimation residuals (heteroskedasticity, serial autocorrelation, and normality: skewness and kurtosis) are reported in the Appendix.

Table 4: Sectoral wage equations

	Ground Transportation		Construction		Manufacturing		Retail and Hotels	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
w_t	1996 – 2020	2003 – 2020	1996 – 2020	2003 – 2020	1996 – 2020	2003 – 2020	1996 – 2020	2003 – 2020
w_{t-1}	1.3456*** (0.0695)	1.3311*** (0.1173)	0.8741*** (0.0372)	0.9256*** (0.0413)	0.6472*** (0.1065)	0.6528*** (0.1239)	1.3192*** (0.0916)	1.2768*** (0.1224)
w_{t-2}	−0.4111*** (0.0671)	−0.3884*** (0.1208)			0.3728*** (0.1089)	0.4032*** (0.1307)	−0.1995 (0.1591)	−0.3064** (0.1204)
w_{t-3}							−0.1612* (0.0910)	
$prod_t$	0.3501*** (0.0817)	0.3026** (0.1207)	0.2192*** (0.0825)	0.2258*** (0.0831)	0.2748* (0.1475)	0.4300** (0.1626)	0.2948*** (0.0680)	0.3097*** (0.0716)
$prod_{t-1}$	−0.2556*** (0.0877)	0.1350 (0.2662)	−0.0891 (0.1651)	0.1175 (0.1730)	0.2613 (0.2535)	0.1394 (0.2837)	−0.0974 (0.1259)	−0.2088** (0.0858)
$prod_{t-2}$		−0.7186** (0.3034)	−0.1918 (0.1260)	−0.4556** (0.1939)	−0.1349 (0.2767)	−0.1181 (0.3107)	−0.1959** (0.0849)	
$prod_{t-3}$		0.3420 (0.2211)		−0.1437 (0.1935)	−0.6568** (0.2720)	−0.6258** (0.3075)		
$prod_{t-4}$				0.2783** (0.1266)	0.3621** (0.1688)	0.3206* (0.1885)		
ICL_t	−0.0028 (0.0021)	−0.0039 (0.0030)	0.0004 (0.0052)	0.0097* (0.0056)	−0.0050 (0.0079)	−0.0038 (0.0080)	−0.0016 (0.0025)	−0.0036 (0.0030)
ICL_{t-1}	0.0057*** (0.0022)	0.0056* (0.0032)	0.0068 (0.0050)		0.0170** (0.0081)		0.0046* (0.0025)	0.0077** (0.0029)
ICL_{t-2}	−0.0032 (0.0020)				−0.0114 (0.0075)			
$reer_t$			−0.0155 (0.0372)	−0.1353* (0.0680)	−0.0432 (0.0526)	0.0419 (0.0365)		
$reer_{t-1}$			−0.1360** (0.0605)	0.1496** (0.0649)	−0.0884 (0.0835)			
$reer_{t-2}$			0.1432** (0.0625)		0.0260 (0.0865)			
$reer_{t-3}$			−0.0682 (0.0607)		0.1382** (0.0563)			
$reer_{t-4}$			0.1147*** (0.0386)					
$D02q2$	−0.1383*** (0.0182)						−0.1446*** (0.0191)	
$D18q3$	−0.0767*** (0.0176)							
$Constant$	1.1820*** (0.2949)	0.6063 (0.4761)	0.6071*** (0.2059)	0.6099* (0.3262)	−0.3615 (0.4224)	−0.7380 (0.7716)	0.1400 (0.1326)	0.5088*** (0.1254)
Observations	92	70	92	70	92	70	92	70
R^2	0.9802	0.9838	0.9745	0.9679	0.9425	0.9203	0.9797	0.9846

Standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$ w = mean sectoral real wage, $prod$ = labor productivity measured as sector GDP/Employment, LCI = Sector labor conflict index, $reer$ = real effective exchange rate $D02q2$ and $D18q3$ are time dummy variables.

How large is this effect? In cases of labor turmoil, when the LCI increases, it usually does that by a large amount: often more than doubling (growing by 100% to 200%) relative to previous values. According to the estimated coefficients, a 1% increase in the incidence of labor conflictivity translates into 0.5% to 2% increase in the mean real wage at the sector level. Thus, the impact captured by the regressions is economically substantial.

Economic theory emphasizes that the real wage equals marginal labor productivity. In empirical jargon, this idea is equivalent to arguing that the long-run elasticity between productivity and the mean real wage is statistically equal to one (on which there is abundant empirical evidence; see, e.g., Judzik and Sala (2013) for OECD countries) or, in other words, that in the long-run the mean real wage is determined by productivity. This is not necessarily the case in our sector level wage equations in Argentina: when we estimate the error-correction version of the ARDL model, we do not find consistent long-run relationships between productivity and the real wage. A possible explanation for this is that we are analyzing only the formal sector, strongly regulated and influenced by collective bargaining, because of which wages do not entirely respond to sectoral productivity growth.

5 Concluding remarks

In this paper, we introduce a new labor conflict index based on text mining as a board indicator or union action incidence and find that it correlates well with alternative official *de iure* measures of union activity, and that it display cyclical properties consistent with a short-run Phillips curve (in that labor bargaining power increases in economic expansions and drives real wages higher). While we find a short-run positive effect of labor conflict on real wages, this effect is not necessarily long-lasting: our results do not contradict the idea that union action may influence real wages beyond labor productivity without diverging from it in the long-run.

As noted, our LCI applies to the private formal sector, which in Argentina (as in most developing economies) represents less than half of the workforce, and therefore we are abstracting from insiders-outsiders considerations that may ap-

ply to wage bargaining and labor union representation¹². Additionally, there is no available information about whether individual workers are unionized, which implies that our result conflates the impact on both unionized and non-unionized workers, without adjusting for the degree of union representation. Further research should benefit from the replicability of our approach to other sectors and countries.

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¹²See Lindbeck and Snower (2001).

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Appendix

The complete vectors of words for the identification in the LCI at the sectoral level are the following ones. First, we have ground transportation;

“trenes, mercadería, rutas, ruta, góndola, gondolas, abastecimiento, camioneros, logística, alimentos, mercado central, nafta, GNC, combustible”

That could be translated as,

“trains, goods, routes, route, supermarket shelf, supermarket shelves, supply, truckers, logistics, food, central market, gasoline, CNG, fuel”

Then we follow with the construction industry,

“construcción, rutas, ruta, UOCRA, cemento, materiales, ladrillo, obras, obra, infraestructura, obra publica, infraestructuras, obras publicas, urbanización, obreros”

An appropriate translation to English would be,

“construction, routes, route, UOCRA, cement, materials, brick, works, construction, work, infrastructure, public works, infrastructure, public works, public works, urbanization, laborers”

OUCRA is the acronym of the main union in the construction industry. We have now the manufacturing industries,

“plantas, planta, industria, metalúrgico, automotriz, autopartes, autotopartistas, operarios, fabrica, producción, manufactura, textiles, metal, fabricas, manufacturas, metalúrgicos, UOM, SMATA, AFAC, ADIMRA, ASIMRA, SEITA, AOTRA, UIA, USIMRA”

That in English is,

“plants, plant, industry, metallurgical, automotive, auto parts, autotoparts, autotoparts, workers, factory, production, manufacturing, textile, metal, factories, manufacturing, metallurgists, UOM, SMATA, AFAC, ADIMRA, ASIMRA, SEITA, AOTRA, UIA, USIMRA”

The last nine words are acronyms for the main unions and chambers in this industry. Finally, we have the Retail industry,

“comercio, comercios, comerciantes, mayoristas, minoristas, shoppings, shopping, centros comerciales, centro comercial, sindicato empleados de comercio, Cámara Argentina de Comercio, mayorista, minorista, restaurant, bares, bar, hoteles, hotel, turismo, gastronomía, gastronómicos, mozo, cocineros, mucamas, restaurants, mozos, camareros, camarero, UTHGRA, FEHGRA, FAECYS, SEC, CAC”

That could be translated as,

“commerce, stores, traders, wholesalers, retailers, shopping malls, shopping centers, commercial center, commercial employees union, Argentine Chamber of Commerce, wholesale, retail, restaurant, bars, bar, hotels, hotel, tourism, gastronomy, gastronomic, waiters, cooks, maids, restaurants, waiters, waitresses, waiters, waiters, waiter, UTHGRA, FEHGRA, FAECYS, SEC, CAC”

Here we have the same that in the manufacturing industries, the last five words are acronyms for the main unions and chambers in retail.

Table 5: Argentinian Labour Market Overview

Year	Formal Private Salaried	Informal Private Salaried	Share Registered Private	Salaried Public	Registered Salaried	Salaried Workers	Non Salaried Workers	Share of Formality
2003	25.8%	26.8%	49.0%	14.7%	60.2%	67.4%	32.6%	40.6%
2004	27.5%	27.4%	50.1%	13.9%	60.2%	68.8%	31.2%	41.4%
2005	29.2%	27.3%	51.7%	14.0%	61.3%	70.5%	29.5%	43.2%
2006	31.3%	26.7%	53.9%	14.6%	63.2%	72.6%	27.4%	45.8%
2007	34.0%	25.8%	56.8%	14.5%	65.3%	74.4%	25.6%	48.6%
2008	35.8%	24.3%	59.6%	14.9%	67.6%	74.9%	25.1%	50.6%
2009	35.7%	23.5%	60.3%	15.5%	68.6%	74.7%	25.3%	51.2%
2010	36.4%	22.9%	61.4%	15.7%	69.5%	74.9%	25.1%	52.1%
2011	36.9%	22.4%	62.2%	15.8%	70.2%	75.1%	24.9%	52.7%
2012	36.4%	22.7%	61.6%	16.4%	70.0%	75.4%	24.6%	52.8%
2013	36.6%	21.9%	62.5%	16.2%	70.7%	74.6%	25.4%	52.7%
2014	36.1%	21.5%	62.7%	16.8%	71.1%	74.4%	25.6%	52.9%
2015	36.4%	21.2%	63.1%	17.2%	71.6%	74.8%	25.2%	53.6%
2016	35.3%	21.6%	62.1%	17.0%	70.8%	73.8%	26.2%	52.3%
2017	34.5%	21.6%	61.5%	17.0%	70.4%	73.1%	26.9%	51.5%
2018	34.9%	21.2%	62.2%	16.6%	70.8%	72.7%	27.3%	51.5%
2019	34.9%	21.0%	62.4%	16.0%	70.8%	71.9%	28.1%	50.9%
2020	32.6%	19.8%	62.2%	19.4%	72.4%	71.8%	28.2%	51.9%

Main indicators of the job market of Argentina. Own calculations based in the Permanent Household Survey (EPH) of the National Statistics and Census Institute (INDEC).

Table 6: Skewness/Kurtosis tests for Normality

Specification	chi2(2)	p-value
1	0.01	(0.99)
2	3.62	(0.16)
3	6.92	(0.03)
4	4.01	(0.13)
5	0.14	(0.93)
6	2.52	(0.28)
7	2.78	(0.25)
8	0.18	(0.91)

Table 7: Breusch-Godfrey LM test for autocorrelation

Specification	Lag	chi2	p-value	Specification	Lag	chi2	p-value
1	1	0.769	0.3806	5	1	0.681	0.4091
	2	0.906	0.6356		2	2,485	0.2887
	3	4,102	0.2507		3	2,597	0.4580
	4	5,035	0.2837		4	2,786	0.5942
2	1	0.000	0.9853	6	1	1764	0.1841
	2	0.179	0.9144		2	1920	0.3829
	3	0.884	0.8294		3	3552	0.3141
	4	1,818	0.7692		4	3610	0.4614
3	1	1,552	0.2129	7	1	0.003	0.9580
	2	1,647	0.4389		2	0.093	0.9545
	3	1,684	0.6406		3	0.670	0.8802
	4	1,688	0.7928		4	3,305	0.5081
4	1	0.935	0.3336	8	1	1,290	0.2561
	2	1,737	0.4196		2	1,338	0.5122
	3	2,574	0.4621		3	3,157	0.3681
	4	5,157	0.2716		4	11,189	0.0245

Table 8: Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Specification			Specification		
1	chi2(1)	3.66 (0.0558)	5	chi2(1)	0.49 0.4843)
2	chi2(1)	0.79 (0.3746)	6	chi2(1)	0.02 0.8930)
3	chi2(1)	0.09 (0.7669)	7	chi2(1)	0.27 0.6042)
4	chi2(1)	0.00 (0.9733)	8	chi2(1)	4.02 0.0450)

P-value in parentheses.