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Profit Sharing as a Bargaining Weapon Against Unions*

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Abstract

There is no consensus among economists about the reasons why firms resort to profit sharing compensation, especially in larger firms. This paper presents evidence for France showing that firms with unions are more likely to resort to profit sharing than those without and, moreover, that strike incidence decreases with its usage. Inspired by these stylized facts, I develop a model to study the effects of profit sharing on union behavior that introduces two novel mechanisms. First, by making employee compensation depend on output, profit sharing makes unions internalize the cost of their strikes so that they are less inclined to organize collective actions. This in turn damages the credibility of their strike threats. Second, over time unions lose reputation, which further reduces their bargaining power. Lastly, I test the model using exogenous dates of elections of union representatives that give incentives for unions to organize collective actions in a competition for voters. I show that employers anticipate the effect of elections by increasing the usage of profit sharing. Its payment leads to a reduction in strike length the same year, and to a drop in wage growth by about 13 percent the year after. The effect is concentrated on lower occupations for whom wage growth is almost halved and driven by a reduction in the bargaining power of unions.

JEL Codes: M52, J51, J52, C78
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1 Introduction

Broad-based profit-sharing schemes are largely used in developed economies. More than half of workers in the US private sector benefit of a form of compensation that varies with a measure of performance (D. L. Kruse, Freeman, & Blasi, 2010). In Europe, the situation is the same for at least its 2,700 largest companies, which represent a fifth of the workforce in the private sector (Mathieu, 2020). The usual explanation for the usage of profit-sharing is that it is a tool to increase the productivity of employees by linking their compensation to their effort (Blasi, Kruse, & Bernstein, 2003; Prendergast, 1999; **?**). However, this incentive alone, cannot explain the widespread usage observed particularly in large firms. An employee of one of these companies has only a small impact on the firm's performance, while the gains that accrue to her effort have to be shared with all of her colleagues. This externality, known as the *1/N problem* (D. Kruse, 1993), dilutes the individual incentive of the scheme and makes it unlikely to be the main driver of the usage of profit sharing.

In this paper I provide a novel reason for the usage of profit sharing that can explain its scope in large firms, which is that employers resort to profit sharing to weaken unions. It builds upon the double observation that unions are natural coordinators of employee effort that internalize individual externalities, and that unions are more likely to operate in larger companies than in smaller ones. Unions can have a significant impact on performance by organizing collective actions, such as strikes, which they use as threats at the bargaining table to embolden their wage offers. Strikes can be very costly for employers because the harm spreads beyond the simple disruption of the business of the firm. They can result in losses of market share and reputation, which are more difficult to recoup in the long run. Profit sharing is therefore a way to make unions bear the cost of their collective actions. When employee compensation depends on output, workers suffer part of the losses caused by strikes, and because unions take decisions on behalf of a large fraction of the workforce they internalize the incentives of profit sharing well. The contribution of the theory that I develop goes beyond the fact that profit sharing reduces the incidence of collective actions. I show that an additional benefit for employers is that such schemes undermine the bargaining power of unions over time by weakening their ability to build a reputation for being strong. With weaker unions, employers can concede smaller wage increases, which results in a reduction in wage growth in the long run.

The paper proceeds in three steps. I start by constructing a new data set on unions and

profit sharing in France, and document the link between the two. The series of stylized facts that I present suggest that profit sharing can be effective for reducing the incidence of unions. In particular, controlling for firm characteristics, profit sharing plans are about 10 percent more common in unionized companies, while strike incidence is half less likely in firms that use profit sharing.

Inspired by these facts I develop a model that provides a new dynamic framework for wage bargaining. I start by revisiting an intuition of John Hicks, for whom unions would strike "not so much to secure greater gains upon that occasion [...] but in order to keep their weapon burnished for future use, and to keep employers thoroughly conscious of the Union's power" (Hicks, 1963). In the model unions thus organize collective actions to build future reputation and invest in their endogenous bargaining power. On their side, employers have beliefs about unions' capability to organize successful strikes, which they update based on the observation of the history of strikes. If unions have managed to coordinate strikes in the past, employers are more likely to accept giving away higher wages today instead of risking enduring disruptions of output. In turn, profit sharing is the *weapon* that employers employ to tip the balance of power in their favor. They use it to increase the cost of strikes for unions and thereby to weaken their reputation. The model thus allows to study the dynamic effects of profit sharing on the behavior of unions and provides a mechanism for the substitution between the two. It shows that despite productivity gains due to increased effort and reduced strike incidence, profit sharing can make employees worse off by leading to a reduction in wages relative to what they would have been with stronger unions.

I then test the predictions of the model by using elections of union representatives, which cause exogenous shifts in the probability of exit of unions. The prospect of elections makes unions compete for the votes of employees and behave more aggressively against employers to secure gains that they can put on their record. The theory predicts that elections should make employers anticipate this threat with an increase in profit sharing. The empirical results show that indeed, before elections firms are more likely to resort to profit sharing, and that its payment leads to a reduction in the incidence of strikes. Further, the year after elections, wages grow 13 percent more slowly. Crucially, the decrease in wage growth is heterogeneous across occupation groups and larger for Blue Collar workers, whose wages are more likely to be tied to bargaining agreements inside firms. Laborers, the occupation category with the lowest skilled and lowest paid employees, experience a decrease in wage growth of more than 40 percent due

to the usage of profit sharing, while there is no significant change for White-Collars. From that perspective, an important result is that the usage of profit sharing can contribute to an increase in labor income inequality. The results further show that the effect is likely due to a reduction in the frequency of wage bargaining agreements the year after the payment of profit sharing, which is consistent with the loss of reputation of unions.

The paper contributes to several strands of the literature on profit sharing and unions. First, with regard to the usage of profit sharing in larger companies in relation to the 1/N problem, most studies find no significant relation or even a positive one (C. Adams, 2002; Amisano & Del Boca, 2004; FitzRoy & Kraft, 1995; Gregg & Machin, 1988; Jones & Pliskin, 1997), and have focused on forms of co-monitoring or peer pressure to explain this puzzle (Kandel & Lazear, 1992; D. Kruse, Blasi, & Freeman, 2004). Profit sharing does incentivize employees to scrutinize their coworkers, especially when there are complementarities in the production function between employees (Heywood & Jirjahn, 2009), however the incentive still decreases with firm size as the proceeds from the effort of co-monitoring have to get shared with more employees. Besides, profit sharing is used in firms where employees cannot necessarily monitor each other easily as well (D. L. Kruse et al., 2010). The theory that I introduce acknowledges the collective dimension of effort, but analyzes it through the length of unions who are natural coordinators of collective effort that internalize the 1/N externality. Unions are more likely to operate in large firms (Breda, 2015; Schnabel & Wagner, 2007), but they do not have to be present for the incentives to be at play. The threat of unionization may be sufficient for employers to act (Taschereau-Dumouchel, 2020), which explains why profit sharing can be pervasive in countries like the United-States where actual union density is low.

Regarding the link between the presence of unions and profit sharing, authors have either found a positive (D. Kruse, 1993; Pendleton, 1997), a negative (Jones & Pliskin, 1997; Ng & Maki, 1994), or no correlation (Pendleton, 2006). By exploiting an exogenous source of variation in the aggressivity of unions, my analysis brings new evidence for a causal relation between profit sharing and union behavior. Further, it embeds the results in a theoretical framework that shows that beyond weakening unions, profit sharing allows employers to reduce their wage bill. It thereby complements a series of papers that have studied the substitution between profit sharing and wages that have found either a positive (D. L. Kruse et al., 2010; Long & Fang, 2012) a negative (Mabile, 1998) or no significant link (Cahuc & Dormont, 1992; Delahaie & Duhautois, 2019). I provide empirical evidence for a negative causal effect of profit sharing on

wages and total compensation at least in the short run due to a loss of bargaining power for unions. The results do not imply that profit sharing cannot have productivity enhancing effects, but that there is a tension between these and those on the behavior of unions, which on balance can be detrimental for employees.

Lastly, the article contributes to the theoretical literature on bargaining. A large body of work has studied strikes as a screening mechanism used by unions to learn the state of productivity (Ausubel, Cramton, & Deneckere, 2002; Cramton, 2003; Kennan & Wilson, 1990). The present paper develops an additional reason for collective actions that become a tool to build bargaining power for future negotiations. The forward-looking incentive brought by the motive of building reputation ensures that unions call for collective actions after rejections of their wage offers, so that strike threats are credible at the onset of bargaining[1]. Reputation also provides a micro-foundation for the bargaining power of unions, which in the model is a variable endogenous to the behavior of both unions and employers. Mauleon and Vannetelbosch (1999) and Cramton, Tracy, and Mehran (2015) have shown that profit sharing can reduce the incidence of strikes but not as an optimal decision of employers and not in a dynamic setting that involves reputation. In the present model, the interplay of strikes and profit sharing generates new predictions about the dynamics of compensation.

More broadly, the article questions policies that have been implemented in order to promote the usage of profit sharing by firms. In France a series of laws in the early 2000s promoted the usage of profit sharing and exempted it from payroll taxes, and similar policies have been implemented in other European Countries and in the United-States. The theory I present suggests that these policies may have played a role in the decline of unions over the last four decades. With the renewed interest in labor representation in link to the fall in the labor share (Blandhol, Mogstad, Nilsson, & Vestad, 2020; Jäger, Schoefer, & Heining, 2021), and with existing evidence that the decline of unions has been a large contributor to the increase in labor income inequality (Blanchflower & Bryson, 2004; Card, Lemieux, & Riddell, 2004), a natural open question is whether policy makers who would want to reduce income inequality should keep subsidizing profit sharing?

The paper is organized as follows. Section 2 details the institutional framework, and presents the data and the stylized facts related to unions and profit sharing in France, Section 3 develops the model and derives its predictions, Section 4 presents the empirical analysis and discusses

[1]Most bargaining models have to assume that unions are able to *ex ante* commit to strike after rejections.

its results, eventually Section 5 concludes.

2 Data and Stylized Facts

The empirical analysis of the paper relies on French firm data, but before describing the different sources and introducing the stylized facts regarding profit sharing and unions, the section introduces the framework governing these institutions in France.

2.1 Institutional Framework

The French institutional framework provides a good setting to study the relation between profit sharing and unions for several reasons. Regarding profit sharing, the French legislation mandates that profit sharing plans are broad-based so that all employees are compensated when employers distribute the proceeds. This ensures that employees whom unions care about, are paid with profit sharing. There are two types of plans that firms can use. The first one, called *Participation*, is mandatory for all firms with more than 50 employees. The amount of profits to be shared is also determined by law and had to be paid on profits above a return on equity of 5 percent.[2] However the legal obligation to implement a Participation plan is quite loose, and a large proportion of firms do not comply with it as it is shown in the stylized facts subsection below. The second plan is called *Intéressement* and is voluntary. Its formula can be determined freely by employers and the amount has to depend on measures of performance. However legislation allows them to adjust the quantities paid upwards, by up to 25 percent of payroll costs, at their own discretion. This leeway makes it easy for employers to adjust profit sharing if needed in the face of an impending union threat.

The French legislation makes unionization easy because workers are free to unionize and organize union sections with appointed representatives if their firm has more than fifty employees. In that case employers are mandated to bargain with union representatives over wages every year. Even if the two parties are not necessarily expected to reach an agreement these features keep unions threatening for employers. In the case of an agreement, its terms must apply to all workers regardless of their union status, so that most workers in France are covered by a

[2]The legal formula determining the amount of participation is $\max\left\{0, \frac{1}{2}\frac{Payroll}{Added\ Value}\left(Profits - 5\%Equity\right)\right\}$. Note that employers below 50 employees are also allowed to set the plan, and that all firms can opt for a different formula, but only if it yields a higher compensation for employees. As a matter of fact, the device was made mandatory in 1967 by President Charles de Gaulle who among other reasons introduced it as a way to "rejuvenate trade unionism" (public address given in Marseille, France, on April 17, 1948) which was at the time dominated by the French communist party.

collective agreement.[3] This gives unions incentives to operate on behalf of all workers, and not only on behalf of those that are unionized.

In many firms, multiple union representatives that belong to different union confederations coexist. These brands are divided politically about the purpose of their action, and about unionism in general. *Radical* unions embrace a Marxist view of the economy and society and advocate for class warfare against employers.[4] *Reformist* unions come from the Christian social doctrine and have been historically known for making more concessions to employers than Radical ones (Mouriaux, 2010).[5] Unions compete for the right to represent workers, and importantly, for the right to sign binding bargaining agreements with employers. Since 2009, that is determined by the results of the elections of worker representatives at Works Councils.[6] The candidates in the first round of elections have to be unionized and only if no unionized candidates run for elections, or if the turnout is below 50 percent, a second round in which non unionized candidates can run is organized. The results determine the unions that are representative of workers inside firms. All of those with more than 10 percent of the votes are granted this status, which gives them the right to bargain with the employer. However only those with at least 30 percent can sign a binding agreement if no union nor coalition of unions that had won more than 50 of the votes opposes to it. A union that has passed the 50 percent threshold can bargain and sign agreements without being concerned by its competitors. Elections are important because they bring about competition between unions, and importantly for the empirical analysis, they are likely to bring cyclical variation in the aggressiveness of unions against employers. There is multiple anecdotal evidence, which I report in section 4, that competition before elections makes unions more aggressive in terms of bargaining and strikes. Their purpose is to advocate

[3]Note that this explains in part why with a very low unionization rate standing at 12 percent, about 95 percent of workers are covered by a form of collective agreement bargained by a union representing them. In firms below fifty employees, or firms without union representatives other types of worker representatives can bargain with employers. These *Personnel Delegates*, unionized in most cases, have to be elected in all firms with more than ten employees and are in charge of reporting and solving the grievances of workers with respect to the employer. If there are no representatives inside the firm, the employer willing to put an agreement into place can submit a referendum to her employees.

[4]Some of them state in their founding charter that the objective of their action is the "expropriation of capitalists".

[5]The doctrine was embodied in the *Rerum Novarum* or Rights and Duties of Capital and Labor, an encyclical issued by Pope Leo XIII in 1891 to give the Church a say on the societal changes brought about by the Industrial Revolution, and to respond to the competition of the new ideology proliferating amid the working class that was Socialism. The Church would encourage workers to unionize but not in opposition to capital owners. Rather than class warfare, the encyclical advocated for class harmony, while it dissuaded workers from striking and promoted collective bargaining instead.

[6]Mandatory in all firms with more than fifty employees, Works Councils are institutions where representatives are consulted on strategic issues of the firm. In practice they do not influence the decision of employers much. In firms where they do not exist the legitimacy of union representatives is determined by the results of the elections of Personnel Delegates.

for a better record in front of employee-voters. The record is important even in firms where a single union runs for election because it still needs to reach a turnout of 50 percent for its election to be valid.

2.2 Construction of the Database

I have used five different sources to construct the final database.[7] The main ones are two firm-level surveys conducted with employers by the French Ministry of Labor under the names PIPA and DSE[8] reporting respectively information on profit sharing and labor relations inside firms. Both surveys are conducted yearly and cover the period 2009-2015 but do not constitute balanced panels. PIPA covers a sample of 18,000 French companies with more than 10 employees operating in the private sector excluding agriculture. All firms with more than 250 employees are interviewed every year, while a quarter of the rest of the sample is renewed yearly. For DSE, the sample consists of 11,000 firms with more than 10 employees of the private sector excluding agriculture. All firms with more than 500 employees are interviewed every year, while as with PIPA the remainder is renewed by quarter yearly. The DSE data does not contain information on elections of union representatives. I use the MARS database collected by the Ministry of Labor and available publicly at to complete this information. It consists of the election records of all workplaces that have complied with the administrative mandate to report results since 2009. Eventually I use information from employees' social security records (DADS) as well as balance sheets and income statements collected by the French Ministry of Finance (FARE) to get variables relative to payroll, size, and firm performance. The DADS are exhaustive of all French companies with salaried workers while FARE encompasses all firms with more than 20 employees and contains a sample of 85,000 firms below that threshold. The final database is constructed by merging these five sources at the firm level. The result is an unbalanced panel of 11,074 firms, covering the 2009 to 2015 period. In total there are 19,336 firm-year observations with between 2,300 and 3,200 observations yearly. A consistent amount of data is lost in the process due to the fact that PIPA and DSE are designed to minimize the overlap between the two samples, no to put too much burden on respondents. The final sample is thus skewed

[7]Most of them have been accessed through the *Centre d'accès sécurisé aux données*, the French Secure Access Data Center, which has supported this work by a public grant overseen by the French National Research Agency as part of the *Investissements d'avenir* program (reference : ANR-10-EQPX-17).

[8]*Participation, Intéressement, plans d'épargne et actionnariat des salariés* standing for "Participation, Intéressement, Firm Savings Plans and Employee Shareholding" *Dialogue social en entreprise* standing for "Labor relations inside firms"

towards large companies because they are the ones that are interviewed by both surveys yearly as aforementioned. However this should be a minor issue since the purpose of the paper is the study of profit sharing in larger firms. For both Intéressement and Participation, the database reports three variables: whether a plan is in place, whether it has led to a payment to workers, and the amount paid. Because what matters from the point of view of my analysis is the sheer amount of profit sharing, I aggregate the two plans into a single variable. Regarding unions the data contains whether union delegates are present inside the firm, their brand, whether bargaining has occurred, the themes of agreements, as well as the incidence of strikes and their duration counted by the number of worker-days lost[9]. Because election records are at the workplace level, I construct a firm-level election variable by computing the proportion of workplaces in a given firm-year that hold elections. I either use elections of Works Councils for firms with more than fifty employees, or elections of Personnel Delegates for firms with a workforce count below fifty that do not have Works Councils. For the purpose of descriptive statistics in the latter part of this Section I use another data set on the compensation structure of employees independently of the main one. ECMOSS[10] are two surveys in 2009 and 2010 of a subset of 125,000 employees of a sample of 15,000 workplaces. It reports the structure of their compensation including wages and profit sharing, as well as whether they went on strike and its cumulative duration during the year. I give more details about the construction of the database and variables, along with summary statistics in Appendix Section A.

2.3 Stylized Facts

This section documents a set of stylized facts regarding the link between profit sharing and union behavior. All of them are simple correlations, but are consistent with the theory of the paper.

Stylized Fact 1. *The usage of profit sharing increases with firm size, while the amount paid per employee is roughly constant. Union presence and strike incidence increase with firm size.*

Figure 1 represents average measures of the usage of profit sharing and the presence and behavior of unions with respect to firm size measured by number of employees. Panel (a) show that larger firms resort to profit sharing more than smaller ones. There is a sharp increase

[9] For example if in a given year ten workers have gone on strike, three days each, the variable will report a value of 30.

[10] *Enquête coût de la main d'oeuvre et structure des salaires* meaning Survey on the cost of the workforce and the structure of wages.

around the threshold of 50 employees due to the legal obligation to implement a *Participation* plan, but it is not likely to be the only driver for the increase in the usage with firm size for two reasons. First a large fraction of firms, between 20 and 50 percent, do not abide by the legal obligation.[11] Second, *Intéressement*, the voluntary profit sharing plan also increases significantly with firm size. If a majority of firms were forced to use profit sharing through the legal mandate to pay Participation, then there should not not be increases in the usage of *Intéressement* in the proportions seen in the graph. Panel (b) shows that the average amount of profit sharing paid to employees does not decrease with firm size and with the spread of its adoption among larger firms. This shows that the increase in adoption does not hide a decrease in the amounts paid to employees on average. The two panels illustrate the puzzle regarding the 1/N externality according to which profit sharing should decrease with size.[12] Panel (c) shows that union presence as well as the number of unions conditional on union presence increase with firm size. This last fact suggests an increased likelihood of the presence of Radical unions and an increase in union competition that is likely to drive contentious positions against employers. So not only unions are more likely to operate in larger firms but they may represent a higher threat. This is suggested by panel (d) which shows that strikes are more common in larger firms, with more that 40 percent of those with more than 1,000 employees experiencing at least a strike per year. Strike length measured by the percentage of working days lost follows the same increasing pattern as strike incidence.

Stylized Fact 2. *Profit sharing is distributed in similar proportions across occupation groups.*

Figure 2 displays the average profit sharing as a proportion of the yearly wage within the four main occupation groups of the official French national classification of professions (*Nomenclatures des professions et catégories socioprofessionnelles* or PCS). It shows that lower skilled workers (on the left of the horizontal axis) get as much profit sharing as higher ones. In principle, lower occupation employees have on average a smaller impact on output individually, but they are still compensated with an important amount of profit sharing. Note that the split of profit sharing among workers is a choice of employers[13] Lower occupation employees are also those who go on strike more often, one day per year on average (displayed in red on the right

[11] This non compliance is certainly due to the fact that it is not checked by the administration, and that employees or their representatives are those that have to report it. The individual cost may be too large and workers may not be aware of their rights.

[12] Note that in firms below the 50 employee threshold, the usage decreases in accordance with the externality, but unionization is much more difficult in these smaller companies.

[13] They can make it a function of experience and wage compensation so that targeting predominantly higher skilled employees is possible in theory.

hand side scale), while white collars almost never strike. This stylized fact suggests that unions are likely to internalize the incentives of profit sharing well because employees whom they are more likely to represent and care about more are compensated with significant amounts of profit sharing. The fact holds within industry and establishments, which is displayed in regression Table 18 of Appendix D.

Stylized Fact 3. *Unionized firms are 10 percent more likely to resort to profit sharing.*

Table 1 shows that with year and industry controls, firms in which unions are present are 27 percent more likely to have a profit sharing plan (column 1). The association is partly due to the correlation through firm size (column 2), but nonetheless strongly significant even after controlling for performance measures (column 3). Even if the link is not causal, this fact supports the idea that profit sharing could be a response to unionization.

Stylized Fact 4. *Firms that resort to profit sharing have half the strike incidence of others, while strike intensity in terms of working-days lost is 40 percent smaller.*

Table 2 shows that the plain correlation between the usage of profit sharing plan and strikes withing industry is positive (column 1), as in Figure 1. However controlling for size, firms with profit sharing are those that experience fewer strikes and a reduced strike intensity (columns 2 and 5). Adding controls for the number of unions and union brand does not affect the association qualitatively (columns 3 and 6). Strike incidence is 5.6 percent smaller, which compared with the average incidence in the sample implies a reduction by a half, while strike length is 40% shorter. This suggests that profit sharing can be effective at weakening the disruptive behavior of unions.

3 Model

In this section I build a theoretical framework to study the effect of profit sharing on the behavior of unions and compensation and derive a set of predictions that are tested in the following empirical section.

3.1 Game Setup

The model consists of a two-period repeated game between an employer, a union, and a set of workers represented by the union. At the beginning of each period $t \in \{1, 2\}$ the employer sets

up a profit sharing plan that consists of a chunk s_t of profits π_t to be paid to the workers at the end of the period if no strike occurs in the meantime. After the scheme has been set the union can decide to negotiate wages with the employer. Bargaining consists of repeated wage offers by the union that can be either accepted or rejected by the employer. After a rejection, workers go on strike with a probability that depends on their type and on the behavior of the union.[14] The behavior of employees depends on the instructions of the union, which can invest an amount of effort a_t to motivate them to go on strike. In practice this consists in reaching out to employees in different forms like announcements, meetings, handouts, in order to convince them to follow its action. If the strike occurs, then output is destroyed. After the employer has accepted a wage offer w_t, bargaining ends, output and payoffs are realized, and the game moves to the next period.

The environment is characterized by two sources of asymmetric information. First, the productivity of the firm is known only to the employer, and determines her type. Output can either be high y^H with probability θ or low y^L with probability $1-\theta$, and its realization is independent across periods. This asymmetry plays a role in the equilibrium of the bargaining game. I follow here the framework of Fudenberg and Tirole (1983), and assume that bargaining lasts at most two rounds and that a low type employer is unwilling to settle above a wage offer $\underline{w}$. The feature implies that in equilibrium the two types of employers behave differently. A high type employer has more to loose from a strike and accepts the wage offer in the first round while a low type rejects it to signal that her productivity is low. The union internalizes that an bids for higher wage offers in the first round than in the second. One last point to note here is that the productivity of the firm is observed by the employer only upon bargaining. This captures the fact that there is a time lapse between the moment when she determines the profit sharing scheme and the moment of bargaining, during which productivity evolves.

The second source of asymmetry, a new feature of the framework, comes from the fact that the fraction of workers whose strike behavior depends on the action of the union is neither known to the employer nor to the union. In practice, employers hardly observe the unionization status of their employees, and most likely form expectations based on the employees who turned up in past strikes. Unions neither know the degree of commitment of workers because they only interact with a fraction of them, and the reach of their actions very often relies on word-of-mouth. In the game, both the employer and the union have Bayesian beliefs about the type

[14] Note that workers do not get to choose their action directly.

of the workforce, which can be either reactive or passive. In a reactive workforce, employees are sensitive to the action of the union, while in a passive one nobody is. I thus define the probability μ_t that the workforce is reactive as its *reputation*. Reputation evolves with the realization of strikes (either a success denoted by S or a failure denoted by F), after which the employer and the union both update their beliefs. Because the union can determine the outcome of a strike the reputation of the worker is the reputation of the union as well, and I use the two terms interchangeably. Formally the belief about the probability that a strike succeeds is defined as $\mu_t g(a_t)$ where $g(a_t) = \gamma + \rho a_t$. The parameter $\rho \in (0, 1-\gamma)$ captures the efficacy of the union's action in motivating reactive workers to go on strike while $\gamma \in (0, 1-\rho)$ reflects the fact that even without investment by the union a portion of reactive employees always strikes. The game starts starts with a initial exogenous prior μ_1, and reputation evolves according to Bayes Rule:

$$\mu_{t+1} = \begin{cases} \mu^S_{t+1} = 1 & \text{after a successful strike} \\ \mu^F_{t+1} = \frac{\mu_t(1-g(a_t))}{1-\mu_t g(a_t)} & \text{after a failure} \end{cases} \tag{1}$$

A success is indicative that the workforce is reactive because only in a reactive workforce there are employees willing to strike. After a failure reputation drops because the probability of a failure is relatively more likely in a passive workforce than in a reactive one. Reputation determines the wage premium that the union can expect from bargaining, and provides an incentive for the union to invest in strikes today to reap future benefits. As mentioned in the introduction, it gives dynamic consistency to strikes and endogenizes bargaining power.

To link the model to the the institutional framework I assume that there is a probability that the union exits every period, and that it is higher in the case of a failed strike and in the case when the union decides not to bargain with the employer. The intuition is that workers do not know the exact amount of resources that the union puts in the organization of actions in their favor, and they use strikes and bargaining as a positive signal for it. This framework is reminiscent of Ashenfelter and Johnson (1969) where union leaders organize strikes to try to convince their base that they have been tough at the bargaining Table. For simplicity I set the probability of exit after a success to zero and the one after failure or no bargaining to ε.

The ex-ante period payoffs of the players are then defined as follows. Employees get the expected wage and profit sharing $u_t = \mathbb{E}[w_t + s_t]$ where the expectation is relative to the outcome of bargaining and strikes, which both depend on the type of the employer. The

expected profits of the employer are revenues (the price is normalized to one) minus payroll costs $\pi_t = \mathbb{E}[y_t - w_t - s_t]$. The union internalizes the utility of the employee but also has to pay a cost for the investment in strike organization so that it gets $\mathbb{E}[u_t - a_t]$. There is no discounting between periods so that total payoffs are the sum of period payoffs.

3.2 Solution

The game is solved backwards. In the second and last period, the union has no incentive to invest in strikes for future reputation so that $a_2^* = 0$. As a corollary the employer has no incentive to use profit sharing to deter strike action and $s_2^* = 0$.

Equilibrium of the bargaining game

Proposition 1. *There is a unique separating Subgame Perfect Nash Equilibrium in which the union offers w_t^H in the first round and $\underline{w}$ in the second one. A high type employer accepts the first wage offer, while a low type rejects it and settles the round after. The high wage offer is the following:*

$$w_t^H = \begin{cases} \underline{w} + \mu_1 g(a_1)[y^H - s_1(1+\tau)] - \varepsilon\mu_1\gamma\bar{y}[1 - g(a_1)] & \text{if } t = 1 \\ \underline{w} + \mu_2\gamma y^H & \text{if } t = 2 \end{cases} \tag{2}$$

Where $\bar{y} = \theta y^H + (1-\theta)y^L$ The equilibrium is constructed by deriving the highest wage offer that a high type employer would accept to settle in the first round of bargaining and checking that the union is better off bargaining than not (the details are in Appendix C.2). The wage premium depends on the probability that a strike is successful in the second round of bargaining, and therefore on the prior reputation of the union. The third term in the first period wage offer is a penalty that captures the difference in future profits between rejection and acceptance $\pi(\mu_1) - \mathbb{E}[\pi(\mu_2)]$. The expected future profits are larger if the employer rejects the wage offer thanks to the possibility that the union exits after a failed strike. It increases in the probability of exit ε and the expected future loss $\mu_1\gamma\bar{y}$. A larger probability of strike in the current period $g(a_1)$ reduces this difference. More profit sharing also reduces bargaining power because the employer can renege on its payment in the case of a strike, which makes rejection more appealing the higher profit sharing is. A corollary is that the tax on profit sharing lowers the wage premium too. The wage premium increases in output because the higher it is, the more the employer has to loose from a strike.

Optimal actions in the first period We need to first determine the optimal investment in strike organization by the union after a rejected wage offer in the first round of bargaining. The union maximizes the sum of its period and future payoffs as follows:

$$\max_{a_1} \underline{w} + s_1[1 - \mu_1 g(a_1)] - \frac{\kappa}{2}a_1^2 + \mu_1 g(a_1)\mathbb{E}[w_2|S] + [1 - \mu_1 g(a_1)][(1-\varepsilon)\mathbb{E}[w_2|F] + \varepsilon\underline{w}] \quad (3)$$

Where the first three terms are the expected payoff in the first period, while the remainder are the expected future wage. Note that in case of exit the worker nonetheless gets compensated with the minimum wage $\underline{w}$, which the union internalizes. The first order condition of the problem is sufficient to determine the optimal investment in strike organization, which is:

$$a_1(s_1) = \frac{\mu_1 \rho}{\kappa}(\varepsilon\gamma\theta y^H - s_1) \quad (4)$$

So given profit sharing, as long as there is an interior solution to the game (so that $s_1 \leq \varepsilon\gamma\theta y^H$), increases in all parameters lead to an increase in the investment in strikes. A larger initial reputation μ_1 increases the likelihood that the investment in strikes leads to a success and therefore to a higher wage next period. A larger proportion ρ of workers sensitive to the call of the union also increase the efficiency of the investment in strikes. A larger portion γ of employees that always strike, a higher output next period y^H and a higher probability θ that it is realized, increase the wage premium in the second period and so the return of investing in reputation in the first period. A higher exit probability ε makes success more attractive relative to a failure. Profit sharing s_1 reduces the investment in strikes by increasing the cost of a strike in the first period.

Given the optimal action of the union, the employer maximizes her objective function as follows:

$$\begin{aligned}\max_{s_1} \theta\left[y^H - s_1 - w^H\right] + (1-\theta)\left[(y^L - s_1)(1 - \mu_1 g(a_1)) - \underline{w}\right] \\ + \theta\pi_2(\mu_1) + (1-\theta)\left[\mu_1 g(a_1)\pi_2(\mu_2^S) + [1 - \mu_1 g(a_1)][(1-\varepsilon)\pi_2(\mu_2^F) + \varepsilon(\bar{y} - \underline{w})]\right]\end{aligned} \quad (5)$$

Where the top line are first period profits and the bottom line are expected second period profits. Note that $g(a_1) = \gamma + \rho a_1(s_1)$ is a function of the amount of profit sharing. The objective function is hump-shaped in s_1 so that the first order condition is sufficient to derive

the optimal amount of profit sharing:[15]

$$s_1^* = \frac{1}{2}\left[\frac{(1+\varepsilon\gamma(2+\tau))\theta y^H + (1+\varepsilon\gamma)(1-\theta)y^L}{1+\tau} - \frac{\kappa(1-\mu_1\gamma)}{\rho\mu_1^2}\right] \tag{6}$$

This closes the equilibrium of the game.

3.3 The Effects of Increases in Profit Sharing

Proposition 2. *An increase in profit sharing leads to a reduction in strike incidence and in reputation, while it increases the probability of exit of the union at the end of the first period. It reduces expected wages in both first and second periods, and provided that the union is efficient enough in motivating workers to go on strike, total compensation of workers is smaller.*

The increase in s_1 directly leads to a reduction in strike incidence as shown in equation (4) because of the increased cost to go on strike. This leads to an increase in the probability of exit and thus to fall in the expected reputation of the union in the second period.

The increase in profit sharing reduces the first period wage premium because it reduces the bargaining power of the union as explained above. The reduction in reputation in the second period leads to a reduction in the expected second period wage. Regarding total compensation, the smaller wages are compensated to some extent by an increase in the amount of profit sharing and in the likelihood that it is paid. I show in appendix C.5 that when the cost of investing in strikes κ is small, the increase in the amount of profit sharing leads to a smaller total compensation for the employee. In that case, the union is very reactive so that small changes in profit sharing lead to large adjustments in the behavior of the union, which implies that the reduction in wages outweigh the increase in profit sharing.

As a corollary, cuts in the taxation of profit sharing lead to the same effects. Besides its direct effect on the bargaining power of the union as shown by the high wage equation (2), a smaller tax directly affects only profit sharing, which the employer adjusts upwards because of its lower marginal cost. Therefore, policies aiming at promoting the usage of profit sharing can lead to reductions in the total compensation of workers. This result is important in light of the developments of political actions to push for the usage of profit sharing over the last decades in several Western countries [16]. What the model can teach is that these policies can harm workers

[15] The concavity comes from the fact that the reduction in profits due to the payment of profit sharing is compensated by a decrease in the probability of a strike.

[16] The Employee Retirement Income Security Act of 1974 developed the usage of Employee Stock Ownership

by weakening the bargaining power of unions.

3.4 The Effects of Increases in the Probability of Exit of Union

To link the model with the empirical framework I lay down here the effects of increases in the probability of exit of the union.

Proposition 3. *A higher probability of exit leads to an increase in profit sharing. Strikes and wages move in the same direction, which depends on the taxation of profit sharing. At lower levels of taxation strike incidence and wages decreases in both periods.*

With an increase in the probability of exit, the firm has an incentive to increase profit sharing for two reasons. First, conditional on the amount of profit sharing the increase in the probability of exit makes the union increase its investment in strikes. The employer anticipates that and responds by increasing profit sharing further more. Second, conditional on the behavior of the union, an increase in the probability of exit gives a better opportunity to the employer of getting rid of the union. So she has an additional incentive to increase profit sharing in order to make failure more likely. Conditional on profit sharing, the investment in strikes is strictly increasing in the probability of exit as shown in equation (4), however because of the response of the employer, the total effect is undetermined. As shown in Appendix C.6, the employer is more likely to outweigh the union when the taxation rate of profit sharing is smaller (which decreases its marginal cost). On the contrary, the adjustment of the employer may not be large enough to outweigh the union's when increasing profit sharing is more costly, and output in the high state is large (which gives a higher wage premium and an incentive for the union to invest in strikes). When the total effect on collective action of the increase in the probability of exit is negative, then the expected wage in the first period decreases because of the loss in bargaining power, while it decreases in the second period due to the loss of reputation. If strikes decrease the effect on total compensation is ambiguous because the decrease in wage is potentially compensated by the increase in profit sharing, however profits increase because of weakening of the union. In the case of an increase in strikes, wages increase in the first period, however the increase in the probability of exit and the resulting loss in expected future reputation could result in a reduction in expected future wages.

Plans in the United States, and the four PEPPER Reports between 1989 and 2009 have pushed for the Promotion of Employee Participation in Profits and Enterprise Results in the European Union.

The analysis thus yields an unambiguous result regarding the effect of increases in the probability of exit on the usage of profit sharing, however regarding strikes and compensation the outcome needs to be tested in the data.

4 Empirical Analysis

The objective of the analysis is to show evidence for the theory of the model and to give an estimation of the effect of profit sharing on compensation and unionisation. It is divided into three parts. In the first I describe the identification strategy that relies on elections of union representatives. In the second, I test the predictions of the model with regard to variations in the probability of exit. In the last one, I use election years as an instrument for profit sharing in a Two-Stage Least Squares estimation to quantify the effects of the increased usage profit sharing on wage growth and union behavior.

4.1 Identification Strategy

Identification is based on the usage of elections of union representatives as exogenous shifts of the probability of exit of unions. I compare outcomes across observations between those firms that are "treated" with elections in a given year and those that are not. The reason why elections increase the probability of exit has already been explained in Section 2.1. Only unions who earn more than 10 percent of the votes can have Union Delegates inside firms, so those that do not pass this bar virtually exit[17]. Further, only those with more than 30 percent of the votes can bargain with employers if there are no opponents with more than 50 percents of votes.[18] In firms with a single unionized candidate, unions also face a threat of exit because those that do not manage to rally a turnout of at least 50 percent have to compete against non unionized candidates in a second round.

Empirically, elections are correlated with an increase in the probability of exit of unions. Table 3 shows that years with elections are strongly correlated with changes in the composition of unions inside firms the year after (the dependent variable is a dummy that takes the value one if there has been a change in the unions present inside the firm on a yearly basis). The probability of a change increases by 40 to 50 percent after elections. This is consistent with the institutional

[17] They can still have members inside the firm but without any role.

[18] Those without a majority only have seats at Works Councils, an institution that has only a consulting role without power to influence employers.

role of elections, and confirms that elections have the effect of increasing competition between unions. Note also that strike incidence is correlated with a 10 percent smaller likelihood of a change in union composition, which suggests that strikes can help unions remain inside firms.

For elections to be a good proxy to test the predictions of the model with regard to changes in the probability of exit, their timing must be exogenous. The legal length of a term in between two elections is four years but it can be set to two or three years at the moment of the first election with a firm agreement, or based on a pre-existing one at the industry level. Changing the length of the term requires that all parties, which comprise the employer and the representatives of all unions, agree to a change. Since all of them are competing in these elections, it is very unlikely that all of their interests converge and that the timing of elections is endogenously changed due to the behavior of the employer or the representatives (Askenazy & Breda, 2019). Figure 3 shows that in practice more than 95 percent of firms respect the legal length of mandate that they declare. For a small proportion the actual length is postponed by a few months, but this is most likely because of the organization of second rounds when there are not enough candidates, or to delays in the constitution of lists of candidates that want to run.

A potential threat to exogeneity could be that employers force delegates to step down in order to organize early elections. However all representatives are protected from layoffs so that an employer cannot precipitate anticipated elections by firing representatives. Further, these are elected jointly with deputy members who would take over representation in that case, and only when more than half of all elected representatives have stepped down an early election can be called. For that same reason neither the death nor the quit of a representative would entail anticipated elections.

The most compelling threat to exogeneity is the timing of the first election. It is the year when a firm gets past the 50-employee threshold that it has to organize a Works Councils election[19], but employers can either delay this moment by adjusting the labor force, or by delaying the organization of the election. Because the estimation is based on a majority of large firms, this potential bias in unlikely to have a important incidence.[20] Another potential

[19]When a firm reaches a size of eleven employees firms have to organize elections of Personnel Delegates which are those that determine the bargaining rights of unions.

[20]Note also that it is not clear how this bias would play. Firms may want to set elections at a moment when they would not drive hostile unionization, in which case they would not have to use as much profit sharing to weaken their unions. This would bias the results towards no effect. Conversely if there are unions already present inside the firm employers would want to set the timing at the moment when the effect of profit sharing is stronger. That case would bias the estimates upward.

bias comes from the length of the term that is determined at the onset of the first election Figure 4 shows the that the length decreases with firm size. However this is mostly due to a new in legislation that increased the legal length of a term from two to four years in 2005.[21] This was mandatory for all firms that were due to organize elections for the first time, but those that already had were allowed to keep a shorter term. Larger firms being older, that certainly explains the correlation. Nonetheless I condition the exogeneity of elections on firm size and consider that conditional on firm size, the treatment is assigned at random across the population of firms. Consequently the estimated coefficients can be interpreted as the causal effects of elections on outcome variables.

The last threat to identification comes from the existence of confounding factors. Elections may not only increase the probability of exit of unions, but also affect other parameters. For example it is possible that during election years, union leaders get additional funding from their confederations for their campaigns, which they can use to reduce the cost of their collective actions. It is also possible that the workforce gets more responsive to unions because of the campaigning activity. The situations would respectively result into a decrease in the parameter κ and increases in parameters γ and ρ. However, the predictions regarding profit sharing with respect to these changes are the same as those with respect to increases in the probability of exit ε, all of them lead to increases.[22] Regarding strikes and wages, they all lead to decreases. Therefore, the prediction of the model would rather be that elections lead to reductions in strikes and wages.

To further motivate the identification strategy, I document the effect of elections on union behavior with anecdotal evidence coming from a series of monographs of unions members inside French firms conducted by Béroud et al. (2011) and Hege, Cothenet, Dufour, and Kahmann (2014). They show that elections can indeed lead to changes in union behavior in practice, like those predicted by the model. Also, since I only observe the joint outcome of profit sharing and elections in the data, I cannot test that conditional on profit sharing, elections lead to a larger investment in strikes by unions, or more generally to more aggressive unions, and that profit sharing increases because of an anticipation of that behavior.

The monographs show first, that unions internalize the competitive pressure that elections

[21] Law number 2005-882 of August 2^{nd}, 2005, amending the articles L. 423-16 and 433-12 of the French Labor Code

[22] Smaller κ and larger ρ increase the efficiency of profit sharing in reducing the probability of a successful strike. A larger γ increases the cost of a higher reputation in the second period, and so the cost of a successful strike in the first period.

put on them, and second, that they respond to it by being more aggressive either when organizing collective actions or when bargaining with employers. The link between elections and the increase in the probability of exit is confirmed by the studies, in which a majority of union representatives account for an increase in exit after elections due to the new electoral rules set in 2009. This increase in the probability of exit was internalized by unions and has put a higher competitive pressure on them. Both studies note that competition that could have existed in the past due to differences in ideologies has been exacerbated. They identify a stronger polarization between brands, which are much less willing to meet to discuss all together and exchange practices. More importantly, competition has driven an accrued aggressiveness in either bargaining or collective actions, which are the two ways for unions to "chase the votes" of workers. For example, Hege et al. (2014) describe the case of a company where the CGT union, known for its radical stance, won over worker representation by helping employees organize a strike to preserve jobs. In another firm the employees who were stepping up for election chose to run with that same brand in order to show voters that they would stand up for employees and oppose directors. Béroud et al. (2011) report that the same strategy consisting of campaigning on a message of "dissatisfaction against the employer" was used by unions that are softer as well. Union members also note the importance of communication about their action towards workers, as well as the importance of hiring representatives that are more "professional", either in terms of bargaining or organizing. In Béroud et al. (2011) an employer explains that in a negotiation he "conceded more than what he would have wanted" because the representative was a "very skilled negotiator". This competition is not only happening in firms with multiple unions, as representatives in single union firms acknowledge the potential threat from outsiders as well.

The monographs also give a few reasons why the change in union behavior should be concentrated just prior to elections. In principle organization and bargaining are costly, and it is more rational to invest closer to the election date because workers should internalise and remember the action of the union better, or simply because of turnover and that new recruits are not familiar with past actions. As reported by Hege et al. (2014), unions willing to establish themselves in a firm may use a form of collective action to gain momentum among employees. Since the institutionalization of a union inside a firm and its ability to bargain is bound to electoral results, it pays more to use that kind of strategy just before elections, otherwise the

new union may not be able to transform the momentum and may lose it.[23]

The monographs also show that employers have internalized the opportunity of getting rid of unions with the new institutional framework after 2009. Béroud et al. (2011) document that some of them have tried to motivate friendlier employees to run and that in one case where one of them won, employees reported a drop in bargaining during the eighteen months after the election. Béroud, Le Crom, and Yon (2012) also document that historically, unions have been wary of grounding the legitimacy of their representation in elections precisely because of the threat that employers manipulate elections. Other pieces of work have reported that employers resort to profit sharing precisely to disincentivise collective action and wage bargaining (Cottereau & Frinault, 2006; Giraud, 2015). In particular employers may announce the amount of profit sharing they expect to pay just before the onset of bargaining in a strategic move to put workers on their side. This is something that a union member reports in Béroud et al. (2011) as well.

To summarize, conditional on firm size, elections are a good proxy for an exogenous measure of increases in the probability of exit of unions captured by the parameter ε in the model because their timing past the first occurrence is very hard to manipulate. Additionally, anecdotal evidence suggests that unions react to the threat of exit in accordance with the model by adopting a more aggressive stance against employers.

4.2 The Effect of Elections

This subsection tests the set of predictions of the model with regard to increases in the parameter ε captured by Proposition 3. I estimate equations of the following form:

$$Y_t = \beta Elec_{j,t} + \mathbf{X}_{j,t}\gamma + \tau_t + \phi_j + \mu_{j,t} \tag{7}$$

Where $Y_{j,s}$ is an outcome variable of firm j at time $s \in t, t+1$. The variable $Elec_{j,t}$ is a measure of the percentage of workplaces having elections as defined in Section 2.2. The other variables

[23] This link between the proximity of elections and the aggressiveness of elections has been reported in a series of case studies of the SNCF, the French national railway company. Andolfatto, Dressen, and Finez (2012) analyse how competition between unions and the stakes of elections at the end of the year fueled one of the company's longest strike in 2010. Note that as Béroud, Denis, Desage, Giraud, and Pélisse (2008) also report it, the strike was driven by the competition between the two Radical unions CGT and SUD for earning the reputation of being the toughest. In 2018, the same logic prevailed for a series of strikes that lasted from January until the Summer. An internal note that leaked in the media Darmon (2018) reported how the strategy was clearly designed for an electoral objective. According to Andolfatto (2018) elections also played a role in the intensity of bargaining between unions — notably Reformist unions — and the French State.

are a vector of controls, $\mathbf{X}_{j,t}$, as well as year an firm fixed effects τ_t and ϕ_j. The error term $\mu_{j,t}$ is assumed to be uncorrelated with $Elec_{j,t}$. All variables except dummies and elections are expressed in terms of logarithms, or in log-differences for growth rates.

Outcome variables are the amount of profit sharing per employee, indicators for the payment of profit sharing and incidence of strikes, their length in terms of worker-days lost, as well as measures of compensation. These include the labor share, the profit share, and average wage growth. I decompose that last variable by occupation category to investigate heterogeneous effects across worker groups. In the case of dummy outcome variables the equation is estimated using a Logit model. Controls include the number of employees and workplaces as well as other variables that also determine the usage of profit sharing: measures of performance, productivity, and indebtedness. Performance and productivity are measured by the return on assets and the value added by worker, two variables on which the payment of profit sharing can depend. The degree of indebtedness, captured by the debt to assets ratio, can also explain the usage of profit sharing since firms may prefer compensate their workers by sharing profits rather than pay wages to conserve cash (Kim & Ouimet, 2014). Standard errors are clustered at the firm level. Table 4 shows the results of regressions of controls on elections and measures of firm size. None of the coefficient is significant, which further alleviates concerns of endogeneity regarding the election variable.

The first prediction of the model is that the increase in the probability of exit due to elections should be anticipated by an increased usage of profit sharing. The institutional framework ensures that the payment of profit sharing is made in the first three months of a given year, because firms must proceed within three months after they report their financial statements which they usually do on December 31^{st}. Thus in most cases the estimation captures the effect of elections on the anticipated payment of profit sharing. In some cases elections may still happen before the actual payment if firms do not want to adjust before their occurrence, or if they have adjusted the year before. This would potentially bias the results towards zero these firms that adjust would fall in the comparison group. However the bias is favorable if a significant effect is measured.

Table 5 displays the estimation of equation (7) on profit sharing and union variables. The results show that elections are associated with an increase in the probability of paying profit sharing at the beginning of the year of elections, but not with a significant increase in the sheer amount of profit sharing paid per employee. The size of the effect is measured by an increase

of $\exp(0.196) = 1.2$ of the odds ratio, which evaluated at the mean, corresponds to an increase in the probability of paying profit sharing by 2.9 percentage points. This result supports the prediction of the model that increases in the probability of exit increase the usage of profit sharing.

Regarding union behavior, election years are associated with significant decreases in the occurrence of strikes and in their length. The decrease in the likelihood of a strike at the mean occurrence is 2 percent, while the average strike length falls by 10 percent. Notice that the difference in the number of observations between the last two columns is due to the fact that many firms experience strikes over the whole period of observation and are dropped due to the fixed effect specification. The results are consistent with the model in a situation where the adjustment of profit sharing by the employer outweighs the incentive that elections put on unions, which happens when the taxation rate of profit sharing is low. This is likely the case in France, where profit sharing is heavily subsidized relative to wages. The latter are taxed at a rate that ranges from 47 to 62 percent while profit sharing is taxed at 20 percent at most. Considering that it is also deductible from taxable profits and that the corporate tax rate ranges from 15 to 33 percent, profit sharing is in fact taxed at most at 5 percent, and in often subject to a subsidy of 13 percent. Note that if elections were to drive a decrease in the cost of the action of the union κ, and increases in the parameters relative to the reactivity of workers γ and ρ as discussed above, the prediction would be the same.

In that situation the model also predicts that wages should fall the year of elections and the year after. While Table 6 shows no significant change in same year compensation measures, Table 7 shows significant decreases in average wage growth the year after. The right panel of the same table shows that the decrease in wage growth is concentrated on lower occupation categories that are Clerks and Laborers. The compensation of these workers is more likely to be tied to bargaining agreements reached by unions than the one of higher occupation employees, who can often negotiate additional pay rises with employers individually. That is an additional piece of evidence for the theory.

4.2.1 The Causal Effects of Profit Sharing on Union Behavior and Wage Growth

The previous results identify a plausibly causal effect of elections on the usage of profit sharing by employers. Therefore, in addition to bringing evidence for the model, the setting can be used to obtain information on the causal effect of profit sharing on union behavior and wage growth,

using elections as an instrumental variable. Here, I follow Levitt (1997) who uses elections of local representatives to estimate the effect of police on crime in the United-States. The setting does not satisfy all criteria for a Two-Stage-Least-Squares estimation because it violates the exclusion restriction, but it can give a lower bound of the effects of profit sharing. If elections were to only affect profit sharing then they would be a valid instrument for the estimation of the effects of its usage on union behavior and wage growth. However because elections also affect union behavior directly, which itself affects wage growth, the estimates from a Two Stage Least Squares estimation are biased by these indirect effects. They measure the effect of profit sharing combined with the direct effects of elections on union behavior. However, provided that the latter go in the opposite direction of the effect of profit sharing — as predicted by the model — the bias is favorable. It reduces the size of the estimates of the effect of profit sharing, which can thus be interpreted as lower bounds of the actual effects. Concretely, if we are looking for a negative effect of profit sharing on strikes and wage growth, I need to assume that the change in union behavior strictly due to the occurrence of elections does not lead to a reduction in strikes and in wage growth. The anecdotal evidence described in the previous section supports this assumption.

The specification for this analysis is an augmented version of the traditional Two Stage Least Squares estimation procedure to include a non linear first stage in the form of a Probit model. A classic Two Stage Least Squares would be a "forbidden regression" (Hausman, 2001), because the fitted values of the first stage would require very restrictive conditions to be uncorrelated with the error term in the second stage. Therefore, to estimate the model I use a method developed by Wooldridge (2001) and used by R. Adams, Almeida, and Ferreira (2009) that consists of a three stage estimation. The first stage is a Probit of the following form:

$$PS_{j,t} = \lambda_1 Elec_{j,t} + \mathbf{X}_{j,t}\delta_1 + \tau_t + \iota_i + \rho_r + \xi_{j,t} \tag{8}$$

It estimates the effect of elections on the payment of profit sharing, where ι_i and ρ_r are industry and region fixed effects[24]. Table 8 reports the results from the first stage regression. The estimate gives an F-statistic of 11, which is acceptable but does not completely alleviate concern about weak instruments.

The second stage of the procedure is different from the classic Two Stage Least Squares and

[24]The specification with firm fixed effects drops too many observations and does not have enough power to run a Two Stage Least Squares estimation (F-statistic close to 4).

consists of an OLS regression of profit sharing on the fitted values from the first stage with the same controls:

$$PS_{j,t} = \lambda_2 \tilde{PS}_{j,t} + \mathbf{X}_{j,t}\delta_2 + \tau_t + \iota_i + \rho_r + \nu_{j,t} \tag{9}$$

Where $\tilde{PS}_{j,t}$ are the fitted values from the first stage Probit. The last stage is the same as the usual second stage of the classic Two Stage Least Squares procedure:

$$Y_{j,s} = \beta \hat{PS}_{j,t} + \mathbf{X}_{j,t}\gamma + \tau_t + \iota_i + \rho_r + \mu_{j,t} \tag{10}$$

Where $\hat{PS}_{j,t}$ are the fitted values from equation (9), where $s \in \{t, t+1\}$ depending on the specification. Table 9 displays the results on outcomes related to union behavior the year of elections and the year after: strike incidence, strike length, the occurrence of bargaining, the number of agreements, and the existence of a wage agreement. The estimates on strikes are all negative but significant only for strike length the year of elections. The size of the estimate is very large which is potentially the symptom of a weak instrument. Regarding bargaining outcomes, there is no significant change in the occurrence of a negotiation both years (which is consistent with the institutional framework which mandates that bargaining takes place every year), however there are significant decreases in the number of agreements and in the probability that parties conclude a wage agreement. Table 10 shows the results for the effects on wage growth. Profit sharing has no significant effect on wage growth the year of elections but induces a reduction by 13 percent on average the year after. The effect is larger for lower occupation workers who incur decreases by 22 percent for Intermediate Occupations, by 30 percent for Clerks, and by 42 percent for Laborers. The wage growth of white collars is unaffected.

Taken all together, the results suggest that profit sharing indeed causes a reduction of wage growth by weakening unions. That is supported by the smaller probability that parties conclude a wage agreement and by the fact that the effect is concentrated on lower occupation workers. As mentioned above, in many firms, white collars have the possibility to negotiate pay rises individually with employers during their annual review, while the wage growth of lower occupation workers is more likely to be only dictated by wage agreements bargained by unions. The results also suggest that profit sharing not only reduces wage growth, but also increase labor income inequality because lower occupation employees are also those with lower wages on average.

Because elections can lead to changes in the composition of unions, it is possible that employers also use profit sharing to affect the outcome of elections. This can be particularly alluring if they can replace Radical Union Delegates with friendlier ones. It is possible that before elections, unions that are closer to employers take credit for the payment of large profit sharing payments and thanks to that, obtain the votes of marginal voters. This hypothesis can be tested by reproducing the analysis with controls for the aggressiveness of unions through their strike behavior.[25] Implicitly, the assumption made here is that there is no other channel for the effect of profit sharing than these two. I thus estimate the effects of profit sharing through its impact on the outcome of elections by adding controls for strike incidence in the specification of equations (8) to (10). If these variables fully capture the effect that elections have on the increase in the aggressiveness of unions then the specification estimates the effects of profit sharing through its incidence on the results of elections.

Tables 11 and 12 display the results on the same set of outcomes as the analysis without conditioning on strikes. First, Table 11 shows that the estimates of the effect on union behavior are no longer significant, and smaller in absolute value, which means that part of the effect is due to the decrease in the aggressiveness of unions the year of elections and could be the result of a loss of reputation. Second, Table 12 shows that the effects on next period compensation are in the same range as the previous estimates and still significant. That suggests that the negative effect of profit sharing on wages mostly comes through its effect on the composition of unions inside firms. To further investigate that, I reproduce the analysis on dummies for the type of unions present inside firms. I divide them into three groups: Radical unions only, Reformist unions only, a mix of both. The results presented in Table 13 show that the payment of profit sharing leads to a shift from Radical to Reformist unions inside firms. In election years, there is a decrease in the probability that firms have Radical unions only and an increase in the probability of mixed structures. The year after, there is a higher probability that firms have Reformist unions only. Taken all together the results suggest that the negative effect of profit sharing both comes from its impact on the behavior of unions, and from its impact on the composition of unions. The former could be interpreted as an effect on the intensive margin, while the latter as an effect on the extensive margin.

[25] The same way Levitt (1997) controls for effects of elections on crime through increased spending on education or other public policies.

4.3 Discussion

The empirical analysis brings evidence for the fact that firms use profit sharing at their advantage against unions, and that it is detrimental for workers in terms of wage growth. However, what are the effects on balance? The results can be used for a simple back-of-the-envelope computation exercise to give a suggestive answer to this question. The idea is to compare the gains from the payment of profit sharing against the wage losses for all four different skill categories of employees over a four-year electoral cycle. I assume that the effect on wage growth is set to last for that period. In the base scenario, the representative firm for this exercise pays a profit sharing to its workers the year of elections, which results in a reduction in wage growth over the four following years equal to the amounts reported in Table 10. The amount of profit sharing paid is computed using the average share of the wage it represents for each occupation category as displayed in Figure 2. In the counterfactual scenario, the firm does not pay profit sharing the year of elections, and wages grow at 2.6 percent, the average growth rate in the database. Note that this number is lower than the amounts that would be needed for this exercise if firms in the sample resort to profit sharing for the purpose of reducing wage growth. I compute the discounted value of the total compensation of workers with a one percent interest rate for both scenarios and compare the amounts. Table 14 displays the results across skills categories. On balance Laborers and Clerks are worse off, losing on average 826 and 189 euros respectively, while Intermediate Occupations and mostly White Collar workers are better off, with gains of 656 and 2,985 euros respectively. These numbers have to be taken with caution as they rely on strong assumptions about wage growth and the amounts of profit sharing paid, but they give an idea of the order of magnitude of the effect of profit sharing. They could also be undervalued, if the estimates of the effect of profit sharing are indeed lower bounds and because they do not account for any long run spillover effects relative to the decline of the reputation of unions.

The results open room for policy recommendations, which come in light of an increasing interest regarding income inequality and the fall of the labor share, both by academics and policy makers. The model suggests that profit sharing taxation is leeway that policy makers could use to prevent the adverse usage of profit sharing against unions. As mentioned above, profit sharing is very lightly weighted or even virtually subsidized in France. Policy makers have thus considerable leeway to affect profit sharing through taxation. However the optimal level of taxation is beyond the scope of this paper notably because benefits on productivity and output are absent from the analysis. The paper suggests that the negative effect of profit sharing is also

due to its discretionary usage. French policy makers could partially alleviate the detrimental effects of profit sharing by better tying its payment to strict performance, and ensuring better compliance with regulatory requirements. Another suggestion worth considering would be to mandate firms to allocate part of the profit sharing payments to unions in order to compensate them for its potential harmful effects.

5 Conclusion

The analysis of this paper brings theoretical and empirical evidence that the usage of profit sharing can weaken unions, dampen wage growth and increase labor income inequality. More data is needed in order to better estimate the long run effects of profit sharing on union reputation and welfare, but the results open room for a discussion on policy intervention in particular regarding the optimal taxation of profit sharing. The empirical exercise being done with French data, a natural questions is whether it extends to other countries and institutional frameworks. The model developed here relies on mechanisms that are not specific to French institutions and establish a general theoretical framework. The main condition for profit sharing to have a detrimental effect on unions and wages is that unions use disruptions of output as threats to assert their bargaining power. Strikes are usually thought to be more common in France than elsewhere, but over the period 2008-2016 their incidence has been comparable in Denmark, and other countries like Canada, Belgium, Spain, and Norway are closely behind (Dribbusch, 2019). In countries without a history of strikes in recent decades like the United States, the situation could actually be in part the result of the pervasive usage of profit sharing. Additionally, the fact that unions have been historically opposed to profit sharing in the United Stated (Doucouliagos, Laroche, Kruse, & Stanley, 2020) and in other countries as well (Reilly, Cummings, & Bevan, 2001), further suggests that the contribution of this article is not specific to France.

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6 Tables

Table 1: Regressions of Usage of Profit Sharing on Union presence

	(1)	(2)	(3)
VARIABLES	Profit Sharing Plan		
Union	0.269***	0.117***	0.109***
	(0.00669)	(0.00778)	(0.00775)
Number of Employees		0.0774***	0.0940***
		(0.00219)	(0.00274)
Number of Workplaces			-0.0237***
			(0.00201)
Return on Assets			0.0653***
			(0.0167)
VA per Worker			0.0665***
			(0.00347)
Debt to Assets			-0.0910***
			(0.0161)
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Observations	19,490	19,490	15,953
R-squared	0.219	0.266	0.230

Notes: The table reports linear regression of the usage of profit sharing on measures of union presence inside firms. Non dummy variables are logged. Standard errors (in parentheses) are clustered at the firm level. *** p<0.01, ** p<0.05, * p<0.1

Table 2: Regression of Strike Incidence and Strike Length on the Usage of Profit Sharing

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Strike Incidence			Strike Length		
Profit Sharing Plan	0.0372***	-0.0840***	-0.0561***	0.188***	-0.519***	-0.403***
	(0.00773)	(0.00787)	(0.0404)	(0.0407)	(0.0483)	(0.0382)
Number of Employees		0.0948***	0.0651***		0.553***	0.462***
		(0.00215)	(0.00364)		(0.0112)	(0.0191)
Number of Workplaces			-0.0167***			-0.0918***
			(0.00234)			(0.0123)
Return on Assets			-0.0137			-0.108
			(0.0193)			(0.101)
VA per Worker			0.000911			0.0625***
			(0.00400)			(0.0209)
Debt to Assets			-0.0175			-0.166*
			(0.0186)			(0.0974)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	19,490	19,490	15,953	19,333	19,333	15,820
R-squared	0.066	0.150	0.194	0.085	0.188	0.227

Notes: Firm controls include return on assets, value added per worker, debt to assets, number of workplaces, number of unions, and dummies for union brand. Non dummy variables are logged. Standard errors (in parentheses) are clustered at the firm level. *** p<0.01, ** p<0.05, * p<0.1

Table 3: Regressions of the Change in Union Composition on Elections

	(1)	(2)	(3)	(4)
VARIABLES	Change in Union Composition			
Elections	0.468***	0.397***	0.3967***	0.462***
	(0.0799)	(0.0677)	(0.0677)	(0.0788)
Strike		-0.0794**	-0.0789**	-0.105**
		(0.0371)	(0.0371)	(0.0427)
Number of Employees			-0.0527	-0.0888
			(0.0844)	(0.101)
Return on Assets				0.100
				(0.278)
VA per Worker				-0.0515
				(0.0613)
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Observations	3,561	3,561	3,561	3,561
Number of Firms	820	820	820	820

Notes: The table reports linear regressions of the change of the composition of unions inside the firm measured as a dummy variable, on the occurrence of elections. Non dummy variables are logged. Standard errors (in parentheses) are clustered at the firm level. *** p<0.01, ** p<0.05, * p<0.1

Table 4: Regression of Control Variables on Elections

	(1)	(2)	(3)
VARIABLES	Return on Assets	VA per Worker	Debt to Assets
Election	-0.000663	-0.00929	-0.000155
	(0.00202)	(0.0137)	(0.00231)
Number of Employees	0.00399***	0.0137*	0.000458
	(0.00133)	(0.00713)	(0.00157)
Number of Workplaces	-0.00492***	-0.0228***	-0.00383***
	(0.000965)	(0.00517)	(0.00114)
Year FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Observations	13,772	13,689	13,791
R-squared	0.018	0.196	0.134

Notes: The table reports linear regressions of control variables on the occurrence of elections. Excluding Election, variables are logged. Standard errors (in parentheses) are clustered at the firm level. *** p<0.01, ** p<0.05, * p<0.1

Table 5: Regressions of Profit Sharing and Strike Variables on Elections

	(1)	(2)	(3)	(4)
VARIABLES	Profit Sharing	PS per Employee	Strike	Strike Length
Election	0.196**	0.0091	-0.141*	-0.0998**
	(0.0961)	(0.0246)	(0.0802)	(0.0428)
Number of Employees	1.286***	0.0843***	1.283***	0.412***
	(0.373)	(0.0132)	(0.304)	(0.127)
Number of Workplaces	-0.194	-0.0929***	-0.000110	-0.000361
	(0.262)	(0.0091)	(0.206)	(0.0948)
Return on Assets	0.00552	0.0639***	0.348	0.112
	(0.870)	(0.0982)	(0.507)	(0.310)
VA per Worker	0.265*	0.765***	-0.165	0.0327
	(0.157)	(0.0178)	(0.139)	(0.0723)
Debt to Assets	-1.033	-0.543***	0.215	0.402
	(0.975)	(0.0802)	(0.664)	(0.387)
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Observations	2,469	2,469	4,169	13,534
Number of Firms	597	597	922	5,954
R-squared	-	0.672	-	0.612

Notes: The table reports Logit regressions of the payment of profit sharing plans and the incidence of strikes on the occurrence of elections and controls, as well as linear regressions of the amount of profit sharing per employee and strike length on the same regressors. Non dummy variables are logged. Standard errors (in parentheses) are clustered at the firm level. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 6: Regressions of Same Year Compensation Variables on Elections

	(1)	(2)	(3)	(4)	(5)
		Wage Growth by Occupation Group			
VARIABLES	Wage Growth	White Collar	Intermediate	Clerk	Laborer
Election	0.00107	0.000813	0.00153	0.00312	0.00737
	(0.00198)	(0.00292)	(0.00343)	(0.00437)	(0.00696)
Number of Employees	-0.0761***	-0.0981***	-0.0310***	0.00241	0.0123
	(0.00561)	(0.00931)	(0.00972)	(0.0124)	(0.0213)
Return on Assets	0.0241**	0.0200	0.0190	0.0181	-0.0374
	(0.0114)	(0.0168)	(0.0197)	(0.0253)	(0.0401)
VA per Worker	-0.00498**	-0.0102***	-0.00215	-0.0105**	-0.00704
	(0.00239)	(0.00364)	(0.00413)	(0.00527)	(0.00850)
Debt to Assets	0.00445	-0.000219	0.0178	0.0471	-0.0358
	(0.0183)	(0.0268)	(0.0316)	(0.0404)	(0.0651)
Year FE	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Observations	11,702	11,471	11,491	11,625	10,729
R-squared	0.040	0.036	0.005	0.008	0.009
Number of Firms	5,429	5,259	5,280	5,373	4,891

Notes: The table reports linear regressions of compensation variables on the occurrence of elections and controls the same year. All variables except dummies are constructed as first differences of their logs. Occupation categories are defined according the French PCS classification. Standard errors (in parentheses) are clustered at the firm level. *** p<0.01, ** p<0.05, * p<0.1

Table 7: Regressions of Future Compensation Variables on Elections

	(1)	(2)	(3)	(4)	(5)
		Wage Growth by Occupation Group			
VARIABLES	Wage Growth	White Collar	Intermediate	Clerk	Laborer
Election	-0.00587**	-0.00232	-0.00522	-0.0122**	-0.0147*
	(0.00231)	(0.00335)	(0.00388)	(0.00496)	(0.00779)
Number of Employees	0.0148**	0.0634***	-0.000632	-0.0225	-0.0105
	(0.00700)	(0.0111)	(0.0117)	(0.0150)	(0.0231)
Return on Assets	0.0185	0.0282	0.0453*	-0.0145	0.0620
	(0.0155)	(0.0224)	(0.0260)	(0.0333)	(0.0528)
VA per Worker	0.00333	0.00665	-0.000510	-0.00411	0.0144
	(0.00323)	(0.00467)	(0.00541)	(0.00693)	(0.0106)
Debt to Assets	0.0710***	0.0550	0.0571	0.0701	0.113
	(0.0262)	(0.0380)	(0.0439)	(0.0565)	(0.0892)
Year FE	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Observations	6,564	6,510	6,516	6,544	6,190
R-squared	0.013	0.024	0.003	0.008	0.010
Number of Firms	2,242	2,218	2,219	2,235	2,117

Notes: The table reports linear regressions of next year compensation variables on the occurrence of elections and controls the same year. All variables except dummies are constructed as first differences of their logs. Occupation categories are defined according the French PCS classification. Standard errors (in parentheses) are clustered at the firm level. *** p<0.01, ** p<0.05, * p<0.1

Table 8: Regressions of Profit Sharing on Elections with Different Fixed Effects

	(1)	(2)
VARIABLES	Profit Sharing Payment	
Election	0.162***	0.196**
	(0.0616)	(0.0961)
Controls	Yes	Yes
Year FE	Yes	Yes
Region FE	Yes	No
Industry FE	Yes	No
Firm FE	No	Yes
Observations	11,688	2,469

Notes: Standard errors (in parentheses) are clustered at the firm level. The table reports logit regressions of the payment of profit sharing on the occurrence of elections, the year of elections. Controls include Number of employees, Return on Assets, Value Added per Worker, Number of Workplaces and Debt to Assets. *** p<0.01, ** p<0.05, * p<0.1

Table 9: IV Regressions of Union Outcomes on Profit Sharing - Unconditional

	(1)	(2)	(3)	(4)	(5)
VARIABLES	Strike	Length	Bargaining	Agreement	Wage Agreement
Election Year					
Profit Sharing	-0.249	-1.419**	-0.667	-0.664*	-0.668*
	(0.443)	(0.614)	(0.449)	(0.391)	(0.352)
Observations	11,967	11,741	11,920	11,967	11,964
Year After					
Profit Sharing	0.927	-0.640	-0.418	-0.817*	-0.934*
	(0.594)	(0.890)	(0.735)	(0.469)	(0.543)
Observations	5,861	5,719	5,733	5,861	5,864

Notes: The table reports the last stage IV specification of the effect of profit sharing on union variables. Controls include Number of employees, Return on Assets, Value Added per Worker, Number of Workplaces and Debt to Assets. Non dummy variables are logged. Standard errors (in parentheses) are clustered at the firm level. *** p<0.01, ** p<0.05, * p<0.1

Table 10: IV Regressions of Same Period and Future Compensation Outcomes on Profit Sharing - Unconditional

	(1)	(2)	(3)	(4)	(5)
		Wage Growth by Occupation Group			
VARIABLES	Wage	White Collar	Intermediate	Clerk	Laborer
Election Year					
Profit Sharing	0.108	0.184	0.176	0.0862	0.421
	(0.0977)	(0.138)	(0.161)	(0.161)	(0.316)
Observations	10,227	10,087	10,089	10,175	9,480
Year After					
Profit Sharing	-0.127*	-0.0317	-0.223*	-0.297**	-0.424*
	(0.0661)	(0.0836)	(0.115)	(0.146)	(0.229)
Observations	5,904	5,860	5,863	5,887	5,596

Notes: The table reports the last stage IV specification of the effect of profit sharing on same year and future compensation variables. Controls include Number of employees, Return on Assets, Value Added per Worker, Number of Workplaces and Debt to Assets. Non dummy variables are logged. Standard errors (in parentheses) are clustered at the firm level. *** p<0.01, ** p<0.05, * p<0.1

Table 11: IV Regressions of Same Year and Future Union Variables on Profit Sharing - Conditional on Strike Incidence

	(1)	(2)	(3)	(4)	(5)
VARIABLES	Strike	Length	Bargaining	Agreement	Wage Agreement
Election Year					
Profit Sharing	-	-	0.382	-0.209	-0.623
	-	-	(0.539)	(0.457)	(0.381)
Strike	-	-	0.0837*	0.00143	-0.0981***
	-	-	(0.0505)	(0.0365)	(0.0300)
Observations	-	-	11,822	11,861	11,858
Year After					
Profit Sharing	0.534	-0.777	0.327	-0.794	-0.734
	(0.669)	(0.803)	(0.852)	(0.604)	(0.498)
Strike	1.126***	2.397***	0.0199	0.0179	-0.108***
	(0.0777)	(0.0621)	(0.0769)	(0.0496)	(0.0415))
Observations	5,790	5,652	5,662	5,793	5,790

Notes: The table reports the last stage IV specification of the effect of profit sharing on same and next year union variables. Controls include Number of employees, Return on Assets, Value Added per Worker, Number of Workplaces and Debt to Assets as well as Strike Incidence. Non dummy variables are logged. Standard errors (in parentheses) are clustered at the firm level. *** p<0.01, ** p<0.05, * p<0.1

Table 12: IV Regressions of Compensation Outcomes on Profit Sharing - Conditional on Strike Incidence

	(1)	(2)	(3)	(4)	(5)
		Wage Growth by Occupation Group			
VARIABLES	Wage	White Collar	Intermediate	Clerk	Laborer
Election Year					
Profit Sharing	0.311	0.181	0.482	0.499	0.529
	(0.260)	(0.225)	(0.343)	(0.446)	(0.763)
Strike	0.00152	8.19e-05	-0.00193	-0.00436	-0.00200
	(0.00414)	(0.00421)	(0.00642)	(0.00684)	(0.00956)
Observations	6,539	6,490	6,487	6,519	6,153
Year After					
Profit Sharing	-0.123	-0.0186	-0.416**	-0.516**	-0.720*
	(0.0829)	(0.0925)	(0.198)	(0.257)	(0.384)
Strike	0.00231	0.00458	0.00624	0.00974	0.00247
	(0.00296)	(0.00346)	(0.00718)	(0.00904)	(0.0134)
	(0.0130)	(0.0150)	(0.0301)	(0.0397)	(0.0604)
Observations	4,142	4,116	4,117	4,129	3,920

Notes: The table reports the last stage IV specification of the effect of profit sharing on same year and future compensation variables. Controls include Number of employees, Return on Assets, Value Added per Worker, Number of Workplaces and Debt to Assets, as well as Strike Incidence. Non dummy variables are logged. Standard errors (in parentheses) are clustered at the firm level. *** p<0.01, ** p<0.05, * p<0.1

Table 13: IV Regressions of Union Types on Profit Sharing - Conditional on Strike Incidence

	(1)	(2)	(3)
VARIABLES	Reformist Only	Radical Only	Mix of Both
Election Year			
Profit Sharing	-0.146	-0.942**	1.039**
	(0.693)	(0.385)	(0.479)
Strike	-0.492***	0.141***	0.401***
	(0.0655)	(0.0346)	(0.0518)
Observations	10,889	10,936	10,936
Year After			
Profit Sharing	1.503**	-0.388	-0.921
	(0.622)	(0.643)	(0.642)
Strike	-0.375***	0.133***	0.425***
	(0.0975)	(0.0458)	(0.0642)
Observations	5,940	5,980	5,980

Notes: The table reports the last stage IV specification of the effect of profit sharing on same year and future Union Types. "Reformist Only" and "Radical Only" variables are dummies that take the value one when only Reformist or only Radical unions are present inside the firm respectively. "Mix of Both" is a dummy that takes the value one when both type of unions are present inside the firm. Controls include Number of employees, Return on Assets, Value Added per Worker, Number of Workplaces and Debt to Assets, as well as Strike Incidence. Non dummy variables are logged. Standard errors (in parentheses) are clustered at the firm level. *** p<0.01, ** p<0.05, * p<0.1

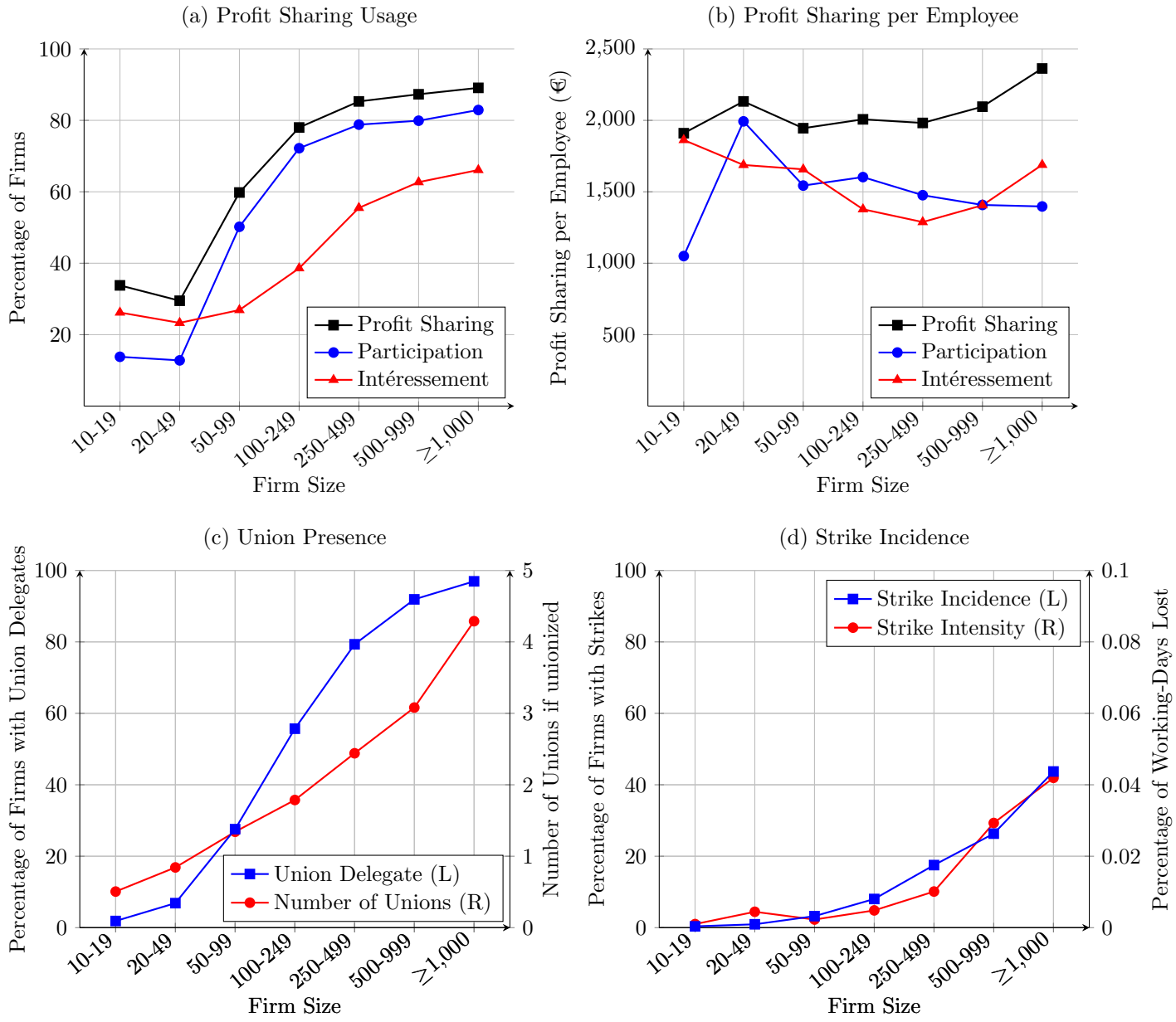
Table 14: Estimation of the Effect of the Usage of Profit Sharing on Total Compensation over Four Years Under Actual and Counterfactual Scenarios

		Actual Scenario			Counterfactual		Difference
	Yearly Wage	Profit Sharing	Wage Growth	Tot Comp	Wage Growth	Tot Comp	
White Collar	39,415	3,350	0.025	171,270	0.026	168,284	2,985
Intermediate	32,499	2,762	0.020	139,412	0.026	138,756	656
Clerk	16,940	1,271	0.018	72,137	0.026	72,326	-189
Laborer	14,714	1,099	0.015	66,266	0.026	67,092	-826

Notes: The Actual Scenario consists of firms paying profit sharing the year of elections, and wages growing at the reduced rates estimated by the analysis. In the counterfactual, firms don't pay profit sharing and wages growth at the constant average rate that I observe in the data of 2.6 percent. Total compensation is computed as the sum over four years discounted at a rate of 1 percent.

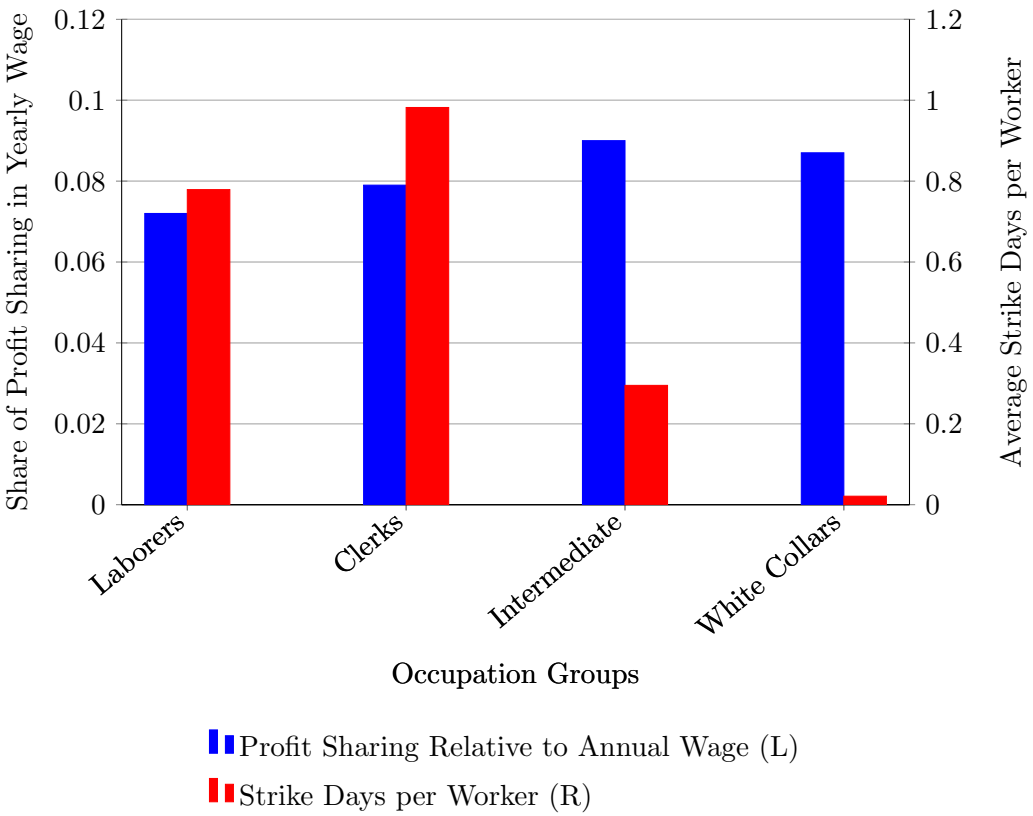
7 Figures

Figure 1: Profit Sharing and Unionization by Firm Size



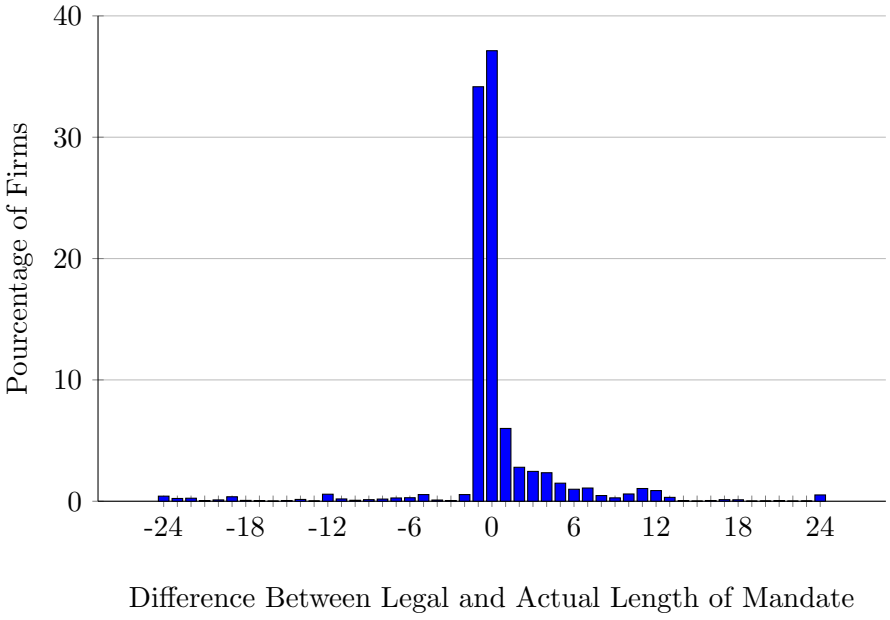
Note: Panels (a) and (b) have been computed with the PIPA database over 2009-2015 using the weights of the survey and are representative of the French private sector excluding agriculture. Panel (a) reports the percentage of firms that resort to the different types of profit sharing plans, by categories of size measured by the number of employees. "Profit Sharing" denotes the usage of at least one plan between Participation and Intéressement. Panel (b) reports the average amount of profit sharing paid per employee by size category in 2015 euros, conditional on it being paid. Panels (c) and (d) have been computed with the DSE database over 2009-2015 using weights and representative of the private sector excluding agriculture as well. The number of unions in panel (c) is conditional on the presence of a union. In panel (d) strike intensity is computed as the average percentage of working-days lost lost relative to the maximum legal annual working days that employees of a given firm can work.

Figure 2: Profit Sharing and Strikes by Occupation Groups



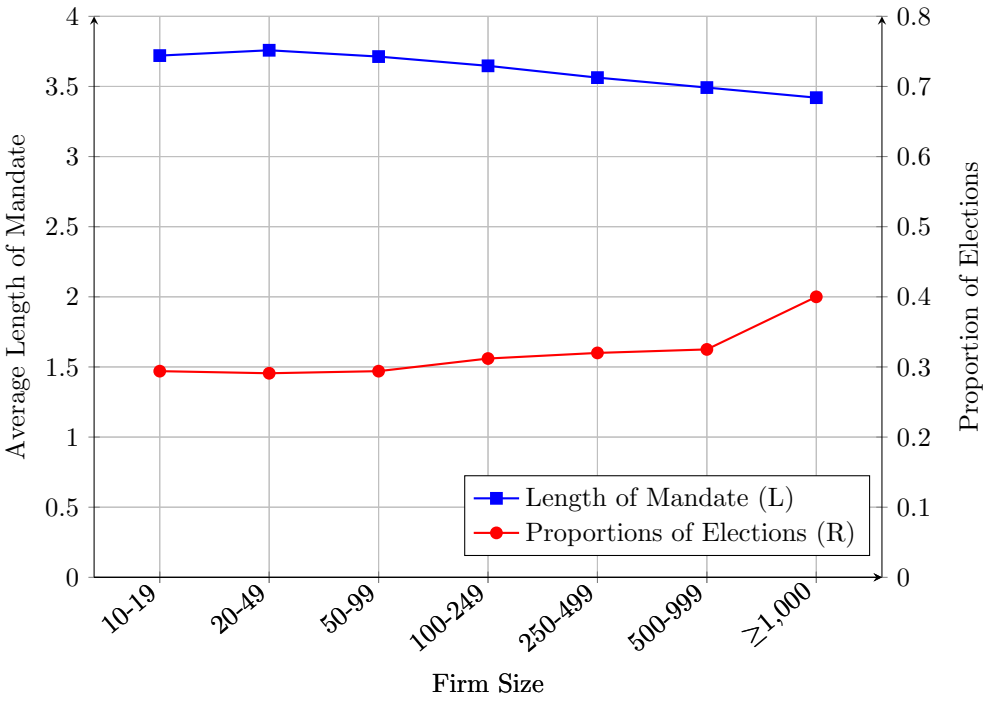
Notes: Workers are split into occupation categories according to the official French PCS classification defined by the The French National Institute of Statistics and Economic Studies (INSEE). The Left Hand Side axis measures the average number of days workers went on strike in a given year. The Right Hand Side axis measures the proportion that profit sharing represents in their yearly wages after tax. These statistics have been computed from the ECMOSS database over the years 2009 and 2010.

Figure 3: Distribution of the Difference Between Legal and Actual Length of Mandate



Notes: The reported mandate is the one reported to the administration with the results of the elections. The actual one is the mandate computed based on the actual duration between the election and the following one. The histogram is truncated so that bars at both ends regroup the percentage of firms beyond these limits.

Figure 4: Elections and Length of Mandate by Firm Size



Notes: The average mandate computed using the mandate reported by employers to the administration in MARS database. The proportion of elections is the average proportion of workplaces that hold elections in a given firm.

Appendix A Data

A.1 Administrative Sources

Ministry of Labor Surveys on Profit Sharing (PIPA) PIPA (*Participation, intéressement, plans d'épargne et actionnariat* is an annual survey lead by the DARES, the Statistical Office of the French Ministry of Labor, available from 2000 until 2014. It covers a sample of 18,000 French companies with more than 10 employees operating in the private sector excluding agriculture, and is representative of about 13 million employees out of the 24 million that constitute the French economy as of 2014. All firms with more than 250 employees are interviewed every year, while a quarter of the rest of the sample is renewed yearly.

Ministry of Labor Surveys on Industrial Relations inside Frims (DSE) DSE (*Dialogue social en entreprise* standing for "Labor relations inside firms") are yearly surveys available over the period 2006-2015, by the DARES of about 11,000 firms with more than 10 employees of the private sector excluding agriculture. All firms with more than 500 employees are interviewed every year, while as with PIPA the remainder is renewed by quarter yearly.

Worker social security records (DADS) The DADS (*Déclaration annuelle de données sociales*[26]) is a data set widely used by economists. Every year employers are mandated to report a set of information regarding all their employees in each of their establishments such as the type of their job, their compensation, working duration, gender, age, occupation category. The data set is exhaustive of all French employees officially employed in a firm. In contains information on wages and number of employees inside firms.

Balance Sheet and Income Statements (FARE) Every year for-profit firms outside of the financial and agricultural industries have to report their financial statements to the French Ministry of Finance, which constitutes the basis of the FARE data base (*Fichers approchés des résultats d'Esane* standing for Financial statement Files from Esane, itself standing for Elaboration of Annual Firm Statistics). The data are complemented with two surveys covering about 160,000 firms. In total there are between 3,5 and 4 million firm-level observations every year. The data contains information on both balance sheets and Income statements.

[26] Annual declaration of social records

Records of Elections of Union Representatives (MARS) MARS (*Mesure d'Audience et de la Représentativité Syndicale* standing for Measure of the Audience and Representativeness of Unions) consists of the election records of all workplaces that have complied with the administrative mandate to report results between 2009 and 2016. The data is available online at https://www.data.gouv.fr but the results of elections are censored.

Compensation Structure of Employees (ECMOSS) The ECMOSS database (*Enquête coût de la main d'oeuvre et structure des salaires* standing for Survey on the Cost of the Labor Force and the Structure of Wges) are two surveys in 2009 and 2010 of a subset of 125,000 employees of a sample of 15,000 workplaces. Besides containing information on wages, profit sharing compensation, it also reports whether employees have participated to strikes and for how long.

A.2 Construction of the Sample of Analysis and Variables

I start by aggregating the MARS data by computing within each firm-year the proportion of workplaces with either Works Council elections, or elections of Personnel Delegates for firms without Works Councils and with fewer than 50 employees. Note that for some firms the two institutions are joined into a single one called Unique Personnel Delegation (*Délégation Unique du Personnel)*. I merge the collapsed data with the four other databases PIPA, DSE, DADS, and FARE on year and firm identifiers. The time span is limited to 2009 to 2015 because of the MARS data but also because prior to 2009 the results of elections did not affect the presence of unions inside firms. The structure of the final sample is summarized in the following table:

Table 15: Description of the Sample of Analysis

Number of observations	19,336
Time span	2009—2015
Number of Firms	11,074
Average length of observations per firm	1.7
Average number of firms per year	2,762
Average length conditional on recurrent observations	2.4
Number of single year observations	5,290
Number of firms with multiple observations	5,784
Number of firms observed over the whole period	974

Construction of Variables I report here how I constructed the variables that are not explained in the main text. The number of employees is the average yearly number of employees reported in the DADS. Return on assets is computed as accounting profits divided by the value of assets reported in the balance sheet. Debt to assets consists of the amount of all type of borrowing divided by the value of assets.

Regarding union group variables, the DSE survey allows to identify more than 99.3 percent of union brands in the sample. Radical unions consist of the CGT (*Confédération générale du travail* standing for General Confederation of Labour), Sud (*Solidaires Unitaires Démocratiques* standing for Solidary Unitary and Democratic), and FO (*Force Ouvrière* standing for Workers' Force), which are historically affiliated to class warfare ideology and known for their radical stance. CFDT (*Confédération française démocratique du travail* standing for French Democratic Confederation of Labour), CFTC (*Confédération française des travailleurs chrétiens* standing for French Confederation of Christian Workers), CFE-CGC (*Confédération française de l'encadrement - Confédération générale des cadres* standing for French Confederation of Management – General Confederation of Executives), UNSA (*Union nationale des syndicats autonomes* standing for National Union of Autonomous Trade Unions), CAT (*Confédération autonome du travail* standing for Autonomous Labor Confederation), and SNB (*Syndicat National des Banques* standing for National Trade Union of Banks) are classified as Reformist unions. Their ideology comes from the Christian social doctrine and are known to be softer to employers.

Occupation categories are divided according to the first level of the French PCS classification (*Nomenclatures des professions et catégories socioprofessionnelles* standing for Classification of Socio-Professional Categories). Laborers (category 6) include base workers in manufacturing, construction workers, craftsmen, and occupations such as janitors, cooks, drivers or dockers. Clerks (category 5) is a diverse category including administrative workers in companies, civil servants, post office employees, policemen, firemen, sales personnel, hotel workers. Intermediate Occupations (category 4) bridge the gap between Clerks and White Collars. They include specialized technicians such as designers, topographers, laboratory assistants, sales managers, school teachers, nurses, translators, photographers. White Collars correspond to category 3 which includes scientific occupations such as engineers, consultants, managers, and employees with "important responsibilities inside firms". They do not include Executives (category 2), whom I do not include in the analysis. Same for workers in agriculture (category 1) who are

excluded from the surveys.

Appendix B Summary Statistics

Table 16: Summary Statistics of the Merged Database — Profit Sharing

	Firm Size			
	11-49	50-99	100-9,999	Total
Profit Sharing Plan	0.244	0.599	0.870	0.821
	(0.012)	(0.019)	(0.003)	(0.003)
	[1,231]	[699]	[17,556]	[19,486]
Payment When There Is a plan	0.757	0.718	0.824	0.820
	(0.025)	(0.022)	(0.003)	(0.003)
	[300]	[419]	[15,272]	[15,991]
Proportion of Profit Sharing in Wage	0.134	0.060	0.057	0.059
	(0.032)	(0.004)	(0.000)	(0.001)
	[229]	[304]	[12,645]	[13,178]
Profit Sharing per Employee	5,915	2,827	2,394	2,466
	(1,452)	(264)	(23)	(34)
	[229]	[304]	[12,645]	[13,178]

Notes: Standard errors in parentheses and number of observation in brackets.

Table 17: Summary Statistics of the Merged Database — Unions

	Firm Size			
	11-49	50-99	100-9,999	Total
Union	0.122	0.391	0.903	0.835
	(0.009)	(0.018)	(0.002)	(0.003)
	[1,231]	[699]	[17,556]	[19,486]
Conditional on Having a Union				
Number of Unions	1.907	1.777	3.387	3.346
	(0.113)	(0.070)	(0.012)	(0.012)
	[150]	[273]	[15,850]	[16,273]
Radical	0.173	0.185	0.041	0.044
	(0.035)	(0.026)	(0.002)	(0.002)
	[1,231]	[699]	[17,556]	[19,486]
Mixed Structure	0.316	0.310	0.736	0.726
	(0.047)	(0.033)	(0.004)	(0.004)
	[1,231]	[699]	[17,556]	[19,486]
Reformist	0.511	0.505	0.223	0.230
	(0.059)	(0.041)	(0.003)	(0.003)
	[1,231]	[699]	[17,556]	[19,486]
Strike	0.047	0.059	0.229	0.224
	(0.018)	(0.015)	(0.003)	(0.003)
	[1,231]	[699]	[17,556]	[19,486]
Conditional on a Strike				
Strike Length (Days)	43	27	819	817
	(29)	(13)	(174)	(173)
	[1,229]	[699]	[17,408]	[19,336]

Notes: Standard errors in parentheses and number of observation in brackets.

Appendix C Model

C.1 Assumptions

I assume the following regarding the parameter κ to ensure that the model has an interior solution for a_1^* and s_1^*. If $\mu_1 < 1/(2-\gamma)$:

$$\frac{\mu_1^2\rho^2(y^L+\varepsilon\gamma y^L-\theta(-y^H+\varepsilon\gamma\tau y^H+y^L+\varepsilon\gamma y^L))}{(1-\gamma\mu_1)(1+\tau)} \leq \kappa \leq \frac{\mu_1^2\rho^2[y^L+\varepsilon\gamma y^L-\theta((-1+\varepsilon\gamma\tau)y^H+y^L+\varepsilon\gamma y^L)]}{[1-(2-\gamma)\mu_1](1+\tau)} \tag{11}$$

Otherwise:

$$\frac{\mu_1^2\rho^2(y^L+\varepsilon\gamma y^L-\theta(-y^H+\varepsilon\gamma\tau y^H+y^L+\varepsilon\gamma y^L))}{(1-\gamma\mu_1)(1+\tau)} \leq \kappa \tag{12}$$

C.2 Bargaining Equilibrium (Proof of Proposition 1)

I derive here the SPNE equilibrium of the bargaining game. The first step consists of determining the high wage offers that the union does to make the high type employer better off accepting them and the low type better off rejecting them. The union makes the lowest offers that satisfy the following conditions, which ensure that a high type has higher profits by accepting (left hand side) than by rejecting (right hand side):

$$y^h - s_1(1+\tau) - w_1^h + \pi_2(\mu_1) \geq [y^h - s_1(1+\tau)][1-\mu_1 g(a_1)] - \underline{w} + \mathbb{E}[\pi(\mu_2)] \quad if\ t=1 \tag{13}$$

$$y^h - w_2^h \geq y^h(1-\mu_2\gamma) - \underline{w} \quad if\ t=2 \tag{14}$$

The left hand sides decrease with the first wage offers, so that the union makes the lowest possible ones that satisfy the inequalities strictly:

$$w_t^H = \begin{cases} \underline{w} + \mu_1 g(a_1)[y^H - s_1(1+\tau)] - \varepsilon\mu_1\gamma\bar{y}[1-g(a_1)] & \text{if } t=1 \\ \underline{w} + \mu_2\gamma y^H & \text{if } t=2 \end{cases} \tag{15}$$

A low type employer does not have interest in accepting these offers because she has less to loose from a strike. Her expected loss if she were to accept a high wage offer is $g(a_t)\mu_t(y^H - y^L)$.

In the second step, we need to check that the union is better off bargaining with the employer than not. In the second period, the condition is $\underline{w} + \theta\mu_2\gamma y^H \geq \underline{w}$ which is always satisfied. In

the first period, it is:

$$\theta\left[w^H + s_1 + u_2(\mu_1)\right] + (1-\theta)\left[\underline{w} + s_1(1-\mu_1 g(a_1)) + \mathbb{E}[u_2(\mu_2)\right] \geq \underline{w} + s_1 + (1-\varepsilon)u_2(\mu_1) + \varepsilon\underline{w} \tag{16}$$

Where $\mathbb{E}[u_2(\mu_2)] = \mu_1 g(a_1)u_2(1) + [1-\mu_1 g(a_1)][(1-\varepsilon)u_2(\mu_2^F) + \varepsilon\underline{w}]$, which can be written as $\varepsilon\mu_1 g(a_1)u_2(1) + (1-\varepsilon)u_2(\mu_1) + [1-\mu_1 g(a_1)]\varepsilon\underline{w}$ using the martingale property of the Bayesian beliefs and the fact that the utility is linear in beliefs. The condition becomes:

$$\theta\Delta + (1-\theta)\mu_1 g(a_1)(\varepsilon\gamma\theta y^H - s_1) + \varepsilon\theta^2\mu_1\gamma y^h \geq 0 \tag{17}$$

Where $\Delta = \mu_1 g(a_1)[y^H - s_1(1+\tau)] - \varepsilon\mu_1\gamma\bar{y}[1-g(a_1)]$ is the first period wage premium. The term $\varepsilon\gamma\theta y^H - s_1$ is positive by assumption, which implies that the whole expression is positive, and that the union is better off bargaining with the employer.

C.3 Optimal Actions

Union The objective function of the union can be expressed as:

$$\max_{a_1} \underline{w} + s_1[1-\mu_1 g(a_1)] - \frac{\kappa}{2}a_1^2 + \underline{w} + \mu_1 g(a_1)\varepsilon\theta y^H + (1-\epsilon)\gamma\mu_1\theta y^H \tag{18}$$

The second order derivative is $-\kappa$ which ensures that the function is hump shaped and that the first order condition is sufficient for determining the optimal investment in strikes:

$$a_1(s_1) = \frac{\mu_1\rho}{\kappa}(\varepsilon\gamma\theta y^H - s_1) \tag{19}$$

The comparative statics are straightforward.

Employer The objective function of the employer in the first period can be written as:

$$\begin{aligned}\max_{s_1}\Pi = [\bar{y} - s_1(1+\tau)][1-\mu_1 g(a_1)] + \theta\varepsilon\mu_1\gamma\bar{y}[1-g(a_1)] - \underline{w} \\ -\bar{y}[1-\varepsilon\mu_1 g(a_1)\gamma - (1-\varepsilon)\mathbb{E}[\mu_2]\gamma] - \underline{w}\end{aligned} \tag{20}$$

Where the top line of the equation are profits in the first period and the bottom line are expected profits in the second one. The parameter τ is a tax on profit sharing. The term $\mathbb{E}[\mu_2]$

is $\mu_1 g(a_1)\mu_2^S + [1-\mu_1 g(a_1)]\mu_2^F$ and equals μ_1. The second order derivative with respect to s_1 is $-\frac{\mu_1^2\rho^2(1+\tau)}{\kappa}$ which ensures that the first order condition is sufficient to determine the optimal level of profit sharing:

$$s_1^* = \frac{1}{2}\left[\frac{(1+\varepsilon\gamma(2+\tau))\theta y^H + (1+\varepsilon\gamma)(1-\theta)y^L}{1+\tau} - \frac{\kappa(1-\mu_1\gamma)}{\rho\mu_1^2}\right] \tag{21}$$

The signs of the derivatives with respect to parameters are unambiguous:

$$\frac{\partial s_1^*}{\partial \varepsilon} = \frac{\gamma((2+\tau)\theta y^H + (1-\theta)y^L)}{2(1+\tau)} \geq 0 \tag{22}$$

$$\frac{\partial s_1^*}{\partial \gamma} = \frac{1}{2}\left[\frac{\kappa}{\mu\rho^2} + \frac{\varepsilon((2+\tau)\theta y^H + (1-\theta)y^L)}{1+\tau}\right] \geq 0 \tag{23}$$

$$\frac{\partial s_1^*}{\partial \theta} = \frac{y^H(1+\gamma(2+\tau)\varepsilon) - y^L(\gamma\varepsilon+1)}{2(1+\tau)} \geq 0 \tag{24}$$

$$\frac{\partial s_1^*}{\partial \rho} = \frac{\kappa(1-\gamma\mu)}{\mu^2\rho^3} \geq 0 \tag{25}$$

$$\frac{\partial s_1^*}{\partial y^H} = \frac{\theta(\gamma(2+\tau)\varepsilon+1)}{2(1+\tau)} \geq 0 \tag{26}$$

$$\frac{\partial s_1^*}{\partial y^L} = \frac{(1-\theta)(\gamma\varepsilon+1)}{2(1+\tau)} \geq 0 \tag{27}$$

$$\frac{\partial s_1^*}{\partial \mu_1} = \frac{\kappa(2-\gamma\mu_1)}{2\mu_1^3\rho^2} \geq 0 \tag{28}$$

$$\frac{\partial s_1^*}{\partial \kappa} = -\frac{1-\gamma\mu}{2\mu^2\rho^2} \leq 0 \tag{29}$$

$$\frac{\partial s_1^*}{\partial \tau} = -\frac{(\gamma\varepsilon+1)(\theta(y^H-y^L)+y^L)}{2(1+\tau)^2} \leq 0 \tag{30}$$

Plugging the expression of s_1^* in equation (19), the optimal investment in strikes is:

$$a_1^* = \frac{1}{2}\left[\frac{1-\gamma\mu_1}{2\mu_1\rho_1} - \frac{\mu_1\rho_1[(1-\varepsilon\gamma\tau)\theta y^H + (1+\varepsilon\gamma)(1-\theta)y^L]}{2\kappa(1+\tau)}\right] \tag{31}$$

C.4 Comparative Statics of the optimal investment in strikes

The comparative statics are derived from the first order derivatives.

$$\frac{\partial a_1^*}{\partial \varepsilon} = \frac{\gamma \mu_1 \rho [\tau \theta y^H - (1-\theta) y^L]}{2\kappa(1+\tau)} \tag{32}$$

$$\frac{\partial a_1^*}{\partial \gamma} = \frac{\mu_1 \rho \varepsilon [\tau \theta y^H - (1-\theta) y^L]}{2\kappa(\tau+1)} - \frac{1}{2\rho} \tag{33}$$

$$\frac{\partial a_1^*}{\partial \theta} = \frac{\mu_1 \rho [y^L(1+\gamma\varepsilon) - y^H(1-\gamma\tau\varepsilon)]}{2\kappa(1+\tau)} \tag{34}$$

$$\frac{\partial a_1^*}{\partial \rho} = -\frac{\mu_1(\theta y^H(1-\gamma\tau\varepsilon) + (1-\theta)y^L(\gamma\varepsilon+1))}{2\kappa(1+\tau)} - \frac{1-\gamma\mu}{2\mu_1\rho^2} \leq 0 \tag{35}$$

$$\frac{\partial a_1^*}{\partial y^H} = -\frac{\mu_1 \rho \theta (1-\gamma\tau\varepsilon)}{2\kappa(1+\tau)} \leq 0 \tag{36}$$

$$\frac{\partial a_1^*}{\partial y^L} = -\frac{\mu_1 \rho (1-\theta)(\gamma\varepsilon+1)}{2\kappa(1+\tau)} \leq 0 \tag{37}$$

$$\frac{\partial a_1^*}{\partial \mu_1} = -\frac{1}{2}\left[\frac{\rho\theta y^H(1-\gamma\tau\varepsilon) + \rho(1-\theta)y^L(\gamma\varepsilon+1)}{\kappa(1+\tau)} + \frac{1}{\mu_1^2\rho}\right] \leq 0 \tag{38}$$

$$\frac{\partial a_1^*}{\partial \kappa} = \frac{\mu_1 \rho(\theta y^H(1-\gamma\tau\varepsilon) + (1-\theta)y^L(\gamma\varepsilon+1))}{2\kappa^2(1+\tau)} \geq 0 \tag{39}$$

$$\frac{\partial a_1^*}{\partial \tau} = \frac{\mu_1 \rho(\gamma\varepsilon+1)(\theta(y^H-y^L)+y^L)}{2\kappa(1+\tau)^2} \geq 0 \tag{40}$$

Of all these derivatives only the sign of the first three is ambiguous. Increases in ρ, y^H, y^L and μ_1 all lead to a reduction of the investment of strikes because the upward adjustment of profit sharing outweighs the reaction of the union. Increases in κ and τ lead to an increase in the investment in strikes because the latter increases the marginal cost of profit sharing, while the former decreases its marginal benefits. Regarding ε, and γ, increases in these parameters can lead to an increase in strikes only if the taxation of profit sharing τ is large enough so that the adjustment or profit sharing is too costly, otherwise, the increase in profit sharing by the employer overwhelms the incentives on the union to invest in strikes.

C.5 The Effects of Increases in Profit Sharing

The expected reputation in the second period can be written as follows:

$$\mathbb{E}[\mu_2] = \varepsilon\mu_1 g(a_1) + (1-\varepsilon)\mu_1 \tag{41}$$

Which implies that increases in profit sharing reduce future reputation. As a corollary the expected wage in the second period $\underline{w} + \mathbb{E}[\mu_2]\gamma\theta y^H$ falls as well. The first period wage decreases

both because of a decrease in the probability of a strike, and because the increase in profit sharing makes a rejection more attractive to high type employers whose gain from not paying profit sharing is larger in the case of a failed strike after a rejection of the high wage offer.

Total compensation The expected total compensation of the worker at the beginning of the game is:

$$\theta[w^H + s_1 + u_2(\mu_1)] + (1-\theta)[\underline{w} + s_1(1-\mu_1 g(a_1)) + \mathbb{E}[u_2(\mu_2)]] \tag{42}$$

Which equals $\underline{w} + \theta\Delta + \theta y^H \gamma\mu_1[1-\varepsilon(1-\theta)(1-g(a_1))] + s_1[1-(1-\theta)\mu_1 g(a_1)]$. The derivative of this expression with respect to s_1 can be written as:

$$1 - \gamma\mu_1(1+\tau\theta) + \frac{\mu_1^2\rho^2}{\kappa}[2s_1(1+\tau\theta) - \theta(1+\varepsilon\gamma y^H[2+\tau\theta]) - \varepsilon\gamma(1-\theta)\theta y^L)] \tag{43}$$

The right hand side expression is negative for all $s_1 \leq \varepsilon\gamma\theta y^H$) so the whole expression is negative if:

$$\kappa \leq \frac{\mu_1^2\rho^2[2s_1(1+\tau\theta) - \theta(1+\varepsilon\gamma y^H[2+\tau\theta]) - \varepsilon\gamma(1-\theta)\theta y^L)]}{1-\gamma\mu_1(1+\tau\theta)} \tag{44}$$

Thus when κ is small, which means that the union is very reactive to changes in profit sharing because of the relatively small marginal cost of its action, changes in profit sharing lead to reductions in the total compensation of the worker due to the large loss in bargaining power of the union.

C.6 The effects of increases in the probability of exit

The partial derivative of a_1^* with respect to ε is:

$$\frac{\partial a_1^*}{\partial \varepsilon} = \frac{\gamma\mu_1\rho[\tau\theta y^H - (1-\theta)y^L]}{2\kappa(1+\tau)} \tag{45}$$

If $\tau =< \frac{(1-\theta)y^L}{\theta y^H}$ the expression is strictly negative, otherwise it is positive. A higher taxation rate increases the marginal cost of profit sharing and reduces its responsiveness to increases in the probability of exit. When it is sufficiently high, the response of the union outweighs the employer's and the investment in strikes increases in equilibrium so that wages increase. In the case of a decrease in the strike investment then the first period wage decreases because of the

loss of bargaining power, and the second period wage decreases due to the loss in reputation and to the the smaller probability that the union achieves a success.

Appendix D Tables

Table 18: Profit Sharing on Union Composition - Conditional (back to main text)

	(1)	(2)	(3)	(4)
VARIABLES	*PS / Wage*		Strike	
White Collar	-0.0058***	-0.0100***	-0.317***	-0.393***
	(0.0007)	(0.0004)	(0.027)	(0.030)
Technician	0.0025***	-0.0023***	-0.091***	-0.174***
	(0.0006)	(0.0004)	(0.022)	(0.025)
Clerk	0.0005	-0.0004	-0.146***	-0.195***
	(0.0006)	(0.0004)	(0.024)	(0.027)
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	No	Yes	No
Establishment FE	No	Yes	No	Yes
Observations	219,126	196,896	195,550	188,392
R-Squared	0.221	0.760	0.068	0.191

Notes: Standard errors (in parentheses) are clustered at the firm level. The table reports the second stage IV specification of the effect of profit sharing on the composition of unions inside the firm, controlling for the strike outcome the year of elections. The left panel *Election Year* reports the effect the year of elections, while the right one *Year After* reports it the year after. "Reformist" and "Radical" variables are dummies that take the value one when only reformist or only Radical unions are present inside the firm respectively. "Mix" is a dummy that takes the value one when both type of unions are present inside the firm. Non dummy variables are logged, and all are defined in section **??**. *** p<0.01, ** p<0.05, * p<0.1