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Author
Pecheu, Vladimir

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Essays on the Usage of Profit Sharing Compensation by Firms

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requirements for the degree Doctor of Philosophy
in Economics

by

Vladimir Pecheu

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ABSTRACT OF THE DISSERTATION

Essays on the Usage of Profit Sharing Compensation by Firms

by

Vladimir Pecheu
Doctor of Philosophy in Economics
University of California, Los Angeles, 2020
Professor Maurizio Mazzocco, Chair

This dissertation consists of three essays on the usage of profit sharing compensation schemes by firms. I show theoretically and empirically that an important reason for firms to pay workers through profit sharing is to weaken their unions. I also analyze how taxation affects the usage of profit sharing and can mitigate its undesirable effects on wage growth and income inequality.

In Chapter 1, I document a series of stylized facts regarding the usage of profit sharing. Both profit sharing and the presence of unions increase with firm size, firms with unions are more likely to resort to profit sharing, while strike incidence decreases with its usage. Second, I develop a model to study the effects of profit sharing on union behavior which introduces two novel mechanisms. The first is that strikes are a tool that unions use to build reputation for being strong. The second is that profit sharing weakens unions. By making employee compensation depend on output, unions internalize the cost of their strikes and are less inclined to organize collective actions. Over time unions lose reputation and bargaining power, and as a result wages grow more slowly.

In Chapter 2, I test the model which predicts that firms increase their usage of profit sharing when unions are more likely to strike. For that I use exogenous dates of elections of union representatives, which give incentives for unions to organize

collective actions in a competition for voters. I show that employers anticipate the effect of elections by increasing their usage of profit sharing, which payment leads to a reduction in strike length the same year, and to a drop in wage growth the year after. The effect is heterogeneous and concentrated on lower skilled employees for whom wage growth is almost halved.

In Chapter 3, I analyze the effects of taxation of profit sharing and wages on the income and welfare of individuals. Wage taxation reduces the bargaining power of unions and helps achieving efficiency through reductions in strikes, while profit sharing taxation is better suited for reducing income inequality. Profit sharing taxation can have additional effects on individual welfare in economies with social security systems where pensions revenues come from wage taxation and profit sharing constitutes an additional source of retirement income. Subsidies to profit sharing can reduce fiscal revenues by reducing wages, and lead to smaller pension benefits. Depending on the allocation of profit sharing across employees the subsidy can exacerbate its negative effect on income inequality by reshuffling retirement income across individuals.

The dissertation of Vladimir Pecheu is approved.

David Lewin

Simon Adrian Board

John William Asker

Maurizio Mazzocco, Committee Chair

University of California, Los Angeles

2020

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VITA

Education

2015	M.A. Economics, University of Southern California, Los Angeles
2013	M.A. Economics, Keio University, Tokyo
2013	M.A. Economics, Polytechnique and Sciences Po, Paris
2011	B.A. Economics and Management, Paris X Nanterre University

Fellowships

2019–2020	Dissertation Year Fellowship, UCLA Graduate Division
2016–2019	Teaching Assistant Scholarship, UCLA Graduate Division
2013–2015	Dornsife College Graduate Merit Award Fellowship, USC
2014	Doctoral Student Summer Institute Fellowship, USC

Teaching

2015–2019	Teaching Assistant and Instructor for Principle of Microeconomics, Intermediate Microeconomics, Industrial Organization, Principles of Macroeconomics

INTRODUCTION

This dissertation consists of three essays on the usage of profit-sharing compensation schemes by firms. I show theoretically and empirically that an important reason for firms to pay workers through profit sharing is to weaken their unions. Thereby, I show how profit sharing can be detrimental for wage growth and exacerbate income inequality. Eventually, I analyze how taxation can be used to regulate the usage of profit sharing and mitigate its undesirable effects.

In Chapter 1, I document a series of stylized facts that support the hypothesis that firms use profit sharing against their unions. I base my analysis on a new data set on French firms that I construct from multiple administrative sources. Both profit sharing and the presence of unions increase with firm size, firms with unions are more likely to resort to profit sharing, while strike incidence decreases with its usage. Then, I develop a model to study the effects of profit sharing on union behavior which introduces two novel mechanisms. The first one revisits an intuition Hicks had about strikes as the "weapon" that unions use to build reputation for being strong. The second is the effect that profit sharing has on unions. By making employee compensation depend on output, unions internalize the cost of their strikes and are less inclined to organize collective actions. This in turn damages the credibility of their strike threats. Over time unions lose reputation and bargaining power, and as a result wages grow more slowly. I derive a series of propositions regarding the usage of profit sharing. The usage of profit sharing leads to a reduction in wage growth, and more importantly it can reduce total worker compensation because of the reduction in the strength of unions.

In Chapter 2, I test the model which predicts that firms increase their usage of profit sharing when unions are more likely to organize strikes. For that I use arguably exogenous dates of elections of union representatives, which give incentives

for unions to organize collective actions in a competition for voters. I show that employers anticipate the effect of elections by increasing their usage of profit sharing, which 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 heterogeneous and concentrated on lower skilled employees for whom wage growth is almost halved. It is driven by a reduction in the bargaining power of unions which are less likely to conclude wage agreements with employers.

In Chapter 3, I analyze the effects of taxation of profit sharing and wages on the income and welfare of individuals. Wage taxation reduces the bargaining power of unions and is more efficient in achieving efficiency through reductions in strikes, while profit sharing taxation is better suited for reducing income inequality by weakening the willingness of firms for using profit sharing against unions. Profit sharing taxation can have additional effects on individual welfare in economies with social security systems where pensions revenues come from wage taxation, and profit sharing constitutes an additional source of income during retirement. Subsidies to profit sharing can reduce fiscal revenues by reducing wages, and lead to smaller pension benefits. At the same time they increase retirement income from profit sharing. Depending on the allocation of profit sharing across employees the profit sharing subsidy can exacerbate its negative effect on income inequality by reshuffling retirement income across individuals.

CHAPTER 1

A Theory of the Usage of Profit Sharing Against Unions

1.1 Introduction

Broad-based profit-sharing schemes are largely used in developed economies. For instance, in the United-States, half of workers benefit of some compensation that varies with a measure of performance. While profit-sharing could be a tool to increase employees' productivity by linking their compensation to their effort (Prendergast, 1999; Blasi, Kruse, and Bernstein, 2003; Kim and Ouimet, 2014), this incentive cannot explain such a large practice. In fact, employees in large companies have only a small impact on total performance individually, while the gains that accrue to their effort have to be shared with all others. Another possible explanation relies on the role of unions. Unions operate by organizing collective actions such as strikes that disrupt the performance of their companies in order to get a larger share of the surplus. Besides, they are more prevalent in large firms and internalize the effects of profit sharing well because they take decisions on behalf of a majority of the workforce. Therefore, making workers' compensation depend on the performance of their companies can be a way to reduce the ability of unions to organize strikes because of the cost that such collective actions indirectly put on employees.

In this chapter I provide evidence that employers use profit-sharing to weaken the incidence of their unions, and thereby reduce the share of the surplus that goes

to their employees. I do that in three steps. First, I construct a novel data set on unions and profit sharing in France to document the link between the two and set up a series of stylized facts that drive my analysis. To begin with, in the aggregate profit sharing per employee does not vary much with firm size while union prevalence and strike incidence increase with it. This is consistent with a usage of profit sharing driven by incentives on individual effort in small firms and by incentives on collective effort internalized by unions in large ones. Second, both White and Blue Collars get a sizable share of profits that represents about one month of salary per year for all employees. Thus, profit sharing compensation is sizeable for unionized employees as well as for those likely to engage in collective action, which supports that unions internalize the effects of profit sharing. Third, a large majority of firms use profit sharing at their own discretion. To show that, I use data on a type of profit sharing plan which amount has to be computed with respect to a specific legal formula. I check whether companies comply with it by computing the counterfactual that they have to pay based on their financial statements. I find that more than three quarters of firms do not comply with the legislation, so that employers are likely to have full control over profit sharing compensation. Eventually, profit sharing plans are 10 percent more common in unionized companies, while strikes are half less likely in firms that use profit sharing. These correlations support that profit sharing can be effective against unions and that employers resort to it for that purpose.

In the second step, I build a model to study how profit sharing affects the behavior of unions and the outcome of bargaining in a dynamic framework where unions use strikes as a "weapon" to build future reputation. Employers who believe that unions are strong and able to organize successful strikes accept conceding higher wages instead of risking to endure a disruption of output in the case of a rejection. Thereby, I revisit an old intuition John Hicks expressed in his Theory of Wages to explain the occurrence of strikes: 1 [(Hicks, 1963)]The most able Trade Union leadership will

embark on strikes occasionally, 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. In turn, employers use profit sharing as a weapon to increase the cost of strikes for workers and to make unions internalize the penalty that higher wages put on the performance of the firm. Profit sharing and strikes are then the two tools that parties can use to affect the endogenous balance of power determining the outcome of bargaining. The introduction of reputation is important for rationalizing the incidence of strikes, because it explains why unions still have an incentive to go on strike even after their wage offers have been rejected. That is because they know that a successful strike is beneficial for future bargaining. In other words, the incentives for strikes are forward looking and make the behavior of unions dynamically consistent, which is not the case in classic models of strikes based on asymmetric information. Further, reputation allows to study the dynamic effects of profit sharing on the behavior of unions as well as the evolution of the share of surplus that goes to the two parties over time. The model gives a mechanism for the progressive substitution between wages and profit sharing. It predicts that profit sharing reduces the incidence of strikes and the ability of unions to build reputation for being strong, while it is detrimental for workers whose wages and total compensation grow more slowly due to the loss of bargaining power of unions.

The chapter contributes to the theoretical literature on bargaining. Since the 1980s, an important focus of bargaining models has been the explanation of the occurrence of delays and strikes in equilibrium. This is a puzzle because if parties anticipate a loss that is detrimental to both of them — which is the case with strikes, they should reach an agreement that yields higher payoffs before its occurrence. Asymmetric information between employers and unions regarding the productivity of the firm has been the main reason given for that (Kennan and Wilson, 1990; Ausubel, Cramton, and Deneckere, 2002; Cramton, 2003). From that standpoint strikes occur

because of an inefficiency. They are a screening mechanism used by unions to learn the state of productivity and resolve it. The present chapter takes a different stance and presents strikes as a mechanism that unions use to build bargaining power for future negotiation with employers. Here strikes are optimal even when the type of the employer is known, because their incentives are forward looking. This ensures that strike threats are credible at the onset of bargaining with employers, and it explains why they happen even after offers are rejected. To the contrary of most bargaining models which have to assume that unions are able to commit *ex ante* to strike after rejections, otherwise their behavior would be dynamically inconsistent. Only the forward-looking incentive brought by the motive of building reputation ensures that unions call for collective actions after rejections of their wage offers.

Considering that strikes are the weapon of unions, I complete the analogy of Hicks, 1963 by defining profit sharing as the weapon of employers. Mauleon and Vannetelbosch, 1999b as well as Cramton, Tracy, and Mehran, 2015 have introduced profit sharing in bargaining models as a tool to reduce the incidence of strikes but not as an optimal decision of employers and not in interplay with the weapon of unions in a dynamic setting. Thereby, the present model can generate new predictions about the dynamics of total compensation intertwined with the incidence of unions. It also provides a framework where no assumption on the production function is needed to explain the usage of profit sharing when the size of the workforce is large. Most of the studies of this free-rider externality also referred to as the "1/N problem" (Kruse, 1993) have focused on forms of co-monitoring or peer pressure to explain the prevalence of profit sharing in large firms (Kandel and Lazear, 1992; Heywood and Jirjahn, 2009). However it is unlikely to be the only reason since profit sharing is used in firms where employees cannot necessarily monitor each other easily as well (Kruse, Freeman, and Blasi, 2010).

More broadly, the analysis questions the policies that have been implemented in

order to promote the usage of profit sharing by firms. In the United-States, since the Employee Retirement Income Security Act of 1974 firms' contributions to employee stock ownership plans are tax deductible up to a limit of 25 percent of covered payroll. Similarly, in France a series of laws in the early 2000s promoted the usage of profit sharing and exempted it from payroll taxes. The results of this chapter suggest that these policies may have played a role in the decline of unions over the last four decades. Since the decline of unions has been a large contributor to the increase in wage inequality (Card, Lemieux, and Riddell, 2004; Blanchflower and Bryson, 2004), a natural question is whether policy makers who would want to reduce income inequality should keep subsidizing profit sharing?

The chapter is organized as follows. Section 1.2 details the institutional framework, Section 1.3 presents the data and the stylized facts related to unions and profit sharing in France, Section 1.4 introduces the model and derives its predictions, Section 2.3 concludes.

1.2 Institutional Framework

Before introducing the data, I expose in this section the main aspects of the institutional framework needed to develop the analysis with respect to profit sharing on the one hand and to unions and bargaining on the other. The French institutional framework ensures that firms can use profit sharing to affect union behavior because it gives them considerable leeway over its usage and because the plan applies to all workers. The legislation regarding unions makes them internalize the incentives of profit sharing because they represent all workers, not only those that are unionized, and because they bargain frequently with employers. Multiple union representation inside firms based on the outcome of elections of worker representatives makes unions compete against each other, and gives them an incentive for adopting aggressive be-

havior against employers.

1.2.1 Profit sharing

In France, two devices can be used by firms for the purpose of sharing their profits with their employees: Participation and Intéressement. Participation is mandatory for all firms with more than fifty employees and subject to a legal formula for its amount that is:

$$Participation = \max\left\{0, \frac{1}{2}\frac{Payroll}{Added\ Value}\left(Profits - 5\%Equity\right)\right\} \tag{1.1}$$

Thus profits are legally mandated to be shared only for a rate of return on equity above 5%. For example, for a firm with a labor share of two thirds, the device acts as 17 percent tax on profits above that threshold, directly redistributed to employees. Note that employers below 50 employees are also allowed to set up such a plan, and that all firms can opt for a different formula but only if it yields a higher compensation for employees.[1]

The other profit sharing plan, Intéressement, is more flexible, and its adoption is an individual choice of firms. Nonetheless legislation bounds employers to base its payment upon a formula of their choice. According to Tounés, 2005, most plans are based on a measure of financial performance. Both types of profit sharing plans are restricted by law on some other aspects. First, they have to be broad-based so that they apply to all employees with more than three months of service. Second, they have to be put into agreements signed by a worker representative. Third, they are subject to the some tax incentives. For the firm, the amounts paid are deductible from taxable earnings and exempt from payroll taxes. For employees, if the sum is vested on a firm savings account for a period of five years, it is exempted from income

[1]As a matter of fact the device was made mandatory in 1967 by President Charles de Gaulle who among other reasons put it as a way to "rejuvenate trade unionism" against an "overwhelming communism".

tax.[2]

The fact that firms have to conclude agreements with their employees does not constraint them much on the usage of profit sharing because of three facts. First, in practice employers decide of the terms of the Intéressement formula (Cottereau and Frinault, 2006), and if they are afraid that their unions disagree they can bypass them for the signature of the agreement by asking workers directly. Empirically less than a quarter of new profit sharing agreements have been signed by a union. Second, firms are not subject to close compliance with the computation of their payments in the case of Intéressement because legislation allows them to freely adjust the amounts upwards, up to 25 percent of the payroll at their own discretion. Third, profit sharing agreements are set up for a duration of three years and can be tacitly extended. This means that after a plan has been set up, a firm is relatively free regarding the amounts it pays since it may not need the agreement of employees every year.

1.2.2 Unions

In France workers are free to unionize and organize union sections with appointed representatives if their firm has more than fifty employees. In that situation employers are mandated to bargain with union representatives over wages every year, but they are not expected to reach an agreement. In the case of an agreement, its terms apply to all workers regardless of their union status,[3] so that most workers in France are covered by a collective agreement.[4]

[2]This aspect is somewhat loose because employees can withdraw the amounts if they leave the company or in the case of exceptional circumstances such as a wedding, the birth of a child, or the purchase of a property, among others.

[3]Note that this explains in part why the unionization rate in France is one of the lowest among developed countries, standing at around 12 percent. It is at odds with the fact that about 95 percent of workers are covered by a form of collective agreement bargained by a union representing them.

[4]In firms below fifty employees, or firms without union representatives other types of worker representatives can bargain with employers. These Personnel Delegates have to be elected in all

In many firms, multiple union representatives belonging to different union confederations coexist. These brands are divided along ideological lines about the purpose of their action and unionism in general. Radical unions embrace a Marxist view of the economy and society and advocate for class warfare against employers.[5] Reformist unions come from the Christian social teaching[6] and have been historically known for making more concessions to employers (Mouriaux, 2010) than Radical ones.

Unions compete for the right to represent workers, and importantly, for the right to sign binding bargaining agreements with employers. Since 2009, their legitimacy comes from the results of the elections of worker representatives at Works Councils. Mandatory in all firms with more than fifty employees, Works Councils are institutions where representatives are consulted on strategic issues of the firm, but in practice they do not influence the decision of employers much.[7] The candidates in the first round of elections have to be unionized and only if no unionized candidates run for elections, of 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

firms with more than ten employees and are in charge of reporting and solving the grievances of workers with respect to the employer. Note that they can also be unionized. If no representatives are present inside the firm, the employer willing to put an agreement into place can organise a referendum for its approval by employees.

[5]Some of them state in their founding charter — the Charter of Amiens of 1906 — that the objective of their action is the "expropriation of capitalists".

[6]The teaching 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.

[7]In case of their absence the legitimacy of union representatives is determined by the results of the elections of Personnel Delegates.

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 about its competitors. Elections are important because they bring about competition between unions. There is multiple anecdotal evidence, which I report in section 2.2, that this competition makes unions more aggressive in terms of bargaining and strikes. The purpose of which is to advocate for a better record in front of employee-voters. Note that prior to 2009 the legitimacy of unions was not rooted in the results of elections and that in my analysis I focus on the period 2009 onward.[8]

1.3 Data and Stylized Facts

This section describes the different sources that I have used and the way I have constructed the data set for my analysis. Most sources have been accessed through the *Centre d'accès sécurisé aux données*, the French Secure Access Data Center.[9] I first describe the different data sources and the main variables used throughout the analysis, before setting up in the last part of this section a series of stylized facts on the link between profit sharing and unions on the one hand, and the behavior of unions and elections on the other.

1.3.1 Construction of the Database

I construct the database with five different sources. First, two firm-level surveys conducted with employers by the French Ministry of Labor on a yearly base under

[8]Before that year, the five oldest and biggest unions that existed or just formed after World Ward Two were give legitimacy de jure and could bargain and sign agreements with the employer freely.

[9]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).

the name ACEMO[10]. The first, called PIPA[11], reports information on profit sharing, the other, called DSE[12], reports on labor relations inside firms. Both surveys are conducted yearly and cover the period 2009-2015 but do not constitute strict panels. PIPA surveys 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 election data comes from the Ministry of Labor as well but is public and downloadable online [13]. It consists of the the records of these elections, collected yearly since 2009. They are exhaustive of all workplaces that have complied with the administrative reporting of the results. To complement the data with variables relating to the performance of the firm, size, and wages, I use two other databases from the CASD. The first one, ESANE[14], is collected yearly since 2008 and contains the balance sheets and income statements of firms from the reports they make to the French Ministry of Finance with their tax documents. The sample is exhaustive of the 75,000 firms with more than 20 employees and contains a sample of 85,000 firms below that threshold. The other source is the DADS database[15] that reports

[10] *Activité et conditions de la main d'oeuvre* standing for "Activity and Labor Force Conditions"

[11] *Participation, Intéressement, plans d'épargne et actionnariat des salariés* standing for "Participation, Intéressement, Firm Savings Plans and Employee Shareholding"

[12] *Dialogue social en entreprise* standing for "Labor relations inside firms"

[13] At `https://www.data.gouv.fr`.

[14] Élaboration des statistiques snnuelles d'entreprise standing for "Production of the Yearly Firm Statictics"

[15] Déclaration annuelle de données sociales standing for "Annual Declaration of Social Data".

the payroll and size inside all French firms paying salaries, a sample that amounts to three million observations.

The final database is constructed by merging all these different sources. In the process I had to aggregate the election data from workplace to firm level, which is detailed in the next Section on the construction of the variables. The result is an unbalanced panel of 11,000 firms, ranging from 2009 to 2015. In total there are 20,000 firm-year observations with 2,300 to 3,200 observations yearly. A consistent amount of data is lost in the process due to the fact that PIPA and DSE are designed so that the two samples of firms overlap as little as possible no to put too much burden on respondents. The final data is thus skewed towards large companies because they are the ones that are interviewed by both surveys yearly as aforementioned For the purpose of descriptive statistics in the latter part of this Section I use two other data sets independently of the main one. ECMOSS[16] are two surveys in 2009 and 2010 of a subset of 125,000 employees of a sample of firms representing 15,000 workplaces. It contains the structure of their compensation including wages, bonuses, and profit sharing, and also reports whether the employees went on strike as well as its duration. Additionally I use the D@ccord database[17] that reports a large set of bargaining agreements reported to the local French administration by firms. It contains the date and topic of the bargaining agreement, which unions were at the bargaining table and which ones signed it.

Table 1.1 displays summary statics describing the merged database. It consists of 19,336 observations split over 7 years and 11,074 firms with a yearly sample of firms ranging between 2,500 and 3,500. 5,784 firms are observed multiple periods, 2.4 on average. The sample is heavily unbalanced with only 974 firms with observations over

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

[17] The French expression d'accord means "agreed".

the whole period.

1.3.2 Variables and Summary Statistics

1.3.2.1 Profit Sharing

For both Intéressement and Participation, the database reports three aspects of the plans, 1) whether there is an agreement, 2) whether an amount was paid to workers, 3) 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 and keep the same three variables: two dummies indicating whether the firm has some form of profit sharing agreement be it Participation or Intéressement, and whether one of the plan has lead to payment, the last one is the sum of the amounts paid. Table 2.1 reports summary statistics of these variables. They have been computed using sampling weights included in the PIPA database so that they are representative of the usage of profit sharing among firms with more than ten employees. The first column reports the average among all firms in the private sector, while the others report statistics by size categories divided along the legal threshold of 50 employees above which Participation is mandatory. An intermediary bin between 50 and a 100 employee is included because the adjustment may not be done immediately past the threshold.

First profit sharing is pervasive. 23 percent of all French firms in the private sector use either Participation of Intéressement. That proportion increases with firm size so that more that 60 percent of workers are covered by an agreement. This is not driven by the legal obligation with respect to Participation since firms above 50 employees have Intéressement agreements, a share that increases with firm size.

Intéressement is paid 11 percent more often than Participation, and in larger firms with more than a 100 employees, more than 80 percent of them pay it when there is an agreement. That supports that firms can adjust Intéressement at greater discretion

than Participation.

Another evidence of the discretionary usage of profit sharing plans is the fact that more than 26 percent of firms do not comply with their legal obligation to implement Participation after they reach a size of 50 employees. This is not concentrated among firms just above the threshold (even though about half of them do not comply).

Table 2.2 decomposes the variation of profit sharing between and within firms over the period of observation. There is substantial within firm variation both in the amounts paid and in whether they are paid or not. Even though Participation varies more within firms than Intéressement, the size is substantial for both. Note that the incidence of agreements varies as well, but it mostly comes from implementation of new agreements.

1.3.2.2 Unions

The database reports whether one or multiple union representatives 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[18].

I group union brands along the division between Radical and Reformist unions. All of the large unions but one can be clearly classified according to the ideology they advocate. Reformist unions, are the CFTC, CFDT, CFE-CGC and UNSA[19] while

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

[19]CFTC, the French Confederation of Christian Workers, is the oldest Reformist union, founded in 1919, and the sixth by size with about 140,000 members. CFDT, the French Democratic Confederation of Labour, an offshoot of the CFTC who did not want to bear its Christian allusion, created in 1964 is the second largest french Trade union with about 600,000 members. CFE-CGC, the French Confederation of Management – General Confederation of Executives, a white collar union founded in 1944 is the fifth largest union with 170,000 members. UNSA, the National Union of Autonomous Unions, founded in 1993 is the fourth largest union claiming 200,000 members.

there are two Radical ones are the CGT and SUD[20]. I assign FO[21], the remaining large union reported in the data, to the Reformist category. Founded in 1948 by members of the CGT who did not want to follow the decision of their leaders to swear allegiance to the Communist party, it still embedded class warfare in its founding chart. However its leaders have been advocating for a Reformist approach and in practice its behavior is similar to the one of Reformist unions. It could be considered as the most Radical Reformist union, and Desrieux and Espinosa, 2016 who apply an ideal points Bayesian estimation technique used in the political science literature to evaluate the position of judges or politicians, also classify FO closely with Reformist unions. More details on the classification are available in the Appendix Section.

Table 2.3 displays summary statistics of these union variables. First unionization at the firm level is quite large, as 70 percent of firms with more than a 100 employees have unions. Note that there is no large jump at the threshold of fifty employees and that there are still about a third of firms where unionization is free that do not have unions. In unionized firms there are about two unions on average, a number that increases with firm size. On average in firms with more than 10 employees, the Reformist union composition is the most pervasive, among about half of firms. However mixed structures constitute a majority among firms above 100 employees. Firms with Radical unions only are about 10 to 20 percent depending on size, however note that Radical unions are present in about two thirds of firms considering mixed structures as well. Conditional on having a union firms with at least one strike during the year represent 8 percent, and incidence which also increases with size. The cost of strikes represents .2 to .3 percentage points in terms of potential working time, which

[20]CGT, the General Confederation of Labour, is the oldest and largest trade union in France, founded in 1895 and with about 700,000 members. SUD, standing for Together United and Democratic, created in 1981 as the Group of 10, is the seventh largest union with 110,000 members.

[21]Workers' Force is the third largest union in France with 500,000 members, also known as CGT-FO.

is not negligible if transformed into output losses. Overall these statistics show that unions and strikes increase with firm size and that their incidence is sizable.

1.3.2.3 Elections of Worker Representatives

As mentioned in the previous section I had to construct the election variable by aggregating elections from workplace to firm level. The variable is computed as follows:

$$Elec_{j,t} = \sum_{k=1}^{K_{j,t}} \omega_{k,j,t} \mathbb{1}_{k,j,t} \tag{1.2}$$

This means that for firm j at time t, the election variable $Elec_{j,t}$ is a weighted average of the elections that have happened in its workplaces indexed by k, denoted by the indicator $\mathbb{1}_{k,j,t}$, with $K_{j,t}$ being the total number of them. I use two measures for the weights $\omega_{k,j,t}$. First, $\omega_{k,j,t} = 1/K_{j,t}$, so that all workplaces have the same weight, In which case the election variable measures the percentage of workplaces of firm j that had elections at date t. The second measure is the share of workers of the workplace relative to the whole firm so that $\omega_{k,j,t} = N_{k,j,t}/N_{j,t}$. Because I do not observe the number of workers in all workplaces this measure is subject to measurement errors as I replace missing observations by the mean workplace size within the firm. In that case $Elec_{j,t}$ denotes the percentage of workers that are concerned by elections inside the firm. Table 2.4 shows the proportion of firms treated with the election variable by firm size. Note averages across firms are slightly increasing with size for the equally-weighted measure, while slightly decreasing for the employee-weighted measure, except at the right tail of the sample where treatment increases for both (note that it is either its intensity or frequency). This is because larger firms have many more workplaces, and notably smaller ones with less than 50 employees where it is more common to have elections every two years[22] For that same reason the measure

[22]In that case that's the election of Personnel Delegates that determines the legitimacy of Unions.

weighted by the number of employees is smaller across firm size, as elections happen more often in smaller workplaces. The last row of the figure displays the proportion of firms which have elections happening at all of their workplaces the same year. This is declining from approximately one to a half over the range. It may be more difficult to organize elections the same year in large firms, or these large firms may operate as several distinct entities. That could be a caveat for the analysis if profit sharing was set independently by these entities. But since it is determined at the firm level, its usage with respect to unions is affected proportionally to the share of treated entities within the firm.

1.3.2.4 Performance Variables and Other Controls

As explained in the institutional framework the payment and amount of profit sharing is in part dependent on performance measures. In the case of Participation, the formula is explicit, and as already mentioned the large majority of Intéressement formulas are based on measures of performance. I control for these factors in the empirical analysis, and the variables I use for that purpose are constructed using the FARE and DADS database. First a measure of the rate of return of the firm: the return on assets (ROA). Then a measure of average productivity as the added value per hour worked at the firm level. Eventually a measure of indebtedness: the debt to assets ratio. Last I also use the age of the firm and the number of workplaces as additional controls.

Tables 2.5 to 2.8 display the statistics for all variable in the data base I constructed from the merge of all sources. On top of means and standard errors the table includes the number of observations in brackets. As noted above, the sample is heavily skewed towards large firms, as at least 90 percent of observations are firms with more than 100 employees. Note also that the unweighted means of profit sharing and union variables are larger than the estimated population means. Regarding performance

and structure variables, on average smaller firms are younger, with higher rates of return and productivity, and more indebted as well.

1.3.3 Stylized Facts

This section documents a as of stylized facts with regard to the link between profit sharing and union behavior.

Stylized Fact 1. *Profit sharing per employee is roughly constant with firm size, while union and strike incidence increase with it.*

Figure 1.2 represents average measures of the usage of profit sharing and unionization in the whole sample of firms with respect to firm size. The graph can be interpreted with regard to the puzzle concerning the usage of profit sharing and firm size and make the point that collective action is a possible determinant of the usage of profit sharing. In theory, without an institution to coordinate collective behavior, the incentive effect of profit sharing on effort must decline with firm size, as the gains accruing to one's individual effort have to be shared with an increasing number of coworkers, an externality that has been known as the "1/N problem" Kruse, 1993. However the data shows that profit sharing measured both in its extensive usage, and in its intensive one as a share of payroll or as the average amount per employee, does not decrease with firm size. Note that for small firms up to a hundred employees, it actually does slightly, consistently with the 1/N puzzle, but the payment picks up again beyond that threshold.

That is the point where the union threat becomes pregnant and starts to increase. Beyond that point profit sharing per employee does not fall but actually increases slightly with size. This fact is consistent with a substitution of the individual incentives for its usage the usage by collective ones related to the behavior of unions and the weight they can put on profits both with strikes and through bargaining.

Stylized Fact 2. *Profit sharing is pervasive among the workforce and does affect unionized workers and those more likely to strike in the same proportion as others. So that unions internalize the effect of profit sharing on the workforce they represent.*

This fact is displayed in Figure 1.3 which has been constructed with the ECMOSS database. Lower skilled workers (on the left-hand-side of the horizontal axis) get as much profit sharing relative to their wage as other ones. Note that they are those who go on a strike more often, one day per year on average (displayed in red on the right hand side scale). Note that the split of profit sharing among workers is a choice of the employer who can in principle make it proportional to experience and/or to the wage so that she or he could target high skilled employees only. It is not the case, and as with firm size the point can be made for the substitution of incentives between individual and collective ones across worker skills. For high skilled employees who have more individual impact on output with their decisions the individual incentive of profit sharing can still be strong even in large firms. Lower skilled employees have an impact on output through collective action and strikes, so profit sharing would be used to disincentivize that.

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

This result relies on linear probability OLS regressions displayed in Table 2.10. This association is not causal, but nonetheless strongly significant even after controlling for firm size and performance measures. The first result comforts the idea that profit sharing could be a response to unionization. Column 4 of the table shows the link between the composition of unions and profit sharing. Conditional on union composition more unions lead to more profit sharing, but the relation is concave. Conditional on the number of unions, Reformist and Radical firm structures are more likely to have a profit sharing than mixed ones.

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

Table 2.12 reports OLS regressions that show this correlation, given the same set of controls as the previous table. Given that it also controls for union structure as well, this suggests that firms with given characteristics and unions, suffer fewer strikes when they use profit sharing plans. The linear regression probability model estimates a reduction in strike incidence by 5 percent, which taken at the average of 10 percent in the sample means a reduction by a half. Note that firms with Radical and Mixed compositions are more 7 to 10 percent more likely to suffer from strikes, which are 30 to 50 percent longer than firms with Reformist unions. Strikes are decreasing with the number of unions.

Stylized Fact 5. *Controlling for productivity, firms with profit sharing plans pay lower wages.*

Table 2.11 shows

Stylized Fact 6. *Firms do not comply with the legal framework regulating profit sharing.*

I show evidence for that by taking advantage of the legal obligations with respect to the Participation device. First, I compute the proportion of firms that should have an agreement because they are above the 50 employee threshold, but do not. These amount to 38 percent of firms in France. Part of it may be due to timing reasons, but even if I restrict the sample to firms above 100 employees, the proportion is still large with 26 percent of non complying firms. Note that part of the reason for non compliance can be explained by the substitution with an Intéressement device, which means that non compliance is not due to the unwillingness to pay profits but to the willingness to have more control over the amount paid.

Second, since the law sets a very specific way to compute the amount paid to workers, I can determine what proportion of firms among those that have an agreement do not comply with the formula in the data, by computing the amount of Participation that should be paid according to the formula. Figure 1.1 reports the histogram of the ratio between the actual amount paid, and the amount computed. The two masses at the left and at the right of the chart are respectively those firms that do not pay the scheme, and those firms that pay an amount more than twice larger, or that pay while they should not. In total both of these firms represent 25 percent of firms above 50 employees. Note that I exclude firms that use a different formula, which are reported by the PIPA survey, so that significant differences between the amount reported by the firm and the amount that I compute can be taken as evidence that the firm does not comply with legislation.

So overall firms do not abide by the Participation formula. It can be due to the fact that there is very little control over its payment and that it is workers who have to prove that the amount if wrong. This is certainly a difficult task that few employees take on, notably because for lack of access to the data needed to do it. An additional way to show that the amount paid is not necessarily linked to the formula is to estimate a logged version of equation (1.1) using OLS. The results reported in table A2.9 are far from the coefficients of the formula, while the estimation does not explain two thirds of the variance.

The same analysis cannot be done for Intéressement but by a revealed preference argument the evidence regarding non compliance with the legislation on Participation must imply that firms can not comply with their Intéressement formula since it is more difficult to check because less official and potentially more complicated (employees have to access the agreement documents).

Stylized Fact 7. *Elections are correlated with an increase in the probability of exit of unions. Strike incidence is correlated with a 10 percent reduction in the probability*

of exit.

Table 2.13 shows a regression where the dependent variable is an indicator that takes the value one if there is a change in the composition of unions inside the firm, and zero otherwise. Years with elections are strongly correlated with changes in the union structure at the end of the year. The probability of a change increases by 40 to 50 percent because of elections, the variation being within firm. This is consistent with the idea that elections increase competition between unions, and the probability of exit for them. Note also that strike incidence is correlated with a 10 percent smaller likelihood of the change in the structure, which suggests that strikes can help unions remain in firms.

These facts support the theory that firms may use profit sharing against their unions. In the next section I lay down a formal model to study its implications for union behavior in terms of bargaining as well as for the split of the surplus. The objective is to derive a set of predictions that can be tested in the data in order to uphold the theory.

1.4 Model

In this section I build a theoretical framework to study the effect of profit sharing on the behavior of unions, as well as its effects on the split of the surplus. The framework consists of a firm where an employer interacts over two periods with a union that represents a number of employees. At the beginning of each period the employer sets up a profit sharing plan for employees that consists of a share of profits paid at the end of the period. In a second stage, the union bargains with the employer, which consists of repeated wage offers that the employer can either accept or reject. After a rejection the union can call for a strike which is followed by employees with a probability that is unknown to both the union and the employer. A successful strike

destroys output, but is also information that workers are responsive to strike calls and gives the union a reputation for being strong. A failure does not affect output and has the opposite effect on reputation. At the end of the period payoffs are realized, employees are paid their compensation which consists of the share of profits and the bargained wage. The union is benevolent and internalizes these payoffs, while the employer is compensated with an exogenously set share of profits. The second period follows the same sequence.

The model contributes to the literature on bargaining from three perspectives. First, it formalizes an idea that John Hicks exposed in his Theory of Wages (Hicks, 1963) regarding the purpose of strikes and left aside since then, which is that unions strike in order to build reputation for being strong. Doing so, they tip the balance of power in their favor when they get to bargain with employers in the future and obtain higher wages. Introducing reputation gives strikes a forward looking incentive and ensures they are credible threats at the onset of bargaining. This way strikes are dynamically efficient since the union has still an incentive to strike after a rejection of its wage offers, which is the purpose of building reputation. To the contrary of other pieces of work the model does not need to assume an ex-ante commitment of the union to follow its strike threat, which is not dynamically consistent with a Subgame Perfect Nash Equilibrium.

Second, modelling reputation this way makes bargaining power a variable that is endogenous to the actions of both the union and the employer. In fact reputation and bargaining power are the same variable, which is a function of the investment in strikes and the amount of profit sharing. This is an important feature and contribution because bargaining power is usually considered as an exogenous parameter and a "black box" in most bargaining work. Dalmazzo, 1995 is the closest to my analysis in an framework where workers' investment in human capital endogenizes their outside option and thereby the bargaining power of the union. To follow on Hicks' terminology

who argued that strikes are the weapon of the union, here profit sharing is the weapon of the employer. It is used to disorganize collective action and weaken the ability of the union to build reputation. To the contrary of Cramton, Tracy, and Mehran, 2015 and Mauleon and Vannetelbosch, 1999a the only two articles that study the usage of profit sharing in the bargaining literature, here profit sharing is modeled as an optimal choice of the employer.

Third, modelling profit sharing as an optimal choice allows to study the effects of its usage on the split of the surplus. Further the dynamic component of the model gives new predictions on the inter-temporal substitution of profit sharing and wages. This is a question in the literature on profit sharing, and I provide here a novel mechanism for the substitution, and why it may not be a Pareto improving outcome. Profit sharing weakens the reputation of the union. It reduces the dynamic sequence of wages and precipitates the exit of the union.

This section is organized in two parts. I first derive the base version of the model and its predictions regarding the effect of profit sharing on union behavior and the split of the surplus. Second I build an augmented version of it to make it analogous to the framework of the empirical section, and discuss a set of predictions to be tested with the data.

1.4.1 Base Model

1.4.1.1 Game Setup

The model consists of a two period repeated game between a union and an employer. The union represents a worker[23] and bargains with the employer over the wage w_t paid to the employee. At the beginning of each period $t \in \{1, 2\}$ the employer sets

[23]The model features a single representative worker, the analysis would not change with a larger number of employees.

up a profit sharing plan that consists of a share s_t of profits π_t to be paid to the workers at the end of the period. Bargaining starts after profit sharing has been set, and consists of repeated wage offers by the union that can be either accepted or rejected by the employer. After a rejection, the worker goes on a strike with some probability, and if the strike succeeds output is destroyed. The union can invest an effort a_t at a cost to help the strike succeed. After the employer has accepted a wage offer, bargaining ends, output and payoffs are realized, and the game moves to the second period. The worker has no choice in the game and her only action is to go on a strike with some probability after a rejection by the employer.

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. It can be either high H or low L and its realization is independent and identically distributed over time: output is y^H with probability θ and y^L with probability $1-\theta$. This asymmetry plays a role in the equilibrium of the bargaining game. It is at the core of the models of sequential bargaining developed in the 1980s to explain delays in bargaining. I follow here the simplest framework developed by Fudenberg and Tirole, 1983, and I assume that bargaining lasts at most two rounds. The asymmetry implies that in equilibrium the two types of employer behave differently. A high type employer accepts the wage offer in the first round while a low type reject it to signal her type because the cost of a strike is larger for her. The union internalizes that an bids for higher wage offers in the first round than in the second.

The other source of asymmetry is a new ingredient of the framework. It is the type φ of the worker, which determines her propensity to go on a strike : either passive p or reactive r. Then the probability that a strike succeeds is $\varphi + a_t$.[24] Worker type is neither known to the employer nor to the union, who form expectations about

[24]This additive form is not restrictive and the model can be easily extended to a more general form, but it simplifies the result. All extensions of the model are in the Appendix Section.

it. This is true in practice. Employers hardly observe the unionization status of their employees, while unions neither know the degree of commitment of workers to follow their strikes, since they can only interact with a small fraction of them. The expectation is defined as:

$$x_t = \mu_t r + (1 - \mu_t)p \tag{1.3}$$

Where μ_t is the probability that the worker is reactive. I further assume that $p = 0$ so that only a reactive worker goes on strike by herself, and $x_t = \mu_t r$. Note also that the game starts with a initial exogenous prior μ_1.

So from the point of view of the employer and the union the probability that a strike succeeds is $x_t + a_t$. The assumption implies lower and upper bounds for a_t which needs to be included in the interval $[-x_1, 1 - r]$ to have well defined probabilities.[25] Note that investment in strikes can be negative. This is interpreted as a case where the union would try to tame the propensity of a reactive worker to go on a strike. Again this assumption is motivated by factual evidence. For example Giraud, 2015 and Giraud and Ponge, 2016 account how union representatives need to sometimes temper workers so that strikes do not get too violent.

The expected propensity of workers to go on a strike is what I call the reputation of the union, because it is the union that controls its evolution by determining the probability of success of collective actions. For that aspect the model builds on Holmström, 1999 in which a manager invests in her action to build up reputation for having high ability, which is neither known to her nor to her employer. Similarly here, reputation evolves with the updating of the beliefs about the type of the worker

[25]Note that this can be relaxed so that in the case of $a_t \leq -x_1$ the expected probability of success is zero, and in the case of $a_t \geq 1 - r$, the probability of success conditional on the worker being reactive is one. These points are developed in the appendix.

after observation of the outcome of strikes. It follows Bayes Rule:

$$\mu_{t+1} = \begin{cases} \mu^S_{t+1} = \frac{\mu_1(r+a_t)}{x_t+a_t} & \text{after a success} \\ \mu^F_{t+1} = \frac{\mu_t(1-r-a_t)}{1-x_t-a_t} & \text{after a failure} \end{cases} \tag{1.4}$$

A successful strike leads to a higher reputation, while a failure reduces it. A success is indicative that the worker is of the reactive type while a failure tells that it is more likely that the worker is passive.

An additional aspect of the model needed to make the link with the empirical framework is that there is some probability ε that after a failure the union is forced to exit. This is comes from the fact that in France unions exit the firm if they do not earn a minimum share of the votes in the elections of worker representatives that happen in firms every two to four years. Strikes are a way for unions to show workers that unions care about them and can help unions remain in firms as suggested by stylized fact 7.[26]

In equilibrium reputation determines the wage premium that the union can ask in the first round of bargaining. Both the employer and the union can affect this reputation with their actions. The union does that directly by helping the strike succeed. This investment in collective action increases the likelihood of a success and thus the probability that the reputation is higher next period. The firm can weaken the incentives of striking by giving profit sharing and thus affect reputation indirectly. The action of the union also bears an experimentation feature. When it pushes for collective action today, success is less informative of the type of the worker, while a failure is more likely to be indicative of a passive type. So both μ^S_{t+1} and μ^F_{t+1} decrease with a larger a_t.[27]

The period payoffs of the players are defined as follows. The union internalizes

[26]The institutional details are given in section 1.2 while section 2.2 brings anecdotal evidence for the effect of elections on union behavior.

[27]For that purpose the choice set of the union is $[-x_t, 1-x_t]$ and not $[-r, 1-r]$

the compensation of the worker $w_t + s_t\pi_t$ where expected period profits are expressed as follows:

$$\pi_t = \mathbb{E}[y_t(1 - x_t - a_t) - w_t] \tag{1.5}$$

Note that this form assumes that decisions with respect to capital are not included in the problem, so that profits are simply expected output (which is zero in the case of a strike) minus the wage. The period payoff of the union can then be expressed as:

$$u_t = \mathbb{E}[(1 - s_t)w_t + s_t y_t(1 - x_t - a_t) - \frac{1}{2}a_t^2] \tag{1.6}$$

Where $\frac{1}{2}a_t^2$ is the cost of its strike in case of rejection. The expectation is with respect to the outcome of the bargaining game which in equilibrium depends on the type of the employer. The total payoff of the union is defined as:

$$U = \mathbb{E}[u_1 + u_2] \tag{1.7}$$

Note that there is no discounting between periods. The employer is compensated by an exogenous share σ of profits that has been set by an absentee shareholder. She also has to bear a cost $\frac{1}{2}\psi s_t$ of sharing profits, which captures some hassle for convincing shareholders of such a plan or for informing workers and the union about it. This cost is an increasing and convex function of s_t.[28] The utility of the employer can be expressed as:

$$V = \mathbb{E}[\pi_1 + \pi_2] - \frac{1}{2}\rho\left(s_1^2 + s_2^2\right) \tag{1.8}$$

Where $\rho = \psi/\sigma$. Note that the employer also takes expectations with respect to the outcome of bargaining and so with respect to her type. This is because the decision

[28] An alternative is to set $v_t = (1-s)\pi$. Defining the game the way I do allows more straightforward comparative statics with respect to the cost of setting a profit sharing plan. Note also that in basic models of gain sharing in contract theory, the same term shows up in the objective function of the employer. It captures the costs of risk aversion that the plan puts on the employee, and that is internalized by the employer who sets up compensation equal to the outside option of the employee.

regarding profit sharing is made before her type is learned. The assumption reflects the fact that there is a lag of time between it and the moment of bargaining, a period over which the productivity of the firm evolves.

For the sake of completeness the period payoff of the worker is $\mathbb{E}[(1-s_t)w_t + s_t y_t(1-x_t-a_t)]$ but since she or he does not have any choice it is not relevant for the solution of the game.

1.4.1.2 Solution

Equilibrium of the bargaining game I first derive the equilibrium of the strict bargaining game taking the actions of the players as given. I follow Fudenberg and Tirole, 1983 and I assume that a low type employer does not settle above a wage offer $\underline{w}$.

Proposition 1. *As long as the cost of setting profit sharing as above a threshold $\hat{\rho}$, 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. A high type employer accepts the first wage, while a low type rejects it and settles the round after. The high wage offer is the following:*

$$w_t^H = \begin{cases} \underline{w} + (x_1 + a_1)y^H - (1 - r - a_1)x_1\varepsilon\bar{y} & \text{if } t = 1 \\ \underline{w} + \mathbb{E}[x_2]y^H & \text{if } t = 2 \end{cases} \tag{1.9}$$

The threshold is defined as:

$$\hat{\rho} = \frac{\bar{y}^2 y^L(1 + x_1\varepsilon)}{\theta(y^H + [ry^H - (1-r)\bar{y}]\varepsilon)} \tag{1.10}$$

The details of the proof are in appendix A.1, but the equilibrium is constructed by deriving the highest wage offer that a high type employer would accept to settle in the first round. That is the offer that makes her indifferent between accepting and rejecting. After this offer has been derived it can be checked that a low type

employer does accept it in any case. The equilibrium is unique because the union has no incentive to ask for a lower wage offer in the first round given that a high type would accept it in any case, and that a low type would not until the bid drops to $\underline{w}$. The union is always worse off in that situation as long as there is a sufficiently high probability that the employer is high, the output is large, and the cost of the strike is small, which gives the condition of the proposition. The condition for separation to be preferred to pooling gives the threshold on ρ. The idea is that profit sharing does not have to bee too high so that the sheer costs in terms of losses of output do not out weight the wage premium that the union can bargain out of a high type employer. Figure 1.4 displays the equilibrium game tree. Note that given this equilibrium there are four potential states at the end of the first period: a high type employer without a strike, and a low type employer with either a successful or a failed strike. In the case of failure the union either stays in the firm, or it exits.

Optimal actions in the second period Since the game ends in the second period, the union has no incentive to invest in strikes for future reputation at that point and $a_2^* = 0$. As a corollary the employer has no incentive to use profit sharing to deter strike action and $s_2^* = 0$. The outcome variables are the wage:

$$w_2^H = \underline{w} + x_2 y^H \tag{1.11}$$

The expected utility of the union:

$$u_2^* = \underline{w} + \theta x_2 y^H \tag{1.12}$$

The expected payoff of the employer:

$$v_2^* = \bar{y}(1 - x_2) - \underline{w} \tag{1.13}$$

Where $\bar{y} = \theta y^H + (1 - \theta) y^L$ is expected output.

Optimization in the first period The union invests in the organization of collective actions given the profit sharing plan. It maximizes the utility function U with respect to $a_1 \in [-x_1, 1-r]$ which can be written as:

$$\max_{a_1 \in [-x_1, 1-r]} U = (1-s)\left[\theta w_1^H + (1-\theta)\underline{w}\right] + s\left[\theta y^H + (1-\theta)(1-x_1-a_1)y^L\right] - (1-\theta)\frac{1}{2}a_1^2 + \underline{w} + \mathbb{E}[x_2]\theta y^H \tag{1.14}$$

Where $\theta w_1^H + (1-\theta)\underline{w}$ is the expected wage at the beginning of the period, while $\theta y^H + (1-\theta)(1-x_1-a_1)y^L$ is the expected output. Note that the union invests in strikes only in the case of rejection which happens in the case of low productivity so that the cost is paid with probability $1-\theta$. This implies that w_1^H is taken as given by the union, since the decision to strike is taken after the wage offer has been made. Expected reputation in the second period can be expressed as $\mathbb{E}[x_2] = x_1[1-(1-r-a_1)\varepsilon]$. In any case it is smaller than in the first period because of the likelihood of exit in the case of a failure.[29] The first order condition of the problem is sufficient for determining the optimal investment in strike organization:

$$a_1(s) = \theta y^H x_1 \varepsilon - s y^L \tag{1.15}$$

So given profit sharing, the union invests in the organization of strikes the larger are reputation x_1, the probability of exit ε, output when productivity is high y^H, as well as the probability it is high θ. That is because, a higher reputation in the first period implies a higher reputation in the second period as well, and so a higher future wage premium; a larger probability of exit in the case of failure increases the payoff of success relative to failure; a higher output in the high state as well as a larger likelihood that it happen both increase the wage premium in the second period. The investment in strikes decreases with output in the low state, since this increases the loss for the worker incurred from the share of profits she is compensated with.

[29]The model implies learning, and in an infinitely repeated version of the game the type of the worker would be learned eventually. This can be broken down if there is entry and exit of workers. In that case there is always some new uncertainty about worker type, as in Holmström, 1999.

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

$$\max_{s_1} V = \bar{y}\left[1 - a_1(s) - x_1\right] - \underline{w} + \theta\left[1 - a_1(s) - r\right] x_1 \varepsilon \bar{y} + \theta\left[\bar{y}(1 - x_1) - \underline{w}\right] + (1 - \theta)\left[\bar{y}(1 - \mathbb{E}[x_2]) - \underline{w}\right] - \frac{1}{2}\rho s_1^2 \tag{1.16}$$

Similarly, the function is hump-shaped so that the first order condition is sufficient to derive the optimal profit sharing plan:

$$s_1^* = \frac{\bar{y} y^L}{\rho}\left[1 + x_1 \varepsilon\right] \tag{1.17}$$

Substituting in equation (1.15) for the optimal level of profit sharing, the equilibrium level of investment by the union is:

$$a_1^* = \theta y^H x_1 \varepsilon - \frac{\bar{y}(y^L)^2}{\rho}\left[1 + x_1 \varepsilon\right] \tag{1.18}$$

Note that these expressions are the equilibrium actions in the case of interior solutions. They imply a set of conditions on parameters detailed in the appendix section A.2 . This result closes the equilibrium of the model.

1.4.1.3 The Effects of Increases in Profit Sharing

The following proposition derives the main theoretical results of the section

Proposition 2. *An increase in profit sharing due to a reduction in the cost of its usage ρ leads to a reduction in strike incidence and in reputation, while it increases the probability of exit of the union in the second period. It reduces expected wages in both first and second periods, total compensation of the worker is smaller while profits are larger.*

This result comes from the study of the derivatives of the optimal values with respect to ρ and the proof is detailed in Appendix A.3.

The intuition for it is the following. First, an decrease in ρ increases s^*, which has the effect of decreasing the investment in strikes in the first period a_1^*. As a consequence expected reputation in second period $\mathbb{E}[x_2] = x_1[1-(1-r-a_1^*)\varepsilon]$ decreases because it is more likely that the strike fails which induces a downward updating of beliefs. A higher likelihood of strike failure implies that the probability of exit $(1-\theta)(1-x_1-a_1)\varepsilon$, which happens only after a failure, increases.

Similarly, expected wages which are both strictly increasing in a_1 fall both in the first and second periods because of the reduction in the probability of a successful strike. However there are two effects happening in the second period, where $\mathbb{E}[w_2] = \underline{w} + \mathbb{E}[x_2]y^H$. Conditionally on the outcome of the strike the wage is $\underline{w} + r\mu_2 y^H$, and a reduction in a_1^* increases it because both μ_2^S and μ_2^F are decreasing function of a_1. That is because of the experimentation nature of the action of the union which adds noise to the information of the strike outcome in the case of success, and reveals passive worker types in the case of failure. A larger a_1 makes it more likely that a success is determined by the action of the union than by worker's so that it is less informative of a reactive type and reputation increases less. The opposite is true after a failure, which is more informative of a passive worker, and reputation drops more. However the expected wage prior to the strike $\mathbb{E}[w_2]$ decreases due to the fact that expected reputation in the second period decreases unconditionally because it is more likely that the strike fails and beliefs are updated downwards.

The expected total compensation of the worker is the sum of expected wages in both periods plus the profit sharing in the first period $\mathbb{E}[w_1 + w_2 + s_1^*\pi_1]$. The effect of an increase in profit sharing is in principle ambiguous because while wages decrease the share of profits given to the worker increases. A condition for the first effect to dominate the second is that profits are not too large: $\pi \leq y^L\left[\theta y^H - s\bar{y} + (\bar{y} + (1-\theta)y^H)\theta x_1\varepsilon\right]$. It can be expressed in terms of the lower bound wage $\underline{w}$, which determines the profit margin. The details are in Appendix A.3.

Profits increase because they are strictly decreasing in strikes. Since the comparative static is done with respect to a reduction in the cost of profit sharing ρ, the utility of the employer also unconditionally increases. Note that the utility of the union may increase in some cases even though total compensation drops. That happens if the reduction in strikes reduces the cost of its action and this it outweighs the loss in compensation.

1.4.2 Profit Sharing and Elections

The empirical framework does not give exogenous variation with respect to ρ, the cost of profit sharing, that could be used to test the previous proposition of the model. But it can be used to study how profit sharing and other variables adjust to elections of worker representative, which are the source of arguably exogenous variation in the data. Elections threaten unions with exit and can thus be captured by an increase in ε, the probability of exit in the case of failure. This is a reduced form for the fact that voters are less inclined support unions that fail helping them organize collective actions, which anecdotal evidence presented in the next section supports. The effect of elections can thus be examined by studying the comparative statics of the base model with respect to ε.

An additional aspect of elections is that the employer could use profit sharing to directly affect the probability of exit of a union. That would happen if profit sharing was a way to strengthen the record of some union representatives relative to others. In that case ε would be a function of profit sharing. In this subsection I determine the predictions of the model in both cases and discuss their implication for the empirical analysis.

1.4.2.1 The Effects of Increased Probability of Exit

The following proposition derives the comparative statics of the base model with respect to ε.

Proposition 3. *Profit sharing strictly increases with a higher probability of exit. Regarding the strike incidence and compensation two cases arise. If the cost of profit sharing is above* $\tilde{\rho} = \frac{\bar{y}(y^L)^2}{\theta y^H}$ *then the likelihood of strike and wages increase. In the opposite case, the converse is true.*

The details of the proposition are in the appendix, the intuition is the following. An increase in the probability of exit after a failed strike is an incentive for the union to achieve a success because it increases its payoff relative to a failure. So conditional on profit sharing the investment in strikes is strictly increasing in ε as shown in equation (1.15). However in equilibrium the employer can outweigh this effect as she also has an incentive to increase profit sharing because in the case of a failure there is a larger probability that the union exits. The size of this incentive depends on the size of the potential gains in output offered by the absence of union activity. The larger these gains are, the stronger is the incentive to respond and make the strike fail. In fact the incentive gains need to be large enough relative to the cost of profit sharing. So that in the case when $\rho \leq \tilde{\rho}$ profit sharing fully outweighs the action of the union, a_1^* as well as expected wages fall as well.

In the case when costs are large enough so that in equilibrium the union goes on a strike, the total effect on collective action of the increase in the probability of exit is positive. Expected wages go up and since profit sharing increases too, total compensation is larger. This analysis thus yields an ambiguous result regarding the effect of elections on the outcomes of the game. However the two channels offer a set of distinct predictions that can be tested in the data.

Prediction 1. *Elections increase the usage of profit sharing by the employer*

The firm has an incentive to increase profit sharing because of two reasons. An increase in the probability of exit in the case of a failed strike makes this state more appealing to the employer who is better off without the union. So before even factoring the effect of elections on union behavior, the firm increases profit sharing to make failure more likely. Second, conditional on the amount of profit sharing the increase in the probability of exit stimulates investment in collective action by the union. So the firm reacts to counter this by sharing profits even more.

Prediction 2. *Regarding unions, two cases arise. Either the firm wins over the union: there is a decrease in strike incidence, and wages decrease. Or the union wins over the firm: elections lead to an increase in collective action, and wages are larger.*

The direct effect of elections on strikes as captured by the left hand side of equation 1.15 is always positive: conditional on the amount of profit sharing unions want to invest more in collective actions. However the indirect effect through the adjustment in profit sharing may or may not overcome the direct effect.

1.4.2.2 Profit Sharing to Influence the Outcome of Elections

The analysis of the previous subsection can be augmented because one could thing that profit sharing can directly influence the outcome of elections. In that situation ε would be a function of profit sharing, such as $\varepsilon + \xi s_1$ in a simple linear specification. This changes the optimal action of the employer so that:

$$s_1^{**} = \frac{\rho s_1^* + (1 - x_1 - a_1^*) x_1 \xi \bar{y}}{\rho - \bar{y} y^L x_1 \xi} \tag{1.19}$$

Where s_1^* is defined as above. As long as $\xi \bar{y} y^L x_1 < \rho$, so that the marginal benefit from increasing the probability of exit $\xi \bar{y} y^L x_1$ is smaller than the marginal cost of increasing s_1, the amount of profit sharing is larger than previously for two reasons. First, the firm has a second channel to reduce the incidence of the union which is to directly increase the probability of exit. Second, because the probability of exit is

larger after a failure, the incentives of making it happen are even stronger so that the usage of profit sharing for that purpose increases. Overall this channel makes it more likely that elections drive the mechanics of Prediction 2 that leads to a reduction in strike incidence, wages and total compensation.

Prediction 3. *When profit sharing is used to influence the outcome of elections by increasing the probability of exit, all other things being equal the incidence of strike is reduced, the probability of exit increases, and wages and total compensation are smaller.*

This result ends the theoretical section.

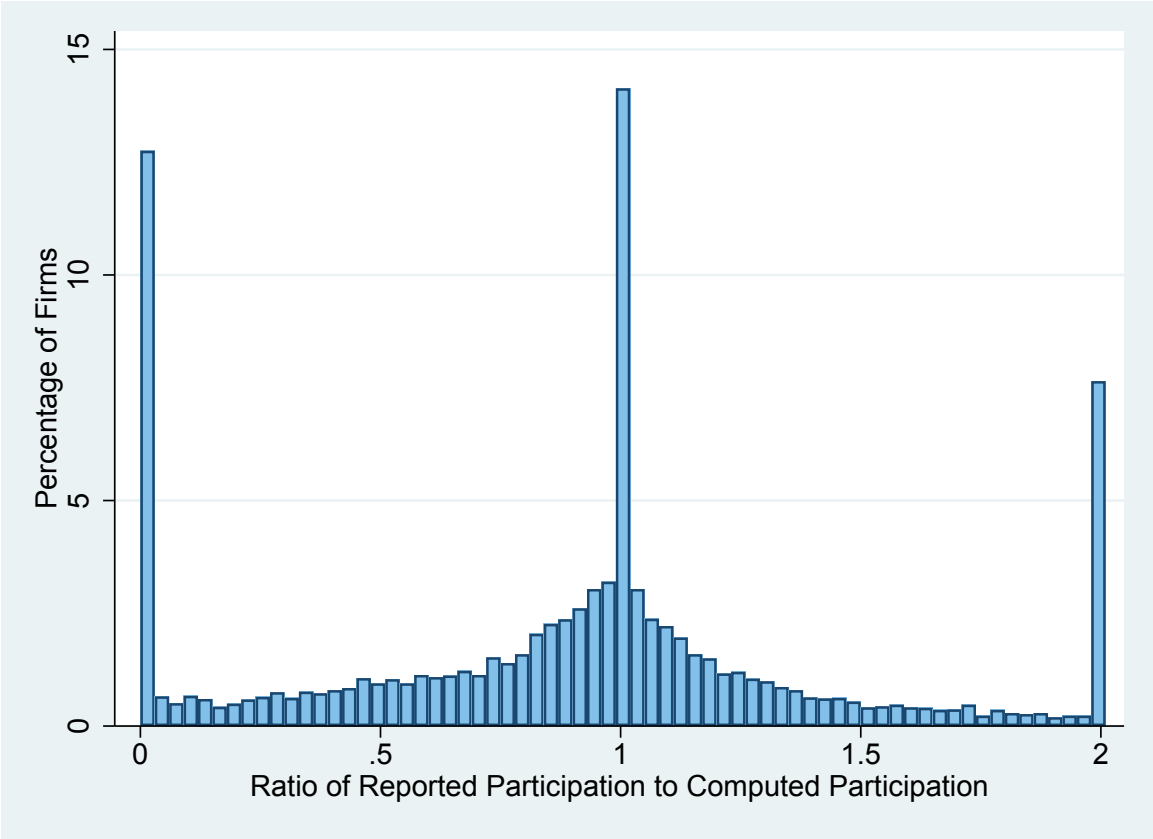
1.5 Conclusion

This chapter has introduced the theory that profit sharing is a tool that can be used by firms for the purpose of weakening their unions or any form of potentially harmful collective action. It acknowledges the fact that besides the effects on individual workers, profit sharing provides incentives to unions which are distinct players from workers. By aligning incentives with employers, profit sharing disjoints incentives from those of unions, which have to adapt their action accordingly. They may be less able to organise strikes, and because strikes are used as threats to bid for higher wages during bargaining with employers, unions loose bargaining power. The stylized facts in this section show that firms resort to profit sharing more in firms where unions are present, and that its usage is associated with fewer strikes. The model rationalizes these incentives and provides alongside, a new theory for the reason why unions go on strike, which is to build reputation for being strong. The predictions of the model are that an increase in the usage of profit sharing spurred by reductions in the cost of its usage leads to reductions in collective actions and wage growth. As a consequence total worker compensation may decrease. The second set of predictions

is that increases in the probability that unions exit the firm lead to an increase in the effort that unions put into the organisation of strikes, and thereby in the usage of profit sharing. The model further predicts that as a consequence strike incidence in the present and future wages move in the same direction. These results are important for income inequality but their relevance and magnitude need to be assessed in order to be able to determine how relevant they are in practice. The next chapter provides empirical evidence for the model.

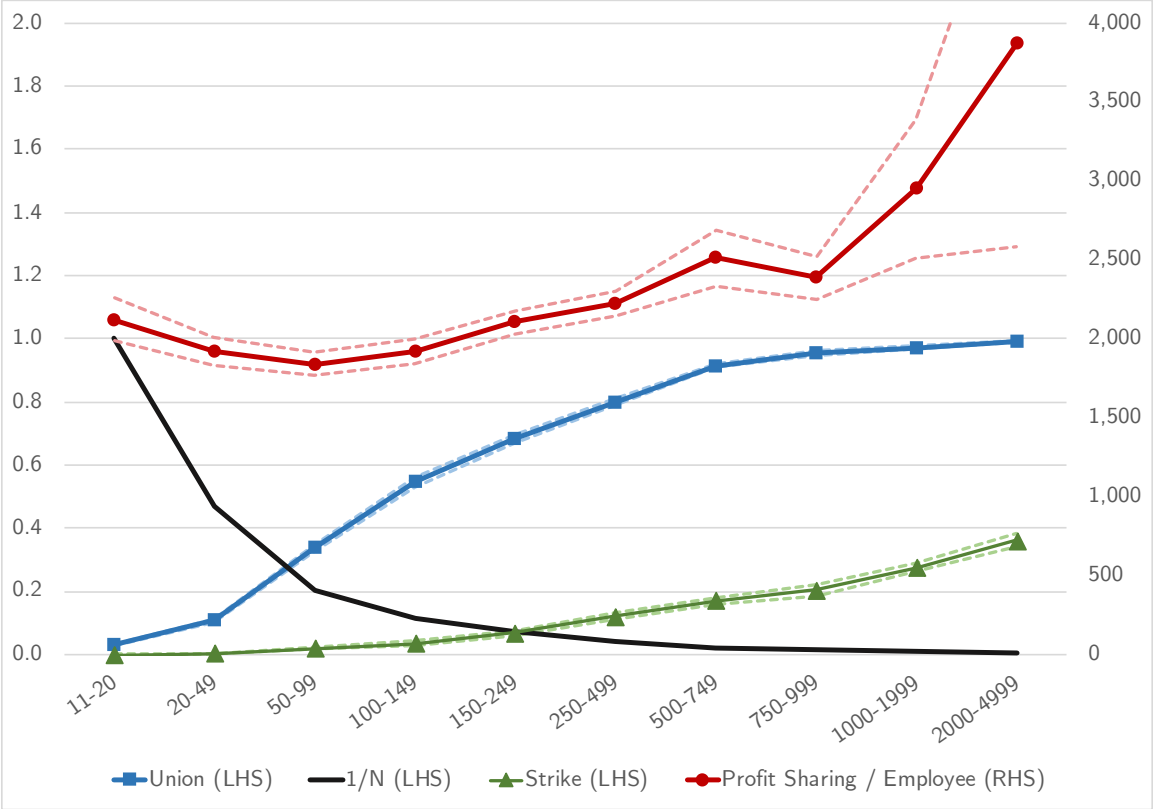
1.6 Figures

Figure 1.1: Ratio of Paid Participation to Computed Participation Using Legal Formula



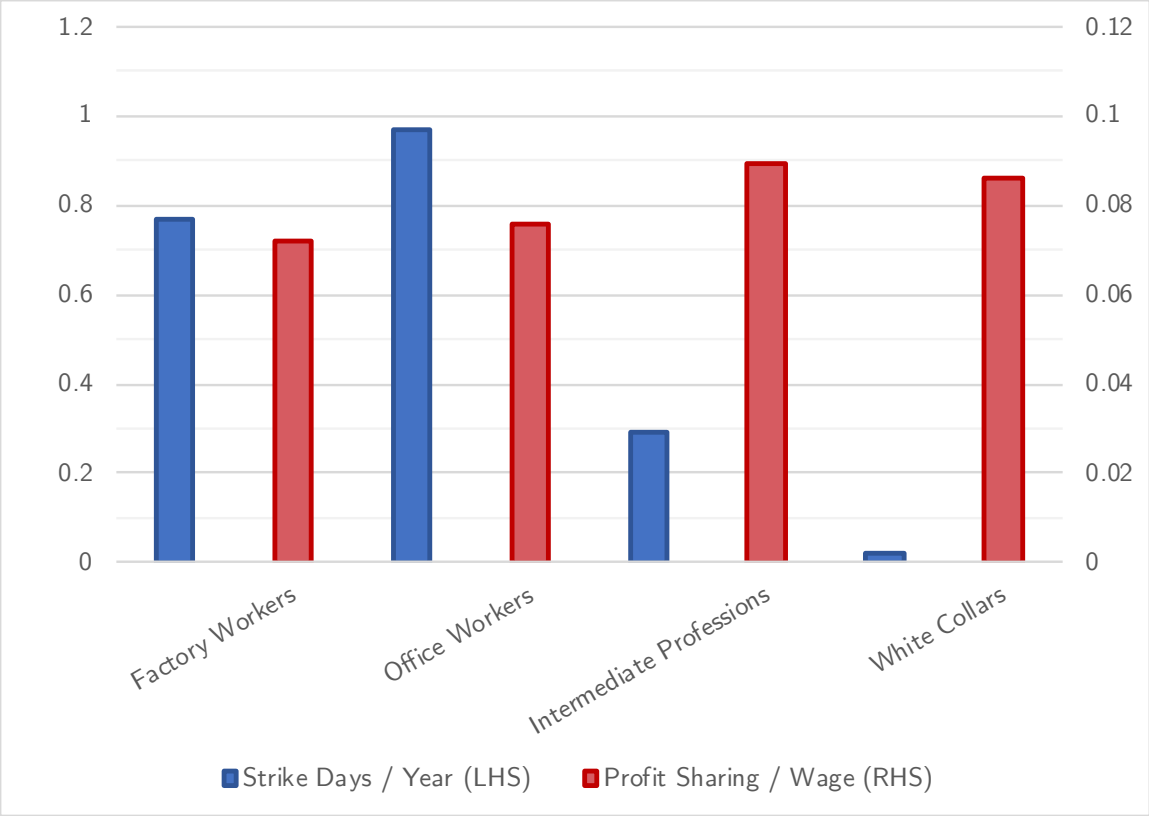
Notes: The distribution is truncated on the right hand side, so that the mass includes firms that pay participation while they should not (which ratio is undefined). The counterfactual participation is computed based on the formula of equation (1.1). The exact details of its components are legally defined by the Ministry of Finance, and available on their website: `http://bofip.impots.gouv.fr/bofip/2685-PGP.html?identifiant=BOI-BIC-PTP-10-10-20-20120912`

Figure 1.2: Profit Sharing and Individual and Collective Incentives With Respect to Firm Size



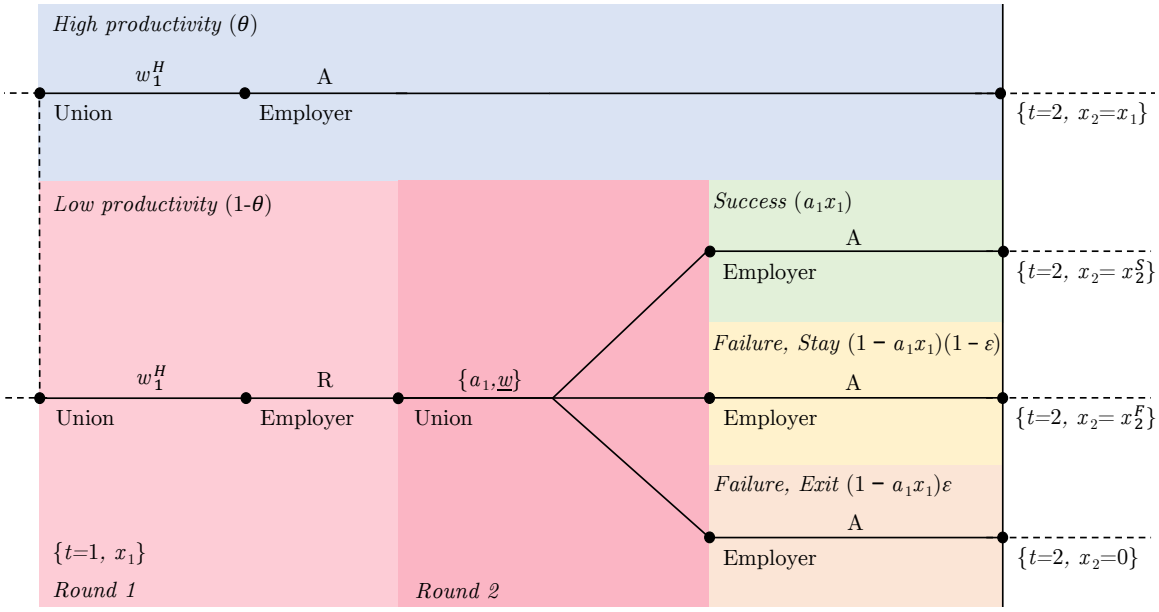
Notes: Firms are split into size bins around the regulatory threshold of 50 employees that regulates unionization and Participation plans so that the variation around that threshold stands out. The Left Hand Side axis measures the share of firms, while the Right Hand Side axis is expressed in euros. The 1/N measure is normalized to one for the first size bin. Solid lines are surrounded by 95 percent confidence intervals.

Figure 1.3: Profit Sharing And Strikes by Skill Categories of Employees



Notes: Workers are split into skill categories according to the Classification of Professions and Socioprofessional Categories, or PCS 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 in the ECMOSS database over the years 2009 and 2010.

Figure 1.4: Equilibrium Tree of the Bargaining Game



Notes: The figure represents the equilibrium path of the bargaining game in the first period. In the first round of the game the Union does not know the type of the employer and makes the wage offer w_1^H. The high productivity Employer accepts, payoffs are realized and the game moves to the second period. In the state of low productivity the employer rejects and in round 2 the Union calls for a strike with intensity a_1 while making a wage offer $\underline{w}$. ,The strike either succeeds, or it fails and the union exits with a probability. In any case the employer accepts, payoffs are realized and the game moves to the second period with the the state of reputation adjusted with respect to the outcome of the strike.

1.7 Tables

Table 1.1: Description of the Constructed Database

Number of observations	19,336
Time span	2009—2015
Number of Firms	11,074
Average length	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 whole period	974

Notes: The database has been constructed by a merge or the five different administrative sources described in section 1.3.

Table 1.2: Summary Statistics Regarding Profit Sharing Plans

			Firm Size		
		Total	11-49	50-99	100-9,999
Profit Sharing	Plan	0.23	0.13	0.58	0.79
		(0.001)	(0.002)	(0.005)	(0.002)
	Payment when Plan	0.75	0.75	0.72	0.78
		(0.002)	(0.005)	(0.005)	(0.002)
	Share of Payroll	0.052	0.052	0.049	0.055
		(0.0004)	(0.0008)	(0.0007)	(0.0007)
	Amount per Employee	2,043	2,036	1,841	2,203
		(20)	(39)	(38)	(35)
Participation	Plan	0.15	0.05	0.52	0.74
		(0.001)	(0.001)	(0.005)	(0.002)
	Payment when Plan	0.66	0.62	0.66	0.68
		(0.002)	(0.008)	(0.006)	(0.002)
	Share of Payroll	0.043	0.049	0.042	0.041
		(0.0005)	(0.0016)	(0.0006	(0.0007)
	Amount per Employee	1,666	1,956	1,536	1,595
		(24)	(82)	(33)	(34)
Intéressement	Plan	0.15	0.11	0.22	0.46
		(0.001)	(0.002)	(0.004)	(0.002)
	Payment when Plan	0.77	0.76	0.73	0.8
		(0.002)	(0.006)	(0.008)	(0.002)
	Share of Payroll	0.0426	0.0461	0.037	0.0376
		(0.0003)	(0.0006)	(0.0008)	(0.0005)
	Amount per Employee	1,690	1,802	1,467	1,554
		(17)	(31)	(44)	(29)

Notes: Standard errors in parentheses. The table displays the percentage of firms resorting to profit sharing plans computed in the Acemo PIPA survey on profit sharing. Statistics are weighted using sampling weights included in the database so that they are representative of the whole universe of firms with more that ten employees in the private sector. Participation is the legally mandated profit sharing plan for firms employing more than fifty individuals, while Intéressement is a profit sharing plan contracted at the discretion of the employer. The share of payroll is computer by the ratio of profit sharing paid to the total payroll, while the amount per employee is computed as the ration between the amount of profit sharing to the number of employees.

Table 1.3: Variance Decomposition of Profit Sharing Plans

		Standard Deviation		
		Overall	Between	Within
Profit Sharing	Plan	0.49	0.48	0.15
	Payment when Plan	0.41	0.38	0.24
	Amount per Employee	8,664	10,139	5,461
Participation	Plan	0.5	0.47	0.16
	Payment when Plan	0.47	0.42	0.27
	Amount per Employee	7,360	4,949	5,904
Intéressement	Plan	0.48	0.44	0.16
	Payment when Plan	0.4	0.37	0.25
	Amount per Employee	6,187	10,152	1,465

Notes: Standard errors are in parentheses. The table has been obtained using the Stata commmand "xtsum". The within and between variances may not sum because the reported variance estimates are the biased-corrected estimates, and because the between variance is calculated using the mean of the panel means.

Table 1.4: Summary Statistics Regarding Unions

		Firm Size		
	Total	11-49	50-99	100-9,999
Firms with Union	0.15	0.07	0.34	0.70
	(0.002)	(0.002)	(0.006)	(0.003)
Conditional on Having a Union				
Number of Unions	1.92	1.51	1.61	2.46
	(0.007)	(0.024)	(0.019)	(0.009)
Reformist Only	0.48	0.59	0.53	0.37
	(0.008)	(0.022)	(0.014)	(0.004)
Radical Only	0.17	0.23	0.21	0.10
	(0.005)	(0.014)	(0.009)	(0.002)
Mixed Structure	0.35	0.19	0.26	0.53
	(0.007)	(0.012)	(0.010)	(0.004)
Firms with Strike	0.080	0.029	0.056	0.136
	(0.002)	(0.023)	(0.005)	(0.001)
Conditional on a Strike				
Strike Length (Worker-Days)	249	23	50	339
	(73)	(6)	(16)	(43)
Share Working Time Lost	0.0024	0.0026	0.0030	0.0022
	(0.0004)	(0.0007)	(0.0010)	(0.0002)

Notes: Standard errors are in parentheses. The table displays the percentage of firms with unions and their decomposition computed in the Acemo DSE survey on industrial relations. Statistics are weighted using sampling weights included in the database so that they are representative of the whole universe of firms with more that ten employees in the private sector. Unions are grouped according to the Radical/Reformist divide along the left/right political spectrum in France. A mixed structure inside the firm means that both type of unions are present. Strike length is computed by summing the number of days that individual workers have gone on strike.

Table 1.5: Summary Statistics Regarding Elections of Worker Representatives by Size

	Firm Size											
	11-19	20-49	50-99	100-149	150-249	250-499	500-749	750-999	1,000-1,999	2,000-4,999	5,000-9,999	Total
Election (1)	0.286	0.285	0.287	0.313	0.300	0.309	0.304	0.314	0.318	0.367	0.408	0.29
	(0.011)	(0.006)	(0.007)	(0.008)	(0.007)	(0.007)	(0.006)	(0.009)	(0.007)	(0.010)	(0.020)	(0.002)
Election (2)	0.268	0.260	0.253	0.261	0.244	0.244	0.241	0.243	0.235	0.270	0.325	0.26
	(0.011)	(0.006)	(0.006)	(0.007)	(0.007)	(0.006)	(0.005)	(0.008)	(0.006)	(0.009)	(0.018)	(0.002)
Concurrent Elections	0.97	0.95	0.93	0.89	0.88	0.83	0.76	0.70	0.64	0.55	0.47	0.93
	(0.004)	(0.003)	(0.004)	(0.005)	(0.005)	(0.005)	(0.006)	(0.009)	(0.008)	(0.011)	(0.023)	(0.001)
Number Workplaces	1.3	1.5	2.0	3.3	4.6	7.2	16	23	45	98	164	2.3
	(0.01)	(0.01)	(0.04)	(0.08)	(0.13)	(0.20)	(0.48)	(0.98)	(1.30)	(4.07)	(11.81)	(0.09)

Notes: Standard errors are in parentheses. Election (1) is the proportion of workplaces having elections, while Election (2) is the proportion of employees called to vote for elections in a firm. The variable Concurrent Elections denotes the share of firms that have elections at all of their workplaces the same year. Number Workplaces reports the average number of workplaces inside the firm-size category. The sample consists of the whole universe of workplaces that have reported election records to the administration.

Table 1.6: 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 Plan	0.757	0.718	0.824	0.820
	(0.025)	(0.022)	(0.003)	(0.003)
	[300]	[419]	[15,272]	[15,991]
Share 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. The table reports the proportion of firms resorting to profit sharing plans and those paying profit sharing conditional on having a plan. The sample consists of the database constructed by the merge or the five different administrative sources described in section 1.3.

Table 1.7: 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				
Nb 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	43	27	819	817
	(29)	(13)	(174)	(173)
	[1,229]	[699]	[17,408]	[19,336]
Lost Work Days	0.001	0.001	0.002	0.002
	(0.000)	(0.001)	(0.000)	(0.000)
	[1,229]	[699]	[17,405]	[19,333]

Notes: Notes: Standard errors in parentheses and number of observation in brackets. The table reports the same statistics as table 2.3 but the sample consists of the database constructed by the merge or the five different administrative sources described in section 1.3.

Table 1.8: Summary Statistics of the Merged Database — Elections

	Firm Size			
	11-49	50-99	100-9,999	Total
Election (1)	0.290	0.280	0.321	0.319
	(0.023)	(0.022)	(0.004)	(0.003)
	[398]	[436]	[15,541]	[16,375]
Election (2)	0.262	0.237	0.249	0.249
	(0.021)	(0.020)	(0.003)	(0.003)
	[398]	[436]	[15,541]	[16,375]
Concurrent Elections	0.942	0.931	0.724	0.734
	(0.012)	(0.012)	(0.003)	(0.003)
	[411]	[451]	[16,699]	[17,561]

Notes: Standard errors in parentheses and number of observation in brackets. The table reports the same statistics as table 2.4 but the sample consists of the database constructed by the merge or the five different administrative sources described in section 1.3.

Table 1.9: Summary Statistics of the Merged Database — Firm Characteristics and Performance

	Firm Size			
	11-49	50-99	100-9,999	Total
Number of Employees	46	97	1,127	1,021
	(3.8)	(4.2)	(27.2)	(24.6)
	[1,231]	[699]	[17,553]	[19,483]
Firm Age	20.910	23.920	27.450	26.900
	(0.386)	(0.551)	(0.124)	(0.117)
	[1,209]	[665]	[16,807]	[18,681]
Number of Workplaces	1.6	2.1	30.9	28.0
	(0.069)	(0.108)	(0.668)	(0.605)
	[1,228]	[693]	[17,490]	[19,411]
Return on Assets	0.139	0.029	0.018	0.016
	(0.043)	(0.006)	(0.002)	(0.003)
	[1,022]	[575]	[14,863]	[16,460]
Average Productivity	0.051	0.040	0.045	0.045
	(0.004)	(0.002)	(0.003)	(0.003)
	[1,049]	[583]	[14,903]	[16,535]
Debt to Assets	0.650	0.514	0.471	0.484
	(0.113)	(0.013)	(0.005)	(0.008)
	[1,022]	[575]	[14,864]	[16,461]

Notes: Standard errors in parentheses and number of observation in brackets. The sample consists of the database constructed by the merge or the five different administrative sources described in section 1.3. Return to Assets has been constructed as the ratio of after tax profits to assets reported in the financial statements of the ESANE database. Productivity has been computed as the ratio of added value reported in ESANE to the number of employees. The Debt variable consists of all types of short term and long term debt reported in ESANE.

Table 1.10: Regression of the Participation Paid on its Formula

	(1)	(2)
VARIABLES	Participation	
Added Value	0.815***	0.203***
	(0.0248)	(0.0515)
Payroll	-0.0241	0.536***
	(0.0245)	(0.0749)
Profits - 5% Equity	0.158***	0.0735***
	(0.00532)	(0.0110)
Year FE	Yes	Yes
Industry FE	Yes	No
Region FE	Yes	No
Firm FE	No	Yes
Observations	11,478	11,478
R-squared	0.630	0.036
Number of firms		4,935

Notes: Standard errors in parentheses. The sample consists of the firms reporting positive amounts of participation in the ESANE database of financial statements of companies. The table reports a regression of the logarithm amount of Participation to the the variables of its formula as legally defined: $1/2 \times Payroll/Added\ Value \times (Profits - 5\%Equity)$. *** p<0.01, ** p<0.05, * p<0.1

Table 1.11: Profit Sharing and Unions

	(1)	(2)	(3)	(4)
VARIABLES		Profit Sharing Plan		
Union	0.269***	0.117***	0.109***	
	(0.00669)	(0.00778)	(0.00775)	
Reformist				0.0976***
				(0.0111)
Radical				0.110***
				(0.0143)
Mix				0.0606***
				(0.0137)
Number Unions				0.0269***
				(0.00697)
Number Unions^2				-0.00689***
				(0.000908)
Employees		0.0774***	0.0940***	0.115***
		(0.00219)	(0.00274)	(0.00299)
Return on Assets			0.0653***	0.0590***
			(0.0167)	(0.0166)
Average Productivity			0.0665***	0.0693***
			(0.00347)	(0.00346)
Firm Age			0.0329***	0.0302***
			(0.00376)	(0.00374)
Number Workplaces			-0.0237***	-0.0251***
			(0.00201)	(0.00199)
Debt to Assets			-0.0910***	-0.0976***
			(0.0161)	(0.0160)
Year FE	Yes	Yes	Yes	Yes
2-Digit Industry FE	Yes	Yes	Yes	Yes
Observations	19,490	19,490	15,953	15,953
R-squared	0.219	0.266	0.230	0.241

Notes: Standard errors in parentheses. The table reports linear regression of the presence of a profit sharing plan on measures of union presence inside firms. Non dummy variables are logged, and all of them are defined in section 1.3. *** p<0.01, ** p<0.05, * p<0.1

Table 1.12: Profit Sharing and Compensation

	Wage		Total Compensation	
VARIABLES	(1)	(2)	(3)	(4)
Profit Sharing Plan	0.0674***	-0.0269**	0.133***	0.000918
	(0.0126)	(0.0121)	(0.0153)	(0.0142)
Employees	0.0440***	0.0476***	0.0305***	0.0351***
	(0.00480)	(0.00434)	(0.00576)	(0.00485)
Return on Assets	0.00577	-0.202***	0.108***	-0.166***
	(0.0523)	(0.0750)	(0.0290)	(0.0466)
Productivity		0.233***		0.327***
		(0.0129)		(0.0171)
Firm Age	0.0163**	0.00588	0.0226***	0.00739
	(0.00678)	(0.00576)	(0.00841)	(0.00664)
Number of Workplaces	-0.0430***	-0.0395***	-0.0259***	-0.0208***
	(0.00351)	(0.00338)	(0.00639)	(0.00494)
Debt Ratio	-0.192***	0.0383	-0.313***	0.00782
	(0.0448)	(0.0512)	(0.0364)	(0.0481)
Observations	16,303	16,134	16,303	16,134
R-squared	0.059	0.293	0.058	0.399

Notes: Standard errors in parentheses. The table reports linear regression of the presence of a profit sharing plan on measures of union presence inside firms. Non dummy variables are logged, and all of them are defined in section 1.3. *** p<0.01, ** p<0.05, * p<0.1

Table 1.13: Strike Incidence and Profit Sharing

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Strike	Length	Strike	Length	Strike	Length	Strike	Length
Profit Sharing Plan	0.0372***	0.188***	-0.0840***	-0.519***	-0.0798***	-0.557***	-0.0561***	-0.403***
	(0.00773)	(0.0404)	(0.00787)	(0.0407)	(0.00917)	(0.0479)	(0.00922)	(0.0483)
Employees			0.0948***	0.553***	0.106***	0.619***	0.0651***	0.462***
			(0.00215)	(0.0112)	(0.00297)	(0.0156)	(0.00364)	(0.0191)
Number Workplaces					-0.0167***	-0.0918***	-0.0124***	-0.0776***
					(0.00234)	(0.0123)	(0.00233)	(0.0122)
Return on Assets					-0.0137	-0.108	-0.00460	-0.0996
					(0.0193)	(0.101)	(0.0193)	(0.101)
Average Productivity					0.000911	0.0625***	-0.00306	0.0372*
					(0.00400)	(0.0209)	(0.00408)	(0.0214)
Reformist							-0.0131	-0.0154
							(0.0129)	(0.0676)
Radical							0.0748***	0.311***
							(0.0167)	(0.0872)
Mix							0.0968***	0.491***
							(0.0160)	(0.0834)
Number Unions							-0.0299***	-0.368***
							(0.00811)	(0.0425)
Number Unions^2							0.00906***	0.0766***
							(0.00106)	(0.00556)
Firm Age							-0.0161***	-0.0930***
							(0.00437)	(0.0229)
Debt to Assets							-0.0175	-0.166*
							(0.0186)	(0.0974)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2-Digit Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	19,490	19,333	19,490	19,333	16,233	16,099	15,953	15,820
R-squared	0.066	0.085	0.150	0.188	0.160	0.196	0.194	0.227

Notes: Standard errors in parentheses. The table reports linear regressions of the presence of a strike and of the measure of its length on the presence of profit sharing plans and additional controls. Non dummy variables are logged, and all of them are defined in section 1.3. *** p<0.01, ** p<0.05, * p<0.1

Table 1.14: Change in Union Composition and 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)
Employees			-0.0527	-0.0888
			(0.0844)	(0.101)
Return on Assets				0.100
				(0.278)
Average Productivity				-0.0515
				(0.0613)
Year FE	Yes	Yes	Yes	Yes
2-Digit Industry FE	Yes	Yes	Yes	Yes
Observations	3,561	3,561	3,561	3,561
Nb Firms	820	820	820	820

Notes: Standard errors in parentheses. 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, and all of them are defined in section 1.3. *** p<0.01, ** p<0.05, * p<0.1

CHAPTER 2

Empirical Evidence for the Usage of Profit Sharing Against Unions and Its Effects on Wage Growth

2.1 Introduction

This chapter brings empirical evidence in favor of the theory developed in Chapter 1. This section provides evidence for the theory that profit sharing is used to disincentivize collective action and to weaken unions by testing the predictions of the model. The identification strategy is based on the fact that election years give a source of exogenous variation in the probability of exit of unions as captured by the parameter ε in the model. The analysis is divided into three parts. I first estimate the direct and unconditional effect of elections on profit sharing, strikes, and wage growth, the endogenous variables of the model, to test predictions 1 and 2. The results are consistent with the case when the employer wins over unions: at the beginning of election years, firms increase their usage of profit sharing plans at the extensive margin by 3 percent; during the year, the incidence of strikes falls both at the intensive and extensive margins; the year after, the labor share in surplus is reduced and wage growth falls significantly for low skilled workers.

Second, I use election years as an instrument for profit sharing in a Two-Stage Least Squares (2SLS) estimation to quantify the effects of the increased usage profit sharing due to elections. Sharing profits before elections leads to a significant reduction in strike intensity and in the probability of having a union by 10 percent. The

year after, wage growth falls by 13 percent on average, but the effect is larger for lower skilled workers. For intermediate employees, office and factory workers wage growth drops by 22, 30 and 42 percent respectively, while White Collar wages are unaffected. These differential outcomes are consistent with the weakening effect of profit sharing on unions, which bargain mostly in favor of Blue Collar workers, while the evolution of White Collar wages is more dependent on individual wage bargaining with the employer or with direct supervisors. The data provides additional evidence for the channel of the effect of profit sharing. Its usage has a consequence on bargaining outcomes as well. It leads to a decrease by 10 to 15 percent in the likelihood that unions conclude a wage bargaining agreement the year of elections and the year after.

Third I test the last prediction of the theory, which is that profit sharing weakens unions by having a direct effect on the outcome of election — measured by the probability of exit in the model. To do that I replicate the 2SLS estimation, conditional on the aggressiveness of unions measured by their strike behavior. I find that the increased usage of profit sharing is associated with an effect on the composition of unions inside the firm. It leads to an increase in Reformist runners and to a higher likelihood that they are elected, measured by an increase by 15 percent in the probability that Reformist unions only operate inside the firm the year after elections.

The chapter contributes to the empirical literature on bargaining. It provides and tests a mechanism for a dynamic substitution of profit sharing to wages in favor of employers, caused by an endogenous decline of unions over time. Thereby, it complements a series of papers in the empirical literature. A strand of them has examined the link between the presence of unions and profit sharing. They have either found a positive (Kruse, 1993; Pendleton, 1997), a negative (Ng and Maki, 1994; Jones and Pliskin, 1997), or no correlation (Pendleton, 2006). While Kochan,

McKersie, and Chalykoff, 1986 and Freeman and Kleiner, 1990 have documented that profit sharing could be used in the context of unionization drives in the United-States to bribe employees not to unionize. The other strand are papers that have looked at the link between profit sharing and worker compensation and more particularly at the potential substitution between the two. Weitzman, 1984 explains how profit sharing can be a tool for firms to gain market shares by channeling lower wages into lower prices and that the expected total compensation should not change after adoption of the plan. Kruse, Freeman, and Blasi, 2010 or Long and Fang, 2012 find that firms that adopt profit sharing pay also higher wages, but the link is not causal. In the context of France (Mabile, 1998) has found a negative correlation of profit sharing and wages in the long run, while (Cahuc and Dormont, 1992; Delahaie and Duhautois, 2019) have not found a significant one. The present chapter links all these pieces together by providing empirical evidence for the negative effect of profit sharing on wages and total compensation. It also supports the mechanism for this substitution which happens because of the loss of bargaining power for unions. The results fo 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.

Eventually, the results regarding the change in the composition of unions support the theory advocated by Breda, 2011 and supported empirically by Bourdieu and Breda, 2011 and Bourdieu, Breda, and Pecheu, 2019. According to it, French union representatives are divided between those that are sincere in their duty of defending workers' interests and those which are not. These "corrupt" representatives could be bought by employers and favored in their careers in exchange of their leniency at the bargaining table. Profit sharing would thus be a bribe to help elect that king of union representatives. The change in the composition of unions in favor of Reformist brands supports this idea because Reformist unions are proponents of a

more consensual approach to bargaining with employers.

More broadly, the chapter questions the policies that have been implemented in order to promote the usage of profit sharing by firms. In the United-States, since the Employee Retirement Income Security Act of 1974 firms' contributions to employee stock ownership plans are tax deductible up to a limit of 25 percent of covered payroll. Similarly, in France a series of laws in the early 2000s promoted the usage of profit sharing and exempted it from payroll taxes. The results of this chapter suggest that these policies may have played a role in the decline of unions over the last four decades. Since the decline of unions has been a large contributor to the increase in wage inequality (Card, Lemieux, and Riddell, 2004; Blanchflower and Bryson, 2004), a natural question is whether policy makers who would want to reduce income inequality should keep subsidizing profit sharing? At the end of the chapter I discuss a few policies that policy makers could implement in response to this interrogation.

Section 2.2 presents the empirical analysis and discusses its results, and Section 2.3 concludes.

The chapter is organized as follows. In Section 2.2 I lay out the identification strategy, and I document the behavior of unions using a series of case studies, in Section 2.3 I discuss the results and perform robustness checks, in Section 2.4 I conclude.

2.2 Identification Strategy

Identification is based on the comparison of outcomes across firm-year observations between those firms that are "treated" with elections in a given year and those that are not. Before I discuss its technical details, I document the mapping between elections and the increase in the probability of exit using a series of case studies that have surveyed employers and union members about elections of worker representatives. I also rely on this piece of descriptive documents to provide evidence that the

mechanisms outlined in the model are indeed happening in practice. First, unions internalize the competitive pressure that elections put on them, second, they respond to it by being more aggressive either when organizing collective actions or when bargaining with employers, third, employers use profit sharing in response with the goal to influence bargaining, collective action and elections at their advantage.

2.2.1 Elections, Exit and the Behavior of Employers and Unions in Practice

As explained in Section 1.3, since 2009 elections determine which unions are legitimate to bargain with the employer as well as which can sign binding agreements. In two reports of thirty eight case studies Béroud et al., 2011 and Hege et al., 2014 describe the changes that union members report with respect to to new legal framework. I use these reports and other case studies to document, first, the link between elections, exit, and the aggressiveness of unions, second, the response of employers with regard to profit sharing.

The elections drive an increase in the probability of exit, first, because of the new rules set by the law. Any union that has not reached the 10 percent threshold cannot be represented by a union delegate who would bargain with the employer. The link between elections and the increase in the probability of exit is very significant in the data as shown by stylized fact 7. It is confirmed by the reports in which a majority of union representatives account for an increase in exit after elections due to the new electoral rules, which in some cases happened for unions that had been implanted in their firm for many years.

This increase in the probability of exit was internalized by unions and has put a higher competitive pressure on them. Both reports note that the 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, this competition drives an 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, again 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 Radical brand in order to show voters that they would stand up for employees and oppose directors. Béroud et al., 2011 report the same strategy, consisting of campaigning on a message of "dissatisfaction against the employer" used by unions that are of the Reformist color as well. Union members also note the importance of communication on 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 reports how he "gave more than what he would have wanted" because the representative was a "very skilled negotiator". Note that this competition is not only happening in firms with multiple unions, but that representatives acknowledge the potential threat from outsiders as well.

There are a few reasons why the effect should be concentrated just prior to elections. First organization and bargaining are costly, and it is more rational to invest closer to the election date because workers will internalise and remember the action of the union better, or simply because of turnover and the fact that new recruits will not necessary be familiar with past actions. Further, as reported in 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 now 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 into an establishment inside the firms and it would lose

it.[1] This increase in aggressiveness caused by the new legal framework has also been documented by Askenazy and Breda, 2019, who use a regression discontinuity design to show an increase in work stoppages, as a well in union coverage and membership.

All these studies support the link between election, the increase in the probability of exit, and its effect on the aggressiveness on unions, which is half of the mechanism of the model with respect to variations in the probability of exit. The second side of the mechanism is that employers internalize the increase in the aggressiveness of unions and try to prevent it by resorting to profit sharing. First, the fact that employers have internalized the change in union behavior is reported both in case studies of Béroud et al., 2011 and Hege et al., 2014. In fact historically unions have been wary of grounding their legitimacy of representation in elections because of the threat that employers manipulate elections.(Béroud, Le Crom, and Yon, 2012) In fact, Béroud et al., 2011 outline that the new legal framework has pushed employers to meddle with elections since they offer an opportunity of getting rid of Radical unions. In one case where the election gave the majority to a union very friendly to employers, they report a drop in bargaining activity during the eighteen months after the election. Besides this, other pieces of work have reported how employers resort to profit sharing precisely to disincentivise collective action and wage bargaining (Cottereau and Frinault, 2006; Giraud, 2015). In particular employers may announce the expected amount of profit sharing just before the onset of elections in a strategic move to put workers on their side. This is something that a union member reports

[1]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 national railway company (Even if the company is private, the French sate is its majority shareholder). Andolfatto, Dressen, and Finez, 2012 analyse how competition between unions and the stakes of elections at the end of the year fulled one of the company's longest strike in 2010. Note that as Béroud et al., 2008 also report it, the strike was driven by the competition between the two Radical unions CGT and SUD for wining 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, 2017 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.

in Béroud et al., 2011 as well. Eventually, this was confirmed independently, in an interview that I conducted personally with Alain Alphon-Layre, member of the board of the CGT union confederation in charge of collective bargaining.

2.2.2 Causality and Threats to Identification

For the strategy to be a test of the model, it must identify a causal effect of the probability of exit. This is based on the exogeneity in the timing of the electoral cycle. As argued by Askenazy and Breda, 2019, there is good amount of facts that justify that the timing of elections is exogenous.

First, it is the moment when a firm reaches a size of eleven (for Personnel Delegates) or fifty (for Works Councils) employees that determines the first occurrence of an election. The legal length of a term is four years but it can be set to two or three years at the moment of the first election with an 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. Second, all representatives are protected from layoffs so that the employer cannot precipitate anticipated elections by firing representatives. Further, they are elected jointly with deputy members who would take over representation in that case, and only when 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 unless they are only two of them in the workplace. So the most likely reason for endogeneity in the incidence of an election comes from the timing of the moment when a firm gets past the 50-employee threshold and from the choice of the length of the term at that moment. Because the estimation is based on a majority

of large firms, this potential bias in unlikely to have a large incidence. Note also that it is not clear how this bias would play. Firms may want to set elections to a moment when they would not drive unionization, in which case they would not have to use profit sharing to weaken the unions. This would bias the results towards no effect. Conversely if there are unions already present inside the firm they want to set the timing such that the effect of profit sharing is stronger. That case would bias the estimates upward. If the timing of elections is exogenous, the treatment is assigned at random across the population of firms. Consequently the estimated coefficient is the causal effect of elections on the outcome variables. Figure 2.1 shows empirically that more than 95 percent of firms respect the legal length of mandate that they declare. For a small proportion the length is postponed by a few months because of the organization of second rounds when there are not enough candidates.

Given that the timing of elections is most likely to satisfy the exogeneity condition, the additional threat to identification comes from the existence of confounding variables that are correlated with profit sharing, strikes and wages in such a way that they drive the same results as the predictions of the model. I discuss this possibility after presenting the results of the test of the model in the next section.

2.3 Results

2.3.1 Test of Predictions 1 and 2: The Unconditional Effect of Elections

This subsection tests the first set of predictions of the model. I estimate equations of the following form, with an event study approach:

$$Y_{j,s} = \beta Elec_{j,t} + X_{j,t}\gamma + \tau_t + \varphi_j + \mu_{j,t} \tag{2.1}$$

Where $Y_{j,s}$ is an outcome variable of firm j at time s with in the main analysis $s \in \{t, t+1\}$. The variable $Elec_{j,t}$ is a measure of the percentage of workplaces

having elections, as defined in Section 1.3. I use the proportion of workplaces with elections, but the results do not vary significantly with the other measure based on the proportion of employees invited to vote in elections. The other variables are a vector of controls, $X_{j,t}$, and year and 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 which can be interpreted as growth rates. Outcome variables are measures of profit sharing, strikes, number of unions, and compensation growth. In the case of a dummy outcome variable the equation is estimated using a logit with a maximum likelihood technique.

Controls include variables that also determine the usage of profit sharing: measures of performance and productivity, size, age, and indebtedness. Performance and productivity are measures on which the profit sharing formula can be based upon. Larger and older firms are more likely to have profit sharing because of the law mandating them to implement the Participation scheme past the fifty employee threshold. The degree of indebtedness 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 and Ouimet, 2014).

Conditional on firm size, all controls should be uncorrelated with the election measure. This is shown in table 2.14, which reports a modified version of the equation above, where controls are regressed on and elections and measures of firm size. None of the coefficient is significant.

Prediction 1 states that the increase in the probability of exit due to elections should increase the usage of profit sharing. Table 2.15 displays the estimation of equation (2.1) for the effect of elections on the usage of profit sharing and its two components Intéressement and Participation, at the onset of the year with elections, and the year after. The results show that Elections are associated with an increase in the probability of paying profit sharing at the beginning on the year of elections,

but without any significant change the year after. The size of the effect is measured by an increase of a $\exp 0.196 = 1.2$ factor 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. Note that the adjustment comes rather from the increase in the payment of Participation, which at the mean increases by 3.4 percent. As argued in section 1.3 it is very likely that firms adjust participation at their own discretion.

Prediction 2 states that elections should either increase strike incidence and wage growth or have the opposite effect, depending on the strength of the effect of profit sharing. Table 2.16 reports the estimation for strike and union outcomes on the year of elections and the year after, while tables 2.17 and 2.18 display the results for same year and next year compensation variables. First, elections reduce strike incidence and its length the same year, while they do not have significant effects the year after. The decrease in the likelihood of a strike at the mean occurrence is 2 percent, while the average strike length falls by 10 percent. Second elections reduce wage growth and the labor share in the surplus the year after. The effect is stronger for lower skilled employees and non significant for White Collars. Note that there is no effect on compensation outcomes the year of elections.

These two sets of results are consistent with Prediction 2 in the case when the firm wins over the union. This is supported also by the effect of elections on the presence of unions, reported in table 2.16. Elections increase the number of unions the year of elections, which can be due to the fact that elections attract candidates. However the year after, elections have the effect of decreasing the number of unions. This is potentially more than an offset of the increase the year of elections, but its confidence interval does not allow to conclude for more that with confidence.

The results provide evidence for the first two predictions of the model, but can they be driven by an unidentified confounding factor as mentioned in the previous section on identification? Preferences are a potential candidate, but their changes

have to be such that they can only be expressed at the moment of elections. If for example employees had become more favorable to profit sharing over time there is no reason for the increase in the usage of profit sharing to be concurrent with the moment of the elections. Only changes in preferences with regard to union color are those that can be channeled in elections years and not at other moments. There is no reason for that to have happened during the period of analysis, and no hint of such transformation exists in the cases studies that review recent changes with respect to elections of worker representatives cited above. However one can argue that preferences are unlikely to interfere with the mechanism of the model. There are two possibilities: either employees' taste has become more favorable to Reformist unions, or it is the opposite. In the first case, the change in preferences would attenuate the need for employers to use profit sharing if it were used to rig the outcome of elections in favor of Reformists — since employees would already take charge of that to some extent. In the second case then the usage of profit sharing would be amplified by the change in preferences for the opposite reason. However these changes would not interfere with the mechanism of the model which is that the increased likelihood of exit drives competition for voters and thereby the aggressiveness of unions. They would only affect its amplitude.

2.3.2 The Unconditional Effects of Profit Sharing in Conjunction with Elections

The previous section estimates the effect of elections, but it does not give estimates of the effect of sharing profits with employees. The former can be interpreted as first stage and reduced form specifications to be used in a 2SLS estimation method in the same way Levitt, 1997 does with elections of local representatives to estimate the effect of police on crime. If elections were to only affect profit sharing then they would be a valid instrumental variable (IV) for the estimation of the effects of its

usage. It could be measured by $\hat{\beta}_Y/\hat{\beta}_{PS}$, the ratio of the reduced form estimate on outcome Y over the estimate of the IV on profit sharing. However since elections also affect variables that are endogenous to profit sharing, the estimates 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 to those 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.

The specification for this analysis is an augmented version of the traditional 2SLS estimation procedure because the first stage is a Probit model, which is non linear. A classic 2SLS would be a "forbidden regression" as coined by Hausman, 2001, because the fitted values of the first stage require much more restrictive conditions to be uncorrelated with the error term in the second stage. To estimate the model more efficiently I use a method developed by Wooldridge, 2001 and used by Adams, Almeida, and Ferreira, 2009 that consists of a three step estimation. The first stage is a Probit of the form of equation (2.1):

$$PS_{j,t} = \lambda_1 Elec_{j,t} + X_{j,t}\delta_1 + \tau_t + \iota_i + \rho_r + \xi_{j,t} \tag{2.2}$$

It is the effect of elections on the payment of profit sharing, but in a regression with industry and region fixed effects, ι_i and ρ_r, instead of firm fixed effects. The specification with firm fixed effects does not have enough power as the F-statistic would be close to 4. Nonetheless since elections are supposed to be random, the effect of elections on profit sharing should not be affected by the change in specification. Table 2.19 reports the coefficients on the election variable of this reduced form specification with different levels of fixed effects. Note that even though they are lower, they remain in the same range as the estimate with firm fixed effects.

The second stage of the procedure is an OLS regression of profit sharing on the

fitted values from the first stage and controls:

$$PS_{j,t} = \lambda_2 \tilde{PS}_{j,t} + X_{j,t}\delta_2 + \tau_t + \iota_i + \rho_r + \nu_{j,t} \tag{2.3}$$

Where $\tilde{PS}_{j,t}$ are the predicted values from the first stage Probit. The last stage is the same as the usual second stage of the 2SLS:

$$Y_{j,s} = \beta \hat{PS}_{j,t} + X_{j,t}\gamma + \tau_t + \iota_i + \rho_r + \mu_{j,t} \tag{2.4}$$

Where $\hat{PS}_{j,t}$ are the fitted values from equation (2.3) and again $s \in \{t, t+1\}$. Tables 2.20 to 2.24 display the results on union and compensation outcomes as the previous sections, and completes the analysis with the effect on bargaining outcomes.

The usage of profit sharing before elections leads to a reduction in strike intensity, as well as in the probability of having a union by 10 percent the year of elections and by 15 percent the year after, if the model is estimated at mean values. The point estimate for the effect on strike length is very large and its interpretation would mean that strike intensity is reduced by 142 percent or in other words, completely annihilated. This is more the result of an statistical "blow-up" due to the estimation method, so the quantification should be taken with caution with respect to the amplitude of the effect. However estimates being significant, their confidence interval provides lower bonds for the effect. With that respect there is 95 percent confidence that profit sharing reduces strike intensity by at least 22 percent. There is no statistical effect on strike incidence, and the effect on strike length does not carry on the next year. However again that may be due to the bias through the positive effects of elections on strikes, if they indeed are there as suggested by the case studies. The increase in the effect on the presence of a union over time can also be explained by the fact that elections are an incentive for unions to run, which disappears the year after.

Profit sharing has no effect on wage grows the year of elections but induces a reduction by 13 percent on average the year after. The effect is larger for lower skilled workers who suffer decreases by 22, 30 and 42 percent for intermediate employees,

office and factory workers respectively. The wage growth of white collars is unaffected. These differential effects are consistent with the weakening effect of profit sharing on unions. Most often, union representatives bargain in favor of lower skilled workers, while White Collars bargain their pay rises individually with their employer or direct supervisor.

The set of results relative to bargaining outcomes supports these results. The larger usage of profit sharing leads to a decrease by 10 to 15 percent in the likelihood that unions conclude a wage bargaining agreement the year of elections and the year after.

2.3.3 Test of Prediction 3: The Election-Rigging Effect of Profit Sharing

The extension of the framework of the model that allows the employer to use profit sharing to affect the probability of exit of the union can be interpreted as her or his effort to rig the outcome of the elections. As described above, Reformist unions are more conciliatory with employers and likely to accept profit sharing agreements. Employers could strategically give profit sharing packages to Reformist union representatives before elections to allow them present these as trophies before employees in order to win their votes. Prediction 3 claims that there is a separate channel to the negative effect of profit sharing on unions on election years. This can be tested by controlling for the aggressiveness of unions through their strike behavior, the same way Levitt, 1997 controls for simultaneous and indirect effects of elections on crime through increased spending on education or other public policies.

The specification estimated is the same as the one in the previous section defined by equations (2.2) to (2.4), but with the additional controls of strike incidence and strike length. If these variables fully capture the effect that elections have on the increase in the aggressiveness of unions the effect estimated by the coefficient on profit sharing is the one it has on outcome variables through its incidence on the

results of elections.

Tables 2.25 to 2.27 display the results on the same set of outcomes as the analysis done so far. The estimates on the decline of unions and compensation next period are in the same range as the estimates without controls. However their significance confirms prediction 3 that profit sharing has a direct effect on the outcome of elections. The analysis of this section is further performed on additional outcomes relating to the composition of unions operating inside the firm displayed in table 2.30. The results confirm that profit sharing advantages employers with respect to electoral outcomes. The increased usage of profit sharing leads to an increase in Reformist runners the year of elections and to a higher likelihood that they are elected, measured by an increase by 15 percent in the probability that only Reformist unions operate inside the firm the year after elections.

Note from table 2.28 that the effects on bargaining outcomes is milder and non significant after controlling for the aggressiveness of unions, than its effects measured in table 2.23. This suggests that the weakened bargaining position effectively comes from a loss in reputation of the unions due to the overall negative effect on strike incidence.

2.4 Conclusion

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, which is likely to be the case because the new composition of unions will not change until the following elections. 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 2.22. The amount of profit sharing paid is computed using the average share of the wage it represents for each skills category as displayed in figure 1.3. 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 because 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 2.31 displays the results across skills categories. On average Factory and Office Workers are worse off, losing 826 and 189 euros respectively, while Intermediate and mostly White Collar workers are better off, with gains of 656 and 2,985 euros respectively. There numbers have to be taken with caution, but they give an idea of the order of magnitude of the effect of profit sharing. They are potentially lower bounds, since they do not account for any long run spillover effects with respect to the decline of unions and of their reputation. Further, they do not take into account the differences in taxation between profit sharing and wages. Firms have to pay social security contributions that fund unemployment benefits and pensions on wages but they do not on profit sharing compensation.

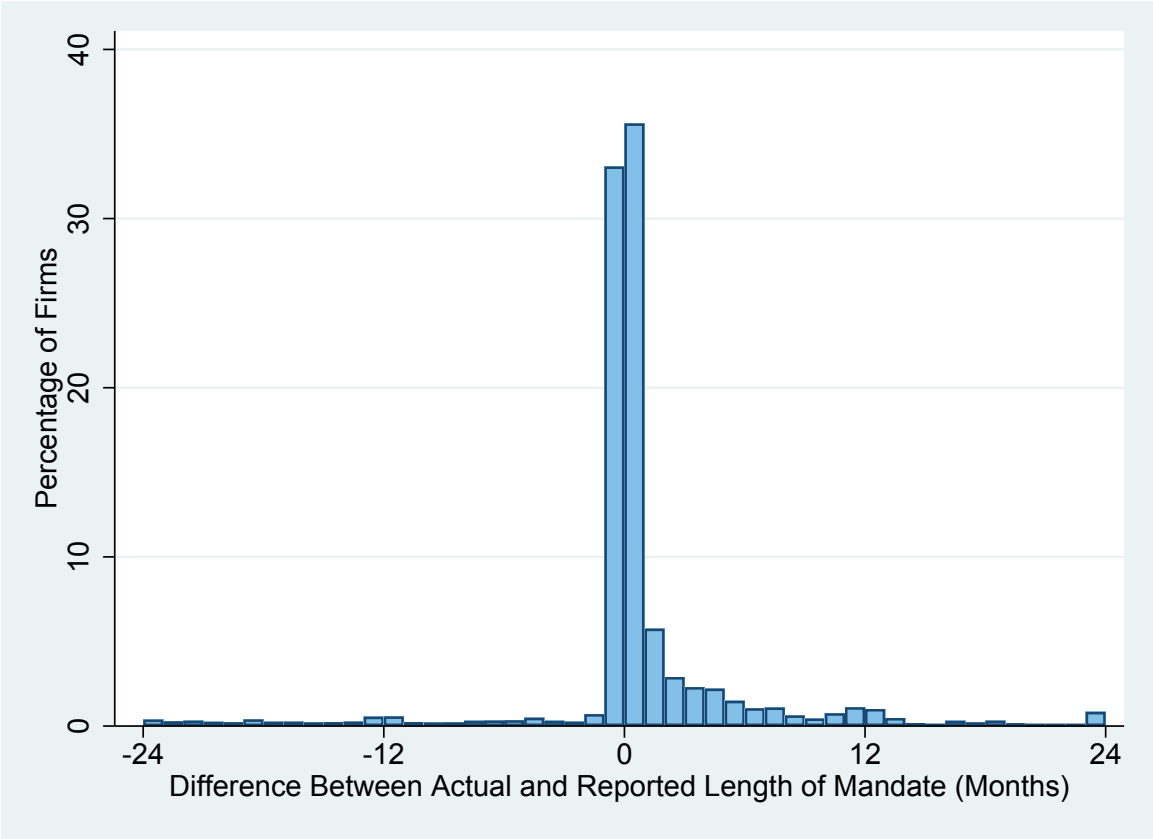
Eventually, through its differential effect across worker skills, the usage of profit sharing has the consequence of widening income inequality. White collars, who earn the highest wages on average are those who win most from profit sharing. The analysis emphasizes that unions are institutions that regulate the dynamics of income inequality, but it also opens room for policy intervention with respect to that channel

if politicians care about income inequality. Note first that profit sharing is heavily subsidized in France 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 most cases subject to a subsidy of 13 percent. Politicians have thus considerable leeway to affect profit sharing through taxation. They may not be conscious of the effect of the subsidy on wage inequality as most scientific work on profit sharing has emphasized its benefits on output, which are absent in my analysis. But the two objectives are not necessarily in conflict. The results of the chapter show that the discretionary adjustment of profit sharing against unions is partly possible because firms breach the legal constraints on its payment, in particular those on the Participation device. Politicians could implement better enforcement mechanisms to ensure that firms comply with regulation, such as mandating worker representatives to check the amounts paid yearly and report any differences to the administration who would sanction non compliers. Currently individual workers can sue employers, but the procedure may not be worth the individual cost, and it can be difficult to check that a firm has not complied. Besides taxation and ensuring better compliance, politicians could mandate that unions also benefit from profit sharing plans. This would ensure that any payment of profit sharing that can potentially harm unions compensates them at least partly with an amount of income.

The belief that unions are "sluggish institutions" that cannot "coexist with industrial competition" (Hirsch, 2008) stands in contrast with the fact that a majority of employees would unionize if they were given the opportunity (Rosenfeld, 2014) and that they do not do it for fear for their careers (Bourdieu, Breda, and Pecheu, 2019). The results in this chapter support that workers would benefit from stronger unions, and that regulation of profit sharing is a way to help achieve such an objective.

2.5 Figures

Figure 2.1: Difference between Legal and Actual Length of Mandate (back to main text)



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.

2.6 Tables

Table 2.1: Summary Statistics Regarding Profit Sharing Plans

			Firm Size		
		Total	11-49	50-99	100-9,999
Profit Sharing	Plan	0.23	0.13	0.58	0.79
		(0.001)	(0.002)	(0.005)	(0.002)
	Payment when Plan	0.75	0.75	0.72	0.78
		(0.002)	(0.005)	(0.005)	(0.002)
	Share of Payroll	0.052	0.052	0.049	0.055
		(0.0004)	(0.0008)	(0.0007)	(0.0007)
	Amount per Employee	2,043	2,036	1,841	2,203
		(20)	(39)	(38)	(35)
Participation	Plan	0.15	0.05	0.52	0.74
		(0.001)	(0.001)	(0.005)	(0.002)
	Payment when Plan	0.66	0.62	0.66	0.68
		(0.002)	(0.008)	(0.006)	(0.002)
	Share of Payroll	0.043	0.049	0.042	0.041
		(0.0005)	(0.0016)	(0.0006	(0.0007)
	Amount per Employee	1,666	1,956	1,536	1,595
		(24)	(82)	(33)	(34)
Intéressement	Plan	0.15	0.11	0.22	0.46
		(0.001)	(0.002)	(0.004)	(0.002)
	Payment when Plan	0.77	0.76	0.73	0.8
		(0.002)	(0.006)	(0.008)	(0.002)
	Share of Payroll	0.0426	0.0461	0.037	0.0376
		(0.0003)	(0.0006)	(0.0008)	(0.0005)
	Amount per Employee	1,690	1,802	1,467	1,554
		(17)	(31)	(44)	(29)

Notes: Standard errors in parentheses. The table displays the percentage of firms resorting to profit sharing plans computed in the Acemo PIPA survey on profit sharing. Statistics are weighted using sampling weights included in the database so that they are representative of the whole universe of firms with more that ten employees in the private sector. Participation is the legally mandated profit sharing plan for firms employing more than fifty individuals, while Intéressement is a profit sharing plan contracted at the discretion of the employer. The share of payroll is computer by the ratio of profit sharing paid to the total payroll, while the amount per employee is computed as the ration between the amount of profit sharing to the number of employees.

Table 2.2: Variance Decomposition of Profit Sharing Plans

		Standard Deviation		
		Overall	Between	Within
Profit Sharing	Plan	0.49	0.48	0.15
	Payment when Plan	0.41	0.38	0.24
	Amount per Employee	8,664	10,139	5,461
Participation	Plan	0.5	0.47	0.16
	Payment when Plan	0.47	0.42	0.27
	Amount per Employee	7,360	4,949	5,904
Intéressement	Plan	0.48	0.44	0.16
	Payment when Plan	0.4	0.37	0.25
	Amount per Employee	6,187	10,152	1,465

Notes: Standard errors are in parentheses. The table has been obtained using the Stata commmand "xtsum". The within and between variances may not sum because the reported variance estimates are the biased-corrected estimates, and because the between variance is calculated using the mean of the panel means.

Table 2.3: Summary Statistics Regarding Unions

		Firm Size		
	Total	11-49	50-99	100-9,999
Firms with Union	0.15	0.07	0.34	0.70
	(0.002)	(0.002)	(0.006)	(0.003)
Conditional on Having a Union				
Number of Unions	1.92	1.51	1.61	2.46
	(0.007)	(0.024)	(0.019)	(0.009)
Reformist Only	0.48	0.59	0.53	0.37
	(0.008)	(0.022)	(0.014)	(0.004)
Radical Only	0.17	0.23	0.21	0.10
	(0.005)	(0.014)	(0.009)	(0.002)
Mixed Structure	0.35	0.19	0.26	0.53
	(0.007)	(0.012)	(0.010)	(0.004)
Firms with Strike	0.080	0.029	0.056	0.136
	(0.002)	(0.023)	(0.005)	(0.001)
Conditional on a Strike				
Strike Length (Worker-Days)	249	23	50	339
	(73)	(6)	(16)	(43)
Share Working Time Lost	0.0024	0.0026	0.0030	0.0022
	(0.0004)	(0.0007)	(0.0010)	(0.0002)

Notes: Standard errors are in parentheses. The table displays the percentage of firms with unions and their decomposition computed in the Acemo DSE survey on industrial relations. Statistics are weighted using sampling weights included in the database so that they are representative of the whole universe of firms with more that ten employees in the private sector. Unions are grouped according to the Radical/Reformist divide along the left/right political spectrum in France. A mixed structure inside the firm means that both type of unions are present. Strike length is computed by summing the number of days that individual workers have gone on strike.

Table 2.4: Summary Statistics Regarding Elections of Worker Representatives by Size

	Firm Size											
	11-19	20-49	50-99	100-149	150-249	250-499	500-749	750-999	1,000-1,999	2,000-4,999	5,000-9,999	Total
Election (1)	0.286	0.285	0.287	0.313	0.300	0.309	0.304	0.314	0.318	0.367	0.408	0.29
	(0.011)	(0.006)	(0.007)	(0.008)	(0.007)	(0.007)	(0.006)	(0.009)	(0.007)	(0.010)	(0.020)	(0.002)
Election (2)	0.268	0.260	0.253	0.261	0.244	0.244	0.241	0.243	0.235	0.270	0.325	0.26
	(0.011)	(0.006)	(0.006)	(0.007)	(0.007)	(0.006)	(0.005)	(0.008)	(0.006)	(0.009)	(0.018)	(0.002)
Concurrent Elections	0.97	0.95	0.93	0.89	0.88	0.83	0.76	0.70	0.64	0.55	0.47	0.93
	(0.004)	(0.003)	(0.004)	(0.005)	(0.005)	(0.005)	(0.006)	(0.009)	(0.008)	(0.011)	(0.023)	(0.001)
Number Workplaces	1.3	1.5	2.0	3.3	4.6	7.2	16	23	45	98	164	2.3
	(0.01)	(0.01)	(0.04)	(0.08)	(0.13)	(0.20)	(0.48)	(0.98)	(1.30)	(4.07)	(11.81)	(0.09)

Notes: Standard errors are in parentheses. Election (1) is the proportion of workplaces having elections, while Election (2) is the proportion of employees called to vote for elections in a firm. The variable Concurrent Elections denotes the share of firms that have elections at all of their workplaces the same year. Number Workplaces reports the average number of workplaces inside the firm-size category. The sample consists of the whole universe of workplaces that have reported election records to the administration.

Table 2.5: 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 Plan	0.757	0.718	0.824	0.820
	(0.025)	(0.022)	(0.003)	(0.003)
	[300]	[419]	[15,272]	[15,991]
Share 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. The table reports the proportion of firms resorting to profit sharing plans and those paying profit sharing conditional on having a plan. The sample consists of the database constructed by the merge or the five different administrative sources described in section 1.3.

Table 2.6: 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				
Nb 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	43	27	819	817
	(29)	(13)	(174)	(173)
	[1,229]	[699]	[17,408]	[19,336]
Lost Work Days	0.001	0.001	0.002	0.002
	(0.000)	(0.001)	(0.000)	(0.000)
	[1,229]	[699]	[17,405]	[19,333]

Notes: Notes: Standard errors in parentheses and number of observation in brackets. The table reports the same statistics as table 2.3 but the sample consists of the database constructed by the merge or the five different administrative sources described in section 1.3.

Table 2.7: Summary Statistics of the Merged Database — Elections

	Firm Size			
	11-49	50-99	100-9,999	Total
Election (1)	0.290	0.280	0.321	0.319
	(0.023)	(0.022)	(0.004)	(0.003)
	[398]	[436]	[15,541]	[16,375]
Election (2)	0.262	0.237	0.249	0.249
	(0.021)	(0.020)	(0.003)	(0.003)
	[398]	[436]	[15,541]	[16,375]
Concurrent Elections	0.942	0.931	0.724	0.734
	(0.012)	(0.012)	(0.003)	(0.003)
	[411]	[451]	[16,699]	[17,561]

Notes: Standard errors in parentheses and number of observation in brackets. The table reports the same statistics as table 2.4 but the sample consists of the database constructed by the merge or the five different administrative sources described in section 1.3.

Table 2.8: Summary Statistics of the Merged Database — Firm Characteristics and Performance

	Firm Size			
	11-49	50-99	100-9,999	Total
Number of Employees	46	97	1,127	1,021
	(3.8)	(4.2)	(27.2)	(24.6)
	[1,231]	[699]	[17,553]	[19,483]
Firm Age	20.910	23.920	27.450	26.900
	(0.386)	(0.551)	(0.124)	(0.117)
	[1,209]	[665]	[16,807]	[18,681]
Number of Workplaces	1.6	2.1	30.9	28.0
	(0.069)	(0.108)	(0.668)	(0.605)
	[1,228]	[693]	[17,490]	[19,411]
Return on Assets	0.139	0.029	0.018	0.016
	(0.043)	(0.006)	(0.002)	(0.003)
	[1,022]	[575]	[14,863]	[16,460]
Average Productivity	0.051	0.040	0.045	0.045
	(0.004)	(0.002)	(0.003)	(0.003)
	[1,049]	[583]	[14,903]	[16,535]
Debt to Assets	0.650	0.514	0.471	0.484
	(0.113)	(0.013)	(0.005)	(0.008)
	[1,022]	[575]	[14,864]	[16,461]

Notes: Standard errors in parentheses and number of observation in brackets. The sample consists of the database constructed by the merge or the five different administrative sources described in section 1.3. Return to Assets has been constructed as the ratio of after tax profits to assets reported in the financial statements of the ESANE database. Productivity has been computed as the ratio of added value reported in ESANE to the number of employees. The Debt variable consists of all types of short term and long term debt reported in ESANE.

Table 2.9: Regression of the Participation Paid on its Formula

	(1)	(2)
VARIABLES	Participation	
Added Value	0.815***	0.203***
	(0.0248)	(0.0515)
Payroll	-0.0241	0.536***
	(0.0245)	(0.0749)
Profits - 5% Equity	0.158***	0.0735***
	(0.00532)	(0.0110)
Year FE	Yes	Yes
Industry FE	Yes	No
Region FE	Yes	No
Firm FE	No	Yes
Observations	11,478	11,478
R-squared	0.630	0.036
Number of firms		4,935

Notes: Standard errors in parentheses. The sample consists of the firms reporting positive amounts of participation in the ESANE database of financial statements of companies. The table reports a regression of the logarithm amount of Participation to the the variables of its formula as legally defined: $1/2 \times Payroll/Added\,Value \times (Profits - 5\%Equity)$. *** p<0.01, ** p<0.05, * p<0.1

Table 2.10: Profit Sharing and Unions

	(1)	(2)	(3)	(4)
VARIABLES		Profit Sharing Plan		
Union	0.269***	0.117***	0.109***	
	(0.00669)	(0.00778)	(0.00775)	
Reformist				0.0976***
				(0.0111)
Radical				0.110***
				(0.0143)
Mix				0.0606***
				(0.0137)
Number Unions				0.0269***
				(0.00697)
Number Unions^2				-0.00689***
				(0.000908)
Employees		0.0774***	0.0940***	0.115***
		(0.00219)	(0.00274)	(0.00299)
Return on Assets			0.0653***	0.0590***
			(0.0167)	(0.0166)
Average Productivity			0.0665***	0.0693***
			(0.00347)	(0.00346)
Firm Age			0.0329***	0.0302***
			(0.00376)	(0.00374)
Number Workplaces			-0.0237***	-0.0251***
			(0.00201)	(0.00199)
Debt to Assets			-0.0910***	-0.0976***
			(0.0161)	(0.0160)
Year FE	Yes	Yes	Yes	Yes
2-Digit Industry FE	Yes	Yes	Yes	Yes
Observations	19,490	19,490	15,953	15,953
R-squared	0.219	0.266	0.230	0.241

Notes: Standard errors in parentheses. The table reports linear regression of the presence of a profit sharing plan on measures of union presence inside firms. Non dummy variables are logged, and all of them are defined in section 1.3. *** p<0.01, ** p<0.05, * p<0.1

Table 2.11: Profit Sharing and Compensation

	Wage		Total Compensation	
VARIABLES	(1)	(2)	(3)	(4)
Profit Sharing Plan	0.0674***	-0.0269**	0.133***	0.000918
	(0.0126)	(0.0121)	(0.0153)	(0.0142)
Employees	0.0440***	0.0476***	0.0305***	0.0351***
	(0.00480)	(0.00434)	(0.00576)	(0.00485)
Return on Assets	0.00577	-0.202***	0.108***	-0.166***
	(0.0523)	(0.0750)	(0.0290)	(0.0466)
Productivity		0.233***		0.327***
		(0.0129)		(0.0171)
Firm Age	0.0163**	0.00588	0.0226***	0.00739
	(0.00678)	(0.00576)	(0.00841)	(0.00664)
Number of Workplaces	-0.0430***	-0.0395***	-0.0259***	-0.0208***
	(0.00351)	(0.00338)	(0.00639)	(0.00494)
Debt Ratio	-0.192***	0.0383	-0.313***	0.00782
	(0.0448)	(0.0512)	(0.0364)	(0.0481)
Observations	16,303	16,134	16,303	16,134
R-squared	0.059	0.293	0.058	0.399

Notes: Standard errors in parentheses. The table reports linear regression of the presence of a profit sharing plan on measures of union presence inside firms. Non dummy variables are logged, and all of them are defined in section 1.3. *** p<0.01, ** p<0.05, * p<0.1

Table 2.12: Strike Incidence and Profit Sharing

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Strike	Length	Strike	Length	Strike	Length	Strike	Length
Profit Sharing Plan	0.0372***	0.188***	-0.0840***	-0.519***	-0.0798***	-0.557***	-0.0561***	-0.403***
	(0.00773)	(0.0404)	(0.00787)	(0.0407)	(0.00917)	(0.0479)	(0.00922)	(0.0483)
Employees			0.0948***	0.553***	0.106***	0.619***	0.0651***	0.462***
			(0.00215)	(0.0112)	(0.00297)	(0.0156)	(0.00364)	(0.0191)
Number Workplaces					-0.0167***	-0.0918***	-0.0124***	-0.0776***
					(0.00234)	(0.0123)	(0.00233)	(0.0122)
Return on Assets					-0.0137	-0.108	-0.00460	-0.0996
					(0.0193)	(0.101)	(0.0193)	(0.101)
Average Productivity					0.000911	0.0625***	-0.00306	0.0372*
					(0.00400)	(0.0209)	(0.00408)	(0.0214)
Reformist							-0.0131	-0.0154
							(0.0129)	(0.0676)
Radical							0.0748***	0.311***
							(0.0167)	(0.0872)
Mix							0.0968***	0.491***
							(0.0160)	(0.0834)
Number Unions							-0.0299***	-0.368***
							(0.00811)	(0.0425)
Number Unions^2							0.00906***	0.0766***
							(0.00106)	(0.00556)
Firm Age							-0.0161***	-0.0930***
							(0.00437)	(0.0229)
Debt to Assets							-0.0175	-0.166*
							(0.0186)	(0.0974)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2-Digit Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	19,490	19,333	19,490	19,333	16,233	16,099	15,953	15,820
R-squared	0.066	0.085	0.150	0.188	0.160	0.196	0.194	0.227

Notes: Standard errors in parentheses. The table reports linear regressions of the presence of a strike and of the measure of its length on the presence of profit sharing plans and additional controls. Non dummy variables are logged, and all of them are defined in section 1.3. *** p<0.01, ** p<0.05, * p<0.1

Table 2.13: Change in Union Composition and 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)
Employees			-0.0527	-0.0888
			(0.0844)	(0.101)
Return on Assets				0.100
				(0.278)
Average Productivity				-0.0515
				(0.0613)
Year FE	Yes	Yes	Yes	Yes
2-Digit Industry FE	Yes	Yes	Yes	Yes
Observations	3,561	3,561	3,561	3,561
Nb Firms	820	820	820	820

Notes: Standard errors in parentheses. 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, and all of them are defined in section 1.3. *** p<0.01, ** p<0.05, * p<0.1

Table 2.14: Election on Controls

VARIABLES	(1) Return on Assets	(2) Productivity	(3) Firm Age	(4) Debt to Assets
Election	-0.000663	-0.00929	0.00734	-0.000155
	(0.00202)	(0.0137)	(0.0134)	(0.00231)
Number Employees	0.00399***	0.0137*	0.0170***	0.000458
	(0.00133)	(0.00713)	(0.00596)	(0.00157)
Number Workplaces	-0.00492***	-0.0228***	0.0314***	-0.00383***
	(0.000965)	(0.00517)	(0.00429)	(0.00114)
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Observations	13,772	13,689	15,285	13,791
R-squared	0.018	0.196	0.048	0.134

Notes: Standard errors in parentheses. The table reports linear regressions of control variables on the occurrence of elections. Excluding Election, variables are logged, and they are defined in section 1.3. *** p<0.01, ** p<0.05, * p<0.1

Table 2.15: Elections on Prior and Future Profit Sharing

	Election Year			Year After		
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Profit Sharing	Intéressement	Participation	Profit Sharing	Intéressement	Participation
Election	0.196**	0.0615	0.230***	-0.0956	-0.0503	-0.0885
	(0.0961)	(0.123)	(0.0871)	(0.148)	(0.171)	(0.134)
Participation		1.779***			1.722***	
		(0.180)			(0.260)	
Intéressement			1.471***			1.338***
			(0.157)			(0.224)
Nb Employees	1.286***	0.279	1.855***	0.130	-2.790***	1.404***
	(0.373)	(0.419)	(0.365)	(0.585)	(0.971)	(0.497)
ROA	0.00552	-0.891	1.038	1.862	-0.926	0.713
	(0.870)	(1.100)	(0.913)	(1.820)	(1.555)	(1.305)
Productivity	0.265*	-0.124	0.769***	0.724*	1.331**	1.669***
	(0.157)	(0.184)	(0.190)	(0.376)	(0.523)	(0.389)
Firm Age	0.138	0.590	-0.423	0.355	1.481	-0.382
	(0.456)	(0.590)	(0.524)	(0.836)	(0.968)	(0.871)
Nb Workplaces	-0.194	-0.122	-0.787***	-0.504	-0.308	-0.839**
	(0.262)	(0.261)	(0.245)	(0.437)	(0.479)	(0.359)
Debt to Assets	-1.033	-0.932	0.545	-1.330	-3.625*	1.099
	(0.975)	(1.160)	(0.894)	(1.927)	(1.950)	(1.815)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,469	1,876	3,013	1,201	962	1,458
Nb Firms	597	450	712	286	234	349

Notes: Standard errors in parentheses. The table reports logit regressions of the payment of profit sharing plans on the occurrence of elections and controls. The left panel Election Year reports the effect of election on the payment of profit sharing at the beginning of the election year, while the right one Year After reports the effect of elections on the payment the year after. Non dummy variables are logged, and all of them are defined in section 1.3. *** p<0.01, ** p<0.05, * p<0.1

Table 2.16: Elections on Same Period and Future Union Variables

	Election Year				Year After			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Strike	Length	Nb Unions	Union	Strike	Length	Nb Unions	Union
Election	-0.141*	-0.0998**	0.0340*	0.511**	0.125	0.0738	-0.0808***	-0.420
	(0.0802)	(0.0428)	(0.0182)	(0.249)	(0.103)	(0.0582)	(0.0232)	(0.451)
Nb Employees	1.283***	0.412***	0.375***	2.604***	1.818***	0.285	0.217***	2.230
	(0.304)	(0.127)	(0.0537)	(0.868)	(0.491)	(0.215)	(0.0826)	(1.374)
ROA	0.348	0.112	-0.0318	3.294*	-1.118	0.230	0.0463	-10.47
	(0.507)	(0.310)	(0.132)	(1.941)	(0.982)	(0.535)	(0.219)	(6.488)
Productivity	-0.165	0.0327	0.112***	1.151	-0.284	0.0452	0.0274	0.990
	(0.139)	(0.0723)	(0.0303)	(0.808)	(0.215)	(0.119)	(0.0469)	(1.415)
Firm Age	0.351	0.359	0.00293	2.164	-0.319	0.673**	-0.106	2.519
	(0.358)	(0.224)	(0.0954)	(1.521)	(0.768)	(0.337)	(0.156)	(5.717)
Nb Workplaces	-0.000110	-0.000361	0.114***	-0.174	-0.245	-0.0749	0.0991	0.366
	(0.206)	(0.0948)	(0.0403)	(0.552)	(0.342)	(0.162)	(0.0623)	(0.953)
Debt to Assets	0.215	0.402	-0.264	2.872	0.678	0.598	-0.0812	5.660
	(0.664)	(0.387)	(0.165)	(2.898)	(1.182)	(0.587)	(0.277)	(5.434)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,169	13,534	13,657	506	2,319	6,132	6,514	203
Nb Firms	922	5,954	5,968	132	537	2,142	2,245	48
R-squared		0.012	0.033			0.030	0.031	

Notes: Standard errors in parentheses. The table reports logit and linear regressions of union variables on the occurrence of elections and controls. The left panel Election Year reports the effect of elections on variables the same year, while the right one Year After reports the effect of elections on the variables the year after. Non dummy variables are logged, and all of them are defined in section 1.3. *** p<0.01, ** p<0.05, * p<0.1

Table 2.17: Elections on Same Period Compensation Variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
				Wage by Skills			
VARIABLES	Labor Share	Profit Share	Wage	White Collar	Intermediate	Office Worker	Factory Worker
Election	-0.0101	-0.0206	0.00107	0.000813	0.00153	0.00312	0.00737
	(0.0167)	(0.0629)	(0.00198)	(0.00292)	(0.00343)	(0.00437)	(0.00696)
Nb Employees	-11,423***	3.567***	-0.0761***	-0.0981***	-0.0310***	0.00241	0.0123
	(533.0)	(0.201)	(0.00561)	(0.00931)	(0.00972)	(0.0124)	(0.0213)
ROA	4,416***	-0.497	0.0241**	0.0200	0.0190	0.0181	-0.0374
	(971.4)	(0.366)	(0.0114)	(0.0168)	(0.0197)	(0.0253)	(0.0401)
Productivity	-13,149***	3.788***	-0.00498**	-0.0102***	-0.00215	-0.0105**	-0.00704
	(260.0)	(0.0978)	(0.00239)	(0.00364)	(0.00413)	(0.00527)	(0.00850)
Debt to Assets	-3,957**	-0.593	0.00445	-0.000219	0.0178	0.0471	-0.0358
	(1,558)	(0.586)	(0.0183)	(0.0268)	(0.0316)	(0.0404)	(0.0651)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	10,593	10,593	11,702	11,471	11,491	11,625	10,729
R-squared	0.303	0.205	0.040	0.036	0.005	0.008	0.009
Nb Firms	4,625	4,625	5,429	5,259	5,280	5,373	4,891

Notes: Standard errors in parentheses. The table reports linear regressions of the change in compensation variables on the occurrence of elections and controls the same year. Skill categories are defined according the French CSP classification. Non dummy variables are logged, and all of them are defined in section 1.3. *** p<0.01, ** p<0.05, * p<0.1

Table 2.18: Elections on Future Compensation Variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
				Wage by Skills			
VARIABLES	Labor Share	Profit Share	Wage	White Collar	Intermediate	Office Worker	Factory Worker
Election	-0.0982*	0.0882	-0.00587**	-0.00232	-0.00522	-0.0122**	-0.0147*
	(0.0577)	(0.0692)	(0.00231)	(0.00335)	(0.00388)	(0.00496)	(0.00779)
Nb Employees	3,087	-0.770***	0.0148**	0.0634***	-0.000632	-0.0225	-0.0105
	(2,011)	(0.219)	(0.00700)	(0.0111)	(0.0117)	(0.0150)	(0.0231)
ROA	-7,936*	1.291***	0.0185	0.0282	0.0453*	-0.0145	0.0620
	(4,297)	(0.468)	(0.0155)	(0.0224)	(0.0260)	(0.0333)	(0.0528)
Productivity	3,395***	-0.804***	0.00333	0.00665	-0.000510	-0.00411	0.0144
	(1,071)	(0.117)	(0.00323)	(0.00467)	(0.00541)	(0.00693)	(0.0106)
Debt to Assets	-520.5	0.224	0.0710***	0.0550	0.0571	0.0701	0.113
	(7,299)	(0.795)	(0.0262)	(0.0380)	(0.0439)	(0.0565)	(0.0892)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,494	6,495	6,564	6,510	6,516	6,544	6,190
R-squared	0.005	0.014	0.013	0.024	0.003	0.008	0.010
Nb Firms	2,213	2,213	2,242	2,218	2,219	2,235	2,117

Notes: Standard errors in parentheses. The table reports linear regressions of the change in compensation variables on the occurrence of elections and controls the year after elections. Skill categories are defined according the French CSP classification. Non dummy variables are logged, and all of them are defined in section 1.3. *** p<0.01, ** p<0.05, * p<0.1

Table 2.19: Elections on Profit Sharing - Different Fixed Effect Models

	(1)	(2)	(3)	(4)
VARIABLES	Profit Sharing			
Election	0.162***	0.168***	0.154**	0.196**
	(0.0616)	(0.0639)	(0.0663)	(0.0961)
Year FE	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	No
2-Digit Industry FE	Yes	No	No	No
3-Digit Industry FE	No	Yes	No	No
4-Digit Industry FE	No	No	Yes	No
Fim FE	No	No	No	Yes
Observations	11,688	11,493	11,193	2,469

Notes: Standard errors in parentheses. 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, ROA, Productivity, Firm Age, Number of Workplaces and Debt to Assets measures. *** p<0.01, ** p<0.05, * p<0.1

Table 2.20: Profit Sharing on Union Outcomes - Unconditional

	Election Year				Year After			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Strike	Length	Nb Unions	Union	Strike	Length	Nb Unions	Union
Profit Sharing	-0.249	-1.419**	-1.478***	-1.980***	0.927	-0.640	-0.482	-2.318***
	(0.443)	(0.614)	(0.433)	(0.251)	(0.594)	(0.890)	(0.568)	(0.262)
Nb Employees	0.569***	0.989***	1.160***	0.697***	0.501***	1.256***	1.095***	0.504***
	(0.0276)	(0.0430)	(0.0303)	(0.0662)	(0.0826)	(0.0620)	(0.0395)	(0.0842)
ROA	-0.204	-0.118	-0.0163	-0.242	-1.129***	-1.392***	-0.316	-0.103
	(0.182)	(0.264)	(0.187)	(0.236)	(0.283)	(0.470)	(0.303)	(0.318)
Productivity	-0.0142	0.221***	0.238***	0.304***	-0.0710	0.188*	0.0365	0.300***
	(0.0541)	(0.0757)	(0.0527)	(0.0321)	(0.0669)	(0.105)	(0.0647)	(0.0431)
Firm Age	-0.0725***	-0.188***	-0.138***	-0.103***	-0.0600**	-0.159***	-0.125***	-0.114***
	(0.0226)	(0.0318)	(0.0220)	(0.0248)	(0.0300)	(0.0454)	(0.0281)	(0.0428)
Nb Workplaces	-0.102***	-0.186***	-0.117***	-0.0726***	-0.0876***	-0.219***	-0.127***	-0.0510***
	(0.0146)	(0.0202)	(0.0142)	(0.0121)	(0.0230)	(0.0266)	(0.0167)	(0.0171)
Debt to Assets	-0.150	-0.345**	-0.565***	-0.630***	-0.0175	-0.228	-0.424***	-0.399**
	(0.118)	(0.162)	(0.114)	(0.112)	(0.145)	(0.227)	(0.141)	(0.187)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2-Digit Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	11,967	11,741	11,967	11,943	5,861	5,719	5,866	5,619

Notes: Standard errors in parentheses. The table reports the second stage IV specification of the effect of profit sharing on union variables. The left panel Election Year reports the effect of profit sharing on outcome variables the same year, while the right one Year After reports the effect of profit sharing on the variables the year after. Non dummy variables are logged, and all are defined in section 1.3. *** p<0.01, ** p<0.05, * p<0.1

Table 2.21: Profit Sharing on Same Period Compensation Outcomes - Unconditional

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
				Wage by Skills			
VARIABLES	Labor Share	Profit Share	Wage	White Collar	Intermediate	Office Worker	Factory Worker
Profit Sharing	-0.0882	-0.111	0.108	0.184	0.176	0.0862	0.421
	(0.559)	(0.0794)	(0.0977)	(0.138)	(0.161)	(0.161)	(0.316)
Nb Employees	-6,130***	6.568***	-0.0852***	-0.0883***	-0.0591***	-0.00843	-0.0668
	(584.3)	(0.829)	(0.0102)	(0.0158)	(0.0201)	(0.0166)	(0.0443)
ROA	1,252	-5.041***	0.0548***	0.0560**	0.0688**	0.0541	0.0667
	(1,043)	(1.480)	(0.0201)	(0.0276)	(0.0324)	(0.0335)	(0.0594)
Productivity	-7,705***	6.605***	-0.0163***	-0.0215***	-0.0172***	-0.00878**	-0.0102
	(187.1)	(0.266)	(0.00272)	(0.00391)	(0.00451)	(0.00439)	(0.00807)
Debt to Assets	-7,039***	-2.118	0.0358	0.0331	0.0355	0.0594	0.0962
	(1,283)	(1.821)	(0.0224)	(0.0310)	(0.0367)	(0.0376)	(0.0657)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2-Digit Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	9,395	9,395	10,227	10,087	10,089	10,175	9,480

Notes: Standard errors in parentheses. The table reports the second stage IV specification of the effect of profit sharing on compensation variables the year of elections. Skill categories are defined according the French CSP classification. Non dummy variables are log-differentiated, and all are defined in section 1.3. *** p<0.01, ** p<0.05, * p<0.1

Table 2.22: Profit Sharing on Next Period Compensation Outcomes - Unconditional

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
				Wage by Skills			
VARIABLES	Labor Share	Profit Share	Wage	White Collar	Intermediate	Office Worker	Factory Worker
Profit Sharing	-0.445	0.322*	-0.127*	-0.0317	-0.223*	-0.297**	-0.424*
	(0.392)	(0.193)	(0.0661)	(0.0836)	(0.115)	(0.146)	(0.229)
Nb Employees	-2,151	-1.069***	0.0101	0.0391***	0.00731	0.000438	0.0197
	(6,013)	(0.297)	(0.00931)	(0.0106)	(0.0163)	(0.0203)	(0.0348)
ROA	-50,156***	2.315***	-0.00995	0.0287	-0.00387	-0.0493	-0.0442
	(12,240)	(0.606)	(0.0195)	(0.0225)	(0.0342)	(0.0432)	(0.0669)
Productivity	-4,995*	-0.800***	0.00538	0.00565	0.00398	0.00258	0.0223*
	(2,681)	(0.133)	(0.00371)	(0.00440)	(0.00654)	(0.00814)	(0.0130)
Debt to Assets	-73,898***	1.548*	0.0397	0.0332	0.00677	0.0910	-0.0414
	(17,111)	(0.849)	(0.0285)	(0.0339)	(0.0501)	(0.0621)	(0.102)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2-Digit Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,852	5,853	5,904	5,860	5,863	5,887	5,596

Notes: Standard errors in parentheses. The table reports the second stage IV specification of the effect of profit sharing on compensation variables the year after elections. Skill categories are defined according the French CSP classification. Non dummy variables are log-differentiated, and all are defined in section 1.3.

Table 2.23: Profit Sharing on Same Period Bargaining Outcomes - Unconditional

VARIABLES	(1) Bargaining	(2) Wages	(3) Firm Savings	(4) Workforce	(5) Any	(6) Nb Agrements
Profit Sharing	-0.667	-0.668*	0.319	-0.646	-0.664*	-0.664*
	(0.449)	(0.352)	(0.399)	(0.423)	(0.391)	(0.391)
Nb Employees	0.518***	0.186***	0.209***	0.286***	0.399***	0.399***
	(0.0213)	(0.0206)	(0.0263)	(0.0223)	(0.0181)	(0.0181)
ROA	-0.345	0.106	-0.209	0.0112	-0.0581	-0.0581
	(0.224)	(0.159)	(0.167)	(0.194)	(0.198)	(0.198)
Productivity	0.175***	0.157***	0.254***	0.152***	0.252***	0.252***
	(0.0546)	(0.0404)	(0.0460)	(0.0478)	(0.0427)	(0.0427)
Firm Age	0.0165	-0.00429	-0.00719	-0.0138	-0.0181	-0.0181
	(0.0258)	(0.0190)	(0.0196)	(0.0218)	(0.0214)	(0.0214)
Nb Workplaces	-0.0689***	-0.0265**	-0.0193	-0.0459***	-0.0476***	-0.0476***
	(0.0145)	(0.0117)	(0.0127)	(0.0132)	(0.0126)	(0.0126)
Debt to Assets	-0.453***	-0.213**	-0.108	-0.251**	-0.351***	-0.351***
	(0.126)	(0.0943)	(0.100)	(0.111)	(0.105)	(0.105)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
2-Digit Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	11,920	11,964	11,966	11,956	11,967	11,967

Notes: Standard errors in parentheses. The table reports the second stage IV specification of the effect of profit sharing on bargaining dummies the year of elections. Bargaining denotes whether bargaining between the employer and unions happened inside the firm during the year. "Wages", "Firm Savings", "Workforce", denote the existence of a bargaining agreement on these respective topics. "Any" denotes whether an agreement on any topic was reached. Non dummy variables are logged, and all are defined in section 1.3. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 2.24: Profit Sharing on Next Period Bargaining Outcomes - Unconditional

VARIABLES	(1) Bargaining	(2) Wages	(3) Firm Savings	(4) Workforce	(5) Any	(6) Nb Agrements
Profit Sharing	-0.418	-0.817*	0.389	-0.715	-0.934*	-0.934*
	(0.735)	(0.469)	(0.554)	(0.595)	(0.543)	(0.543)
Nb Employees	0.353***	0.0594*	0.162***	0.233***	0.303***	0.303***
	(0.0487)	(0.0335)	(0.0374)	(0.0333)	(0.0306)	(0.0306)
ROA	-0.441	0.123	-0.143	-0.341	0.276	0.276
	(0.388)	(0.278)	(0.294)	(0.381)	(0.321)	(0.321)
Productivity	0.188**	0.194***	0.243***	0.182***	0.280***	0.280***
	(0.0882)	(0.0495)	(0.0613)	(0.0596)	(0.0541)	(0.0541)
Firm Age	-0.0293	-0.0159	-0.00355	0.00284	-0.0303	-0.0303
	(0.0414)	(0.0259)	(0.0266)	(0.0294)	(0.0303)	(0.0303)
Nb Workplaces	-0.0394*	-0.00209	-0.00812	-0.0394**	-0.0247	-0.0247
	(0.0223)	(0.0152)	(0.0160)	(0.0168)	(0.0169)	(0.0169)
Debt to Assets	-0.531***	-0.176	-0.210	0.189	-0.236	-0.236
	(0.203)	(0.130)	(0.135)	(0.146)	(0.147)	(0.147)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
2-Digit Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,733	5,861	5,866	5,861	5,864	5,864

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Notes: Standard errors in parentheses. The table reports the second stage IV specification of the effect of profit sharing on bargaining dummies the year after elections. Bargaining denotes whether bargaining between the employer and unions happened inside the firm during the year. "Wages", "Firm Savings", "Workforce", denote the existence of a bargaining agreement on these respective topics. "Any" denotes whether an agreement on any topic was reached. Non dummy variables are logged, and all are defined in section 1.3. *** p<0.01, ** p<0.05, * p<0.1

Table 2.25: Profit Sharing on Future Union Outcomes - Conditional

	(1)	(2)	(3)	(4)
VARIABLES	Strike	Length	Nb Unions	Union
Profit Sharing	0.534	-0.777	-0.446	-2.443***
	(0.669)	(0.803)	(0.346)	(0.260)
Nb Employees	0.219***	0.718***	0.223***	0.210***
	(0.0612)	(0.0618)	(0.0265)	(0.0549)
ROA	-0.756**	-0.910**	0.149	-0.0186
	(0.327)	(0.422)	(0.184)	(0.362)
Productivity	-0.0386	0.190**	0.0140	0.295***
	(0.0745)	(0.0951)	(0.0395)	(0.0612)
Firm Age	-0.0236	-0.0779*	-0.0161	-0.0422
	(0.0324)	(0.0408)	(0.0171)	(0.0501)
Nb Workplaces	-0.0336	-0.121***	-0.0192*	-0.00422
	(0.0210)	(0.0238)	(0.0101)	(0.0264)
Debt to Assets	0.125	0.00951	0.00851	-0.114
	(0.159)	(0.202)	(0.0848)	(0.234)
Strike	1.126***	2.397***	0.0898***	0.0598
	(0.0777)	(0.0621)	(0.0260)	(0.0893)
Year FE	Yes	Yes	Yes	Yes
2-Digit Industry FE	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes
Observations	5,790	5,652	5,795	5,548
R-squared		0.413	0.764	

Notes: Standard errors in parentheses. The table reports the second stage IV specification of the effect of profit sharing on union variables the year after election. The specification controls for the strike outcome the year of elections. Non dummy variables are logged, and all are defined in section 1.3. *** p<0.01, ** p<0.05, * p<0.1

Table 2.26: Profit Sharing on Same Period Compensation Outcomes - Conditional

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
				Wage by Skills			
VARIABLES	Labor Share	Profit Share	Wage	White Collar	Intermediate	Office Worker	Factory Worker
Profit Sharing	0.276	0.196	0.311	0.181	0.482	0.499	0.529
	(1.092)	(0.182)	(0.260)	(0.225)	(0.343)	(0.446)	(0.763)
Strike	-28.97	-0.0316	0.00152	8.19e-05	-0.00193	-0.00436	-0.00200
	(172.1)	(0.286)	(0.00414)	(0.00421)	(0.00642)	(0.00684)	(0.00956)
Nb Employees	-8,030***	8.541***	-0.109***	-0.126***	-0.0849***	-0.0427	-0.0665
	(819.3)	(1.363)	(0.0187)	(0.0197)	(0.0280)	(0.0314)	(0.0795)
ROA	2,012	-7.405**	0.0849**	0.0619*	0.103*	0.0884	0.0628
	(1,771)	(2.947)	(0.0417)	(0.0372)	(0.0565)	(0.0709)	(0.114)
Productivity	-9,320***	8.322***	-0.0215***	-0.0374***	-0.0219***	-0.00167	-0.0109
	(270.7)	(0.450)	(0.00499)	(0.00520)	(0.00765)	(0.00826)	(0.0115)
Debt to Assets	-7,820***	-2.976	0.0300	0.0113	0.0468	0.125	0.0784
	(1,920)	(3.195)	(0.0462)	(0.0458)	(0.0680)	(0.0789)	(0.0993)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2-Digit Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,535	6,535	6,539	6,490	6,487	6,519	6,153

Notes: Standard errors in parentheses. The table reports the second stage IV specification of the effect of profit sharing on compensation variables the year of elections, controlling for the concurrent strike outcome. Skill categories are defined according the French CSP classification. Non dummy variables are log-differentiated, and all are defined in section 1.3. *** p<0.01, ** p<0.05, * p<0.1

Table 2.27: Profit Sharing on Next Period Compensation Outcomes - Conditional

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
				Wage by Skills			
VARIABLES	Labor Share	Profit Share	Wage	White Collar	Intermediate	Office Worker	Factory Worker
Profit Sharing	-0.0731	0.0388	-0.123	-0.0186	-0.416**	-0.516**	-0.720*
	(0.0617)	(0.0268)	(0.0829)	(0.0925)	(0.198)	(0.257)	(0.384)
Strike	601.2	0.0648	0.00231	0.00458	0.00624	0.00974	0.00247
	(2,281)	(0.100)	(0.00296)	(0.00346)	(0.00718)	(0.00904)	(0.0134)
	(9,813)	(0.432)	(0.0130)	(0.0150)	(0.0301)	(0.0397)	(0.0604)
Nb Employees	-4,051	-0.512	0.00734	0.0382***	0.00305	-0.00749	0.0358
	(8,055)	(0.353)	(0.00968)	(0.0112)	(0.0233)	(0.0293)	(0.0489)
ROA	-69,566***	1.422*	-0.0306	0.0215	-0.0354	-0.0806	-0.105
	(17,703)	(0.779)	(0.0222)	(0.0252)	(0.0535)	(0.0691)	(0.101)
Productivity	-6,842*	-0.290*	0.00453	0.00615	0.00541	0.00252	0.0234
	(3,910)	(0.172)	(0.00398)	(0.00466)	(0.00972)	(0.0121)	(0.0182)
Debt to Assets	-96,606***	1.550	0.0443	0.0140	0.0339	0.159	0.0641
	(25,766)	(1.137)	(0.0335)	(0.0396)	(0.0817)	(0.103)	(0.157)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2-Digit Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,110	4,111	4,142	4,116	4,117	4,129	3,920

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Notes: Standard errors in parentheses. The table reports the second stage IV specification of the effect of profit sharing on compensation variables the year after elections, controlling for the strike outcome the year of elections. Skill categories are defined according the French CSP classification. Non dummy variables are log-differentiated, and all are defined in section 1.3.

Table 2.28: Profit Sharing on Same Period Bargaining Outcomes - Conditional

VARIABLES	(1) Bargaining	(2) Wages	(3) Firm Savings	(4) Workforce	(5) Any	(6) Nb Agrements
Profit Sharing	0.382	-0.623	0.449	-0.572	-0.209	-0.209
	(0.539)	(0.381)	(0.405)	(0.437)	(0.457)	(0.457)
Nb Employees	0.0878*	0.0280	0.0947***	0.202***	0.135***	0.135***
	(0.0473)	(0.0308)	(0.0314)	(0.0297)	(0.0344)	(0.0344)
ROA	-0.188	0.262	-0.181	0.0384	0.0771	0.0771
	(0.234)	(0.163)	(0.165)	(0.191)	(0.204)	(0.204)
Productivity	0.0311	0.143***	0.241***	0.140***	0.205***	0.205***
	(0.0707)	(0.0438)	(0.0486)	(0.0500)	(0.0533)	(0.0533)
Firm Age	0.106***	0.00668	0.00857	-0.00758	0.0196	0.0196
	(0.0290)	(0.0200)	(0.0200)	(0.0222)	(0.0234)	(0.0234)
Nb Workplaces	-0.0356*	-0.0181	-0.00944	-0.0383***	-0.0245*	-0.0245*
	(0.0191)	(0.0126)	(0.0130)	(0.0137)	(0.0146)	(0.0146)
Debt to Assets	-0.134	-0.158	-0.0323	-0.205*	-0.163	-0.163
	(0.153)	(0.0996)	(0.102)	(0.114)	(0.115)	(0.115)
Strike	0.0837*	-0.0981***	0.0191	-0.00193	0.00143	0.00143
	(0.0505)	(0.0300)	(0.0302)	(0.0332)	(0.0365)	(0.0365)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
2-Digit Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	11,822	11,858	11,860	11,850	11,861	11,861

Notes: Standard errors in parentheses. The table reports the second stage IV specification of the effect of profit sharing on bargaining dummies the year of elections, controlling for the strike outcome that year. Bargaining denotes whether bargaining between the employer and unions happened inside the firm during the year. "Wages", "Firm Savings", "Workforce", denote the existence of a bargaining agreement on these respective topics. "Any" denotes whether an agreement on any topic was reached. Non dummy variables are logged, and all are defined in section 1.3. *** p<0.01, ** p<0.05, * p<0.1

Table 2.29: Profit Sharing on Next Period Bargaining Outcomes - Conditional

VARIABLES	(1) Bargaining	(2) Wages	(3) Firm Savings	(4) Workforce	(5) Any	(6) Nb Agrements
Profit Sharing	0.327	-0.734	0.443	-0.818	-0.794	-0.794
	(0.852)	(0.498)	(0.561)	(0.586)	(0.604)	(0.604)
Nb Employees	-0.0152	0.00193	0.108**	0.174***	0.145***	0.145***
	(0.0733)	(0.0413)	(0.0422)	(0.0389)	(0.0440)	(0.0440)
ROA	-0.403	0.194	-0.112	-0.178	0.442	0.442
	(0.440)	(0.285)	(0.297)	(0.369)	(0.337)	(0.337)
Productivity	0.123	0.186***	0.241***	0.189***	0.270***	0.270***
	(0.112)	(0.0526)	(0.0633)	(0.0587)	(0.0603)	(0.0603)
Firm Age	0.0609	-0.00528	0.0120	0.00991	0.00779	0.00779
	(0.0475)	(0.0268)	(0.0270)	(0.0297)	(0.0322)	(0.0322)
Nb Workplaces	0.0137	0.00800	-0.00183	-0.0311*	-0.00172	-0.00172
	(0.0265)	(0.0161)	(0.0162)	(0.0170)	(0.0187)	(0.0187)
Debt to Assets	-0.296	-0.109	-0.137	0.244*	-0.0724	-0.0724
	(0.235)	(0.134)	(0.136)	(0.147)	(0.152)	(0.152)
Strike	0.0199	-0.108***	0.0373	-0.00421	0.0179	0.0179
	(0.0769)	(0.0415)	(0.0410)	(0.0447)	(0.0496)	(0.0496)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
2-Digit Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,662	5,790	5,795	5,790	5,793	5,793

Notes: Standard errors in parentheses. The table reports the second stage IV specification of the effect of profit sharing on bargaining dummies the year after elections, controlling for the strike outcome the year of elections. Bargaining denotes whether bargaining between the employer and unions happened inside the firm during the year. "Wages", "Firm Savings", "Workforce", denote the existence of a bargaining agreement on these respective topics. "Any" denotes whether an agreement on any topic was reached. Non dummy variables are logged, and all are defined in section 1.3. *** p<0.01, ** p<0.05, * p<0.1

Table 2.30: Profit Sharing on Union Composition - Conditional

	Election Year			Year After		
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Reformist	Radical	Mix	Reformist	Radical	Mix
Profit Sharing	-0.146	-0.942**	1.039**	1.503**	-0.388	-0.921
	(0.693)	(0.385)	(0.479)	(0.622)	(0.643)	(0.642)
Strike	-0.492***	0.141***	0.401***	-0.375***	0.133***	0.425***
	(0.0655)	(0.0346)	(0.0518)	(0.0975)	(0.0458)	(0.0642)
Nb Employees	0.00964	0.0623**	-0.0131	-0.132**	-0.137**	0.184***
	(0.0544)	(0.0314)	(0.0428)	(0.0556)	(0.0551)	(0.0478)
ROA	-0.105	0.134	-0.605***	-0.542*	-0.0417	-0.117
	(0.214)	(0.138)	(0.181)	(0.283)	(0.283)	(0.338)
Productivity	0.165**	0.0958**	-0.167***	-0.0220	0.0969	0.0566
	(0.0758)	(0.0438)	(0.0502)	(0.0849)	(0.0609)	(0.0674)
Firm Age	-0.0381	-0.0547***	0.0645**	-0.0277	-0.0706**	0.0514
	(0.0324)	(0.0200)	(0.0251)	(0.0386)	(0.0279)	(0.0327)
Nb Workplaces	0.0708***	-0.0539***	-0.0110	0.0930***	-0.0253	-0.0455**
	(0.0232)	(0.0129)	(0.0184)	(0.0196)	(0.0187)	(0.0187)
Debt to Assets	-0.203	-0.232**	-0.0633	-0.415*	-0.0230	-0.252
	(0.181)	(0.110)	(0.153)	(0.234)	(0.154)	(0.165)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
2-Digit Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	10,889	10,936	10,936	5,940	5,980	5,980

Notes: Standard errors in parentheses. 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 1.3. *** p<0.01, ** p<0.05, * p<0.1

Table 2.31: Effect on Total Compensation of the Usage of Profit Sharing over a Four Year Electoral Cycle

		Actual Scenario			Counterfactual		
	Yearly Wage	Profit Sharing	Wage Growth	Tot Comp	Wage Growth	Tot Comp	Difference
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
Office Worker	16,940	1,271	0.018	72,137	0.026	72,326	-189
Factory Worker	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 discounted sum over four years at a rate of 1 percent.

CHAPTER 3

The Effects of the Taxation of Profit Sharing on Income Inequality

3.1 Introduction

The first two chapters of this dissertation show evidence that the usage of profit sharing can have widespread effects on modern economies that go beyond boosting productivity. Through their effect on union behavior and collective action, profit sharing can first reduce wage growth, and second lead to increases in income inequality because of its differential effects across worker skills. Compounded over time, such effects can become significantly large. This analysis is at odds with the stance that policy makers have with respect to profit sharing. In countries such as the United-States, the United Kingdom, or France, politicians have been promoting the usage of profit sharing with tax cuts, subsidies and other forms policies. Considering that income inequality is a mainstream feature of political debates, understanding how it is affected by fiscal policy, is an important issue, and the subject of this chapter. The analysis here is theoretical, but the features of the models that are developed are based on the actual policy design of profit sharing in France. This allows to extend the analysis of the empirical effects of profit sharing on the French economy that was the object in Chapter 2.

The first section of this chapter builds on the model developed in Chapter 1 to include a social planner that can tax wages and profit sharing independently. The

planner cares both about economic efficiency and income inequality, which respective weights can vary in her objective function. More efficiency and lower income inequality are incompatible. Efficiency is achieved with a reduction in strikes, which destroy output and are costly to undertake. While lower income inequality is obtained through wage gains bargained by the union and supported with credible strike threats that can be carried out and lead to destruction of output.

The model predicts that when the planner cares more about income inequality, profit sharing should be taxed more than wages. When the weight on efficiency increases relative to income inequality, the optimal fiscal policy tilts towards the taxation of wages. That is because wage taxation reduces the bargaining power of unions because employers cannot afford conceding any wage increases due to the additional burden that taxation puts on their payroll. Because profit sharing has an economic cost, the optimal profit sharing tax may also increase with the weight on efficiency. However profit sharing is only used as long as the union carries out its threats. So that after a sufficiently high level of wage taxation, the employer does not need to use profit sharing to prevent union strikes, and profit sharing taxation is neither needed anymore. That is why it decreases with the efficiency weight past a certain threshold.

The second section of the chapter extends the analysis of profit sharing taxation to a long-run macroeconomic level to study how taxation affects lifetime income in economies where politicians incentivize the usage of profit sharing by companies for the purpose of constituting firms savings that are paid upon retirement. For example, in the United-States Employee Stock Ownership Plans are paid at the retirement of employees, while in France employers that pay profit sharing schemes have to transfer the amounts on employees' firm-saving accounts. These funds are usually kept untouched until employees retire or quit the company. The analysis developed in this section aims at understanding how profit sharing and wage taxation affect

individual retirement and lifetime income. It introduces a two period model, where individuals live on their wages when young, and on their retirement income when old. Retirement income is constituted of profit sharing savings, and of social security benefits.

The effect of an increase in profit sharing taxation affects all types of compensation. First it reduces employer usage of profit sharing, which leads to higher wages for young individuals through the increase in the bargaining power of their union. Because profit sharing compensation is proportional to the wage, its reduction does not necessarily imply a decrease in its compensation upon retirement if the wage increase is larger to compensate for the proportion of wages that profit sharing represents. For the same reason, the total effect on the fiscal revenues stemming from profit sharing are undermined, because the tax increase can be overcome by the reduction in the usage of profit sharing. However higher wages imply higher revenues collected from wage taxation, which leads to increases in pension revenues.

Based on these results the section develops a discussion on the effects of a policy aiming at subsidizing profit sharing as it was introduced in France in the early 2000s, in order to evaluate its effects on lifetime income and income inequality. The outcome of the policy depends on the relative extent to which profit sharing can lead to gains in surplus. If these are large enough, it is possible that despite the losses in bargaining power, the union is able to bargain higher wages for its employees. In that case, all forms of compensation increase: wages, profit sharing, and pensions as well thanks to the increase in the fiscal base of wage taxation. On the contrary, if the gains in surplus due to profit sharing are small, the loss of bargaining power of the union and the loss of fiscal income from wage taxation are likely to reduce both early life, and retirement income. I lay down the basis for an empirical analysis in the last part of this chapter.

The optimal taxation of firms with regard to labor compensation has been a sub-

ject of interest since relatively recently (Kopczuk and Slemrod, 2006). Papers on the taxation of wages have grown over time Boone and Bovenberg, 2002; Hamilton, 1987, but not much has been produced in relation to the optimal taxation of profit sharing compensation schemes. Profit sharing taxation has been mostly discussed from the perspective of whether and how strong of an incentive it provides employers for the adoption of such plans, as in Kruse, Freeman, and Blasi, 2010. In a cross country comparison Pérotin and Robinson, 2002 underline the widespread variation in taxation schemes regarding profit sharing, and argue for the need to give tax incentives for profit sharing in order to achieve productivity gains. Kruse, 1994 acknowledges the complexity of the taxation of profit sharing and makes the point that if the gains of such plans accrue to firms only, then there should not be any role for public intervention. He makes the point that profit sharing subsidies can help if there are barriers to its implementation. Some authors like Mitchell, 1995 and Mitchell, 1982 have emphasized that subsidizing profit sharing can have potential macro stabilizing effects by making labor income more flexible. Kaufman and Russell, 1995 and Florkowski, 1991 argue that the taxation of profit sharing is more complex than just incentivizing productivity. They discuss what the underlying determinants of the taxation of profit sharing are, with the objective of answering whether the current US fiscal incentives are efficient or not. They argue that proponents of subsidizing profit sharing for its productivity enhancing effects do not consider its ultimate effects on worker utility. These could turn out to be negative due to the additional effort that profit sharing puts on employees (through co-monitoring for example), which is difficult to include in studies because of selection bias and workforce turnover. Other macro effects of profit sharing on savings and investment worth considering from an optimal taxation perspective are also left off discussion. Considering these aspects the authors conclude that the US profit sharing fiscal system is unlikely to be efficient. Bernheim and Scholz, 1993 make the point that private saving may too low among low income

earners and consider potential fiscal incentives as remedies. Thereby the optimal taxation of profit sharing should consider that particular point, something that has been acknowledged by lawyers for a long time (Swietlik, 1963; Smiley and Gilbert, 1990).

The effects of taxation on private savings have been studied extensively (for example see Bernheim, 2002 for a review) but mostly from the perspective of individual incentives, and not from the one of the trade off that policy makers can face in the design of an optimal retirement system. In particular, the study of employer provided retirement plans has focused on the effects on individual saving decisions (for example Gomes, Michaelides, and Polkovnichenko, 2009 find that tax-deferred retirement accounts promote higher wealth accumulation) or on the allocation of assets across portfolios (Dammon, Spatt, and Zhang, 2004), on their sorting across firms, and on companies' own behavior with respect to saving. However only recently researchers have started examining the optimal retirement design between pay-as-you-go and individual taxation. This has been done in the face of the burden that put aging populations on the public finances (Woodland, 2016). Nishiyama and Smetters, 2007 finds that while privatizing social security can improve labor supply incentives, it can also reduce risk sharing. The author studies the effect on the tax base and finds that government matching of private contributions on a progressive basis is not very effective at restoring efficiency and can actually cause harm. McGrattan and Prescott, 2013 compute a transition path from the current U.S. system to a saving-for-retirement system. Fehr, Habermann, and Kindermann, 2008 study the introduction of tax-favored individual savings account in order to reduce the strain of pay-as-you-go retirement schemes in a context of aging population Hosseini and Shourideh, 2019 argue that progressive asset subsidies provide a powerful tool for Pareto optimal reforms and that earnings tax reforms do not always yield efficiency gain. However no contribution has been made on the specific point of profit sharing plans as a tool to transition from pay-as-you-go to a saving-for-retirement system.

This chapter brings contributions to the topic of the optimal taxation of profit sharing by first, studying the way taxation affects income inequality through union behavior, and second, by studying how the subsidy of profit sharing schemes related to firm-savings accounts affects pensions and income inequality as well through pensions in a social security retirement system. The chapter is organized as follows, section 3.2 develops the study of the trade off between taxation of wages and taxation of profit sharing, section 3.3 exposes how the taxation of profit sharing can affect income in a social security retirement system, finally section 3.4 concludes.

3.2 Taxation of Profit Sharing, Union Behavior and Income Inequality

3.2.1 Model

Environment and Setup The model is an extension of the one introduced in Chapter 1. It is constituted of a firm comprised of an employer, a union, and of two different workers, which is the first extension. The workers are different, one is a high skilled White Collar, while the other one is a low skilled Blue Collar. Formally, the difference is first, that the union cares about the low skilled worker only, so that it bargains with the employer on her behalf solely. Second, the high skilled worker has a higher base wage than the low skilled one. Wages here are not necessarily in line with marginal productivity and their level can represent the bargaining power of employees. A higher White Collar wage can be due to higher productivity, but also to a higher bargaining power.

The second extension is that profit sharing is paid in proportion to the base wage. It makes the model closer to the French institutional features of the empirical analysis in Chapter 2. The stylized facts from Chapter 1 showed that in France, larger amounts of profit sharing are paid to higher wage workers, so that the share of profit sharing

compensation to wage compensation is roughly the same for all workers. The thirst and last new aspect of the model is the introduction of a social planner that can tax profit sharing and wages. her objectives will be discussed in Section 3.2.2 specially dedicated to optimal taxation. The rest of the model is similar to the one of Chapter 1.

There are two periods indexed by $t \in \{1, 2\}$ which unfold as follow: first the employer sets a profit sharing scheme that consists of a share s_t of the wages to be paid to workers, second, the employer bargains sequentially with the union over the wage of the low skilled worker. The union makes the wage offers, and can invest an effort a_t in the organization of a strike in between rounds. A strike succeeds with some probability that depends on the action of the union and on the type of the low skilled worker. In the case of a successful strike, output is destroyed. Besides that, in the case of success, profit sharing compensation $s_t w_t$ is not paid to the workers. Firm productivity is private information of the employer, and is identically and independently distributed over periods. A slight difference with the base model is that employers also change over periods, so that they remain at the head of the firms for one period only, which reduces the horizon of their objective function. This twist does not change the predictions of the model, but simplifies the mathematical analysis.

The objective functions of the players are defined in the following way. Starting with the union, its objective is to maximize Blue Collar compensation which in a given period consists of the base wage plus the expected profit sharing:

$$u_t^b = \mathbb{E}\left[w_t\left[1 + s_t(1 - \mathbb{P}[S_t])\right]\right] \tag{3.1}$$

The wage w_t can be either high w_t^h, or low $\underline{w}$, which depends on the outcome of the bargaining game between the union and the employer, which itself depends on the type of the employer. So that the expectation of the above expression is defined with respect to the distribution of productivity. The probability of a strike $\mathbb{P}[S_t]$ depends

on the investment of the union and on the reputation of the Blue Collar worker. Following the base model it is defined as:

$$\mathbb{P}[S_t] = a_t + x_t \tag{3.2}$$

Where a_t is the investment in strikes of the union and x_t is the reputation of the worker. The period utility of the union corresponds to worker utility netted of the costs of strike investment:

$$v_t = u_t^b - \mathbb{E}\left[\frac{1}{2}a_t^2\right] \tag{3.3}$$

The profits of the employer are defined as output netted of the wage bill:

$$\pi_t = \mathbb{E}\left[y_t - [(\underline{w} + \Delta)(1+\phi) + \bar{w}] - s_t(1+\tau)(\underline{w} + \bar{w})(1 - \mathbb{P}[S_t])\right] - \frac{1}{2}s_t^2 \tag{3.4}$$

Where y_t is output, which can be either high y^h with probability θ, or low y^l with probability $1-\theta$. White Collar wage $\bar{w}$ is fixed and higher than the base Blue Collar wage $\underline{w}$. The term Δ denotes the wage premium that the firm concedes at the end of bargaining. It is assumed here that the firm pays profit sharing over the base wage only. This is because the profit sharing plan is set before bargaining happens, so that the firms can only commits to the base wage prevailing at the beginning of the period. The usage of profit sharing has a quadratic cost, captured in a reduced form by the term $\frac{1}{2}s_t^2$. It corresponds to the costs attached to a higher risk aversion to the worker that can result into increased turnover, as well as hassle costs of setting profit sharing and reporting to shareholders. The terms ϕ and τ correspond to the respective tax rates of Blue Collar wage and profit sharing. The objective is to keep track with the empirical framework, where policy makers can tax payroll progressively (the wage of White Collar workers is assumed to be net of tax, which rate is kept exogenous[1]).

Workers do not have any choice in their action, but the type of the Blue Collar worker determines the probability that a strike occurs after a rejected wage offer. He

[1]Since only relative taxation matters for redistributive purposes this assumption is not constraining.

or she can be reactive or passive. A reactive type strikes with probability r, while a passive type does not go on a strike by herself, so that the expected probability of a strike is $x_t = r\mu_t$. Worker type is neither known to the employer nor to the union. They share a common belief about the probability of the worker of being reactive, which prior is μ_1. The belief is updated with the history of strikes according to Bayes Rule so that:

$$\mu_{t+1} = \begin{cases} \mu^S_{t+1} = \frac{\mu_1(r+a_t)}{x_t+a_t} & \text{after a success} \\ \mu^F_{t+1} = \frac{\mu_t(1-r-a_t)}{1-x_t-a_t} & \text{after a failure} \end{cases} \tag{3.5}$$

Optimal Actions and Equilibrium Before determining the optimal actions of the union and the employer in each period, I first solve for the equilibrium of the bargaining game. There is a unique Subgame Perfect separating Nash Equilibrium, in which the union first makes a high wage offer $w^h_t = \underline{w} + \Delta$ that is accepted by a high type employer and rejected by a low one. After a rejection the union makes a low wage offer $\underline{w}$ which the low type employer accepts. The proof of the equilibrium follows from the base model's in the Appendix of Chapter 1. The first, high wage, offer w^h_t makes a high type employer indifferent between accepting and rejecting it such that her profits are the same in each case so that:

$$w^h_t = \underline{w} + \frac{\mathbb{P}[S_t]\left[y^h - s_t(1+\tau)(\underline{w}+\bar{w})\right]}{(1+\phi)} \tag{3.6}$$

The expression on the right of this equation corresponds to Δ, the wage premium.[2] It increases in the probability of a strike, the level of output, and given a level of strike investment and profit sharing, it decreases with the taxation rates. Taxation decreases the bargaining power of the union because it increases the payroll cost burden for the employer more when she accepts a high wage offer than when she rejects the wage offer (the probability of a strike reduces the expected wage bill in the case of rejection). So increasing taxation, makes it more attractive to reject the

[2]The condition for this to be a premium and not a malus, is that $y^h \geq s_t(1+\tau)(\underline{w}(1+\phi)+\bar{w})$.

first wage offer unless the union decreases it. In other words, rejection is a way for the employer to reduce her tax bill, and taxation is a way for policy makers to reduce the bargaining power of unions.

Now the optimal actions of the game can be determined. In the second period the solution is straightforward. Since the union does not have any forward looking incentives to strike, $a_2^* = 0$, and thereby the employer does not have any incentives to give profit sharing because it cannot have any effect on the occurrence of a strike. So $s_2^* = 0$ as well, and the equilibrium wage in the second period is $w_2^h = \underline{w} + \frac{x_2 y^h}{1+\phi}$. In the first period, the union solves the following objective function:

$$\max_{a_1} \underline{w}\left[1 + s_t(1 - \mathbb{P}[S_t])\right] - \frac{1}{2}a_1^2 + \mathbb{P}[S_t]v_2^S + (1 - \mathbb{P}[S_t])(1 - \epsilon)v_2^F \tag{3.7}$$

Where v_2^S and v_2^F are second period union values respectively in the case of success and failure. The term ϵ captures the probability of exit of the union in the case of a failed strike, in which case its continuation value is zero. The optimal strike action in the first period is the solution to the first order condition:

$$a_1(s) = \epsilon\left(\underline{w} + \frac{x_1 y^h}{1+\phi}\right) - \underline{w}s_t \tag{3.8}$$

It increases in the probability of exit in the case of failure, as well as in the factors increasing the second period wage premium: a higher initial reputation level and level of output, a lower taxation rate of the low skilled wage. It decreases in the amount of profit sharing, and in the base wage level $\underline{w}$ if $s_t > \epsilon$ because in that case the current costs of a strike in terms of forgone wages outweigh the expected future gains if the union remains in the firm thanks to a successful strike.

The last step needed to solve the model is to determine the optimal amount of profit sharing. In the first period, the employer solves the following problem:

$$\max_{s_1} \left[\bar{y} - s_1(1+\tau)(\underline{w} + \bar{w})\right]\left[1 - x_1 - a_1(s))\right] - \left[\underline{w}(1+\phi) + \bar{w}\right] - \frac{1}{2}s_1^2 \tag{3.9}$$

Where $\bar{y} = \theta y^h + (1-\theta)y^l$ is expected output. The term $[1 - x_1 - a_1(s))]$ is the probability that a strike fails. Note that the expression implies that the firm bears the cost of a strike in any state of nature, so even when productivity is high and the employer settles before the union calls a strike. In that case the expected loss due to a strike is incurred in the form of the wage premium. An increase in profit sharing is costly not only because of the reduced form term, but also because it increases the base wage bill. However, profit sharing also decreases the probability of a strike and the wage premium. This latter effect follows the same logic as the effect of taxation on the bargaining power of the union explained above. Profit sharing increases the wage bill more for an employer that pays a high wage than for an employer that pays a low wage, which further reduces the bargaining power of the union (the first effect is to reduce the premium through the reduction of the credibility of the strike). The solution for the optimal amount of profit sharing in the first period is derived from the first order condition:

$$s_1^* = \frac{\underline{w}\bar{y} - (1+\tau)[\underline{w} + \bar{w}]\left[1 - x_1 - \epsilon\left(\underline{w} + \frac{x_1\bar{y}}{1+\phi}\right)\right]}{1 + 2\underline{w}(1+\tau)[\underline{w} + \bar{w}]} \tag{3.10}$$

The optimal amount of profit sharing increases in the level of output, prior reputation, the probability of exit in the case of a failure, and taxation. The tax on profit sharing τ increases the cost of paying profit sharing. The payroll tax ϕ reduces the incentives for the union to invest in strikes because it reduces the future wage premium. That is because payroll taxation reduces the bargaining power of the union, and it that sense acts as a substitute to profit sharing. The relation between profit sharing and the base wage level $\underline{w}$ is ambiguous because it both increases the marginal cost of profit sharing (by directly inflating the wage bill) and it increases its marginal benefits by increasing the opportunity cost of a strike.

3.2.2 Optimal Taxation

In general, the social planner in this exercise has two objectives, the first is to maximize efficiency, the second to minimize income inequality. Therefore its objective welfare function is a combination of the two. The expected net output of the economy at the beginning of the game can be written as:

$$Y = 2\bar{y} - (1-\theta)\left(\mathbb{P}[S_1] + \mathbb{E}[\mathbb{P}[S_2]]\right) y^l - \frac{1}{2}a_1^2 - \frac{1}{2}s_1^2 \tag{3.11}$$

The expected difference in income is:

$$D = (\bar{w} - \underline{w})\left(2 + s_1^*[1 - (1-\theta)\mathbb{P}[S_1]]\right) - \theta(\Delta_1 + \Delta_2) \tag{3.12}$$

Therefore the objective function of the social planner can be written as:

$$\max_{\phi,\tau} \eta Y - (1-\eta)D^2 \tag{3.13}$$

Where η is the weight put on efficiency in the objective function relative to income inequality. With regard to efficiency, the objective of the planner is to reduce strike incidence, as well as the amount of profit sharing because of the cost that its usage, captured by the reduced form expression, entails. The effects of taxation on efficiency are not unidirectional. A higher taxation of any king reduces profit sharing, which increases efficiency by reducing its direct costs. However the planner may not want to completely prevent the usage of profit sharing because its preventive effect on strikes is beneficial for efficiency. Wage taxation is more efficient in increasing efficiency because it has a dampening effect on strike investment through the reduction in the future wage premium, while profit sharing taxation does not have any direct effect on strike investment.

Regarding income inequality, first note that profit sharing has only negative effects. It increases inequality because it compensates high wage workers more than low wage ones, which is amplified because the likelihood that it is paid increases with the

reduction in the probability of a strike that its usage entails. Further, profit sharing reduces the wage premium that the union is able to bargain for the Blue Collar worker. Strikes have the opposite effect on income inequality. They increase the wage premium and reduce the likelihood that profit sharing is paid. So regarding income inequality the objective of the planner would be to reduce profit sharing and to increase strikes. This can be done by increasing taxation on profit sharing, but also by increasing wage taxation as well.

It is not possible to solve the social planner's problem analytically, but a numerical analysis of the optimal taxation in three sets of parameter values is displayed in figures 3.1, 3.2, and 3.3. A general pattern is that wage taxation increases along with increases in the weight of efficiency relative to income inequality. That is because wage taxation is a way for the social planner to control the bargaining power of the union. Wage taxation increases the burden on the employer with regard to her payroll and therefore reduces the likelihood that she makes a strong wage concession to the union. Therefore strike threats are weaker and generate smaller wage gains, so that the union is less likely to carry them out.

In general the taxation of profit sharing is hump-shaped in the weight parameter. Profit sharing has an economic cost, so as long as its usage is large, the planner gets to increase its taxation along increases in the weight on efficiency. However as soon as wage taxation is sufficient to reduce the bargaining power of the union beyond a point where the employer does not need to resort to profit sharing too much, its taxation falls. That is the difference between figures 3.1 and 3.2, where the usage of profit sharing is larger in the latter.

Notice that utility of both types of employees decreases with the efficiency, because they both suffer from the lower usage of profit sharing. The low skilled is more impacted because her wage drops as well. A higher likelihood of high productivity (higher θ in figure 3.3) increases taxation levels because this change gives stronger

incentives for the union to go on a strike. That is because reputation gains are more likely to translate into wage gains in the future.

As a conclusion to this section, the main results of the analysis are that for the purpose of reducing income inequality, profit sharing should be taxed more than wages, which may actually have to be subsidized. But as long as the objective of the planner is to maximize efficiency to some extent, wage taxation is better suited for that purpose for its direct effect on the bargaining power of the union. Efficiency is achieved at the cost of reducing employee compensation, however the analysis has abstracted from the possibility of redistribution of the income generated by the planner. Fiscal revenue is positive beyond a given weight on efficiency, which can then be redistributed to employees and in turn increase their income.

3.3 Taxation of Profit Sharing in a Social Security Retirement System

Redistribution is addressed in this section, in a framework where individuals live fore two periods, and the social planner allocates income with pensions in a social security system.

3.3.1 Model

The model is similar to the one in the previous section in several aspects. There are two employees, a union, an employer, and a social planner, and two time periods indexed by $t \in \{1, 2\}$ that correspond to young and old ages respectively. The firm is only active in the first period, because employees work only in the first period, and they retire in the second. Employees yet differ in terms of skills, and compensation. High skilled, White Collar (indexed by h), earns a high fixed wage w^h, while the low skilled Blue Collar (indexed by l) earns a wage w^l that depends on the bargaining

outcome between the union and the employer. Bargaining differs in that section and is modeled in a way that follows Nash Bargaining. This simplifies the analysis compared to the above framework and allows to focus on redistribution. The employer still can resort to profit sharing compensation, which also has a

In this framework, employees still do not have choices over their actions. Their period utility corresponds to their income. When young, they earn their wages, when old, they get paid the profit sharing accrued in the first period, and receive retirement benefits transferred by the government from the taxes that it has collected in the first period as well. All actions are taken in the first period. The government first determines an fiscal policy consisting of tax rates for wages and profit sharing, respectively ϕ and τ. Second, the determines an optimal profit sharing scheme that consists of a share of profits $s(w^l + w^h)$ to be paid to low and high skilled workers. Third, the employer bargains with the union over the wage of the low skilled employee w^l.

The model is solved backwards, which implies first determining the outcome of Nash Bargaining. The wage of the low skilled employee is the solution to the following maximization problem:

$$\max_{w^l} [w^l(1+s) - \underline{w}]^{\beta}[\pi - (\underline{y} - [\underline{w} + w^h][1+\phi])]^{1-\beta} \tag{3.14}$$

Where $[w^l(1+s) - \underline{w}]$ and $[\pi - (\underline{y} - [\underline{w} + w^h][1+\phi])]$ are respectively the net surpluses accruing to the low skilled employee and to the employer. The term β is the bargaining weight of the union representing the worker, and hence $1 - \beta$ is employer's. The bargaining power of parties depends on the bargaining weights as well as on their outside options. The one of the union is the base wage $\underline{w}$, which means that in the case of no agreement profit sharing is not paid to the worker. For the firm, the outside option are base profits, where profit sharing is not paid and output $\underline{y}$ is no greater than $y(s)$.

Notice that profit sharing has the effect of increasing the net surplus that accrues

to the employee, which is equivalent to reducing her outside option because it increases the opportunity cost of disagreement. Thus more profit sharing reduces the bargaining power of the union. Regarding taxation, it reduces the net surplus of the employer, which also has the effect reducing the bargaining power of the union, by reducing the opportunity cost in case of disagreement for the employer. The solution to the Nash Bargaining problem is:

$$w^l = \underline{w}\left[\frac{\beta(1+\phi)}{z} + \frac{1-\beta}{1+s}\right] + \frac{\beta}{z}\left[y(s) - \underline{y} - w^h s(1+\tau) - \rho(s)\right] \tag{3.15}$$

Where $z = 1 + \phi + (1+\tau)s$. The right hand side is the relative surplus left to the employer after incurring all costs except the wage to be paid to the low skilled employee. As predicted above, the bargaining power of the union is reduced by profit sharing and taxation. Profit sharing increases the total compensation that goes to the worker and acts as a substitute to the wage bargained with the union, which is captured by the division by z and $1+s$. It also has the effect of potentially increasing the relative surplus left, which can have the effect of increasing the wage that goes to the worker. Conditional on a given level of profit sharing, profit sharing taxation decreases the wage of the low skilled worker by reducing the relative surplus. Notice that this result of the model is in line with the model introduced in Section 3.2, which predicted that both profit sharing and wage taxation have a negative effect on the wage outcome of bargaining.

The next step towards the equilibrium of the model is to solve for the optimal amount of profit sharing paid by the employer. The profit maximization problem is the following:

$$\max_s \ \pi = y(s) - (w^l + w^h)[1 + \phi + s(1+\tau)] - \rho(s) \tag{3.16}$$

Where $y(s)$ is output as a function of profit sharing, and $\rho(s)$ is a reduced form way to capture the costs of profit sharing related to turnover and other potential indirect effects as in the model in Section 3.2. Notice that wage taxation applies to fixed part

of the total compensation of employees, and that profit sharing taxation applies to profit sharing only. Profits maximization can then be expressed as:

$$\max_s \ \pi = \underline{y} + (1-\beta)\left[y(s) - w^h s(1+\tau) - \rho(s)\right] - \underline{w}\left[\beta(1+\phi) + \frac{(1-\beta)z}{1+s}\right] - w^h(1+\phi) \tag{3.17}$$

And the first order condition is:

$$y'(s) + \underline{w}\frac{\tau - \phi}{(1+s)^2} = w^h(1+\tau) + \rho'(s) \tag{3.18}$$

On the left hand side, the marginal benefits are the increase in output and reduction in the wage paid to the Blue Collar worker. On the right hand side, the marginal costs are the increase in the payment to the White Collar and the additional cost of profit sharing. Without any functional form for the output and indirect costs function it is not possible to solve for the optimal amount of profit sharing. However, with a few standard assumptions it can be shown that the solution is unique. If the output function is an increasing and concave function of profit sharing and the indirect cost function is an increasing and convex function, then the marginal benefits of profit sharing are decreasing and the marginal costs are increasing, as long as $\tau > \phi$.[3]

The optimal amount of profit sharing decreases with profit sharing taxation (see appendix for details). It also decreases with wage taxation, because wage taxation reduces the need to use profit sharing for reducing the bargaining power of the union. It increases with a larger base wage, because in that case the effects of profit sharing on bargaining are lager in absolute terms. However it decreases with a larger high skilled wage because of the increase in the marginal cost that this implies. Eventually higher efficacy of profit sharing in boosting output leads to an increase in its usage, while higher marginal costs have the opposite effect.

[3]This assumption is needed to ensure that profit sharing has an dampening effect on the wage bill paid to the low skilled. It implies that the additional payment in terms of profit sharing is more than offset by the decrease in the wage through the effect on bargaining power.

This concludes the model. the fiscal policy of the social planner is discussed in the next section, but before let us determine how the government affects the outcome of the model. For now, retirement benefits are split between the low skilled and the high skilled worker from the revenue that the government raises through taxation:

$$B = (\phi + \tau s)(w^l + w^h) \tag{3.19}$$

The revenue is split between the two in proportion to their wages so that their pension benefits b^j are expressed a $\frac{w^j}{w^l+w^h}B$ which can be written as:

$$b^j = w^j(\phi + \tau s) \tag{3.20}$$

So individual income is w^j when young and $b^j + sw_j$ when old. Assuming that there is not time discounting and no interest rate in the model, lifetime individual income is just the sum of all sources of income.

3.3.2 The Effects of Changes in the Tax System on Income

Given the optimal level of profit sharing, the effects of a change in the tax system on total individual income $w^j + b^j + d^j$ can be evaluated for each individual. Total income can be expressed as follows for each individual:

$$I^h = w^h[1 + \phi + (1 + \tau)s^*(\tau)] \tag{3.21}$$

$$I^l = w^l(\tau, s^*(\tau))[1 + \phi + (1 + \tau)s^*(\tau)] \tag{3.22}$$

The Effects of Profit Sharing Taxation The effects can be decomposed as follows:

$$\frac{d\ I^j}{d\ \tau} = \left[\frac{\partial w^j}{\partial \tau} + \frac{d\ s^*}{d\ \tau}\frac{\partial w^j}{\partial s}\right][1 + \phi + (1 + \tau)s^*] + w^j\left[s^* + (1 + \tau)\frac{d\ s^*}{d\ \tau}\right] \tag{3.23}$$

This expression highlights the three channels through which profit sharing taxation affects retirement income: (1) through the adjustment in the bargained wage, (2)

through the change in tax revenues, (3) through the adjustment of profit sharing itself. On the left hand side of the derivative are the effects of the taxation of profit sharing on the wage of the individual. For the high skilled White Collar worker ($j = h$) this derivative is zero because her wage is fixed. For the Blue Collar ($j = l$), it is comprised of two terms: the direct effect of the taxation of profit sharing on her wage, plus the indirect effect through the change in profit sharing induced by the tax adjustment. The change in the wage of the individual impacts her income by first affecting the wage, then payroll tax revenues, and further by affecting the amount of profit sharing she receives upon retirement because it is proportional to her wage. On the right hand side, are the effects of the change in taxation on, first, the tax revenues (the change in the tax rate plus the change in the tax base) and, second, on the income that is paid upon retirement through profit sharing.

The direction of the effect of taxation is ambiguous. Consider first the the Blue Collar wage. The effects on the wage go in opposite direction. Taxation reduces the wage by reducing the bargaining power of the union, but its indirect effect through the downward adjustment of profit sharing is positive (profit sharing by itself has a negative effect on the wage because any increase in surplus is not sufficient to outweigh the loss in bargaining power of the union). The effect through tax revenues is also undetermined, because even if the social planner is able to raise more revenues, the tax base is reduced. Eventually, the downward adjustment in profit sharing unilaterally reduces retirement income.

Consider now the case of a subsidy to profit sharing, or a reduction in its tax rate. This policy will have beneficial effects on retirement income by increasing the amount of profit sharing paid in that period, by increasing the tax base, and by increasing the surplus. But these effects may be outweighed by the reduction in bargaining power and the foregone tax revenues.

The Effects of Payroll Taxation As with profit sharing taxation, the effects can be decomposed as follows:

$$\frac{d\ I^j}{d\ \phi} = \left[\frac{\partial w^j}{\partial \phi} + \frac{d\ s^*}{d\ \phi}\frac{\partial w^j}{\partial s}\right][1 + \phi + (1+\tau)s^*] + w^j\left[1 + (1+\tau)\frac{d\ s^*}{d\ \phi}\right] \tag{3.24}$$

The effects on income are still divided between the effects on wages, on tax revenues, and on profit sharing. The effect on the wage is again ambiguous because the increase in the bargaining power of the union resulting from the reduction in profit sharing may be offset by the reduction in the surplus. The payroll tax revenues increase, however profit sharing tax revenues decrease, and so does the payment of profit sharing.

3.3.3 The Effects of Changes in the Tax System on Income Inequality

In line with the first analysis of profit sharing taxation detailed in Section 2, the question at hand is to determine how taxation affects income inequality. Income inequality can be defined as the relative income of the White Collar worker to the Blue Collar's, I^h/I^l, which is simply the ratio of their wages w^h/w^l. Since White Collar wage is fixed, the effects can be simply analyzed by the effects of taxation on the Blue Collar Wage, and are straight forward from the above analysis.

However, this changes if one considers a pension benefit system that is tailored to the actual social security retirement system that prevails in many countries, like the United States and France. In its design, pension benefits are not proportional to the base wage for both types of workers and they are in fact regressive (meaning that pension benefits decline as a fraction of wages with income). An extreme case situation is when the Blue Collar worker gets all benefits from payroll taxation, while the White Collar gets all firm profits (which until now were going to an absentee shareholder). Thereby the lifetime income of both parties can be expressed as:

$$I^h = w^h(1+s^*) + \pi \tag{3.25}$$

$$I^l = w^l(1+s^*) + \phi(w^l + w^h) \tag{3.26}$$

The Effects of a Subsidy to Profit Sharing A profit sharing subsidy has the effect of increasing the usage of profit sharing. It benefits the White Collar worker by increasing her profit sharing compensation, and profits (see Appendix for details). The effects on the Blue Collar are more complex and depend on the bargained wage. If the increase in surplus generated by the usage of profit sharing is large enough to yield a wage increase, then all forms of income increase for the Blue collar: the wage, profit sharing compensation, as well as retirement income thanks to the increase in fiscal revenues. If otherwise, the bargained wage decreases, then both wage compensation and pension benefits decrease. This drop is outweighed to some extent by the increase in profit sharing compensation, but it may not be sufficient for overcoming the loss of income.

Regarding income inequality measured as above by I^h/I^l, as long as the effect of profit sharing taxation on the bargained wage is positive, then a profit sharing subsidy leads to an increase in income inequality. Otherwise the effect depends on the comparison between the increase in profits and the potential increase in the Blue Collar wage and fiscal revenues.

However this analysis of the effect on income omits the fact lifetime income is not allocated freely across periods. Individuals are not allowed to access financial markets in order to transfer income across periods. The optimal allocation with standard separable preferences over periods, and without interest rate and discounting (or in a situation where the discount factor equals one over the gross interest rate) is to allocate equal amounts of consumption over periods. Since consumption equals income in our model, the optimal allocation here would be achieved in a situation where $w^l = w^l s^* + b^l$. In the case where period income is larger in young age than in old age, then a subsidy to profit sharing may be welfare enhancing because it allows individuals to smooth their consumption over time. Considering that the savings rate may be too low for many low income individuals (as outlined in the literature), then

the profit sharing subsidy could be welfare improving for that purpose.

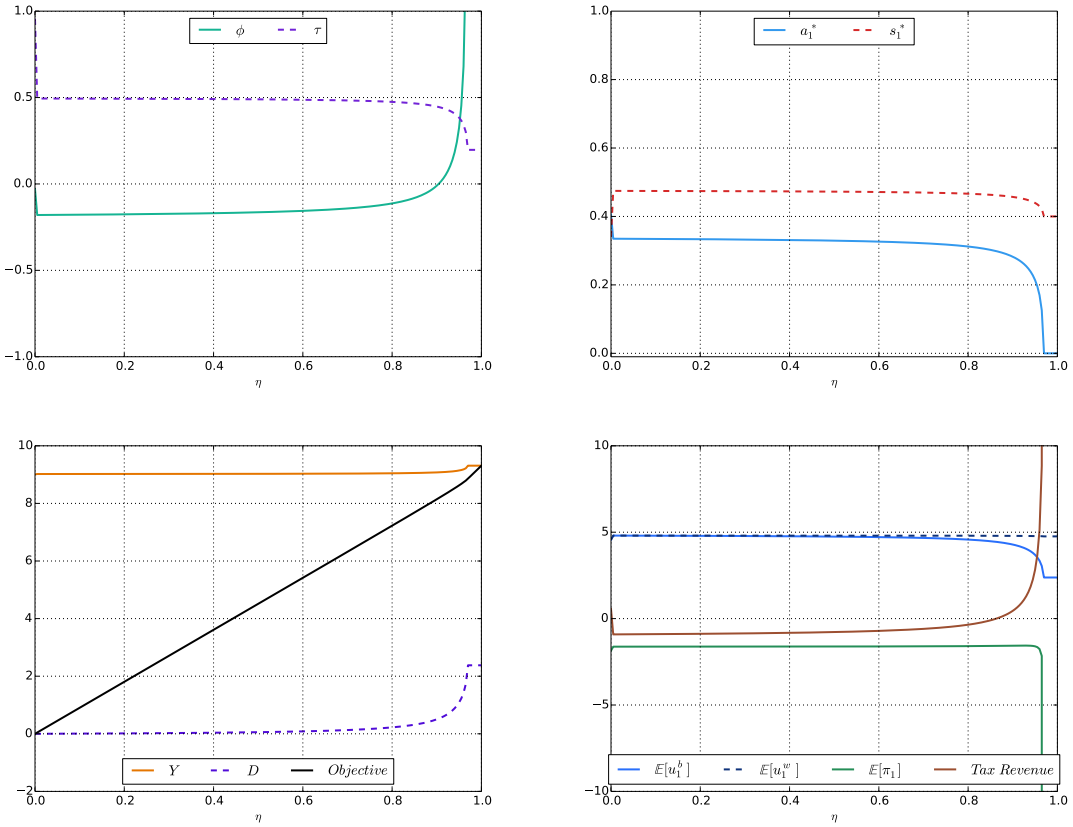
3.4 Conclusion

The analysis of the effects of taxation of profit sharing in this analysis has determined four channels through which taxation of profit sharing affects the welfare of individuals. Since over the last decades favorable fiscal policies with respect to profit sharing have been implemented in several countries, consider the effects of a subsidy to profit sharing. First, by promoting the usage of profit sharing, the subsidy leads to an increase in the usage of profit sharing by employers, and in increase in the output of companies. Second, by affecting the bargaining power of unions, the subsidy can have a negative effect on wages. Thereby the total compensation of individuals may increase or decrease depending on which effect dominates between the one on surplus and the one on bargaining power. Third, the new fiscal policy affects fiscal revenues and through that, retirement income. Revenues may decrease if the increase in the usage of profit sharing is not sufficient in compensating the loss in fiscal revenues due to the reduced taxation in profit sharing and the reduction in the wage that leads to lower fiscal revenues from wage taxation. Fourth, in situations with incomplete financial markets and financial constraints, the taxation of profit sharing leads to transfers of income over time that can be beneficial to individuals if they allow for better consumption smoothing over time.

The models presented in this section predict that profit sharing subsidies can lead to an increase in income inequality depending on the strengths of these different effects. Further empirical research is needed to shed light on these points and to give better policy recommendations for policy makers with regard the taxation of profit sharing.

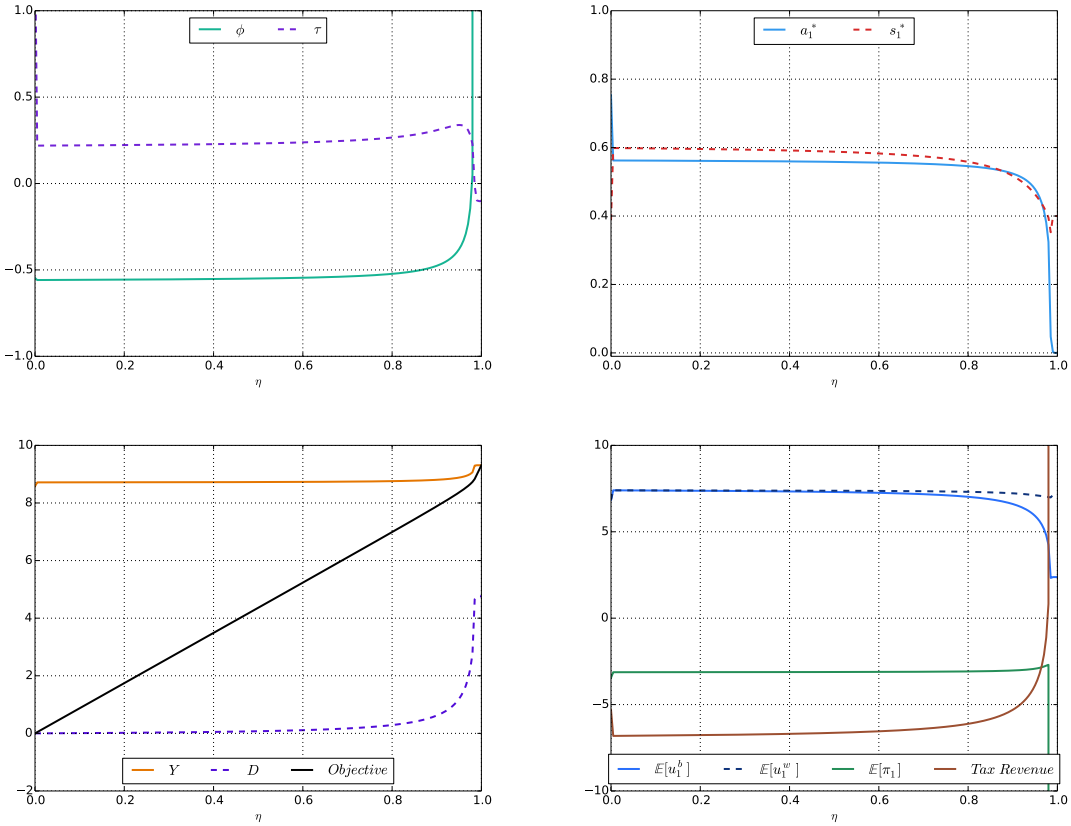
3.5 Figures

Figure 3.1: Optimal Taxation and Equilibrium Variables as a Function of Objective Weights



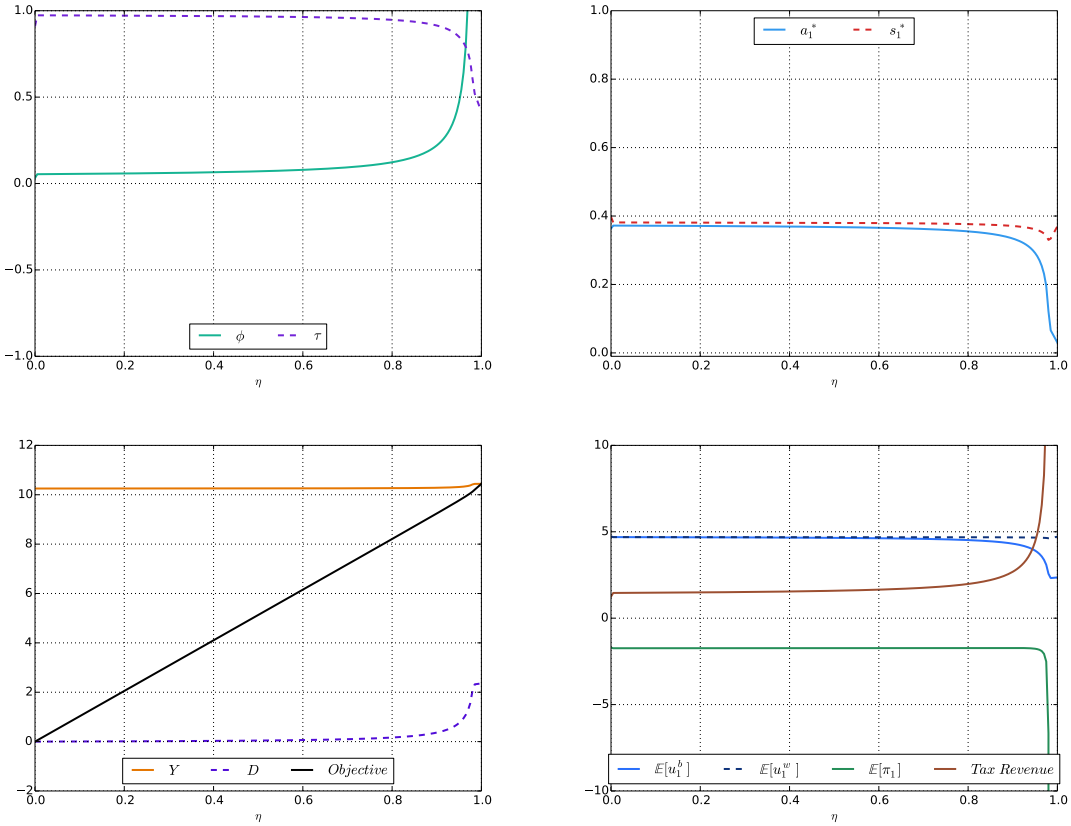
Note: Parameter values are: $y^l = 2,\ y^h = 6,\ w^l = 1,\ w^h = 2,\ r = 0.35,\ \mu_1 = 0.5,\ \theta = .7,\ \epsilon = 0.4$

Figure 3.2: Optimal Taxation and Equilibrium Variables as a Function of Objective Weights



Note: Parameter values are: $y^l = 2,\ y^h = 6,\ w^l = 1,\ w^h = 3,\ r = 0.35,\ \mu_1 = 0.5,\ \theta = .7,\ \epsilon = 0.4$

Figure 3.3: Optimal Taxation and Equilibrium Variables as a Function of Objective Weights



Note: Parameter values are: $y^l = 2,\ y^h = 6,\ w^l = 1,\ w^h = 2,\ r = 0.35,\ \mu_1 = 0.5,\ \theta = .83,\ \epsilon = 0.4$

APPENDIX A

Appendix to Chapter 1

A.1 Equilibrium of the Bargaining Game

The separating Subgame Perfect Nash Equilibrium is constructed so that it satisfies two conditions: 1) the employer accepts a high wage offer in the first period, and 2) the union is better off asking this offer instead of the low wage $\underline{w}$ in which case both employers would behave the same way and the equilibrium would be pooling.

I fist derive the equilibrium in the second period. Condition 1) is satisfied if and only if:

$$y^H - w_2^H \geq y^H(1 - x_2) - \underline{w} \tag{A.1}$$

Which is equivalent to: $w_2^H \leq \underline{w} + x_2 y^H$ Since the utility of the union strictly increases in the wage then $w_2^H = \underline{w} + x_2 y^H$. Condition 2) is satisfied if the utility under pooling which is $\underline{w}$ is smaller than the utility under separation which is $\underline{w} + \theta x_2 y^H$. Note that this is always true so that in the second period, any SPNE is separating.

In the first period, the same reasoning applies. Condition 1) is satisfied if and only if:

$$y^H - w_1^H + \bar{y}(1 - x_1) - \underline{w} \geq y^H(1 - x_1 - a_1) - \underline{w} + \bar{y}(1 - \mathbb{E}[x_2]) - \underline{w} \tag{A.2}$$

That condition is different from the previous one because the payoff captures period 2 profits. In the case of acceptance reputation is not updated and $x_2 = x_1$ so that the future expected payoff is $\bar{y}(1 - x_1) - \underline{w}$. In the case of rejection it is $\bar{y}(1 - \mathbb{E}[x_2]) - \underline{w}$,

where $\mathbb{E}[x_2] = x_1\left[1-(1-r-a_1)\varepsilon\right]$. The equilibrium wage is then derived as:

$$w_1^H = \underline{w} + (x_1+a_1)y^H - (1-r-a_1)x_1\varepsilon\bar{y} \tag{A.3}$$

Note that the wage premium is diminished compared to the one in period two due to the fact that the high type employer may have incentives to reject the offer in order to get rid of the union, in which sens it may want to put the union to the test. The union factors that and lowers the wage premium it bids for.

The last step is to derive a condition for the separating equilibrium to be optimal for the union. In case of separation the utility of the union is:

$$u^{sep} = (1-s)\underline{w} + s\bar{y} + (\theta y^H - s\bar{y})(x_1+a_1) - \theta(1-r-a_1)x_1\varepsilon\bar{y} - \frac{1}{2}a_1^2 + \underline{w} + \theta y^H\mathbb{E}[x_2] \tag{A.4}$$

In the case of pooling it is:

$$u^{pool} = (1-s)\underline{w} + s\bar{y} + \underline{w} + \theta y^H x_1(1-\varepsilon) \tag{A.5}$$

Note that in the case of pooling the union exits next period with probability ε. That captures the fact that workers can interpret no bargaining for an absence of willingness to defend their interests. Because the union chooses the optimal action to maximise u^{sep} and that $a_1 = 0$ is in its choice set, then it must be that at the optimal action a_1^*, the maximized utility in the case of separation, $(u^{sep})^*$, is such that: $(u^{sep})^* \geq (1-s)\underline{w} + s\bar{y} + (\theta y^H - s\bar{y})(x_1) - \theta(1-r)x_1\varepsilon\bar{y} + \underline{w} + \theta y^H x_1[1-(1-r)\varepsilon]$.

Then taking differences between this last expression and u^{pool} and substituting with the optimal value for s, a sufficient condition for the separating equilibrium to be more appealing is:

$$\rho \geq \frac{\bar{y}^2 y^L(1+x_1\varepsilon)}{\theta(y^H + [ry^H - (1-r)\bar{y}]\varepsilon)} \equiv \hat{\rho} \tag{A.6}$$

Note that the denominator is strictly positive as long as $\varepsilon < 1$.

A.2 Bounds on Parameters

These sections derive the bounds $\underline{\rho}$ and $\bar{\rho}$ on the cost of profit sharing so that the equilibrium is an interior solution. They are defined by the conditions that $-x_1 \leq a_1^* \leq 1-r$ and $0 \leq s_1^* \leq 1$. The imply that:

$$\rho \geq \frac{\bar{y}(y^L)^2(1+x_1\varepsilon)}{x_1(1+\theta y^H\varepsilon)} \tag{A.7}$$

$$\rho \leq \frac{\bar{y}(y^L)^2(1+x_1\varepsilon)}{r(1+\theta y^H\varepsilon\mu_1)-1} \tag{A.8}$$

$$\rho \geq \bar{y}y^L(1+x_1\varepsilon) \tag{A.9}$$

There are only three conditions because $s_1^* \geq 0$ for all parameter values. Then the bounds on ρ can be defined as:

$$\underline{\rho} = \begin{cases} \frac{\bar{y}(y^L)^2(1+x_1\varepsilon)}{x_1(1+\theta y^H\varepsilon)} & \text{if } y^L \geq x_1(1+\theta y^H\varepsilon) \\ \bar{y}y^L(1+x_1\varepsilon) & \text{if } y^L \leq x_1(1+\theta y^H\varepsilon) \end{cases} \tag{A.10}$$

$$\bar{\rho} = \frac{\bar{y}(y^L)^2(1+x_1\varepsilon)}{r(1+\theta y^H\varepsilon\mu_1)-1} \tag{A.11}$$

A.3 Proposition 2

The results of Proposition 2 come from the sign of the first order derivatives of the optimal actions of the players with respect to ρ:

$$\frac{\partial s_1^*}{\partial \rho} = -\frac{\bar{y}y^L}{\rho^2}(1+x_1\varepsilon) \leq 0 \tag{A.12}$$

$$\frac{\partial a_1^*}{\partial \rho} = \frac{\bar{y}(y^L)^2}{\rho^2}(1+x_1\varepsilon) \geq 0 \tag{A.13}$$

For total compensation $\mathbb{E}[w_1+w_2+s_1^*\pi_1]$ to be increasing in ρ (which means that increases in profit sharing reduce it) its derivative with respect to ρ needs to be positive, which can be written as:

$$\frac{\partial a_1^*}{\partial \rho}\left[\theta y^H - s\bar{y} + (\bar{y}+(1-\theta)y^H)\theta x_1\varepsilon\right] + \frac{\partial s_1^*}{\partial \rho}\pi_1^* \geq 0 \tag{A.14}$$

Substituting the derivative terms by their expressions gives:

$$\left[\theta y^H - s_1^*\bar{y} + (\bar{y} + (1-\theta)y^H)\theta x_1\varepsilon\right] y^L \geq \pi_1^* \\ = (1 - x_1 - a_1^*)\bar{y} + (1 - r - a_1^*)x_1\varepsilon\bar{y} - \underline{w} \tag{A.15}$$

Note that the left hand side of the equation is positive under the condition that the equilibrium of the bargaining game to be separating. The inequality implies the following condition on the lower bound wage:

$$\underline{w} \geq (1 - x_1 - a_1^*)\bar{y} + (1 - r - a_1^*)x_1\varepsilon\bar{y} - \left[\theta y^H - s_1^*\bar{y} + (\bar{y} + (1-\theta)y^H)\theta x_1\varepsilon\right] y^L \tag{A.16}$$

A.4 Proposition 3

The results of Proposition 3 come from the sign of the first order derivatives of the optimal actions of the players with respect to ε:

$$\frac{\partial s_1^*}{\partial \varepsilon} = \frac{\bar{y}y^L}{\rho}x_1 \geq 0 \tag{A.17}$$

$$\frac{\partial a_1^*}{\partial \varepsilon} = \left[\theta y^H - \frac{\bar{y}(y^L)^2}{\rho}\right] x_1 \tag{A.18}$$

The second derivative is positive when:

$$\rho \geq \frac{\bar{y}(y^L)^2}{\theta y^H} \equiv \tilde{\rho} \tag{A.19}$$

APPENDIX B

Appendix to Chapter 3

B.1 Taxation of Profit Sharing, Union Behavior and Wage Inequality

Comparative Statics of Profit Sharing Optimal profit sharing can be rewritten as follows for compactness:

$$s_1^* = \frac{\underline{w}\bar{y} + T\Omega\left[x_1 + \epsilon\left(\underline{w} + \frac{x_1\bar{y}}{1+\phi}\right) - 1\right]}{1 + 2\underline{w}T\Omega} \tag{B.1}$$

Where $\Omega = [\underline{w}(1+\phi) + \bar{w}]$ and $T = 1 + \tau$. Then the sign of the derivative of s^* with respect to taxation of profit sharing is equivalent to:

$$\frac{\partial s_1^*}{\partial T} \propto -\Omega\left[1 - x_1 - \epsilon\left(\underline{w} + \frac{x_1\bar{y}}{1+\phi}\right) + 2\underline{w}\right] \tag{B.2}$$

$$\propto -[1 - x_1 - a_1^* + \underline{w}(2 - s_1^*)] \tag{B.3}$$

This last expression is strictly negative since $1 - x_1 - a_1^* \geq 0$ and $s_1^* \leq 1$. The derivative with respect to the payroll tax is proportional to:

$$\frac{\partial s_1^*}{\partial \phi} \propto \underline{w}s_1^* - (1 - x_1 - a_1^*) - \frac{\Omega}{\underline{w}}(1 + 2\underline{w}T\Omega) - 2\underline{w}^2\bar{y} \tag{B.4}$$

It is negative if $1 - x_1 - \epsilon\left(\underline{w} + \frac{x_1\bar{y}}{1+\phi}\right) = 1 - a_1^* - x_1 - \underline{w}s_1$ is positive.

Effect of Taxation on Efficiency The first order derivatives of Y with respect to taxation are:

$$\frac{\partial Y}{\partial \phi} = \frac{\partial s_1^*}{\partial \phi}(\underline{w}[a_1^* + (1-\theta)y^l] - s_1^*) + \frac{\epsilon x_1 y^h}{(1+\phi)^2}[a_1^* + (1-\theta)y^l] \tag{B.5}$$

$$\frac{\partial Y}{\partial \tau} = \frac{\partial s_1^*}{\partial \tau}(\underline{w}[a_1^* + (1-\theta)y^l] - s_1^*) \tag{B.6}$$

By equating the parenthesis on the right hand side of the latter equation to zero, we have the following condition for the tax rate on profit sharing:

$$T = \frac{\underline{w}\left[\bar{y}[1+\underline{w}^2] - \epsilon\left(\underline{w} + \frac{x_1\bar{y}}{1+\phi}\right) - (1-\theta)y^L\right]}{(1+\underline{w}^2)(1-x_1) + \epsilon\underline{w}^2\left(\underline{w} + \frac{x_1\bar{y}}{1+\phi}\right) + 2\underline{w}(1-\theta)y^l} \tag{B.7}$$

Replacing in equation B.5 implies that $\frac{\epsilon x_1 y^h}{(1+\phi)^2}[a_1^* + (1-\theta)y^l]$ needs to be equal to zero for for fining the optimal taxation rates. As long as a_1^* is positive, this cannot be satisfied, and the planner has the incentive to set the taxation on wages as high as possible in order to reduce the incentives to strike. This upper bounds then determines the optimal taxation of profit sharing.

B.2 Optimal Taxation of Profit Sharing in a Social Security Retirement System

Optimal Profit Sharing Comparative Statics Using the indirect function theorem the derivatives of s^* can be expressed as:

$$\frac{\partial s^*}{\partial \tau} = \frac{\frac{\underline{w}}{(1+s)^2} - w^h}{-y''(s) + \frac{2\underline{w}(1+\tau-\phi)}{(1+s)^3} + \rho''(s)} \tag{B.8}$$

Assuming that y'' is negative and that ρ'' is positive, meaning that the marginal benefits of profit sharing on productivity are declining, while the marginal costs of its usage are increasing, implies that the denominator is positive. By assumption $\underline{w}$ is smaller than w^h which implies that the derivative is negative.

The Effects of Taxation on Profits The Envelope Theorem can be applied so that:

$$\frac{d\ \pi^*}{d\ \tau} = \frac{\partial \pi^*}{\partial \tau} = -(1-\beta)s^*[w^h + \underline{w}/(1+s^*)] \tag{B.9}$$

$$\frac{d\ \pi^*}{d\ \phi} = \frac{\partial \pi^*}{\partial \phi} = -w^h - \underline{w} \tag{B.10}$$

The Effect of Taxation on Income inequality The derivative of White Collar income to Blue Collar income is:

$$\frac{d\ \frac{I^h}{I^l}}{d\ \tau} \propto \frac{d\ s^*}{d\ \tau}[w^h - w^l] - (1-\beta)s^*[w^h + \underline{w}/(1+s^*)]I^l - \frac{d\ w^l}{d\ \tau}(s^* + \phi)I^h \tag{B.11}$$

A sufficient condition for this expression to be negative is that $\frac{d\ w^l}{d\ \tau}$ is positive.

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