The Role of Labor Unions in Wages: The Case of Mexico*

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(Preliminary Version)

Abstract

This research analyzes cross-section and panel firm-level data to test two main hypotheses: (1) Some Mexican labor unions make more aggressive wage demands than others, and (2) The union's level of aggressiveness depends on its affiliation with nationwide confederations. I find that during the 1990s, unions that were affiliated with the CTM, the most important labor confederation in Mexico, were the most aggressive in pursuit of high wages, while unions that were affiliated with alternative confederations pursued wage moderation. Recognizing that there are two types of unions based on their wage demands has important implications for how the Mexican labor market operates. Despite the general consensus about wage rigidities in the Mexican labor market, I argue that the union's decision about the type of confederation to affiliate with -whether it pursues aggressive or moderate wage demands- creates a channel via which wages respond, to some degree, to economic factors. One main finding supports my argument: Labor unions from low-productivity firms were associated with confederations that made wage cuts easier, while unions in high-productivity firms affiliated with confederations that made more aggressive wage demands. In general, then, unions change their confederation affiliation in response to productivity shocks.

JEL Codes: J31, J41, J51.
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1 Introduction

Questions about distortions in the labor market and wage rigidities have spurred considerable interest in the field of economics. Most research agrees that these rigidities or inefficiencies are created by unions and restrictive regulations that prevent the reallocation of labor and other resources to their most efficient uses.

Despite considerable effort to measure the magnitude and determinants of these labor market inefficiencies, as well as to estimate the causal effect of unions on wages, previous research has neglected the study of more particular union characteristics such as their affiliation to nationwide confederations.[1] This attachment to broader labor organizations might have an impact on the union's bargaining power to extract surplus, and thus on wage determination.

Labor confederations and their impact on wages are especially interesting in countries like Mexico where the labor movement has been strongly linked to the government since the 1930s.[2] At that time, Mexican unions and the state (or more precisely the PRI)[3] came to an agreement where the state held a monopoly over politics and unions supported economic development by controlling workers and containing wages in exchange for preferential treatment from the government.[4] In addition, unions by their votes committed

[1]Some examples of labor confederations are: The American Federation of Labor and the Congress of Industrial Organizations (AFI-CIO), both in the United States, the General Italian Confederation (CGIL) in Italy, the General Labor Confederation (CGT) in Argentina, the United Workers Central Organization (CUT) in Colombia, the Unified Labor Confederation (CUT) in Brazil, the Mexican Workers' Confederation (CTM), etc.

[2]This agreement developed in Mexico during the 1930s has been referred to in the literature as "corporatisvismo". This corporatist structure provided the government with a powerful mechanism to control the two most important economic forces at that time -the peasants and the laborers. This government strategy stimulated the creation of laborer and peasant organizations, incorporating them into the political party in power (the PRI) and giving them some political and economic privileges such as the development of institutions (IMSS, ISSSTE, Fonacot, INFONAVIT) in charge of redistributing income in favor of workers. This labor movement on the government side was called "official".

[3]The Institutional Revolutionary Party (PRI) is a political party that ruled Mexico for more than 70 years. In 2000, for the first time in history, Mexico elected a president who was not a PRI candidate.

[4]There has been a lot of work concerning the long term relationship between Mexican labor unions and the government. Haber et. al. [16] claim that political integration between Mexican firms, unions, and the state convinced firms to invest in the country during the Post-Revolutionary period. In this context, labor unions worked as a mechanism to make the government's stated commitment not to extract firm's rents credible. Zapata [34] focuses on the impact of Mexican economic and political events during the 1982-1994 period, such as privatization, devaluation, financial and trade liberalization, economic crisis, among other factors on the historical relationship between the labor movement and

to supporting the PRI.

This reciprocal relationship between unions and the state was made possible by the creation of nationwide labor organizations, called Centrals, that guided firm-level unions through wage bargaining. The guided wage policies were determined in negotiations between the Centrals' leaders and the government. Even today, it is argued that confederations are strongly linked to the government because of their affiliation with political parties.

The important connection between political matters and labor confederations, well documented by historians, suggests that wages have been linked to political considerations rather than determined freely in the labor market. Even so, there has been little attempt on the part of economists to measure the causal effect of labor confederations on wages. The present study is the first rigorous analysis of this matter, complementing previous historical research which was based primarily on limited evidence such as interviews and case studies.

This line of research on the case of Mexico is particularly interesting for at least three reasons. First, the Mexican economy has undergone economic and political transitions during the past two decades when the government moved to promote greater productivity and efficiency, when the government pursued trade liberalization and privatization. This transition has affected not only the bargaining power of unions, but also the relationship between the labor movement and the PRI. For instance, the role of nationwide confederations has become less clear as political democracy has opened the space for new alliances between confederations and alternative political parties to the PRI. Second, no matter what the connections were between the labor movement and the government during the twentieth century, labor unions have always had different alternatives in choosing their Central affiliation. There are more than thirty Centrals in Mexico from which unions can choose, but yet the determinants of the union's decision in choosing a specific Central remain unknown. Third, although there is some generalized perception, based on anecdotal evidence, that the role of Centrals on wage determination has diminished after liberalization, to the best of my knowledge rigorous empirical evidence is rare.

Even though available data do not allow me to study the role of labor Centrals on wages before and after liberalization policies, my research sheds new light on the importance of this plethora of confederations in Mexico. In particular, this work estimates the wage gap among Centrals, taking into

the political system. Middlebrook a[25] analyzes the factors behind both the origins and the durability of the alliance between the PRI and the labor movement. He also analyzes the impact of liberalization on this alliance.

account the dynamics of the unions' Central affiliation over time. I find that Mexican unions change Centrals relatively often, and more importantly, I show that despite the strong relationship between politics and the labor movement, wages react to changes in productivity as labor unions are allowed to switch Centrals when the circumstances of the firm change. For example, unions affiliated with Centrals that adopt wage moderation policies switch to Centrals that make more aggressive wage demands when facing increases in labor productivity. On the other hand, the likelihood of leaving a Central that follows pro-wage policies either does not change or slightly increases when productivity decreases.

To explain the above phenomena, I argue that Mexican confederations adopt different wage policies that labor unions recognize. Specifically, I argue that the CTM, the largest Central in Mexico, is associated with high wages, while the CROC, the second largest Central, can be distinguished by cutting wages to levels lower than the CTM's. Results from different identification strategies suggest that the wage gap between these two Centrals ranges between 3% and 11%. Therefore, when Mexican unions face negative productivity shocks, they may switch to the CROC with the hope of keeping their jobs. This specific scheme by which unions select themselves into Centrals over time allows me to make robust conclusions about the wage gap among Centrals and therefore, to generalize about the existence of different types of unions based on their wage demands. Recognizing types of Centrals based on their wage policies raises interesting questions for future research. For example, is one union type better than another for firms' economic performance?

The order of this paper is as follows: Section 2 presents both the main characteristics of labor unions and Centrals in Mexico and a short review of the Mexican economic and political transitions during the 1990s. Section 3 briefly highlights the theoretical framework and the sources of bias in estimates of the wage gap among confederations. Section 4 includes the identification strategies and empirical results. Finally, Section 5 concludes.

2 The Institutional Context

2.1 Mexican Labor Unions and Confederations

In this study I analyze the relationship between the Mexican labor movement and wages through nationwide confederations. It is important to first understand, therefore, how labor unions operates from a legal perspective and how their affiliation with Centrals works.

In Mexico, labor unions can be formed in multiple ways. A union can cover employees in one or more firms, in one or more industries, in one or more states, and in one or more job categories.[5] Further, Mexican labor contracts have "closed shop" rules: the employers can only hire members of a specific labor union, and employees must remain members of that union to keep their jobs.[6]

A Mexican union must be registered before it may legally represent workers. The rules for union registration are set down in the Art. 365 of the Mexican Labor Law (MLL): unions must have a minimum of twenty members, all of whom must be at least fourteen years old, and the union must submit notarized copies of its statutes, as well as the name and address of each member, to the Ministry of Labor and to the Conciliation and Arbitration Boards.[7] If the above requirements are satisfied, registration should be automatic. It has been argued, however, that the process might favor a particular type of union because the government may interfere in the registration process. For example, the state can delay both union registration and the legalization of industrial disputes (see appendix A.2).

When a union already exists in a firm, an incoming union has to file a petition with the labor boards seeking an election in order to determine which union represents a majority of the workers. However, exclusion clauses have made entry difficult since the old union has the right to instruct the employer to fire disloyal organizers. This is possible because there is no secret ballot when workers vote on union affiliation. There are also rules regarding the union's dissolution. This must be approved by two-thirds of the membership or unions can be dissolved when reaching the expiration date set down in its own statutes (Art. 379, MLL).

Once a union has been settled down in a firm, it has the alternative to affiliate with broader labor organizations at regional or national levels. In this study, I restrict my attention to national attachment. In most cases when unions affiliate with regional federations, they are also affiliated with confederations. Therefore, focusing on the union's affiliation with nationwide confederations, although a broader definition of union's affiliation, is infor-

[5] Art. 360, Mexican Labor Law.

[6] Even though the Mexican Labor Law does not prohibit the existence of more than one union in a workplace, "closed shop" rules can be created through collective bargaining agreements. In fact, these exclusionary clauses are included in most of the collective bargaining agreements that are signed in Mexico (source: collective contracts from firms that are located in the Mexico-US border). "Closed shop" rules do not apply in job-category unions since these are known for unionizing groups of few employees.

[7] For information about the Mexican Conciliation and Arbitration Boards see appendix A.2.

mative enough. Examples of confederations, in Mexico known as "Centrals", are the Mexican Workers Confederation (CTM), the Regional Confederation of Workers and Peasants (CROC), the Regional Confederation of Mexican Workers (CROM), etc.[8] The Central of Centrals is the Mexican Labor Congress (LC) that combines more than thirty confederations encompassing around 75% of the unionized workforce.

How a union joins a confederation is regulated by each Central's statutes (CS): a union has to fill out an affiliation petition in which unionized employees agree to follow the Central's policies (Art. 86, CS). Also, these statutes are straightforward about dissolution: the union's separation from a confederation must be accepted by two-thirds of the union membership (Art. 87, CS). However, this two-thirds rule is contradicted by the Mexican Labor Law, which states that labor unions can leave a confederation at any time (Art. 382, MLL). What is important for this study is the fact that unions can easily change Centrals, at least from a legal perspective.

It is important to emphasize that a Mexican Central is not a union which bargains with employers over labor contracts, but a confederation of separate unions, each of which bargains individually.

The confederations' capital consists of the following: (1) they offer guidance on administration and expertise in formulating wage policies, (2) they centralize resources from members through union dues, (3) depending on their connection with political parties, they might have the ability to obtain concessions from the state, as well as to speed negotiations with the government, and (4) the unity of unions offered by nationwide confederations increases the credibility of strike threats.

Given the above skills, Centrals sell themselves as mediators more capable of appropriate rents than non affiliated firm-level unions. At the same time, these confederations differentiate themselves from each other in terms of goals, strategies, and ideologies. These differences among Centrals have become more tangible after the economic and political transitions that took place in Mexico during the 1990s. After this period some unions started securing employment rather than pursuing high wages and the union's ability to communicate with the government also started to depend less on their connections with the PRI, as other parties were gaining political territory. These broader differences in goals and strategies might explain the wage gap among Mexican confederations during the 1990s (table 1).

Among Centrals, the literature has distinguished between two main types: official and alternative Centrals. According to previous research, the former has helped the government to contain wage increases and to discourage in-

[8]For more information about these Centrals see appendix A.

dustrial conflict. Besides that, official confederations are incorporated into political parties while alternative Centrals do not affiliate to any political party.[9] The PRI is the only political party that has made explicit its relationship with labor Centrals, while the PAN has refrained from any association with them.[10]

Although all official unions have been affiliated with the Labor Congress, conflicts among them have not been rare. For example, there has been rivalry between the CROC (and its allies such as STERM, SME, and COR)[11] and the CTM since the former was created in 1952. In fact, Middlebrook claims that Mexican president Miguel Alemán (1946-1952) facilitated the formation of the CROC to undermine the CTM's capacity to pressure the state for economic concessions.

Among the more than thirty Mexican Centrals, the CTM has stood as the largest and most powerful confederation in Mexico since its creation in 1936. Even though there were periods of confrontation between the state and the CTM, over the long run, the CTM has been the most important supporter of Mexican presidents, especially before liberalization policies. For example, the state relied on the CTM for help in pushing through nationalization and agrarian reforms during the 1980s. By 2001, the CTM still remained as the largest Central in the country, as suggested by data from Mexican manufacturing firms. Despite the 14% drop in the number of unionized firms attached to the CTM during the economic crisis of 1995, by 2001 this Central had fully recovered (table 2).

While the CTM has retained its dominance in most industries, in certain activities, the CROC has gained remarkable importance. To illustrate, the CROC's participation in unionized employment in the wood industry increased 130% between 1992 and 2001, whereas the CTM's increased only 26%.[12] On average, unionized firms and workers attached to the CROC have increased by almost 50% and 35%, respectively (tables 2 and 3).

The increased presence of non-CTM unions might be explained by the

[9]Alternative Centrals are the National Union of Workers (UNT) and independent federations such as the Federation of Independent Unions (FNSI) and the Proletarian Independent Movement (MPI).

[10]The incorporation of unions into political parties is asserted directly in the Central's statutes. For example, the CTM 2004-statutes state that the CTM is an official member of the PRI, then, any union affiliated with this Central must be incorporated to the PRI too. On the other hand, President Fox (from the National Action Party -PAN) has ratified his position against any corporatist relationship with labor unions.

[11]STERM: Mexican Electrical Workers' Union, and SME: Mexican Electricians' Union and COR: Confederation of Revolutionary Workers.

[12]Also, the CROC's participation in total employment in the wood industry increased 100% between 1992 and 2001, while the CTM's increased only 12%.

entrance and exit of firms in the manufacturing sector over time. The lower panel of table 2 shows that by 1992 a large share of new firms (i.e., firms that have been in operation since any time after December 1984) were attached to the CROC. Other Centrals also increased their firm membership, but by 2001 they lost nearly 30% of their members.

The drop in the number of old firms affiliated with the CTM between 1992 and 1999 suggests that firms attached to this Central were more vulnerable to the economic crisis of 1995 than firms with other affiliation. However, how to interpret the increase in the number of old firms associated with the CTM when affiliation is assumed fixed over time. One concern of this study is, then, the analysis of the Central affiliation dynamics over time. If unions are moving, this should be taken into account when estimating the causal effect of Central status on wages.

2.2 Mexico's Economic and Political Restructuring

The role of unions in the labor market was importantly affected by the economic environment in Mexico during the 1990s. In fact, the 1990s have often been called the decade of the unionization crisis because membership severely dropped during this period. Data from household surveys show that unionization rates decreased by around 40% between 1989 and 1996, and increased by only 10% between 1996 and 2004.[13] Data from manufacturing firm surveys also show that unionization rates dropped around 20% between 1992 and 1994, and slightly recovered from 1994 to 2001, when unionization rates increased by about 5% (table 4).[14]

Many industries were particularly vulnerable to economic changes during the 1990s (food, drinks and tobacco, textiles and non-metal minerals) and yet, there were industries that slightly increased their number of unionized workers relative to total employment (basic metals, and metals, machinery and equipment). Also, some regions were severely affected during this period such as the South and the Bajío regions, where unionization rates decreased between 15% and 20%, respectively (table 5).

This shrinkage in unionization rates has been linked to the government's effort to promote greater productivity and efficiency in both the public and

[13]To calculate union rates, labor force was defined as every person above 14 years old who was working when the survey was taken. Union rates are higher when self-employed workers are excluded from the labor force as well as when employees between 14 and 16 years old and part-time workers are excluded.

[14]Sources: (1) Household surveys- ENIGH (available for the years of 1984, 1989, 1992, 1994, 1996, 1999, 2000, 2002 and 2004) and (2) Firm surveys- ENESTYC (available for the years of 1992, 1994, 1999 and 2001).

private sectors through liberalization and privatization policies. This economic restructuring might have weaked Mexican unions because liberalization coincided with increases in unemployment, decentralization of production, high levels of turnover, and the government's effort to both decrease inflation and make employment more flexible.

On the political side, the 1990s were characterized by the growth of opposition parties to the PRI, as well as by the victory of the first non-PRI candidate in presidential elections (in 2000). This more heterogeneous political environment had an impact on the seven-decade relationship of the PRI and the labor sector as it opened space for new political alignments between non-PRI political parties and non-CTM confederations.

In fact, previous research has recognized both that the Central's wage policies have been strongly linked to political matters, and that this relationship was affected by liberalization policies. Some authors claim that after the late 1980s, there was a deep rupture between the government and Centrals when the old imported substitution model was replaced by open trade.[15] In contrast, others claim that official Centrals (the CTM, CROC, CROM, etc.) continued to support the established government through moderate wage demands, thus boosting investment and reducing inflation.

To sum up, the important economic and political transitions that Mexico experienced in the 1990s and its peculiar union history -extremely tied to politics- open a broad set of questions about labor unions and wage determination. In this study, I focus on the role of nationwide confederations in the Mexican labor market because of two main reasons. First, the changes in Centrals' participation in employment suggest that unions might be switching Centrals over time; and second, the plethora of confederations in the country raises questions about how unions decide which confederation to move to, and how this decision impacts wages.

3 Theoretical Framework

Most theoretical models analyzing the effect of labor unions on wages and employment are based on the Nash-bargaining model. This model shows that the outcome of a bargain between two players -in this case, a firm and a labor union- comes from maximizing the Nash formula $(Z - \hat{Z})^{\theta}(\Pi - \hat{\Pi})^{1-\theta}$, where

[15] From the early 1930s, the Mexican government adopted a strategy of Import Substitution Industrialization (ISI). ISI supporters believed that economies of scale put nascent industries at a disadvantage when competing with more developed foreign rivals. To achieve economies of scale, industries would initially require economic assistance and exclusive access to markets which only the state could provide.

Z refers to the union objective function and Π refers to the firm objective function. When there is no agreement between players, then the objective functions are $\hat{Z}$ and $\hat{\Pi}$, respectively. The parameter θ refers to the bargaining power of unions. The higher θ, the greater the union bargaining power.

The union objective function, $Z = L(W - \hat{W})$, is derived from a median voter framework which assumes that unions maximize a surplus over an alternative salary, $\hat{W}$, that can be thought of as the competitive wage (i.e., equal to labor productivity). The profit function of the firm is $\prod = R(L) - WL - F$, where R(L) is the firm's revenue, W refers to wages, L refers to employment and F refers to the firm fixed cost. Previous studies assume that $\hat{\prod}$ is equal to F, employment is unilaterally determined by the firm, and the wages are determined in bargaining between the firm and the union.

Although labor unions are usually assumed to bargain only for wages, in this study, labor unions are allowed to differ one from the other based on their preferences toward employment. To account for the weight unions put on employment relative to wages, an additional parameter (ϕ) was included in the maximization problem. The higher ϕ, the greater the union's preference toward employment.

Appendix C presents a detailed discussion about the different assumptions and implications behind different Nash-bargaining models: the monopoly model, the right to manage model and the efficient-bargaining model. In this section, I briefly set up the more general maximization problem and its solution.

The Nash maximization problem is:

$$Max_W \quad [L^{\phi}(W - \hat{W})][R(L) - wL]^{\gamma} \tag{1}$$

subject to:

$$R_L = W$$

where $\gamma = \frac{1-\theta}{\theta}$

substituting $R_L = W$ in Eq. (1):

$$Max_L \quad [L^{\phi}R_L - L^{\phi}\hat{W}][R(L) - R_L L]^{\gamma} \tag{2}$$

solving the maximization problem in Eq. (2):

$$(R_L - \hat{W}) = [\frac{\gamma L}{R - R_{LL}} - \frac{\phi}{LR_{LL}}]^{-1} \tag{3}$$

therefore:

$$(W^* - \hat{W}) = [\frac{\gamma L^*}{R - R_{LL}} - \frac{\phi}{L^* R_{LL}}]^{-1} \tag{4}$$

where $L^* = L^*(W, \phi, \gamma)$

According to Eq. 4, the wage in a particular firm is a function of both firm characteristics (such as the the firm's revenue and labor productivity) and union characteristics (bargaining power and union's preference over employment in relation to wages).

In this study, I am concerned with analyzing differences in wages derived from differences in unions characteristics, such as its Central affiliation. For example, I am interested in estimating the wage gap between a firm associated with the CTM and a firm associated with the CROC. It follows that:

$$W^*_{CTM} = \hat{W} + [\gamma_{CTM} * x_1 - \phi_{CTM} * x_2]^{-1} \tag{5}$$

$$W^*_{CROC} = \hat{W} + [\gamma_{CROC} * x_1 - \phi_{CROC} * x_2]^{-1} \tag{6}$$

where $x_1 = L^*/(R - R_{LL})$ and $x_2 = 1/(L^* * R_{LL})$

Despite the fact that γ and ϕ cannot be estimated separately, I assume that these parameters are determined by the type of Central each firm is associated with. The higher ϕ, the lower the wages demanded by the union. The effect of γ on wages would depend on how employment changes as the union's bargaining power changes. The reduced form proposed here is:

$$Ln(W_f) = a + b * C_f + c * Ln(\hat{W}) + d * Ln(X_f) + \eta_f \tag{7}$$

where C is equal to one if the firm f is associated with the CTM and zero otherwise, and X includes firm characteristics as proxies of L^*, R and R_{LL}. It can also be assumed that $\hat{W}$ is the same for all firms regardless the affiliation of their union; or less restrictive, $\hat{W}$ can be assumed the same over industries or regions. In the latter case, state and industry fixed-effects should be included in the reduced form as additional controls. Time fixed-effects should also be included when analyzing wage determination over time.

The coefficient b in Eq. 7 measures the wage gap between Centrals. If b-estimated is statistically significantly different from zero, then the wage gap among Centrals is explained by union characteristics, such as its bargaining power (γ) or its preferences toward wages or employment (ϕ).

However, if γ and ϕ are associated with the firm's characteristics, then, some bias should be expected. For example, if unions in high-productivity firms choose a particular Central and labor productivity is omitted in Eq. 7, then the correlation between C_f and R_L will lead to bias in the estimated effect of Central affiliation on wages (i.e., in the estimated wage gap among confederations). The side of the bias is determined by:

$$\frac{Cov(W,C)}{Var(C)} = b + \frac{Cov(C,\eta)}{Var(C)} \tag{8}$$

where $Cov(\cdot)$ refers to the covariance between two variables, $Var(\cdot)$ refers to the variance of a particular variable, and $\eta_f = \beta * R_{Lf} + \varepsilon_f$. Therefore,

$$\frac{Cov(W,C)}{Var(C)} = b + \Gamma'_{CR_L}\beta \tag{9}$$

where Γ_{CR_L} refers to the correlation between Central affiliation and labor productivity. Since labor productivity is positively correlated with wages ($\beta > 0$), then whether b-estimated is upward or downward biased depends on the sign of Γ_{CR_L}.

In the following sections, I estimate the causal relationship between Central affiliation and wages using available data in the Mexican manufacturing industry and challenging the exogeneity assumption of Central status. First, I assume that Central status is exogenous or at least stable over time. Given this assumption, I estimate the correlation between Central status and wages using a cross-section database at firm level. Second, I test the exogeneity assumption of Central affiliation analyzing the possible link between labor productivity and the union's Central choice. I also test the causality direction between Central status and wages. Finally, I use a panel database at firm level to explore the determinants of Central attachment and estimate the impact of Central status on wages using both instrumental variables (IV) and Fixed-effects (FE) approaches.

4 Empirical Estimation

4.1 Data

The theoretical discussion from section 3 stressed the importance of including controls for firm and union characteristics in estimating the effect of Central affiliation on wages. I use data from the National Employment, Salaries,

Technology and Training Firms Survey (ENESTYC) that provides indicators of Central affiliation that are not generally available in labor market surveys.[16] In particular, firms from the ENESTYC reported to be associated with three main confederations that are: the CTM, the CROC and the CROM. Associations with other Centrals are categorized as Others.[17]

The ENESTYC consists of a nationally representative sample of Mexican manufacturing firms that has been fielded four times (1992, 1995, 1999 and 2001).[18] It is a large stratified survey with over representation of larger workplaces because firms are drawn from the Mexican industrial census following a specific sampling methodology: big and medium firms are all selected (i.e., plants with more than 101 employees), while small and micro firms are randomly chosen.[19] Therefore, sampling weights must be used to extrapolate from the analysis to the population from which firms were drawn. The sampling weights are calculated as the inverse of the probability of being drawn and all estimations in this work account for these weights.

In this study, I restrict attention to production workers since they are the population of interest. This job category usually is unionized compared to directors and management that never belong to a union.[20] In addition, I restrict attention to wages, rather than total earnings, paid to workers. I exclude benefits because results did not change when considering total payments at firm level. This suggests that unions affect wages and benefits similarly.

Another advantage of the ENESTYC data is that measures of firm output and employment are available; these variables play a major role in this analysis since they are used to calculate labor productivity. The indicator of labor productivity is measured as the ratio of real output and total hours worked. It is well known that a more precise measurement of productivity would consider value-added (VA) rather than output. Unlike the output measurements, the VA calculation does not overestimate the real value produced by the firm because the latter subtracts the value of intermediate goods from the market

[16]The ENESTYC contains detailed information on employment, wages, industry, size of firm, firm age, union status (whether a firm has a union or not) and Central affiliation. See appendix 4.1 for a detailed description of the available data on Mexican unions.

[17]Others category includes confederations such as FAO, FOR, FROT, FSTSE, SNTMMSRM, CGT, CRT, COR, COCEM, and independent Centrals such as FAT, FNSI, FSI, CTC, COM and UNT.

[18]It would be interesting to estimate the wage gap among Centrals, before and after trade liberalization. Unfortunately, there is not comparable data from years before 1992.

[19]Big -firms: more than 250 employees; Medium firms: between 100 and 250 employees; Small firms: between 15 and 100 workers and Micro firms: less than 15 employees.

[20]All specifications in this study were estimated using both production workers and total workers. Results did not change.

value of final goods. However, the inclusion of industry fixed-effects in my estimations diminishes the bias resulting from using only output. Moreover, output per hour measures have been used extensively in previous literature.

Table 6 shows the basic characteristics of the ENESTYC survey. For example, the 1992 survey includes 5,071 firms that represent 138,774 firms in the population (i.e., number of firms when weights are used). The 1992 survey includes maquila plants in the sample, but these sweatshops, at least in this year, are not representative of the Maquila industry as a whole. In the ENESTYC survey, big and medium non-maquila firms (1,2) were chosen with 100% certainty, whereas only big maquila firms (1), in specific year surveys, were chosen with 100% certainty.[21]

The lower panel of table 6 shows the date each survey was taken and the reference date of relevant information. For example, the 1992 questionnaires include monthly information from March, 1992 and yearly information from 1989, 1990 and 1991. Also, the 1992 sample includes firms from 52 industries.

4.2 Cross-Section Analysis

Since there is some evidence of labor unions not changing Central affiliation over time (e.g. the predominance of the CTM during the twentieth century, the practice of exclusion clauses in labor contracts and government interference in administrative procedures concerning union's registration), I first report estimates of a conventional log wage equation using a constant-coefficients regression model with Central status as a covariate. In other words, I estimate a naïve estimation of Eq. 7 using a cross-section database at firm level that contains information on wages and labor unions.

The cross-section specification based on the available data is then:

$$Ln(W_f) = a + b * C_f + c * X_f + [\lambda_s + \delta_t + \phi_i] + \varepsilon_f \tag{10}$$

where W_f refers to the average real wage level paid by the firm f.[22] X_f refers to firms' characteristics such as age and size. The term $\lambda_s + \delta_t + \phi_i$ refers to fixed-effects by state, year of survey and industry (see table 7 for a full

[21] While the last two surveys (1999 and 2001) separate maquila and non-maquila plants to make these surveys representative of each of these industries, the 1995 survey does not include maquila firms. Also, the petrochemical and gas industry (Petroquímica Básica, code 3511), as well as oil refinery (Refinación de Petróleo, code 3530) were excluded from each sample.

[22] All quantities in this study are in real pesos, unless otherwise specified.

description of variables).[23]

The inclusion of fixed-effects by industry, state and year (as well as interaction terms) helps to overcome potential bias in the estimation of the coefficient on Central (b). For example, industry fixed-effect controls for differences in returns among industries. Economic activities with higher markups should be able to pay higher wages regardless of the firm's union characteristics. There may also exist state-specific institutional and cultural differences which result in wage differentials among confederations. Finally, including year dummies controls for exogenous shocks such as the 1995-economic crisis.

Results of Eq. 10 are shown in table 8. Central affiliation is correlated to wages. Firms with unions affiliated with the CROC show wages 8.2% below those in firms with CTM-unions. However, there are not important wage differences between CTM-unions and CROM/Other-unions.

4.2.1 Endogeneity of Central Affiliation

The results from above strongly depend on the exogeneity assumption of the Central affiliation variable. In this section, I examine both the extent to which unions change affiliation over time and the determinants of Central choice at firm level. In particular, I am concerned with whether attachment is correlated to wages (i.e., Central affiliation is non-random).

A panel, heavily biased toward bigger firms, can be created to analyze the dynamics of Central affiliation. Although the ENESTYC does not follow the same firms over time, it is possible to match many firms across surveys because each of them includes all big and medium firms. In order to keep as many observations as possible, firm matching was carried out each pair of years. Firms from the 1992 survey were matched to the 1995 survey, as well as to those from the 1999 and 2001 surveys. Firms from the 1995-survey were matched to the 1999 and 2001 surveys. Finally. firms from the 1999 survey were matched to the 2001 survey. Table 9 shows the number of observations in each panel and compares them with observations in each original year survey.

The panel shows that firms change Centrals relatively often and more often than their union status (i.e., whether a firm is unionized or not): around 6% of unionized firms change Central affiliation per year (table 10), and 2% of total firms change union status per year (table 11). This changing Central phenomenon was particularly important between 1999 and 2001 when more than 10% of unionized firms changed Central affiliation per year. Not surprisingly, these results are robust to include only medium and big firms.

[23]Interactions between year and state fixed effects or between year and industry fixed effects are other potential controls.

In order to verify the importance of unions switching Centrals, I also analyze a four-year panel that includes firms from all the ENESTYC surveys. Table 12 shows that 37% of unionized firms change Centrals at least once during the period from 1992-2001, and 37% of those unions switch back to their initial Central. The year-by-year results of Central changes are similar to table 10.

As mentioned in previous sections, there are two main sources of endogeneity relevant to this work: (1) Labor unions may switch Centrals depending on firm's labor productivity and (2) Centrals may adopt different wage policies over time. The next sections deal with the first case of endogeneity, but it is still assumed that Centrals do not change their policies over time. The fact that the Centrals' leaders remain in their position for long periods and that the Central's statutes also have not changed much over time make the latter assumption reasonable.[24] However, it can still be argue that Centrals' policies change according to economic conditions.

One example is the year of 1989 when there was an important agreement between official unions[25] and the government to contain wages ("Pacto de Solidaridad") and thereby, reduce the high levels of inflation at that time. The important drop in national wages at this time indicates that, in fact, most unions followed the Pacto, thus changing their wage policies. I argue that aggressive Centrals were more resistant to following the Pacto than moderate Centrals. Thus, the wage demands of the former were still higher during the 1990s.

A second example of the possible association between economic conditions and the Central's wage policies is the 1995 Mexican economic crisis. In table 13, it is interesting to notice that during this period, most official unions switched to Other Centrals, and the opposite happened during economic stability, when the CTM and CROC received unions that were leaving the Other Centrals. The latter switching-pattern suggests that official Centrals followed wage moderation policies in 1995 that made their members look for apolitical Centrals at that time.

The connection between economic conditions and the Central's wage policies remains an interesting matter to analyze in future research. That being said, what is important for this study is the fact that unions have changed their Central affiliation over time, and that the CROC stood as the main winner over the long run (1992-2001).

[24]Fidel Velázquez, Rodríguez Alcaine, Blas Chumacero are examples of CTM members who have leaded the organization for more than thirty years.

[25]From here on, an official Central refers to a confederation that is affiliated with the Labor Congress which is the main channel of unions to communicate with the government.

4.2.2 Omitted Variable Correction

The first estimation problem that arises because Central affiliation changes over time is that variables correlated with both Central attachment and wages might be omitted. The most obvious omitted variable, as mentioned in section 3, is labor productivity which might well affect wages and Central status. For example, it might be that CTM-unions are associated with high-productivity firms and thus with high wages. This seems, in fact, to be the case. As suggested by table 14, the estimation of the wage gap between the CTM and the CROC might be upward biased ($\Gamma_{CR_L} > 0$).

A straightforward strategy to reduce the bias in naive comparisons is to include as controls the variables that are related to the covariate of interest (i.e., labor productivity should be included in the econometric specification of Eq. 10). However, if CTM-unions are associated with high-productivity firms, while other unions are associated with low-productivity firms, then the coefficient regarding Central affiliation would be downward biased because part of the effect of Central status on wages would be attributed to labor productivity. In the extreme case of perfect collinearity, the coefficient on Central would not be identified. On the other hand, if the Central affiliation coefficient remains statistically significant and with the same sign as before (table 8), I can conclude that Central affiliation matters and that CTM-unions can be categorized as pro-wage type.

Table 15 shows the results if Eq. 10 is estimated including labor productivity as a covariate. First, the significance and magnitude of the coefficient regarding Central affiliation do not change much. Second, allowing productivity's impact on wages to vary among Centrals shows that productivity has almost no effect on wages in firms with CROM and Other-unions, and that the effect of productivity on wages in firms with CTM and CROC-unions is similar: increasing productivity by 1% increases wages by 0.11%. Finally, columns (C) and (D), show that the CROM, Other and CTM-unions can be categorized as pro-wage type, while the CROC-unions show the lowest wages regardless of labor productivity: 6% lower than the CTM's wages.

An alternative strategy to measure the impact of Central status on wages, and thus reduce the omitted variable bias, is to reduce my original sample to keep only firms with similar productivity. This reduction in firms sampled may serve to isolate the effect of productivity on wages, thus allowing a comparison between alike firms that differentiate themselves from each other only by their Central attachment. This is possible because an important number of firms in the cross-section sample have similar labor productivity regardless of their affiliation (more than 50% of original observations).

Table 16 shows the results of estimating Eq. 10 including labor productiv-

ity as a covariate and reducing the firms to only those with productivity one standard deviation from the average.[26] Columns (A) and (B) confirm that there is some association between CTM-unions and high-productivity firms as the coefficient of Central affiliation decreases by 0.06 percentage points when labor productivity is included in the estimation.

As before, allowing productivity's impact on wages to vary among Centrals shows that productivity has almost no effect on wages in firms with Other-unions. The effect of productivity on wages in firms with CROC and CROM-unions is half the one observed in CTM-unions: increasing productivity by 1% increases wages by 0.08%. Also, the CROM, Other and CTM-unions can be categorized as pro-wage type based on both the constant and the interaction term from table 16, column (C).

Although most constant terms are not statistically significant in the censored specification[27] with productivity interactions, it can be concluded that union's Central affiliation matters because of two main findings: (1) Among Centrals, the elasticity between wages and productivity considerably differs and (2) The CROM, Other and CTM-unions show wages above the CROC-unions' at almost every level of productivity. Specifically, results from this section suggest that not only do CTM-unions obtain higher wages than other unions, but they extract more rents than other unions as productivity increases.

To further inspect the relationship between Central attachment and productivity, I estimate a multinomial logit model with Central status as the dependent variable and labor productivity as one of the covariates. Table 17 shows that the correlation between the CROM/Other Centrals and labor productivity is close to zero. The CTM and the CROC, in contrast, are significantly associated with labor productivity: increasing productivity by 1% increases the probability of being affiliated with the CTM by 1.3%, and decreases the probability of being affiliated with the CROC by 1.1%.

Besides the omitted variable bias, a less obvious concern is the endogeneity of labor productivity. In terms of the reduced model in section 3: $R_L = \varphi_0 + \varphi_1 * C_f + \nu_f$ and $E[\nu_f, \varepsilon_f] \neq 0$. In other words, if wages and productivity are both outcomes affected by Central status, then productivity cannot play the role of an exogenous, pre-determined control variable in a wage equation. However, it is reasonable to assume that unobservable variables from a regression of Central status on labor productivity are positively correlated to the unobservable variables in the wage equation ($E[\nu_f, \varepsilon_f] > 0$). For ex-

[26] Average productivity for the sample of study is equal to 234.06 real pesos ($LnR_L = 4.81$), and the standard deviation is equal to 1,029.74 ($sd(LnR_L) = 0.90$).

[27] Censored specification refers to the cross-section estimation using only firms with similar labor productivity (i.e., sample with 50,421 observations).

ample, adoption of technology, unobservable information in both equations, should positively affect both R_L and W. If this is the case, the estimate of Central status obtained in this section would be downward biased. However, in this section, I showed that estimates of the wage gap between Centrals, so far, were not sensitive to the inclusion of additional control variables. The next sections show additional robustness tests.

4.2.3 Instrumental Variables Approach

One problem the cross-section regression leaves aside is that wages may affect Central affiliation directly. For example, if unions look at the wage differences among confederations to measure the Centrals ability to extract surplus, then wage gaps should affect the unions' Central choice.

An alternative story behind the possible reverse causality between wages and Central status is that firms, rather than unions themselves, may chose Central affiliation. If this is the case, then the employer's incentives to resist high wages would lower the likelihood that any given union facing high markups would affiliate with a pro-wage Central.[28]

One strategy to account for joint determination of wages and Central status is to estimate a simultaneous equation model.[29] What is key for identification in any of these models is having a good set of instruments. In particular, in this study, what it is needed are variables that affect Central affiliation but have no effect on wages, as well as variables that affect wages but do not affect Central affiliation.

There are two sets of potential instruments: current instruments based on variables at time t, and lagged instruments based on variables at time $t-1$. Instruments in the first category are both limited and controversial. For example, history indicates that there has been a strong relationship between the PRI and the CTM and in this way, political affiliation at state level should have an effect on Central affiliation. At the same time, however, the PRI has been also associated with poor-rural states where democracy has taken longer to arrive.[30]

[28]Previous literature has argued that Maquiladoras (assembly/sweatshops plants) in some regions in Mexico are characterized by protected labor contracts signed between a "ghost" union and the employer. These "ghost" or "white" unions work to the employer rather than to the workers (Carrillo [6] and Quintero [29]).

[29]In this study, the simultaneous equation model consists of four wage equations (one for each Central) and a multinomial logit equation for the probability of joining to a particular Central. See appendix D

[30]In the appendix D of this research, I show the results of estimating a simultaneous equation model using current instruments. As previously, I find a positive correlation between productivity and wages in CTM-unions, while the opposite is observed in CROC-

A better set of instruments comes from using a panel. This panel database allows me to include lagged variables as instruments, thus correcting the selectivity bias due to the possible joint determination of wages and Central status. The panel matches six pair of surveys (1992-95, 1995-99, 1999-01, 1992-99, 1992-01, and 1995-01) creating more than 12,000 manufacturing firms observed twice. Most of these firms are medium and big establishments.

I argue that initial Central affiliation is a good instrument for current Central affiliation since $C_{f(t-1)}$ affects C_{ft} and then W_t, but W_t should not affect $C_{f(t-1)}$ directly.[31] Table 18 shows that around 90% of unionized firms remained in the same Central over time. This low mobility in attachment suggests that there is a strong persistence of union's initial affiliation, therefore current and initial affiliation can be used interchangeably to explain current wages.

If W_{ft} is highly determined by its lag and, as I argue, $C_{f(t-1)}$ is correlated to $W_{f(t-1)}$, then it could not be convenient to use $C_{f(t-1)}$ as an instrument for C_{ft}. However, the coefficient from a regression of initial wages on wages is equal to 0.18 -statistically significant at 1%.[32] Although this last result is surprising, it is known that Mexico has experienced important economic shocks, during the nineties, that has indistinctly affected wages across firms. For example, the 1995 currency crisis in Mexico (December, 1994) can be thought as a firm specific shock that impacted domestic and export-oriented firms differently. In fact, export-oriented plants even took advantage of the country's economic collapse since they employed Mexican labor but did not rely on Mexican purchasing power.

Given both the low correlation between W_{ft} and $W_{f(t-1)}$, and the strong dependence of C_{ft} on $C_{f(t-1)}$, it is possible to estimate:

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unions. Wages in CROM and Other-unions are also positively correlated to productivity but not strongly as in the case of the CTM unions. Also, CTM-unions show higher wages than non-CTM-unions. However, it is difficult to be confident of these results because the instruments used are controversial.

[31] Initial Central affiliation refers to the union's Central status in the first year of each panel.

[32] The econometric specifications to estimate the correlation of wages over time were:

$$Ln(W_{f,t}) = a + b * Ln(W_{f,t-1}) + c * X_{f,t} + [\lambda_s * \delta_t + \phi_i] + \varepsilon_f \tag{11}$$

and

$$Ln(W_{f,t}) = a + b * (Ln(W_{f,t-1}) * \delta_t) + c * X_{f,t} + [\lambda_s * \phi_i] + \varepsilon_f \tag{12}$$

From Eq. 11, $b = 0.18$ and from Eq. 12 (equation with an interaction term between initial wage and time), b ranges from 0.20 to 0.45. In the case of maquila plants, b=-0.033. All these coefficient are statistically significant at 1%.

$$Ln(W_{ft}) = a + b * X_{ft} + c * C_{f(t-1)} + [\lambda_s + \phi_i + \delta_p] + \varepsilon_{ft} \qquad (13)$$

where X_{ft} includes firm's age and size, labor productivity, as well as political variables.[33] As before $\lambda_s + \phi_i + \delta_p$ refers to state, industry and panel fixed-effects.

Table 19, from columns (C) to (E), show that using "Initial Central" (IC) rather than "Current Central" (CC) affiliation does not change results much. This is not surprising because Central attachment is highly persistent over time (i.e., IC is equal to CC for must of the sampled firms). In particular, it is observed that CTM-unions have in average wages 7% higher than CROC-unions, regardless labor productivity. When Central-productivity interactions are included, the wag gap between the CTM and the CROC narrows as firms' productivity increases (column E). Surprisingly and contrary to previous sections, CROC-unions are extracting more surplus as productivity increases.

Using initial Central affiliation as an instrument of current affiliation solves the problem of the simultaneous determination of wages and Central attachment. Nevertheless, the estimated wage gap between the CTM and the CROC, using this initial attachment as a covariate, can be read only as an upper bound estimate because unions may change Central in response to changes in productivity. If CTM-unions switch to the CROC as productivity decreases, then low wages would be wrongly associated with the CROC rather than with productivity. In contrast, if increases in productivity make unions switch from the CROC to the CTM, then high wages would be wrongly associated with the CTM.

Table 20 shows that most of the unionized firms that changed Central affiliation had lower productivity relative to those that stayed with the same Central. The exception are unionized firms affiliated with the CROC. Even more, firms with unions that switched to the CROC can be characterized as low-productivity. The latter hints that CROC does attract low-productivity firms while high-productivity firms leave the Central.

Despite the fact that it seems reasonable to argue that unions look for aggressive mediators when productivity is high, unions cutting wages at any circumstance is less compelling as workers usually resist to nominal pay cuts. However, in an environment of increasing international competition, employees tend to be more concerned about job cuts as they are aware of the impact that aggressive wage demands have on the likelihood of shutting down a firm.

[33]Gender composition, average employees' seniority and schooling level were also included as covariates in specification of Eq. 13 and results did not change.

In order to analyze further the dynamics of Central affiliation at different levels of firm's productivity, I estimate:

$$\triangle C_{ft} = a + b * C_{f(t-1)} + c * Ln(ProdL_{f(t-1)}) + d * X_{ft} + [\lambda_s + \phi_i + \delta_p] + \varepsilon_{ft} \quad (14)$$

where $\triangle C_{ft}$ refers to a dummy variable equal to one if the union in firm f changes Central attachment from $t-1$ to t and equal to zero if the union remains affiliated with the same Central. $C_{f(t-1)}$ refers to the union's Central affiliation in the first year of the panel. $ProdL_{f(t-1)}$ refers to initial productivity. Interactions between initial affiliation and initial labor productivity are also alternatively included in the estimation. Just as in previous sections, X_{ft} are firm characteristics.

Table 21 shows the results of estimating Eq. 14. In the first two columns, it is observed that labor productivity does not affect the likelihood of switching Centrals when controlling for initial Central attachment. However, when analyzing the impact of initial productivity separately Central by Central, I find that the probability of leaving the CROC is higher when productivity increases, and the opposite result is observed when the CROM is considered. Results for the CTM and Other Centrals are not statistically significant in most of the specifications.

To sum up, figure 1 shows changes in the predicted probability of switching Central at different levels of initial labor productivity by Central and using the estimated coefficients from table 21, column (D). CROC-unions attract low-productivity firms, while repelling high-productivity firms. Moreover, most of the unions leaving the CROC affiliate with the CTM and Other Centrals (tables 13 and 20).

In this section, it was shown that the wage gap among Centrals is determined by two factors: (1) Selection of unions into Centrals depending on firms' labor productivity, and (2) Centrals' characteristics such as its bargaining power to extract rents or its preferences over employment in relation to wages.

4.3 Panel Analysis

4.3.1 Lower and Upper Estimates

The above results show that changes in productivity affect Central affiliation, thus, part of the wage gap among Centrals found in previous sections can be explained by the former. A panel database allows me to estimate the effect of Central status on wages using first differences and in this way controlling

for changes in labor productivity. At the same time, the specific scheme by which unions select themselves into Centrals allows me to estimate lower and upper bounds of the wage gap among confederations.[34]

The panel specification is:

$$\triangle W_{ft} = a + b * C_{f(t-1)} + c * \triangle ProdL_{ft} + d * X_{ft} + [\lambda_s + \phi_i + \delta_p] + \varepsilon_{ft} \quad (15)$$

where $\triangle W_{ft}$ refers to changes in firms average wages, $\triangle ProdL_{ft}$ refers to changes in productivity.[35] Interactions between initial affiliation and changes in labor productivity are also alternatively included in the estimation. Just as in previous sections, X_{ft} are firm characteristics.

The specification in Eq. 15 allows me to obtain a lower bound estimate of the wage gap between CTM and CROC-unions. It is biased because as it was shown before, labor unions leave the CROC for Centrals that are wage aggressive mediators as productivity increases. Thereby, higher wage changes might be wrongly associated with CROC-unions that switch to the CTM. Table 22 shows results of estimating Eq. 15. Although the CROC still appears as moderate-wage type in all specifications, the wage gap among confederations' is not as wide as in previous sections. Firms with unions affiliated with the CROC obtain wages 3% below those in firms with CTM-unions.

In order to obtain an upper bound estimate of the wage gap between CTM and CROC-unions, I estimate Eq. 15 including only firms that did not change Central affiliation during the nineties.

Table 23 shows that the CROC and Other Centrals can be considered as moderate-wage confederations: the average increase in wages is 9% lower in unions affiliated with the CROC/Other than in CTM-unions. Differences between CTM and CROM-unions are close to zero and not statistically significant in most of the specifications.

Results from estimating Eq. 15, including all firms and only those that did not switch Central, suggest that the wage gap between CTM and CROC-unions ranges between 3% and 9%. The elasticity between wages and labor productivity is higher in CROC-unions relative to CTM-unions, indicating that the former have a greater bargaining power over wages. However, less than 1% of the firms with CROC-unions have wages above those obtained by CTM-unions.

[34] As mentioned in section 4.2.1, six two-year panels were created. Also, see table 9.

[35] $\triangle Y_{ft} = Ln(\frac{Y_{ft}}{Y_{f(t-1)}})$ where Y_{ft} refers to either wages or labor productivity.

On the other hand, table 24 shows the estimation of Eq. 15, including only firms with unions that change Central affiliation. It is observed that unions leaving the CTM obtain on average wages 10% lower than those that switched to the CTM, columns (A)-(C). Allowing changes in productivity to vary among Centrals, it is observed that unions that switched to the CROC were the ones that cut wages the most. In contrast, unions that switched to the CTM and Others obtained higher wages.

Although previous results are mixed when Other Centrals are considered, it is interesting to notice that these Centrals appear as a pro-wage type: the unions that move to Others gain the most in wages, 10% more than unions switching to the CTM (Column D, table 24).

4.3.2 Fixed-Effects Approach

Panel data are particularly useful in answering questions about the dynamics of change but also, this type of database allows me to control for firm characteristics that do not change over time. If there is any time-fixed variable omitted in the cross-section analysis, the use of a panel will reduce any bias resulting from this omission. Next, I use the fixed-effects approach to estimate the impact of Central status on wages, controlling for firm specific characteristics that do not change over time (μ_f). I would like to estimate:

$$Ln(W_{ft}) = a + b*C_{ft} + c*Ln(ProdL_{ft}) + d*X_{ft} + [\lambda_s + \phi_i + \delta_t + \mu_f] + \varepsilon_{ft} \quad (16)$$

Therefore, the fixed-effects estimation is:[36]

$$\triangle W_f = a + b * \triangle C_f * C_{f(t-1)} + c * \triangle ProdL_f + d * \triangle L_f + \triangle \delta_t + \triangle \varepsilon_f \quad (17)$$

where terms that do not change over time are differentiated out. $\triangle X_f$ includes changes in firm size (measured as the change in the number of total employees). The interaction term between an indicator equal to one when a union switches Central ($\triangle C_f$) and the union's initial Central affiliation ($C_{f(t-1)}$) accounts for the different combinations of switching confederation: from CTM to CROC, from CROC to CTM, from the CTM to Others, etc.

Table 25 summarizes my findings: CROC-unions that did not switch Central obtained on average wage increases 11% lower than loyal CTM-unions. Also, Other-unions obtained lower wage increases than CTM-unions. CROC and Other-unions that switched Central increased wages 20% and 10% more

[36]Each firm in my sample is observed twice (t=2).

than CTM-unions that also changed confederation, respectively. In fact, the unions that left the CTM decreased their wages by 6%. This result is not surprising as it was shown before that CROC-unions switch to alternative Centrals as productivity increases.

Table 25 also suggests that unions that changed Central increased wages 5% more that unions in similar firms that did not change Central, column (E). Therefore, since there is a gain in wages coming from changing Central, it is important to analyze whether all changes involve a gain or it depends on which Central the union switches to.

Table 26 shows that all mover unions gained in wages, but especially the unions that switched to the CTM (column A). These unions obtained on average wage increases 20% higher than loyal unions. On the other hand, unions that changed to the CROC make only a 8% wage gain.

In addition, I would like to distinguish between the increase in wages that due to changes in productivity and the increase due to changing Central affiliation. A term, capturing both whether a union changes Central and which Central the union switches to, interacted with changes in productivity, shows that unions that switched to Others Central made the highest wage-profit relative to non-mover unions that faced similar productivity changes. As before, unions that switched to the CROC were the ones that cut wages the most (columns from (B) to (C), table 26). In particular, it is observed that unions that changed to the CROC cut wages in approximately 8%. The same pattern is observed in unions that switched to the CROM, but it is not as strong. On the other hand, unions that switch to the CTM and Other Centrals make a 2% (not statistically significant) and 15% wage gain, respectively.

Although the model of Eq. 17 may yield to imprecise estimators since it might be subject to biases which render the results difficult to interpret (e.g. different unobserved variables may cause unions to join and exit a particular Central), the causal story argued in this research about recognizing two types of unions once again is strengthened. In other words, results from looking separately at firms with unions that move from one Central to another are consistent with the argument of this study.

5 Conclusion

Previous research has neglected the study of the union's affiliation with nationwide confederations, perhaps because there is an apparent low mobility of unions switching confederation over time or perhaps because, in some countries, unions have few alternatives to choose from. However, this study

indicates that labor unions in Mexico change their Central attachment relatively often and in response to economic factors. Also, these Mexican unions have had plenty of options when choosing a Central, especially during the 1990s when democracy and liberalization created new opportunities for Centrals other than the CTM to increase their membership.

Using data from manufacturing firms in Mexico, this research sheds new light on the importance of this plethora of confederations and their impact on wage determination during the 1990s. Despite difficulties in accounting for how unions select themselves into Centrals, this research shows that CTM-unions make more aggressive wage demands than other confederations, especially compared to those made by the CROC. Recognizing different types of unions based on wage demands has important implications in understanding the performance of the Mexican labor market.

A key implication is that wages respond to productivity shocks: Labor unions switch Centrals as a firm's labor productivity changes, thus changing their wage demands. Specifically, I find that the likelihood of choosing a Central is highly determined by the firm's labor productivity and also importantly correlated with wages. For example, CROC-unions that face higher productivity are likely to switch Centrals, whereas the likelihood of joining the CTM or Others is not associated with productivity. In addition, unions make important wage gains as they switch to the CTM or Others Centrals, while unions that move to the CROC cut wages more than non-mover unions when facing similar changes in productivity.

This finding -that a union tended to choose to affiliate with a Central that cut wages- raises an interesting question that is, unfortunately, beyond the scope of this study: Is it really the union itself that decides its Central affiliation? Evidence from the maquila industry (Carrillo [6] and Quintero [29]) suggests that it is the employer who makes this decision as he has the option to sign a protected labor contract with a "ghost" union hired by him. It is called "ghost" union because employees from this type of firm are not aware that they belong to the union. This is obviously an interesting area where more work is needed.

Overall, the particular scheme by which unions select themselves into Centrals yields greater assurance about the argument of this study. Accordingly, I conclude that the CTM is a pro-wage confederation, while the CROC is characterized by cutting wages to levels lower than other Centrals. Despite the mixture of confederations included in Other Centrals, this group appears to be a pro-wage type Central. Results about the CROM are somewhat contradictory, and statistically insignificant in most econometric specifications. Besides that, I conclude that wages react, to some degree, to labor productivity shocks because unions recognize this disparity in wage policies among

Centrals. This finding has important implications in how the Mexican labor market operates.

By general consensus the Mexican labor market has been characterized as inflexible for several reasons: the poor response of wages to productivity changes, the existence of minimum wages, and the workers' resistance to nominal pay cuts. According to various authors, these wage rigidities are partly explained by the highly restrictive Mexican labor legislation and/or by the mutually dependent relationship between the labor movement and the state.

My results call this argument into question and show that the umbrella of labor confederations at the union's disposal brings some level of flexibility to the Mexican labor market. For example, labor unions may affiliate with Centrals that make a wage cut easier when facing negative productivity shocks. This was true for medium and big manufacturing firms observed in Mexico during the 1990s -a period not only when the economic and political transitions affected the bargaining power of unions, but when the distinction between official and non official Centrals became vague.

Although this work does not focus on wage rigidities, it opens a debate about the flexibility of the Mexican labor market and its connection to political matters. My findings suggest that wages react to productivity as labor unions are allowed to switch Centrals. Yet this conjecture is tempered by the fact that I use both very aggregate information to measure political matters (e.g. political affiliation at state level) and a short period of time for my analysis. It is also important to mention that this channel, from which wages respond to labor productivity, is limited as most unions (around 90%) did not switch Central during the period of analysis. Therefore, future investigation will help to enrich this topic.

A Union's Structure in Mexico

A.1 Mexican Labor Confederations[37]

The largest Mexican labor confederation is the Mexican Workers Confederation (CTM). This Central claims to have 5.5 million members. Members include the federal district federation (around two million workers) and its branches operated in other states, state federations, national unions, and about 10,000 smaller unions.

The Revolutionary Workers and Peasants Confederation (CROC) is the major private sector rival of the CTM. The CROC claims to have between 2 and 4 million members. The CROC has a stalwart hotel and a restaurant union, as well as relatively strong unions in the construction, transport, textile and beverage industries. Its strength is concentrated in certain regions, such as Guadalajara, Cancun, Mexico City, Manzanillo, Puebla, Veracruz and Tlaxcala.

The Regional Mexican Workers Confederation (CROM) is a third significant private sector Central. The CROM claims to have one million members. The CROM unions tend to be in older industries, such as textiles and construction, and are strong in many local areas.

The Mexican Labor Congress (LC) is a coordinating and research body of 33 labor union confederations, federations, and national unions, which represents around 75% of organized workers. The LC includes seventeen members traditionally linked to the PRI (official Centrals such as CTM, the CROC and the CROM), and sixteen national unions, of which the largest and the strongest is the teacher's union (SNTE). Other unions participating in the LC include the State and Municipal Government Employee Federation (short above 100,000 members), the National Mine and Metal Workers Union (around 80,000 members), and the National Railroad Workers Union (around 100,000 members).

The National Union of Workers (UNT) was created in November 1997 as an alternative to the Labor Congress. The UNT does not seek affiliation with any political party. This labor Central is composed of 160 independent labor federations and unions that represents 1.5 million members. Members include FESEBS, the Union of Telephone Workers of Mexico (STRM), and the Union of Metal, Steel, Iron, and Allied Workers (STIHMACS). The Authentic Labor Front (FAT) also belongs to the UNT, and claims to have around 50,000 members.

There is an additional group of federations and unions, not affiliated with either the LC or the UNT. The strongest of these federations is the National Federation of Independent Unions (FNSI) with about 300,000 workers. Another group is the left Proletarian Independent Movement (MPI), which claims about 200,000 workers. The MPI is centered of the former Mexico City "Route 100" public bus company union, which turned itself into a cooperative to operate privatized bus enterprisers.

[37]This section summarizes the Foreign Labor Trend Report of the U.S. Department of Labor, the Bureau of International Labor Affairs and the U.S. Embassy in Mexico City, 2001.

A.2 Mexican Labor Legislation

The Mexican Labor Law is derived directly from Art. 123 of the 1917 Federal Constitution. This article provided three essential distinctions: (1) Divides workers in two different jurisdictional levels, (2) Gives the state the right to interfere when there is a conflict between firm and workers, gives the state the power to lead the Conciliation and Arbitration Boards (CAB), as well as a deciding vote in labor matters,[38] and (3) Sets down the union's limits of action. They are limited because, by law, the CABs have the power of deciding whether a strike is legal or not.

The Art. 123 from the Mexican Federal Constitution establishes two jurisdictional levels to classify workers: Section A and Section B. The first group covers workers in the private sector, while the second group covers employees working to the state. Following, labor unions are classified in two groups: unions affiliated with the Federation of Union of in the Service of the State (FSTSE) (Section B), and unions affiliated with the CTM, CROM, CROC, etc (Section A).[39]

The most powerful Central from Section A is the CTM, a Central that still have a great presence in most of the Mexican states and in most of the industries. The FSTE, in contrast, has lost around one third of its members (around one million and 600 thousands of workers) such as the teachers' union (SNTE), the DF-Government union, the subway's union. By 2001, most unions were affiliated with Centrals from Section A. Around 70% of the unionized workers in Mexico were affiliated with three Centrals: the CTM, the CROC and the CROM.[40]

The next relevant point from the Art. 123 is the authority the government entails over the labor market. This government's control is possible because of his lead over the CABs, because of his ability to declare whether a strike is legal or not, because of his voting power in collective contracts and minimum wages. In particular, the state has the power to ratify or reject petitions related to labor contracts, wages and employment demands, the authority to control the process of union registration, a condition a union need to become legal.

Registration procedures are in principle relatively straightforward, but in prac-

[38]The Conciliation and Arbitration Boards (CABs) were established in the end of the Mexican Revolution to provide a mean to implement the labor legislation in the country. These boards are represented by members from the business sector, government and union leaders. Besides union's registration and labor contract's filing, the CABs also deals with strike's procedures. The tripartite composition of the CABs is determined by the article 123, section A, Fracc. XX from the Mexican Constitution. This article establishes that CABs have to be represented by one member from the government and equal number of members representing the capital side and the workers. Workers and employers are the ones who decide their CAB's members, following articles 652 and 653 from the Mexican Labor Code.

[39]According to the Art. 123, Fracc. XIII bis from the Mexican Constitution, banking workers belong to a separate jurisdictional level and are affiliated with the FENASIB (National Federation of Banking Unions).

[40]Source: ENESTYC (National Employment, Wages, Technology and Training Survey) - 2001.

tice they are sometimes subject to political influence and purposeful delay. The criteria for union registration, originally set in the 1931 federal labor code, have not significantly changed since then: unions must have a minimum of twenty members, all of whom must be at least fourteen years of age, unions must submit to the appropriate authorities notarized copies of the minutes from its organizational assembly and the meeting at which the union leadership was elected, a list of members' names and addresses (as well as the name and address of the employer); finally, unions must summit their own statutes. Registration petitions may be rejected if any of these requirements is not met, and the registering agency may cancel a union's registration at any time if it ceases to fulfill these various conditions (similar requirements govern the registration of labor federations and confederations).

Finally, Art. 123 determines the operational levels of the CABs. These boards must operate in two levels: in industries at federal jurisdiction (i.e., activities that, because of their economic importance, are controlled by the federal government), and in industries at local jurisdiction (i.e., activities that are controlled by authorities at state level). The distinction between local and federal jurisdiction among CABs is determined by Articles 123 and 124 from the Mexican Constitution. These articles specify the industries which must be regulated by federal authorities: textiles, electronics, cinematography, rubber, sugar, mining, metals, petrochemicals, chemistry, paper, oil, as well as firms controlled directly or in decentralized way by the federal government. The rest of the industries must be regulated by local authorities.

B Data on Labor Unions in Mexico

There are four main sources of data on labor unions in Mexico: (1) The National Income-Earnings Households Survey (ENIGH) published by the National Institute of Statistics (INEGI), (2) The National Employment, Salaries, Technology and Training Firms Survey (ENESTYC) also published by the national statistical Mexican agency (INEGI), (3) The Mexican Labor Ministry (STPS)[41] that publishes information drawn from the Federal Conciliation and Arbitration Boards (FCABs), and (4) The Local Conciliation and Arbitration Boards (LCABs).

The ENIGH survey asks household members about their unions status (i.e., whether they belong to a union or not). Therefore, unionization rates can be measured, at least, at national level and over time (1984-2004). However, the ENIGH questionnaire misses in asking the respondent about their Central affiliation. The ENESTYC survey, in contrast, includes information about both union and Central status (i.e., firms are asked about their union's Central name).

The ENESTYC is a large stratified (by employment size) random sample of manufacturing firms, national and foreign, in Mexico. The ENESTYC survey has

[41] STPS stands for "Secretaria de Trabajo y Previsión Social".

been fielded five times- 1992, 1995, 1999, 2001 and most recently 2004 -though only data from the first four surveys are available. The ENESTYC contains detailed qualitative and quantitative information on employment structure, wages, technology, adoption and use, worker training, as well as union status, Central affiliation, and participation of unions on collective contracts.

The Mexican Ministry of Labor (STPS) publishes information drawn from collective contracts signed by firms and unions at federal jurisdiction. The STPS database contains information at firm level such as unionized employment, union's Central affiliation, annual wage increments, industry and firm location at state level. While the STPS is the ministry responsible to collect information from firms at federal jurisdiction, through FCABs, there is not institution alike to collect information from firms at local jurisdiction.[42]

The LCABs are state institutions that collect information from collective contracts signed by firms and labor unions at state level. LCABs collect data about summons, strikes, union registration, as well as wage and employment levels. Even though the later information is available at firm level and for all municipalities in Mexico, this information has to be collected by hand from the reading of each collective contract registered at each of the 200 LCABs over the country.[43]

C Theoretical Framework

Most theoretical models analyzing the effect of labor unions on wages and employment levels are based on the "Nash Bargaining Model". This model shows that the outcome of a bargain between two players -in this case a firm and a labor union- comes from maximizing the Nash formula $(Z - \hat{Z})^{\theta}(\Pi - \hat{\Pi})^{1-\theta}$, where Z refers to the union objective function and Π refers to the firm objective function. When there is no agreement between players, then the objective functions are $\hat{Z}$ and $\hat{\Pi}$, respectively. The parameter θ refers to the bargaining power of unions. The higher θ, the greater the union bargaining power.

[42]The absence of data from firms at local jurisdiction is explained by the autonomy of the local CABs with respect to the federal state. However, the INEGI has a department of administrative registration that deals with the collection of some LCABs information over the country. This information is published in the book "Statistics of Labor Relationships at Local Jurisdiction". Unfortunately, this publication does not offer information about wages and employment at firm level, it focusses on information about labor disagreements and strikes.

[43]In the next step of this research, I explore a database containing information from firms at local jurisdiction and with detailed union's information such as name of the labor union, union age, among others. In order to compile such a panel data, three LCABs from three different municipalities in the Mexican-US border were visited (Tijuana, Victoria and Ciudad Juarez). For each visited municipality, around 10% and 20% of the yearly collective contracts were revised. The final database includes unionized employment and wages, name of the firm, name of the labor union, Central affiliation, industry and firm location at municipal level.

Theoretical Nash models of wage and employment determination with the presence of labor unions defers among each other in both the union and firm's objective functions and in the choice variables of each player. For example, while Layard and Nickell [19] assume that labor unions maximize the level of wages and employment, Lancaster [18] and Gout [15] assume that unions maximize their participation in the total output considering the effect of high wages on investment rates.

Another key difference among bargaining models refers to the sequence of choosing the wage and employment level through bargaining. For example, labor unions and firms can bargain on wage and employment in just one stage, or the bargaining process can be completed in two stages: in the first stage the wage level is chosen and in the second stage both players bargain on employment levels.

Following previous literature, the labor union objective function is derived from a median voter framework, assuming that unions maximize a surplus over an alternative salary ($\hat{W}$). The utility function of unions is, thus:

$$Z = L(W - \hat{W})$$

The profit function for the firm is:

$$\prod = R(L) - WL - F$$

where $\prod$ is the income function of the firm and F refers to the firm fixed cost. If it is assumed, as in previous studies, that $\bar{\prod}$ is equal to F, then the objective function of the firm in the Nash maximization problem is:

$$\prod - \bar{\prod} = R(L) - WL$$

Finally, assuming $\hat{Z}$ and $\hat{\Pi}$ are equal to zero, the Nash maximization problem is reduced as:

Case A

$$Max_W \quad [L(W - \hat{W})]^{\theta}[R(L) - WL]^{1-\theta} \tag{18}$$

subject to:

$$R_L - W = 0 \tag{19}$$

Case B

$$Max_{W,L} \quad [L(W - \hat{W})]^{\theta}[R(L) - WL]^{1-\theta} \tag{20}$$

Cases A and B summarize the most popular bargaining models. For example, case A and θ equal to one refers to the "Monopoly Model" (Dunlop [11] and Oswald [27]); in this case the level of employment is unilaterally determined by the firm, while the wage is unilaterally determined by the union taking into account the effect of wages on employment. The case A and θ between zero and one refers to the "Right to Manage Model" (Nickell [19]); in this case employment is also unilaterally determined by the firm, but wage is determined in bargaining between the firm and the union. Finally, case B and θ between zero and one refers to the "Efficient Bargaining Model" (McDonald and Solow [22]); in this model the union bargain with the firm on both wage and employment. The latter type of model assumes that even though labor unions might not be able to impose employment levels; they can interfere in labor flexibility issues through clauses in the contract, clauses about temporal and sub-contracted labor, worked hours, etc.

Manning [21] extents previous models including different bargaining powers for each decision variable. In other words, while equations 18 and 20 assumed that the bargaining power of the labor union on wage and employment is the same, Manning allows for differences. In particular, this author includes and additional parameter, π, that refers to the bargaining power of the union on employment ($\theta \neq \pi$). The higher the value of these two parameters (θ and π), the more powerful the labor union. The maximization problem proposes by Manning is solved in two stages; in the first stage wage is bargained and in the second stage employment is bargained. In each bargaining stage, the union's influence on W and L is different. The Manning model shows that the wage and employment levels are determined by the difference between the bargaining power on wages and employment ($\theta - \pi$). In particular, if θ is equal to π, then $R_L = \hat{W}$.

Following, I present the solution of a Nash maximization problem that includes an additional parameter that account for the union's preferences toward employment and wages. In this particular case, employment is unilaterally determined by the firm, but wage is determined in bargaining between the firm and the union. Even though labor unions do not bargain for employment levels, unions put some weight on it (ϕ).

$$Max_{w} \quad [L^{\phi}(w - \hat{w})]^{\theta}[R(L) - wL]^{1-\theta}]. \tag{21}$$

subject to:

$$R_L = w$$

that can be reduced to:

$$Max_w \quad [L^{\phi}(w-\hat{w})][R(L)-wL]^{\gamma} \tag{22}$$

subject to:

$$R_L = w$$

where $\gamma = \frac{1-\theta}{\theta}$

substituting $R_L = w$ in Eq. (22), we have:

$$Max_L \quad [L^{\phi}R_L - L^{\phi}\hat{w}][R(L)-R_L L]^{\gamma} \tag{23}$$

solving the maximization problem in Eq. (23), we have:

$$(R_L - \hat{w}) = [\frac{\gamma L}{R - R_{LL}} - \frac{\phi}{LR_{LL}}]^{-1} \tag{24}$$

therefore:

$$(w^* - \hat{w}) = [\frac{\gamma L^*}{R - R_{LL}} - \frac{\phi}{L^* R_{LL}}]^{-1} \tag{25}$$

where $L^* = L^*(w, \phi, \gamma)$

It can be shown that $\frac{\partial w}{\partial \phi} \leq 0$, while $\frac{\partial w}{\partial \gamma}$ is a function of L_{γ}.

D Simultaneous Equation Model Estimation

In order to adjust estimations for reverse causality between wages and Central attachment, I estimate a simultaneous equation model. The system consists on four separate wage equations (one for each Central) and one multinomial logit equation to estimate the probability of joining to a particular Central. I have:

$$Ln(W_{jf}) = a_j + b_j * X_f + c_j * Z_f^w + [\lambda_s + \phi_i + \delta_t] + \varepsilon_f \tag{26}$$

$$C_f = a + b * X_f + c * Z_f^c + \sum_{g=1}^{4} d_g * [ln(W_{jf}) - ln(W_{gf})] + [\lambda_s + \phi_i + \delta_t] + \nu_f \quad (27)$$

where W_{jf} refers to the average wage paid in firm f with a union affiliated with Central j. X_f refers to the firm's characteristics including labor productivity and other characteristics that affect both Central status and wages. The j subscript in Eq. 26 refers to Central and this equation is estimated separately for each four Centrals (CTM, CROC, CROM and Other).

Z_f^w in Eq. 26 refers to exogenous firm's characteristics that affect wages but do not affect union's decision to affiliate to certain Central, such as firm's gender composition, job categories (white and blue collar categories), seniority and employees' average level of education. Z_t^c in Eq. 27 refers to exogenous firm's characteristics that affect Central status but do not affect wages, such as political variables and a firm's export-oriented category.

$ln(W_{jf}) - ln(W_{gf})$ in Eq. 27 refers to the wage gap between Centrals j and g. The g subscript takes values from 1 to 4 (1: CTM, 2: CROC, 3:CROM and 4:Others) and j refers to the Central in firm f. Finally, $\lambda_s + \phi_i + \delta_t$ in all equations refer to state, industry and year fixed effect.

Although $ln(W_{jf}) - ln(W_{gf})$ is not observed for a particular firm, each wage gap from Eq. 26 can be substitute in Eq. 27, resulting in:

$$C_f = \gamma_0 + \gamma_1 * X_f + \gamma_2 * Z_f + +[\lambda_s + \phi_i + \delta_t] - \varepsilon_f^* \quad (28)$$

where Z_f includes both Z_f^w and Z_f^c. The outcome $ln(W_{CTMf})$ is observed if and only if Central CTM is chosen by the union. Further, the probability of choosing the CTM can be estimated from Eq. 28. In particular, I can estimate γ_0, γ_1 and γ_2 by a multinomial logit model and obtain consistent estimators, then it is possible to estimate:

$$P_k = Prob(C_f = k) \quad (29)$$

and,

$$E[\varepsilon_{jf} | C_{jf} > 0, X, Z] = \mu(P_k) \quad (30)$$

Since Central status' selection in Eq. 28 is specified as a multinomial logit model, I follow François Bourguignon, et. al. to correct selection bias. In particular, I use the Dubin and MacFadden (1984) method to calculate $\mu(P_k)$ and therefore estimate the following equation:

$$Ln(W_{jf}) = a + b_j * X_{jf} + c_j * Z^w_{jf} + [\lambda_s + \phi_i + \delta_t] + \sum_{k \neq j} \mu(P_k) + \omega_{jf} \qquad (31)$$

where ω_{jf} is a residual mean-independent of the regressors. Restrictions over $\mu(P_k)$ are required, and the bias corrections proposed in the literature differ precisely in these imposed restrictions (see Bourguignon, et. al. [4]).

The main concern about the above system is the quality of the instruments used in each equation. Firm's export-status and political variables in Z^c_f are all controversial instruments. Since export-oriented firms were the most benefited by liberalization policies, Central affiliation should be associated with this category. In particular, pro-employment unions (i.e. unions that follow moderate wage policies) should be associated with firms that face the highest level of competition. However, if export-oriented firms are more efficient than other firms, then wages should be higher in these type of firm regardless Central attachment.

Table 28, lower panel, shows that firms open to the foreign market are associated with higher wages relative to firms that do not trade abroad. However, wages do not vary much within export/import categories. On the other hand, firms with imports greater than 50% are associated with the CTM, while the CROC is associated with low-import and high-export firms.

Political variables should affect Central affiliation directly. For example, states with a strong PRI-heritage should be associated with CTM-unions given their long lasting relationship over the twentieth century. Also, this study's argument suggests that PRI-localities should be associated with moderate-wage unions after trade liberalization policies. Despite the controversy about the impact of a state's political affiliation on Central attachment, I argue that political variables affect wages only through Central status.

Table 28 shows that the labor unions affiliated with the CROC are heavily located in non-PRI states such as the Bajio, while the CROM-unions have presence along the Northeast region. The CTM-unions have strong presence in most of the country but especially in the Center and the Bajio. There is no correlation between wages and states' political status, at least at regional level. In fact, the poorest regions in the country are associated with both the strongest and weakest PRI-heritage states.

Although gender composition, job categories, seniority and employee's education level clearly affect average wages in a firm, it might be the case that Centrals attract certain type of workers. For example, the CTM might cover more educated employees and/or with more seniority. If so, variables in Z^w_f (Eq. 26) are not good instruments and should be added also in Eq. 27.

Table 29 shows that gender composition, job categories and schooling within production workers are good instruments to include in Z^w_f since these characteristics do not vary importantly among Centrals. Since seniority appears particularly

low in firms with CROC-unions, the system of equation from above is estimated with and without this variable as an instrument.

Table 30 shows the estimation of the system from equations 26 and 27. As previous results, there is a positive correlation between productivity and wages in CTM-unions, while the opposite is observed in CROC-unions. Wages in CROM and Other-unions are also positive correlated to productivity but not as strong as in the CTM case.

The negative correlation between productivity and wages in firms with CROC-unions is consistent with the story where the CROC appears as pro-employment type: unions facing loses in productivity are willing to affiliate to a Central that makes the wages cutting easier.

As before, bigger firms are associated with higher wages and this is true for all Centrals. Gender, job categories within production workers, seniority and schooling have the expected impact on wages and it is similar among Centrals. Firms with a high men-women ratio show higher average wages; more educated or more skilled employees also increase the average wage paid, and more seniority translates in higher wages.[44] The exceptions are the CROC where more educated employees are paid less and the CROM where more skilled production workers are paid less.

The first step estimation (the multinomial logit equation, not included in table 30) shows that the PRI-state variable was not significative associated with most of the Centrals but it was correlated with wages. Therefore, the PRI-state variable was not consider as an instrument but as a covariate that affects both Central status and wages. Table 30 shows that CROC and CROM-unions in states with a strong and long presence of PRI-governors are associated to low wages. The same with Other-unions although the effect is not as strong.

Table 31 shows the predicted wages for each Central based on the estimated coefficients from two econometric specifications: (1) Ordinary Least Squares (OLS) model that does not correct for the simultaneous determination of wages and Central status and (2) Selectivity Bias Correction (SBC) model defined in equations 26 and 27.

As previous results, the wage gap between Centrals is positive and statistically significant only between CTM and CROC-unions. Column (A) from table 31 include all instruments described in table 27. However, since the 1995 survey does not include some employees' information such as gender composition, job-categories, schooling and seniority, this year is excluded from the analysis in columns (A) and (C).

In order to keep as much observations as possible, column (B) includes only instruments available in the 1995 survey, such as the export-import category. Finally, column (C) replicates estimation from column (B) without the 1995 information. Excluding data from 1995 lower the wage gap between CTM and CROC-union in around 4 p.p.

Based on the most complete specification (column A), I conclude that the wage

[44]Including or not seniority as an instrument do not change results.

gap between the CTM and the CROC is important and at least equal to 14%. The CROM and Other-unions appear as pro-wage unions only when the 1995 survey is excluded for the analysis. Otherwise, their wage demands are not much different to the CTM's.

Tables 15 (column C) and 31 (column B, OLS estimation) include same variables but in the latter case I estimate the wage equation separately for each Central. The predicted wages are similar: using estimated coefficients from table 15 (column C), the predicted wage gap between CTM and CROC-unions is equal to 19%, and between CTM-CROM and CTM-Other are -0.69% and 3.35%, respectively. All wage differences are statistically significant.

It is important to mention that wage gaps in this section are bigger than previous gaps based on the estimated coefficients on Central since calculation of predicted wages use not only the estimated constants but the estimated coefficients related to all firm's characteristics.

What should be learned from table 31 is that results from the OLS and the SBC model are almost the same. There are three possible interpretations of this result: (1) There is no selection through ability, then differences in wage demands reflect different Central types, (2) Wage gaps are explained by ability but instruments in the SBC model are weak, and (3) Ability determines wage gaps but wage differences among Centrals are not big enough to generate selection.

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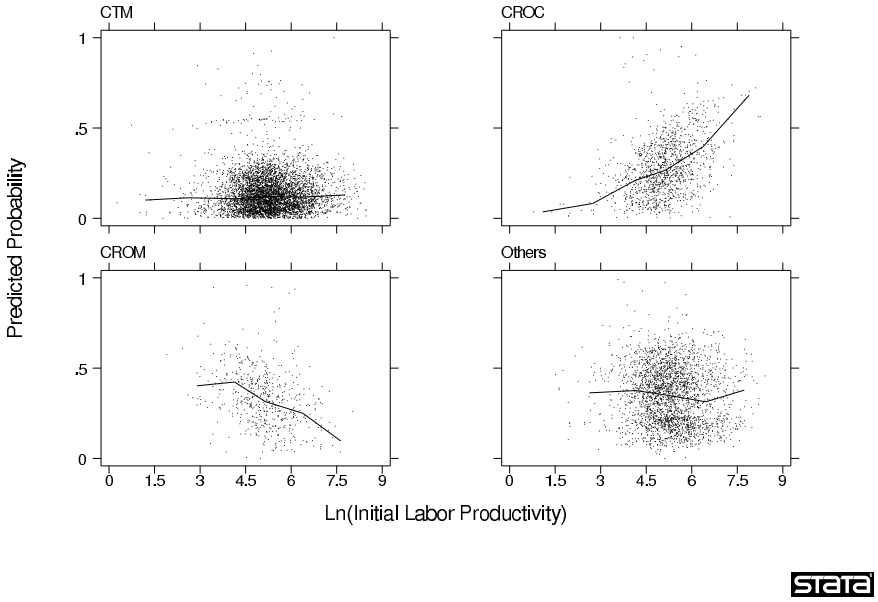
Figures

Figure 1: Labor Union's Predicted Probability of Changing Central



Source: ENESTYC.

Tables

Table 1: Monthly Average Wage by Central

(Real Dollars)

Central	1992	1994	1999	2001	Obs.
No Unionized Firms	836	771	220	206	2,410
Unionized Firms					
CTM	957	1,038	254	283	2,240
CROC	869	971	218	254	630
Diff CTM-CROC (%)	10.2	6.9	16.4	11.5	
CROM	984	938	281	274	220
Others	884	1,049	281	301	1,062

Exchange rate tripled from 3.28 to 9.09 pesos per dollar between 1994 and 1999.

Calculations using weights, except for Obs.

Source: ENESTYC.

Table 2: Central's Participation in Unionized Labor Market

Unionized Employment

Year	No. Workers	CTM	CROC	CROM	Others
1992	1,492,667	58.0	10.7	5.0	26.3
1999	2,031,459	57.9	14.5	4.2	23.4
2001	1,863,190	57.5	15.5	4.9	22.3

Unionized Establishments

All Firms

Year	No. Firms				
1992	18,984	52.7	17.3	6.3	23.6
1999	24,054	45.0	20.0	4.6	30.5
2001	26,681	51.6	23.3	4.2	21.0

Old Firms[a]

Year	No. Firms				
1992	13,350	50.9	13.5	7.6	28.0
1999	10,842	44.1	15.7	6.6	33.6
2001	8,868	53.0	20.6	3.2	23.2

New Firms

Year	No. Firms				
1992	5,634	56.9	26.5	3.3	13.2
1999	15,212	45.6	23.0	3.2	28.2
2001	17,813	50.9	24.6	4.7	19.8

[a] Cut off to categorize old and new firms: December, 1984.

Calculations using weights and including Maquila.

The 1995 survey does not include Maquila plants.

Source: ENESTYC

Table 3: Central's Participation in Labor Markets by Industry

Unionized Employment Participation

	CTM			CROC		
Economic Activity	1992	1999	2001	1992	1999	2001
Food, drinks and tobacco	65.3	63.1	64.3	9.7	15.6	15.6
Textiles	49.9	54.8	51.0	15.2	18.8	26.6
Wood	43.3	56.8	54.8	12.1	23.3	27.9
Paper, printing and editing	51.3	42.0	56.1	8.0	9.2	9.8
Chemicals, rubber and plastic	54.1	47.1	51.8	9.1	15.0	12.3
Non-metallic minerals	48.6	51.5	48.6	9.3	13.8	9.2
Basic metals	36.9	29.8	52.6	2.4	2.5	3.4
Metals, machinery and equipment	58.1	65.4	62.6	9.5	11.8	10.0
Other manufacturing industries	46.9	52.9	66.1	4.4	11.3	7.6

Total Employment Participation

Food, drinks and tobacco	44.2	35.6	33.5	6.8	8.3	8.2
Textiles	36.4	32.8	31.9	11.2	12.6	15.8
Wood	17.2	21.0	19.9	4.8	7.1	9.6
Paper, printing and editing	31.2	19.7	28.0	4.5	4.2	4.9
Chemicals, rubber and plastic	47.1	38.6	41.5	7.4	11.3	9.9
Non-metallic minerals	33.1	28.8	24.0	6.5	6.5	4.5
Basic metals	35.9	31.3	52.1	2.3	2.4	3.1
Metals, machinery and equipment	41.1	40.0	37.7	7.0	8.0	6.1
Other manufacturing industries	37.9	28.7	37.4	4.0	6.6	3.1

Calculations using weights and including Maquila

The 1995 survey does not include Maquila plants.

Source: ENESTYC

Table 4: Unionization Rates in Mexico

Survey	1984	1989	1992	1994	1996	1998/99	2000/01	2002	2004
ENIGH	18.8	19.9	13.7	12.8	11.4	11.9	11.6	11.5	12.6
ENESTYC			52.4	42.3		45.7	44.4		

ENIGH: Household survey which includes individuals who work in any economic sector.

Years available in the ENIGH: 1984, 1989, 1992, 1994, 1996, 1998, 2000, 2002 and 2004.

ENESTYC: Firm survey which includes firms from the manufacturing sector only.

Years available in the ENESTYC: 1992, 1994, 1999 and 2001.

Calculations using weights.

Table 5: Unionization Rates by Industry and Region

Industry and Region	1992	1999	2001
Total	52.4	44.9	44.5
Manufacturing Sector[a]			
Food, drinks and tobacco	52.7	40.7	38.6
Textiles and apparel	60.9	49.0	45.1
Lumber and wood	31.5	28.4	26.6
Paper, printing and editing	41.8	33.0	35.1
Chemicals, rubber and plastic	54.6	50.4	55.0
Non-metallic minerals	54.0	42.7	40.1
Primary metals	66.0	66.5	66.8
Metals, machinery and equipment	51.8	46.9	52.5
Other manufacturing industries	61.2	46.2	35.3
Region			
Bajio	47.8	35.5	39.6
Center	55.9	50.3	48.2
Northeast	58.2	60.5	58.8
Northwest	33.9	27.4	30.1
South	48.2	40.4	35.4

[a] The ENESTYC does not include firms in petroleum refining and related industries.

Calculations using weights and including Maquila.

The 1995 survey does not include Maquila plants.

Source: ENESTYC.

Table 6: ENESTYC Characteristics

Year	No. Plants ENESTYC Obs.	ENESTYC Weights	Census	Maquila Included	Firms Inc. 100%[a] No-Maquila	Firms Inc. 100%[a] Maquila
1992	5,071	138,774		Yes	1,2	
1995	5,242	222,222		No	1,2	
1999	7,429	310,703	344,118	Yes	1,2	1
2001	8,856	336,695	337,462	Yes	1,2	1

	Survey was taken:	Reference Date[b] Monthly	Reference Date[b] Yearly	No. Industries Included
1992	From April to October, 1992	March, 1992	89,90,91	52
1995	From August, 1995 to March, 1996	March, 1994	93,94	52
1999	From August to November, 1999	June, 1999	97,98,99	52
2001	From August to November, 2001	June, 2001	99,01	54

[a] ENESTYC is a stratified survey that included some firms with 100% certainty:

[b] Firms from the ENESTYC are asked about monthly/yearly information in specific dates.

Big firms with more than 251 employees (1) and Medium firms, between 102 and 250 employees (2).

Source: ENESTYC.

Table 7: Variables' Definitions

Variable	Definition
Labor Central	Distinguishes between firms with unions affiliated with the CTM, the CROC, the CROM or Others. The category of reference is the CTM.
Firm Age	It refers to the firm's number of operating years.
Firm Size	Distinguishes between big-size firms (more than 250 employees), medium-size (between 101 and 250 employees), small-size (between 16 and 100 employees) and micro-size (below 16 employees). The category of reference is big size firms.
PRI-state	Dummy variable equal to one if a state had had only PRI governors over the period of 1970 to 1992, and if these governors had won with wide margin (i.e., with more than 70% of the votes).
Region	Distinguishes among different regions in Mexico: Bajio (Aguascalientes, Colima, Jalisco, Michoacán and Nayarit), Center (DF, Guanajuato, Hidalgo, México, Morelos, Pueblo, Querétaro and Tlaxcala), Northeast (Coahuila, Nuevo León, San Luis Potosí, Tamaulipas and Zacatecas), Northwest (Baja California Norte and South, Chihuahua, Durango, Sinaloa and Sonora) and South (Campeche, Chiapas, Guerrero, Oaxaca, Quintana Roo, Tabasco, Veracruz and Yucatán). The reference category is Bajio.
Industry	Distinguishes between nine manufacturing sectors: Food, beverage and tobacco; Textiles, clothes and leather industry; Wood industry; Paper, printing and editing; Chemicals, rubber and plastic; No metallic minerals; Basic metals, Metals and machinery; and Other manufactures.
State	Distinguishes among the 31 states in Mexico and the capital.
Year	Distinguishes between four years: 1992, 1995, 1999 and 2001. The year of reference is 1992.
Unionization Rate	The percentage of unionized employees with respect to the total workers.
Labor Productivity	Measured as the ratio of real output and total hours worked.
Total Employment	Total number of employees (unionized and non-unionized) in the firm.

Table 8: Cross-Section Specification

Variables	(A)	(B)	(C)	(D)	(E)	(F)	(G)
Cons.	0.97^a	0.87^a	0.90^a	1.06^a	1.01^a	0.77^a	1.03^a
Central							
CROC	-0.15^a	-0.13^a	-0.09^a	-0.08^a	-0.09^a	-0.082^a	-0.087^a
CROM	0.02^b	0.03^a	-0.0004	0.01	0.008	0.007	0.002
Others	-0.05^a	-0.06^a	0.03^a	0.0.03^a	0.02^a	0.03^a	0.02^a
Firm Age				0.002^a	0.002^a	0.002^a	0.002^a
Firm Size							
Medium				-0.09^a	-0.09^a	-0.09^a	-0.09^a
Small				-0.20^a	-0.20^a	-0.20^a	-0.20^a
Micro				-0.24^a	-0.24^a	-0.24^a	-0.24^a
PRI-State					0.06^a	0.29^b	0.07^a
Region							
Center		0.15^a					
Northeast		0.11^a					
Northwest		0.10^a					
South		-0.10^a					
Industry	No	Yes	Yes	Yes	Yes	Yes	Yes
State	No	No	Yes	Yes	Yes	Yes	Yes
Year	No	Yes	Yes	Yes	Yes	Yes	Yes
State*Year	No	No	No	No	No	Yes	No
Industry*Year	No	No	No	No	No	No	Yes
N	97,336	97,336	97,336	97,303	97,302	97,303	97,303
$\bar{R}^2$	0.02	0.04	0.21	0.24	0.24	0.27	0.25

Dependent variable: Ln(Average Real Wage of Production Workers).

^{a} Statistically Significant at 1%. ^{b} Statistically Significant at 5%.

Table 9: PANELS[a]

	1992	1995	1999	2001	Obs.
Total Obs.	5,071	5,242	7,429	8,856	
			No Maquila Firms		
	x	x	x	x	906
	x	x			3,037
Panel			x	x	3,067
		x	x		1,682
		x		x	1,439
	x			x	1,531
	x		x		1,068
			Maquila Firms		
			x	x	350

[a] The numbers in this table do not consider weights.
Matching firms over four surveys reduces observations to 906 firms.
On the contrary, matching firms over two surveys reduces
observations to about 2,300 firms per panel.
Source: ENESTYC.

Table 10: Changes in Central Affiliation[a]

	Panel (Two years)					
Obs:	1992-95	1995-99	1999-01	1995-01	1992-99	1992-01
Total Firms	3,037	1,682	3,067	1,439	1,068	1,531
Unionized Firms[b]	2,150	1,424	2,528	1,177	918	1,290
Change Central	361	326	572	219	229	289
(%)	17	23	23	19	25	22

[a] The numbers in this table do not consider weights.
[b] Unionized firms include plants that provided the name of their Central.
Only around 1% of unionized firms did not provide their union Central name.
Source: ENESTYC.

Table 11: Changes in Unionization[a]

Panel (Two years)						
Obs:	1992-95	1995-99	1999-01	1995-01	1992-99	1992-01
Total Firms	3,037	1,682	3,067	1,439	1,068	1,531
Change Union-status	228	100	185	102	62	120
Union to No-union	115	48	109	57	29	64
CTM-(%)	53(45)	62(69)	57(62)	71(67)	56(60)	55(71)
No-union to Union	113	52	76	45	33	56
CTM-(%)	51(70)	52(68)	49(30)	58(45)	58(62)	48(55)

[a] The numbers in this table do not consider weights. The numbers in parenthesis are the exception. For example, 53% (without weights)/45% (with weights) of the firms changing union status were affiliated with the CTM

Source: ENESTYC.

Table 12: Changes in Central Affiliation[a]

Panel (All years)				
Obs:	1992-2001	1992-95	1995-99	1999-01
Total Firms	906	906	906	906
Unionized Firms[b]	684	684	684	684
Change Central	255	98	148	160
(%)	(37)	(14)	(22)	(23)

1992-2001			
Change Central:		Change Central and:	
Never	429 (63)	Switch Back	95 (37)
Once	118 (17)	Never Switch Back	146 (57)
Twice	123 (18)	Other	14 (5)
Three times	14 (2)		

[a] The numbers in this table do not consider weights.

Panel (All years): Include firms that were found in all four surveys.

[b] Unionized firms include plants that provided the name of their Central.

Only around 1% of unionized firms do not provide their Central name.

Source: ENESTYC.

Table 13: Changes Among Centrals[a]

	Panel (Two years)					
	1992-95	1995-99	1999-01	1995-01	1992-99	1992-01
	Switching Patterns (%)[b]					
	A					
CTM to -	27.4	45.1	35.0	45.7	37.6	35.6
CROC to -	12.5	22.1	14.5	16.4	18.8	16.6
CROM to -	10.0	9.5	8.4	14.2	7.4	11.4
Other to -	50.1	23.3	42.1	23.7	36.2	36.3
	B					
- to CTM	43.2	27.9	40.0	24.2	34.1	37.7
- to CROC	26.3	13.2	21.3	20.6	17.0	21.8
- to CROM	10.5	8.0	7.9	8.2	7.9	6.6
- to Other	19.9	50.9	30.8	47.0	41.1	33.9
	Losers and Winners (B-A)					
CTM	15.8	-17.2	5.1	-21.5	-3.5	2.1
CROC	13.9	-8.9	6.8	4.1	-1.8	5.2
CROM	0.6	-1.5	-0.5	-5.9	0.4	-4.8
Other	-30.2	27.6	-11.4	23.3	4.8	-2.4

[a] The numbers in this table do not consider weights.

[b] Switching Patterns (%) refers to the percentage of unions changing affiliation from one Central to another. For example, CTM to - refers to unions that leave the CTM, and - to CTM refers to unions changing affiliation from non-CTM to the CTM.

Source: ENESTYC.

Table 14: Labor Productivity by Central

(Value of Output per hour in Real Dollars)

Central	1992	1994	1999	2001	Obs.
No Unionized Firms	19.4	31.9	4.5	5.1	2,410
Unionized Firms					
CTM	62.9	83.1	14.8	18.9	2,240
CROC	47.9	48.4	10.3	12.7	630
Diff CTM-CROC (%)	31.3	71.7	43.3	49.0	
CROM	199.8	96.4	12.4	15.9	220
Others	141.8	57.1	13.2	17.8	1,062

Exchange rate tripled from 3.28 to 9.09 pesos per dollar between 1994 and 1999.

Calculations using weights, except for Obs.

Source: ENESTYC.

Table 15: Cross-Section Specification with Labor Productivity

Variables	(A)	(B)	(C)	(D)
Cons.	0.76[a]	0.63[a]	0.66[a]	0.52[a]
Central				
CROC	-0.083[a]	-0.093[a]	-0.057[a]	-0.085[a]
CROM	-0.003	-0.002	0.43[a]	0.41[a]
Others	0.03[a]	0.02[a]	0.34[a]	0.31[a]
Firm Age	0.002[a]	0.002[a]	0.002[a]	0.002[a]
Firm Size				
Medium	-0.07[a]	-0.08[a]	-0.07[a]	-0.08[a]
Small	-0.16[a]	-0.16[a]	-0.15[a]	-0.16[a]
Micro	-0.17[a]	-0.17[a]	-0.17[a]	-0.17[a]
PRI-State	-0.11	0.03[a]	-0.13	0.03[a]
Ln(Labor Productivity)	0.08[a]	0.08[a]	0.11[a]	0.11[a]
Ln(Labor Productivity) Interactions				
CROC*ProdL			-0.005	-0.001
CROM*ProdL			-0.09[a]	-0.09[a]
Others*ProdL			-0.07[a]	-0.07[a]
Industry	Yes	Yes	Yes	Yes
State	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
State*Year	Yes	No	Yes	No
Industry*Year	No	Yes	No	Yes
N	93,253	97,253	93,253	97,253
$\bar{R}^2$	0.29	0.28	0.29	0.28

Dependent variable: Ln(Average Real Wage of Production Workers).

[a] Statistically Significant at 1%. [b] Statistically Significant at 5%.

Table 16: Censored Cross-Section Specification with Labor Productivity

Variables	(A)	(B)	(C)
Cons.	0.73[a]	0.30	0.08[a]
Central			
CROC	-0.091[a]	-0.085[a]	0.24
CROM	0.062[a]	0.091[a]	0.31
Others	0.046[a]	0.057[a]	0.57[a]
Firm Age	0.002[a]	0.002[a]	0.002[a]
Firm Size			
Medium	-0.07[a]	-0.08[a]	-0.07[a]
Small	-0.16[a]	-0.16[a]	-0.15[a]
Micro	-0.17[a]	-0.17[a]	-0.17[a]
PRI-State	-0.11	0.03[a]	-0.13
Ln(Labor Productivity)		0.10[a]	0.16[a]
Ln(Labor Productivity) Interactions			
CROC*ProdL			-0.08[a]
CROM*ProdL			-0.06[a]
Others*ProdL			-0.13[a]
Industry	Yes	Yes	Yes
State	Yes	Yes	Yes
Year	Yes	Yes	Yes
State*Year	Yes	Yes	Yes
N	50,421	50,421	50,421
$\bar{R}^2$	0.32	0.34	0.34

Dependent variable: Ln(Average Real Wage of Production Workers).

[a] Statistically Significant at 1%. [b] Statistically Significant at 5%.

The censored sample include only firms with one standard deviation far from the average labor productivity.

Table 17: Effect of Labor Productivity on Central Affiliation

Variables	CROC	CROM	Other
Multinomial Logit			
Cons.	-1.33	-25.83[a]	-1.22
Ln(Labor Productivity)	-0.16[a]	0.08[a]	-0.03[a]
Firm Age	-0.003[a]	-0.001	0.002[b]
Firm Size			
Medium	0.42[a]	0.37[a]	0.21[a]
Small	0.23[a]	0.45[a]	0.19[a]
Micro	0.21[a]	0.62[a]	-0.37[a]
PRI-State	-3.15	-3.47[c]	-2.06[c]
Marginal effects of Ln(Labor productivity)			
Dependent Var.	dy/dx		Sd. Dev.
CTM	0.013		484.76
CROC	-0.011		898.83
CROM	0.000		1.30
Other-	0.002		417.48

N=98,733. R^2=0.19.

Industry and State*Year fixed effect are included.

The dependent variable (Central affiliation) takes 4 values:

CTM (category of reference), CROC, CROM and Other.

Source: ENESTYC

Table 18: Central Affiliation Dynamics

Panel 1992-1995[a]

	CTM_{92}	$CROC_{92}$	$CROM_{92}$	$Others_{92}$
CTM_{95}	95.7	4.3	3.0	10.9
$CROC_{95}$	1.3	92.0	7.3	4.0
$CROM_{95}$	0.7	1.8	86.3	1.0
$Others_{95}$	2.2	2.0	3.4	84.2

[a] Same results are obtained when using the other five panels.

Source: ENESTYC.

Table 19: Cross-Section Specification: IV Approach

Variables	(A)	(B)	(C)	(D)	(E)
Cons.	0.63^a	0.31^a	0.65^a	0.38^a	0.36^a
Current and Initial Central*	CC		IC		
CROC	-0.10^a	-0.13^a	-0.09^a	-0.07^a	-0.29^a
CROM	-0.10^a	0.35^a	-0.08^a	-0.07^a	0.48^a
Others	-0.07^a	-0.05	-0.03^a	-0.03^a	-0.04
Firm Age	0.002^a	0.002^a	0.002^a	0.002^a	0.002^a
Firm Size					
Medium	-0.06^a	-0.07^a	-0.06^a	-0.07^a	-0.07^a
Small	-0.11^a	-0.10^a	-0.11^a	-0.10^a	-0.10^a
Micro	-0.11^a	-0.11^a	-0.10^a	-0.11^a	-0.10^a
PRI-State	-0.04^b	-0.05^a	-0.05^a	-0.05	-0.05
Ln(Labor Productivity)	0.11^a	0.12^a	0.11^a	0.11^a	0.12^a
Ln(Labor Productivity) Interactions					
CROCini*ProdL		0.001			0.04^a
CROMini*ProdL		-0.08^a			-0.10^a
Othersini*ProdL		-0.002			-0.003
Industry	Yes	Yes	Yes	Yes	Yes
Panel	Yes	Yes	Yes	Yes	Yes
State	Yes	Yes	Yes	Yes	Yes
Panel*State	No	Yes	No	Yes	Yes
N	22,122	22,122	22,122	22,122	22,122
$\bar{R}^2$	0.19	0.25	0.19	0.24	0.25

Dependent variable: Ln(Average Real Wage of Production Workers).

CC: Current Central and IC: Initial Central affiliation.

*The first two columns include Current Central (CC) as covariate, while columns C, D and E include Initial Central (IC) as covariate. Productivity in all specifications refers to current productivity.

[a] Statistically Significant at 1%. [b] Statistically Significant at 5%.

Table 20: Changes in Central Status and Initial Productivity

Initial Central	Initial productivity of firms that Change Central	Initial productivity of firms that No Change Central	% Change[a]
CTM	273.4	271.6	11.7
CROC	206.1	178.7	32.2
CROM	232.1	411.2	20.3
Others	263.7	280.9	35.0

	Initial productivity of firms that change Central to							
	CTM	%	CROC	%	CROM	%	Other	%
CTM			161.2	25.6	267.9	7.2	317.6	66.8
CROC	197.9	78.5			284.0	8.1	207.3	13.4
CROM	298.8	25.2	231.3	55.2			147.5	19.7
Others	259.8	62.0	232.4	31.5	453.0	6.5		

[a] % of unions that change Centrals, using the full sample of firms.

Calculations using weights.

Source: ENESTYC.

Table 21: Union's Probability of Change Central

Variables	(A)	(B)	(C)	(D)	(E)
Cons.	-1.65[a]	-1.55[a]	-1.48[a]	-1.68[a]	-1.52[a]
Initial Central					
CROC	0.44[a]	0.46[a]	-0.68[a]	-0.63[a]	-0.51[a]
CROM	0.65[a]	0.57[a]	1.67[a]	1.92[a]	1.40[a]
Others	0.92[a]	0.95[a]	1.00[a]	0.94[a]	0.98[a]
Firm Age	-0.002[a]	-0.003[a]	-0.002[a]	-0.003[a]	-0.003[a]
Firm Size					
Medium	0.13[a]	0.06[b]	0.12[a]	0.12[a]	0.06[c]
Small	0.07[b]	0.02	0.09[a]	0.07[b]	0.02
Micro	0.04	0.06	0.12[a]	0.06	0.07[c]
PRI-State	-1.24	0.17[b]	0.07	-1.21	0.16[b]
Ln(Initial Productivity)	0.02[b]	0.02[c]	0.03[b]	0.02	0.12
Ln(Initial Productivity) Interactions					
CROC*ProdL			0.23[a]	0.21[a]	0.20[a]
CROM*ProdL			-0.20[a]	-0.24[a]	-0.16[a]
Others*ProdL			-0.01	0.003	-0.005
Industry	Yes	Yes	Yes	Yes	Yes
Panel	Yes	Yes	Yes	Yes	Yes
State	Yes	Yes	Yes	Yes	Yes
Panel*State	Yes	No	No	Yes	No
Panel*Industry	No	Yes	No	No	Yes
N	22,549	22,897	22,904	25,549	22,897
$\bar{R}^2$	0.18	0.18	0.16	0.19	0.18

Dependent variable is Current Central affiliation:

Firms can be associated with the CTM, CROC, CROM or with Others.

[a] Statistically Significant at 1%. [b] Statistically Significant at 5%. [c] Statistically Significant at 10%.

Table 22: Panel Specification: IV Approach

All firms

Variables	(A)	(B)	(C)	(D)
Cons.	0.37[a]	0.002	0.36[a]	0.004
Initial Central				
CROC	-0.03[b]	-0.03[a]	-0.02[c]	-0.03[a]
CROM	0.11[a]	0.04[b]	0.11[a]	0.05[a]
Others	0.07[a]	0.06[a]	0.05[a]	0.06[a]
Firm Age	0.0004	-0.0001	0.0004	0.000
Firm Size				
Medium	-0.09	-0.03[a]	-0.01	-0.03[a]
Small	-0.01	-0.02[b]	0.01	-0.21[b]
Micro	-0.09[a]	-0.13[a]	-0.08[a]	-0.13[a]
PRI-State	-0.12[a]	0.28	-0.08[a]	0.29
Productivity Changes	0.008[b]	0.009[b]	0.001	-0.01[a]
Productivity Changes Interactions				
CROCini*△ProdL				0.03[a]
CROMini*△ProdL				-0.02[a]
Othersini*△ProdL				0.09[a]
Industry	Yes	Yes	Yes	Yes
State	Yes	Yes	Yes	Yes
Panel	Yes	Yes	Yes	Yes
State*Panel	No	Yes	No	Yes
Industry*Panel	No	No	Yes	No
N	25,935	25,935	25,935	25,935
$\bar{R}^2$	0.27	0.31	0.30	0.31

Dependent variable: Changes in Average Real Wage of Production Workers.

[a] Statistically Significant at 1%. [b] Statistically Significant at 5%.

Table 23: Panel Specification: IV Approach

Firms with unions that do not change Central affiliation

Variables	(A)	(B)	(C)	(D)
Cons.	0.48[a]	0.12	0.38[a]	0.12
Initial Central				
CROC	-0.09[a]	-0.08[a]	-0.09[a]	-0.08[a]
CROM	0.07[a]	0.11	0.04[b]	0.03
Others	-0.09[a]	-0.08[a]	-0.08[a]	-0.09[a]
Firm Age	-0.0009[a]	0.0007[a]	0.0008[a]	0.0008[a]
Firm Size				
Medium	0.02	0.005	0.001	0.007
Small	0.04[a]	0.04[a]	0.03[a]	0.04[a]
Micro	-0.01	-0.05[a]	-0.004	-0.05[a]
PRI-State	-0.10[a]	-0.32	-0.07[a]	-0.32
Productivity Changes	0.02[a]	0.03[a]	0.03[a]	0.03[a]
Productivity Changes Interactions				
CROCini*△ProdL				0.03[b]
CROMini*△ProdL				-0.09[a]
Othersini*△ProdL				-0.04[a]
Industry	Yes	Yes	Yes	Yes
State	Yes	Yes	Yes	Yes
Panel	Yes	Yes	Yes	Yes
State*Panel	No	Yes	No	Yes
Industry*Panel	No	No	Yes	No
N	17,181	17,181	17,181	17,181
$\bar{R}^2$	0.20	0.26	0.23	0.26

Dependent variable: Changes in Average Real Wage of Production Workers.

[a] Statistically Significant at 1%. [b] Statistically Significant at 5%.

Table 24: Panel Specification: IV Approach

Firms with unions that change Central affiliation

Variables	(A)	(B)	(C)	(D)
Cons.	0.22[b]	-0.33	-0.33	-0.34
Central				
CROC	-0.10[a]	-0.09[a]	-0.09[a]	-0.09[a]
CROM	-0.10[a]	-0.11[a]	-0.11[a]	-0.11[a]
Others	-0.16[a]	-0.12[a]	-0.12[a]	-0.13[a]
Firm Age	-0.002[a]	-0.001[a]	-0.001[a]	-0.001[b]
Firm Size				
Medium	-0.01	-0.002	-0.002	-0.003
Small	-0.05[b]	-0.02	-0.02	-0.03[a]
Micro	-0.21[a]	-0.18[a]	-0.18[a]	-0.19[a]
PRI-State	-0.54[a]	-0.13	-0.13	-0.11
Productivity Changes	0.08[a]	0.07[a]	0.07[a]	0.06[a]
Productivity Changes Interactions				
CROC*△ProdL				-0.13[a]
CROM*△ProdL				-0.007
Others*△ProdL				0.10[a]
Industry	Yes	Yes	Yes	Yes
State	Yes	Yes	Yes	Yes
Panel	Yes	Yes	Yes	Yes
State*Panel	No	Yes	No	Yes
Industry*Panel	No	No	Yes	No
N	4,649	4,649	4,649	4,649
$\bar{R}^2$	0.21	0.29	0.29	0.30

Dependent variable: Changes in Average Real Wage of Production Workers.

[a] Statistically Significant at 1%. [b] Statistically Significant at 5%.

Table 25: Panel Specification: FE Approach

Variables	(A)	(B)	(C)	(D)	(E)
Cons.	0.02[b]	0.02[b]	0.04	0.08	0.12
Initial Central					
CROCini	-0.18[a]	-0.18[a]	-0.18[a]	-0.11[a]	-0.11[a]
CROMini	0.17[a]	0.17[a]	-0.08[a]	-0.02	0.01
Othersini	-0.05[a]	-0.05[a]	-0.05[a]	-0.06[a]	-0.07[a]
△C	-0.12[a]	-0.12[a]	-0.09[a]	-0.06[a]	-0.06[a]
Change and Initial Central Interactions					
△C*CROCini	0.23[a]	0.24[a]	0.18[a]	0.22[a]	0.19[a]
△C*CROMini	-0.09[a]	-0.10[a]	-0.07[b]	0.07[b]	0.03
△C*Othersini	0.08[a]	0.09[a]	0.10[a]	0.09[a]	0.10[a]
△Prod	0.04[a]	0.02[a]	0.02[a]	0.03[a]	0.03[a]
Change Central and Productivity Interactions					
△C*△Prod			0.07[a]	0.06[a]	0.05[a]
△L	-0.14[a]	-0.14[a]	-0.14[a]	-0.08[a]	-0.08[a]
Change Central and Employment Interactions					
△C*△L			0.01[a]	-0.06[a]	-0.03[b]
Panel	Yes	Yes	Yes	Yes	Yes
State*Panel	No	No	No	Yes	Yes
Industry*Panel	No	No	Yes	No	Yes
N	20,799	20,799	20,799	20,799	20,799
$\bar{R}^2$	0.12	0.12	0.22	0.22	0.25

Dependent variable: Changes in Average Real Wage of Production Workers.

[a] Statistically Significant at 1%. [b] Statistically Significant at 5%.

Table 26: Panel Specification: FE Approach

Variables	(A)	(B)	(C)	(D)
Cons.	0.12	0.11	0.11	0.11
CROCini	-0.11^a	-0.10^a	-0.10^a	-0.10^a
CROMini	0.01	0.009	0.009	0.009
Othersini	-0.07^a	-0.07^a	-0.07^a	-0.07^a
△C	-0.09^a	-0.09^a	-0.09^a	-0.12^a
Change and Initial Central Interactions				
△C*CROCini	0.08^a	0.06^b	0.06^b	0.06^b
△C*CROMini	-0.04	-0.03	-0.02	-0.05
△C*Othersini	-0.02	-0.04^c	-0.04	-0.04^c
Change to CTM	0.20^a	0.22^a	0.21^a	0.25^a
Change to CROC	0.08^a	0.07^a	0.07^b	0.13^a
Change to CROM	-	-	-	-
Change to Others	0.01	0.006	0.007	0.04
△Prod	0.03^a	0.03^a	0.03^a	0.03^a
Change to Central and Productivity Interactions				
△C*△Prod	0.05^a			
Change to CTM*△Prod		0.02	0.02	0.02
Change to CROC*△Prod		-0.08^a	-0.08^a	-0.07^a
Change to CROM*△Prod		-0.04	-0.04	-0.06^b
Change to Others*△Prod		0.16^a	0.16^a	0.15^a
△L	-0.08^a	-0.08^a	-0.08^a	-0.08^a
Change Central and Employment Interactions				
△C*△L			-0.007	
Change to CTM*△L				0.001
Change to CROC*△L				0.10^a
Change to CROM*△L				-0.14^a
Change to Others*△L				-0.08^a
$\bar{R}^2$	0.25	0.25	0.25	0.26

Dependent variable: Changes in Average Real Wage of Production Workers.

Industry and State*Year fixed-effects are included. N=20,799

^{a} Statistically Significant at 1%. ^{b} Statistically Significant at 5%.

Tables: Appendix

Table 27: Instrumental Variables' Definitions

Variable	Definition
Gender Composition	It refers to the proportion of men and women that work in a firm. Proportions are calculated for total and production workers.
Education	It refers to the employees' average years of schooling. This variable is calculated for total and production workers.
Seniority	It refers to the employee's average years at work. This variable is calculated for total and production workers.
Job Categories	It refers to the proportion of directors, employees and production workers employed in a firm. According to the ENESTYC's definitions, "Employees" include professionals, technicians, supervisors and administrators. Also, production workers can be sub-categorized between skilled and unskilled workers.
Initial Central Status	It refers to the union's Central status during the first year of each assembled panel. For example, in the panel 1992-1995, $C_{f(t-1)}$ refers to the union's Central affiliation in 1992, while C_{ft} refers to the union's Central affiliation in 1995. The same for the rest of the panels
Political Variables	It refers to the political affiliation at state level.
Export-oriented	Distinguishes between firms where exports are (1) greater than 0%, (2) greater than the average exports of unionized firms (6.01%) and (3) greater than 50%.
Import-oriented	Distinguishes between firms where imports are (1) greater than 0%, (2) greater than the average imports of unionized firms (2.82%) and (3) greater than 50%.

Table 28: Possible Instruments (Z^c)

Region	Real Wage[a]	CTM	CROC	CROM	Others	PRI-States (%)[b]	
			%			1992	2001
Bajio	2,552	59.9	32.7	4.9	7.5	100.0	20.0
Center	2,960	56.6	15.6	5.1	22.7	100.0	37.5
Northeast	2,904	48.9	11.5	0.9	38.7	100.0	60.0
Northwest	2,922	45.3	16.6	27.0	11.1	66.7	66.7
South	2,474	42.3	12.9	9.3	35.5	100.0	62.5
						% in Northern region[c]	
Exports-Imports						All firms	Maquila
X = 0%	2,143	48.9	21.5	5.1	24.5	17.7	56.0
X > 0%	2,931	51.3	17.2	4.2	27.3	19.7	57.2
X > Mean%	2,947	50.6	18.5	4.7	26.2	24.0	57.5
X > 50%	2,888	52.7	17.9	4.2	25.2	24.0	57.0
M = 0%	2,130	48.8	21.7	4.6	25.0	17.6	46.6
M > 0%	2,997	50.7	17.7	5.9	25.7	26.1	58.8
M > Mean%	3,003	52.7	17.8	4.7	24.9	26.0	59.2
M > 50%	2,950	60.2	12.1	4.3	23.4	33.1	61.8

[a] Wage in real pesos. Exchange rate in 2001 is equal to 9.3 pesos per dollar.

[b] PRI-States (%): Refers to the % of states in each region that had a PRI-governor in 1992 and 2001.

[c] % in Northern Region: Refers to the % of firms located in the Northern region of Mexico. All firms account for all firms in each category and Maquila accounts only for Maquila plants.

X: Exports, M: Imports.

Source: ENESTYC and IFE

Table 29: Possible Instruments (Z^w)

	Central			
Instrument	CTM	CROC	CROM	Others
Job categories				
% Directors	7.6	7.5	9.1	6.6
% Employees	24.7	19.7	27.3	23.0
% Prod. workers	67.7	72.8	63.5	70.4
Prod. workers categories				
% Skilled	32.1	31.4	35.6	37.8
% Unskilled	67.9	68.6	64.4	62.2
Gender (Prod. workers)				
% Men	73.3	73.7	73.9	69.3
% Women	26.6	26.3	26.1	30.7
Education (Years of schooling)				
Total	9.5	8.5	9.8	9.7
Prod. workers	8.0	7.7	8.5	8.2
Seniority (Years at work)				
Total	5.2	5.0	5.9	5.5
Prod. workers	4.5	3.8	4.5	4.9

Source: ENESTYC.

Table 30: Cross-section with Selection Bias Correction

Variables	CTM	CROC	CROM	Other
Cons.	0.45^a	4.14^a	2.12^a	-0.25
Ln(Labor Productivity)	0.08^a	-0.01^b	0.06^a	0.04^a
Firm Age	-0.0002	-0.002^a	-0.002^a	-0.0007^a
Firm Size				
Medium	-0.08^a	-0.01^a	-0.18^a	-0.06^a
Small	-0.20^a	-0.18^a	-0.25^a	-0.17^a
Micro	-0.21^a	-0.28^a-	0.32^a	-0.10^a
PRI-State	0.11	-0.96^c	-1.68^a	-0.03^a
Gender	0.14^a	0.14^a	0.49^a	0.15^a
Skilled Prod. Workers	0.29^a	0.19^a	-0.12^a	0.36^a
Schooling	0.004^a	-0.02^a	0.006	0.03^a
Seniority	0.005^a	0.009^a	0.006^b	0.004^a
Selectivity Bias				
CTM	-	2.45^a	1.38^a	-0.58^a
CROC	0.30^a	-	0.23	0.24^a
CROM	-0.43^a	-0.25^a	-	0.22^a
Other	0.14^a	-0.82^a	-1.55^a	-
N	31,802	13,654	2,896	16,589
$\bar{R}^2$	0.30	0.39	0.48	0.37

Industry and State*Year fixed-effects are included.

The dependent variable is Ln(Average Real Wage of Production workers) by Central (CTM, CROC, CROM and Other).

Source: ENESTYC.

Table 31: Predicted Wages[a]

	(A)		(B)		(C)	
	OLS	SBC	OLS	SBC	OLS	SBC
Central	Predicted Wage (Real Pesos)					
CTM	2,466	2,466	2,711	2,712	2,425	2,425
CROC	2,152	2,155	2,307	2,312	2,132	2,141
CROM	2,605	2,609	2,733	2,728	2,596	2,583
Other	2,524	2,524	2,622	2,623	2,493	2,493
	Wage Gap (%)					
CTM-CROC	14.4	14.6	17.5	17.3	13.7	13.3
CTM-CROM	-5.5	-5.3	-0.8	-0.6	-6.6	-6.1
CTM-Other	-2.3	-2.3	3.4	3.4	-2.8	-2.7
N	65,233	64,941	93,251	92,959	64,941	65,233

[a] Predicted wages based on estimated coefficients basedon:

Ordinary Least Square (OLS) and Selectivity Bias Correction (SBC) models.

(A) More instruments but data from 1995 not included.

(B) Less instruments but data from 1995 included.

(C) Less instruments and data from 1995 not included.

Source: ENESTYC.