

Civil society and the state:  
The interplay between cooperation and minimum wage  
regulation<sup>1</sup>

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## **Abstract**

In a cross-section of countries, state regulation of labor markets is strongly negatively correlated with the quality of labor relations. In this paper, we argue that these facts reflect different ways to regulate labor markets, either through the state or through the civil society, depending on the degree of cooperation in the economy. We rationalize these facts with a model of learning of the quality of labor relations. Distrustful labor relations lead to low unionization and high demand for direct state regulation of wages. In turn, state regulation crowds out the possibility for workers to experiment negotiation and learn about the potential cooperative nature of labor relations. This crowding out effect can give rise to multiple equilibria: a “good” equilibrium characterized by cooperative labor relations and high union density, leading to low state regulation; and a “bad” equilibrium, characterized by distrustful labor relations, low union density and strong state regulation of the minimum wage.

**JEL Classification:** J30, J50, K00.

**Key words:** Quality of labor relations, trade unions, minimum wage,

# 1 Introduction

Across OECD countries, there is a negative correlation between state regulation of wages and the quality of labor relations. Figure 1 illustrates the negative cross-country correlation between the stringency of minimum wage regulation and the quality of labor relations. The index of state regulation of minimum wages combines information on the level of the wage floors, and the existence of a legal statutory minimum wage along with the number of derogations from the law, in 2000.<sup>1</sup> The index of the quality of labor relations is constructed using the 1999 Global Competitiveness Reports, a survey sent out to thousands of executives with the following question: “Do you think that labor/employer relations are generally cooperative”. Responses may vary from 1 for strong disagreement to 7 for strong agreement. Figure 1 shows that pessimistic beliefs in cooperation are associated with stringent regulation of wages at the country level.<sup>2</sup> Scandinavian countries display high quality of labor relations and low minimum wage regulations, whereas a country like France shows low quality of labor relations and stringent minimum wage regulations.

The high quality of labor relations observed in Nordic countries in the end of the 20th century is striking to the extent that labor relations used to be conflicting in all OECD countries in the early 20th century, and especially in Nordic countries, as stressed by Crouch (1993). However, Crouch also argues that governments’ attitudes toward trade unions in Europe over the 19th century have had a major impact on the quality of labor relations one century later. More precisely, countries where governments decided to settle labor conflicts by promoting direct negotiations between social partners are currently associated with better quality of labor relations. In contrast, countries where the state substituted for direct negotiations between social partners are now characterized by pessimistic beliefs in cooperation.

These facts raise the following question: starting from similar initial conditions, why did some countries converge to the "Scandinavian" type situation with high trust in labor relations and weak regulation of minimum wage, whereas other countries converged to the "French" type situation with low trust and strong state regulation of minimum wage? In this paper, we argue that historical (institutional or policy) accidents that influence beliefs in the quality of labor relations provide an explanation for these diverging dynamics of labor markets institutions and trust across countries.

In the first part of the paper we provide evidence to the effect that: (i) beliefs about the

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<sup>1</sup>This index of state regulation of minimum wages and data on union density are presented more precisely in section 2.

<sup>2</sup>The *Global Competitiveness Reports* is presented in section 2. The same pattern of correlation between minimum wage regulation and the quality of labor relations holds when we focus on workers’ perception.

quality of labor relations are history dependent: in particular, current beliefs are shaped by past beliefs and past government attitudes towards social dialogue and organized labor; (ii) past beliefs about the quality of labor relations affect current demand for minimum wage regulation: indeed, we document that current individual demand for wage regulation is positively correlated with past pessimistic beliefs in cooperation and past state regulation of wages. Together, these two findings suggest the possibility of multiple long-run equilibria, with some countries converging toward a French equilibrium, whereas other countries converge toward a Scandinavian equilibrium.

In the second part of the paper we develop a simple model to rationalize these findings. In this model, by joining a trade union, workers can experiment on the firm's willingness to cooperate. Upon deciding whether or not to join the union and thereby engaging in such experimentation, individuals do not necessarily know whether they operate in a cooperative environment. In other words, the investment decision can be seen as a costly experimentation device aimed at finding out more about the true cooperative nature of the economy.<sup>3</sup>

In this framework, workers have less incentives to unionize and thereby pay the experimentation cost when they can rely on state regulation rather than on union's strength in order to secure high wages (Checchi and Lucifora, 2002). Accordingly, the legal minimum wage reduces workers' incentives to learn about the scope for cooperation.<sup>4</sup> The model thus predicts that a more stringent legal minimum wage increases the probability that the economy will fall into a *low* quality of labor relations *trap*. The model also accounts for the reverse impact of the quality of labor relations on state regulation of the minimum wage. When beliefs in cooperation are too pessimistic to motivate workers to join trade unions, there is a strong demand for direct state regulation of minimum wage, which in turn results in a higher minimum wage being set by the government in equilibrium. This interplay between state regulation and beliefs can lead to multiple long-run equilibria, including a bad equilibrium with high minimum wage and a low quality of labor relations. However, under suitable conditions on initial beliefs and the initial minimum wage regulation, experimentation can succeed in making the country converge towards the good equilibrium with low minimum wage and highly cooperative labor relations.

An additional prediction is that the joint dynamics of the legal minimum wage and of trust or union density, is history-dependent. Namely, countries starting with low quality labor relations

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<sup>3</sup>Our analysis draws on the distinction between *voice* rather than *exit* in labor relations, first proposed by Hirshman (1970) and then applied to trade unions by Freeman and Medoff (1984). Namely, employees have two alternative ways to respond if their relationship with the employer is not working: they can either exit the relationship, or instead voice their discontent in an attempt to repair the relationship. Voice can help improve the quality of the labor relation, but it involves a costly experimentation of the employer's willingness to negotiate.

<sup>4</sup>The effects of state regulation of minimum wages on distrust in labor relationships in our model are similar to those identified by the political science literature on centralized rules that regulate civil society (Ostrom, 2005).

will converge to a French equilibrium with higher probability than countries starting with high quality of labor relations. However, a country starting with relative high quality of labor relations may still fall in the "French trap" if random events occur which result in new labor conflicts remaining unresolved.

Although our paper highlights new interactions between state regulation and the dynamics of beliefs in cooperation, it builds on a whole literature on trust, beliefs and policy. First, our view that the building-up of cooperation results from experimentation in collective negotiations, is consistent with Putnam (1993)'s finding of a high degree of persistence in cooperative values over time, a finding also confirmed by Guiso et al. (2006, 2007a), Tabellini (2005) and Algan and Cahuc (2006). Our analysis is somehow complementary to that proposed by Tabellini (2008), who develops a model where parents rationally choose which values to transmit to their offspring, and this choice is in turn influenced by the external enforcement institutions. In Tabellini's framework, values evolve gradually over time and if the quality of external enforcement is chosen by majority rule, there is hysteresis in the dynamics of values: namely, adverse initial conditions, together with poor enforcement institutions, may lead to an equilibrium path where external enforcement remains weak and individual values discourage cooperation.<sup>5</sup> Our paper is also closely related to a literature emphasizing the coevolution of policies and beliefs, along the lines of Piketty (1995), Alesina and Angeletos (2005), Benabou and Tirole (2006) and Aghion et al. (2009). In Piketty (1995), multiple equilibria in beliefs and redistributive policies can originate from heterogeneous initial beliefs together with individuals' inability to learn the true costs and benefits of redistribution. Benabou and Tirole (2006) suggest that agents can deliberately bias their own perception of the truth. In Alesina and Angeletos (2005), the multiplicity of equilibria originates in individuals' preference for fair economic outcomes. Aghion et al. (2009) show how regulation can interact with moral values within families. Francois and van Ypersele (2008) look at the relationship between product market competition and cooperative values.

Our paper adds to these contributions in at least three respects. First, we explicitly analyze the dynamics of beliefs and institutions, we derive the probability that this dynamics converges to a good steady-state, and we perform comparative statics on this probability. Second, our framework allows us to explain why individuals with pessimistic beliefs about the scope for cooperation demand more state regulation on the labor market, and why this in turn deters private investment in cooperation. Third, we illustrate these interactions by providing new empirical facts on the interplay between past state regulation of minimum wages, dynamic beliefs in the quality of labor relations, and future demand for regulation.

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<sup>5</sup>See also Bisin and Verdier (2001), Lindbeck and Nyberg (2006) and Guiso et al. (2007b) for alternative formulation of transmission of beliefs and norms from parents to children.

The paper is organized as follows. Section 2 shows the empirical relations between state regulation of minimum wages, the quality of labor relations, and the demand for more minimum wage regulations. Section 3 presents the model. Section 4 concludes.

## 2 Facts about the quality of labor relations, union density and minimum wage regulations

This section documents the cross-country heterogeneity in the quality of labor relations. We show that this heterogeneity is associated with different institutional designs. Countries with distrustful labor relations are characterized by low union density and direct state regulation of wages by law. In contrast, countries with trustful labor relations are associated with high union density and minimum wage setting rules decided within the civil society by collective agreement between firms and unions. Finally, we analyze the dynamics of the quality of labor relations and their links with minimum wage regulations. Let us begin to present the data that allow us to shed light on these facts.

### 2.1 Data

Our cross-country analysis is based on 20 OECD countries: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom and the United States.

#### 2.1.1 State regulation of minimum wage

We measure the stringency of state regulation of minimum wages through a composite index, including both the legislation and the level of the wage floors.

The first component of this index measures the stringency of the minimum wage legislation, that is the extent to which the state directly regulates by law the labor market instead of letting the civil society negotiate. This index includes two sub-indicators: 1°) *minwage\_legal* measures the existence of a legal statutory minimum wage, and if not, the degree of coverage of the minimum wage set by collective bargaining; 2°) *minwage\_dispersion* measures the degree of derogations in the minimum wage law, leading to dispersion in minimum wages across ages, qualifications, regions, sectors or occupations. Data are borrowed from the International Labor Organization (ILO), which provides detailed description of the different legal procedures to set minimum wages across countries. We scale each of these two indicators between zero and one, a higher value indicating more stringent law enforcement. The indicators are fully described in Appendix. We comment the values of these indicators below.

Figure 2 shows the strong cross-country heterogeneity in the first sub-indicator *minwage\_legal* over the period 1980-2003. A first group of countries, namely Scandinavian countries, do not have any legal minimum wage, and no legal automatic extension of the negotiated wage floors. Wage floors are determined as part of the collective agreements between unions, and then they apply to workers covered by these collective agreements only. A similar group of countries, made up of Austria, Germany and Italy, do not have any legal statutory minimum wages. But legal dispositions stipulate to what extent the negotiated wage floors should be extended to all other workers. Lastly, a legal statutory minimum wage is implemented by most Mediterranean and Anglo-Saxon countries. In the United States, this tradition dates back at least to the 1938 Fair Act while it is more recent in United Kingdom which established a legal minimum wage in 1999. Figure 3 shows that the same cross-country heterogeneity holds in the extent of derogation to the minimum wage laws. Countries like France leaves no scope for derogations based on age, occupation, or industry. Other countries allow for subminimum wages. Thus, special wage floors extend up to age 24 in Sweden and to age 22 years in the Netherlands. The Netherlands accepts a reduction up to 40 percent of standard minimum wage at 17 years old. Nordic countries let unions negotiate the wage floor at the industry level, without any automatic extension to other parts of the economy.

Henceforth, we measure the stringency of the overall minimum wage legislation using the composite indicator *minwage\_legislation*, obtained by multiplying the indicator of legal determination of the minimum wage, *minwage\_legal*, by the indicator of potential dispersion, *minwage\_dispersion*.

To get a comprehensive picture on state regulation of minimum wage, we combine the previous index on the stringency of the legislation, *minwage\_legislation*, with an index on the level of minimum wage. We measure the minimum wage level by the index *minwage\_level* defined as the ratio of the minimum wage over the median wage in the economy. Minimum wage levels are provided by the OECD database for all years since the mid-1970s. The OECD only reports countries which have a legal statutory minimum wage. We thus complete these data by using Neumark and Wascher (2004)'s indicators for other countries. These data cover two time periods, the late 1970s and the 2000s. The exact definition of the minimum wage variables used to calculate the real value of national minimum wages.

The overall measure of minimum wage regulation used in the following tables and figures, denoted by *minwage*, is simply the product *minwage\_legislation\*minwage\_level*.

### **2.1.2 Union density and the quality of labor relations**

We measure the perceived level of cooperation in the labor market by the quality of the relation between workers and managers. We first use the *Global Competitiveness Reports*, a survey sent out to thousands of executives each year across more than 50 countries. Among other questions, executives are asked to respond to the following statement: “*Labor/employer relations are generally cooperative*”. Responses may vary from 1 for strong disagreement to 7 for strong agreement. One may of course worry about this only reflecting the perception of executives. We thus use additional information from the *International Social Survey program 1999* (ISSP), which asks similar questions but for workers. The question is the following: “*In all countries there are differences or even conflicts between different social groups. In your opinion, how much conflict is there between management and workers in your country?*” Responses are equal to 1 for “very strong conflict”, 2 for “strong conflict”, 3 for “not very strong conflict”, and 4 for “no conflict at all”. We construct a variable equal to 1 if the respondent chooses answer 3 or answer 4, and zero otherwise, to capture the share of workers who believe in cooperative labor relations in each country.

We measure workers’ involvement in unions by using the unionization data provided by the OECD at a yearly frequency since the 1960s. We should be clear at this point that our primary focus is on workers’ propensity to cooperate and to group into associations rather than rely on state intervention to guarantee their wage. In this regard, union density appears to be a more relevant indicator than union coverage rates. Obviously, the coverage indicator provides information regarding the bargaining power of unions, and as a matter of fact the role of unions in regulating wages becomes fairly high in some countries due to the automatic extension of negotiated wages to all sectors, even if the union density rate is really low. However the coverage indicator also captures the extent of state intervention in setting wages, since negotiated wages are extended by law to the different sectors of the economy. Thus this indicator does not truly reflect workers’ preference for direct negotiations over the alternative of relying on state intervention.

## **2.2 Cross-country correlation between the quality of labor relations, union density and minimum wage regulations**

Figure 1 illustrates the negative correlation between the stringency of minimum wage regulations and executives’ beliefs in cooperative labor relations. The index of perceived cooperation on the labor market is constructed using the 1999 Global Competitiveness Reports. Figure 4 shows that the same correlation pattern holds when we look at the ISSP index of workers’ perceived quality of labor relations. Figure 1, 4 and 5 show that Scandinavian countries are characterized

by a low level of state intervention in the regulation of minimum wage. Wage floors are directly negotiated between unions and no statutory legal minimum wage exists. This characteristic is associated with highly cooperative labor relations. At the other extreme, state intervention is high in countries (in particular, France) where labor relations are distrustful.

Another interesting fact about labor markets comes out of Figure 5. Indeed this figure reports a strong positive correlation between the executives' beliefs in cooperative labor relations and union membership. This directly contradicts a common wisdom whereby anything that strengthens employees' bargaining power in firms, in particular higher rates of unionization, should be negatively perceived by employers and therefore increase their distrust vis-a-vis workers. Countries with low union density, such as France, are characterized by distrustful labor relations, whereas Nordic countries with their high unionization rates show widespread beliefs in cooperative labor relations.

Table 1 presents the results of the associated OLS regression. Column 1 reports the positive correlation between the quality of labor relation and union density in 2000. We measure the degree of cooperation by the GCR index which provides more observations, even if the correlation pattern is lower than that obtained with the ISSP index. Column 1 shows that the  $R^2$  is 0.34, and union density is statistically significant at the one percent level. The second column shows that the correlation between the quality of labor relation and union density remains statistically significant at the five percent level when one controls for the unemployment rate and traditional labor market institutions taken from Nickell et al. (2001). Columns 3 and 4 report the strong negative correlation between the GCR index of the quality of labor relation and our index of state regulation of the minimum wage in the 2000s. The negative correlation is highly statistically significant at the one percent level even when one controls for the unemployment rate and other labor market institutions in Column 4, none of which appear to be statistically significant.

Table 2 shows that these multiple equilibria in beliefs are associated with different ways of regulating labor markets: either by strong state regulation or through social dialogue. Column (1) reports the cross-country estimated correlation between unionization rates and the extent of state regulation of minimum wage over the three period 1980, 1990 and 2003. The sample is unbalanced, with fewer 2 observations for the period 1980. This correlation is negative, and statistically significant at the 1 percent level. Almost 45 percent of the cross-country variation observed in the state regulation index is associated with differences in unionization rates.

Table 2 - Column (2) reports the within correlation between contemporaneous values of unionization rate and state regulation of minimum wage. To allow for enough time variation between periods, we focus on the evolution of attitudes between the two sub-periods 1980s and 2000s. A strong negative correlation shows up, the effect being statistically significant at the one

percent level. Table 2 - Column (3) reports the correlation between the index of state regulation of minimum wage and the lagged value of union density. When looking at state regulation in the early 1980's, we use union density in the early 1970s (1970-74). The estimated coefficient is strongly negative and statistically significant at one percent level. Lower unions rates during the 70's are associated with more stringent minimum wage regulation by the state a decade or two later. This result might account for the rising political support in favor of an increase in statutory minimum wages in countries where the bargaining power of unions is declining. A striking example is the United Kingdom where wage floors used to be set by unions before the country embraced a statutory minimum wage in 1999 to offset the decline of union bargaining power. What happened is that the unionization rate had fallen from 50 % in 1980 to less than 30% in the late 1990's, in part as a result of Margaret Thatcher's crackdown on strikes in 1982. Meanwhile, the political pressure from the workers to get a legal minimum wage has gained momentum, leading Tony Blair to introduce a statutory minimum wage.

## 2.3 History dependence and the demand for labor market regulation

Now we move from looking at aggregate cross-country data to looking directly at individual beliefs in cooperation and individual demand for regulation. We document the fact that beliefs in the quality of labor relations are strongly history-dependent and shaped by past regulation of the labor market. We then show that these beliefs affects the current demand for regulation.

### 2.3.1 History-dependence of beliefs in cooperation

To analyze the history-dependence of beliefs, we focus on the attitudes of US-born immigrants. We look at the correlation between their beliefs in the quality of labor relations and the features of their country of origin likely to shape their beliefs. We use the General Social Survey which provides information on both attitudes towards the quality of labor relations and the country of origin of the ancestors. The GSS covers the period 1972-2004 and provides information on the birth place and the country of origin of the respondent's forebears since 1977. The GSS variable for the country of origin reads as follows: "*From what countries or part of the world did your ancestors come?*". Origins cover nearly all European countries. We focus on US-born immigrants and select country of origins with at least 10 observations.<sup>6</sup> Beliefs in cooperative labor relations of US immigrants are measured by two main questions. The first one reads : "*There will always be conflict between management and workers because they are really on*

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<sup>6</sup>This leaves us with a maximum of 16 country of origins depending on the GSS question: Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom

*opposite sides*". The answers ranges from 1: "Strongly agree", 2: "Agree", 3: "Disagree", 4: "Strongly disagree". We order the answers to provide an index of *Distrustful labor relations*. The second question, more general, deals with the level of confidence in business: "*Would you say you have a great deal of confidence, only some confidence, or hardly any confidence at all in companies?*". The answers range from 1: "A great deal", 2: "Only some" to 3: "Hardly any". This question provides an index of *Distrust in companies*

Figure 6 shows the correlation between beliefs in cooperation of US-immigrants and the quality of labor relations in the home country. We measure the conditional average of US-immigrants' beliefs by running individual ordered probit regressions controlling for age, education, employment status (inactive, employed, unemployed), gender, level of income (expressed in brackets between 1 and 12 in the GSS database) and country of origin fixed effects. Denmark is considered as the reference country of origin. Standard errors are clustered at the country of origin level. There is a substantial heterogeneity in the beliefs in cooperative labor relations depending on the country of origin. Relative to US-immigrants with Danish origins, immigrants from Africa, Latin America, Mediterranean countries and most Eastern European countries have a much higher level of distrust in cooperative labor relations. The gap in distrust is lower among immigrants from other Nordic countries and from UK or Austria. These beliefs are fairly persistent. All the coefficients associated with the country of origins are statistically significant at the 1 percent level (not reported here). Besides these beliefs are strongly correlated with the quality of labor relations in the home country. Between 40 percent and 50 percent of the heterogeneity in US-immigrants' beliefs is associated with differences in the quality of labor relations in the home country.

Table 3 - Row I reports the corresponding ordered probit estimates when we replace the country of origin dummies by the index of the quality of labor relations in the source country. We still control for age, education, employment status, gender and the level of income. Standard errors are clustered at the country of origin level. The correlation between US-immigrant beliefs in the quality of labor relations of the US-born immigrants and the quality of labor relations in the home country is statistically significant at the one percent. This correlations suggests a strong inertia of beliefs, influenced by a common history.

### **2.3.2 The effect of past state regulation on the dynamics of beliefs in cooperation**

What explains the heterogeneity in beliefs in the quality of labor relations? One main explanation, put forward by Crouch (1993), is that current beliefs in the quality of labor relations have been shaped by past labor market regulation and by past success or failure in negotiations between social partners. Since minimum wage legislation might be too recent to be related to

the attitudes of US-born immigrants, here we focus on Crouch's broader historical variables on state regulation and industrial relations.<sup>7</sup> Crouch links the evolution of trust in labor relationships across countries to governments' attitudes toward unions or towards using labor market regulations when facing labor disputes in the late 19th century and early 20th century.

Crouch's first key finding is that the quality of labor relations is not given by nature. Instead it is largely shaped by the success or failure of negotiations between unions and firms in the past. Thus Nordic countries, with currently high levels of trust between employers and employees, used to experience very tense labor relations: in particular, Crouch stressed that labor relations were fairly hostile in Denmark in the late 19th century, with the Great Lock-Out of 1898 probably being the single biggest industrial dispute in Europe by that time. However, this dispute led to a social pact between organized labor and firms, whereby unions would accept private property of firms by capitalists, and in exchange, capitalists and workers unions would negotiate wages directly without any state intervention. Ever since, the unionization rate has steadily risen in Denmark and this country displays one of the highest quality of labor relation in the 2000s. The same picture holds for Belgium, Austria, Germany, United Kingdom and Sweden. According to Crouch, labor relations in these countries used to be highly conflicting. But precisely this encouraged employers and the state to design institutions aimed at involving unions in order to contain social disruption. This evolution pattern departs from that of France where central governments, whether from the right or from the left, have remained traditionally suspicious vis-a-vis unions and instead have privileged centralized negotiations led by the government itself, for example during the Front Populaire in 1936 or more recently with the Grenelles Agreement in the aftermath of May 1968.

Crouch's second finding is that previous success or failure in labor negotiations are largely associated with past governments' attitude towards organized labor and to its propensity to directly regulate labor markets. Crouch classifies countries in three categories. The first category includes countries that were most hostile to the development of unions and consequently most prone to regulate labor markets and settle labor disputes through centralized decisions. This group includes the main catholic strongholds in Europe, namely France, Italy, Spain and Portugal. Crouch accounts for this fact by stressing that in these countries the central government needed to assert its authority over the Catholic church and to confront all forms of organized interests, including worker organizations. The second category comprises five countries where the state was rather neutral vis-a-vis labor organization and would consequently let them directly with firms. This is the case of Belgium, Denmark, Norway, Sweden, Finland, UK and Ireland.

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<sup>7</sup>Blanchard and Philippon (2006) show that these past government attitudes toward unions may also explain current unemployment rates.

Finally, the third category consists of countries where the State would encourage union involvement in the regulation of labor markets. This category includes Austria, Germany, Netherlands, Switzerland. In particular, the Austrian and German governments were first to set up elected workers commissions to run pensions and social insurance schemes as of the 1880s.

Table 3 - Row II provides quantitative evidence on the effect of past state regulation on the current trust between social partners. More specifically, we run the same micro estimates on the beliefs in cooperative labor relationships of US-immigrants, but we replace the country of origin dummies by dummies that reflect the state's attitude towards organized labor and social dialogue in the country of origin. The hostile states category is taken as the reference. Table 3 - Row II shows that the probability to distrust companies, or to think that managers and workers will always be in conflict, decreases when US-immigrants come from a country with neutral or supportive attitudes vis-a-vis unions. Relative to hostile states, the effect is statistically significant at the one (ten) percent when individuals come from a country which used to have supportive (neutral) attitude toward unions at the end of the 19th century.

### **2.3.3 Beliefs in cooperation and the demand for regulation**

Here, we document how individuals' past beliefs in cooperative labor relations and how past regulations in the country of origin, shape current political support for regulation of the labor market. More specifically, we analyze the demand for wage regulation by US-immigrants with the question: *“Here are some things the government might do for the economy. Please show which actions you are in favor of and which you are against: control wages by law?”*. The answers ranges from 1, for strongly disagree, to 5 for strongly agree.

Table 4 - Column (1) reports the correlation between the demand for wage regulation from US-immigrants and their beliefs in cooperative labor relations, as measured by their level of confidence in business. We run ordered probit regression controlling for the same set of individual controls as before and for country of origin fixed effects. Column (1) shows that the propensity to call for wage regulation by law decreases with the level of confidence in business, the effect being statistically significant at the 1 percent level. Table 4 - Columns (2) reports the correlation between the probability for US-immigrants to call for a state regulation of wages and the indicator of labor quality in the source country. The correlation is positive and statistically significant at the 5 percent level.

Table 4 - Columns (3) - (4) report the correlation between the demand for regulation of US-immigrants and quantitative indicators of contemporaneous wage regulation in the home country. Column (3) reports the correlation with the stringency of state regulation of minimum wage in the home country, based on our synthetic index presented in section 2. The relations

is positive and statistically significant at the 1 percent level. In contrast, Column (4) shows a negative correlation between the demand for wage regulation and union density in the home country, averaged over the period 1960-2000.

Table 4 - Columns (5) documents the impact of past state attitudes towards organized labor and social dialogue in the home country, drawing on Crouch's classification. Countries of origins in the hostile category are taken as the reference group. Respondent coming from country of origin in the supportive or neutral category, are more likely to believe that it is not the role of the state to regulate wages. The effect is statistically highly significant. Interestingly, the effect is even more significant for respondents from a country of origin in the neutral category. This is consistent with the fact that in these countries the state was much less interventionist in the process of building-up organized labor and collective negotiations.

### 3 The model

We have provided evidence to the effect that: (i) past minimum wage regulation and past beliefs on the quality of labor relations affect current beliefs; (ii) current beliefs on the quality of labor relations in turn affect future demand for minimum wage regulation. In this section we develop a simple model that rationalizes these empirical findings and that shows how they can explain the diverging dynamic paths of the quality of labor relations and minimum wage legislations across countries.

#### 3.1 Basic framework

We consider an infinite horizon model of an economy populated by a unit continuous mass of risk neutral individuals, each of whom lives for one period. There are two non storable goods in the economy: a numeraire good and labor. Each individual is endowed with one unit of labor. Individuals get utility from their consumption of the numeraire good and they differ in productive ability. In each period  $t$ , the proportion of individuals who produce less than  $y$ ,  $y \geq 0$ , with one unit of labor, is defined by the cumulative distribution function  $G(y)$ . For simplicity, we shall take the  $G$  distribution to be uniform on the interval  $[0, 1]$ .

Individuals may decide to join a trade union. The utility of an individual paid wage  $w_t$  in period  $t$ , is just equal to  $w_t$  if the individual is not unionized and to

$$v_t = w_t(1 - c)$$

if she is unionized. The parameter  $c \in (0, 1)$  is introduced to represent the cost of unionization, equal to  $cw_t$ . The assumption that the cost of unionization is proportional to the wage has many

empirical justifications. In most countries, the cost of membership is a fraction of the wage. The opportunity cost of the time that workers devote to union activity increases with their wage. Employers may also slow the career of union members. For the employee, the cost of this behavior of the employer should increase with the wage.

Workers face a monopsonistic representative firm. This assumption is made for simplicity. It is the simplest way to represent monopsonistic labor markets, where workers are paid below their marginal productivity. This property can be derived from many models, in particular from the standard search and matching model which shows that search and matching cost induce wages below marginal productivity (see e.g. Pissarides, 2000). In our framework, the monopsonistic firm makes take-it-or-leave-it offers to non unionized workers. Consequently, non unionized workers cannot get more than the minimum wage  $\bar{w}_t \geq 0$  set by the government if their productivity  $y$  is higher than the minimum wage, and they get no job offer from the firm otherwise.

Unionization induces collective bargaining over wages and over other dimensions of labor relations. Following Hirschman (1970) and Freeman and Medoff (1984) we consider that unionism provides a “voice” which can improve productivity. Namely, the production of the workers increases from  $y$  in the absence of trade union to  $(1 + \lambda)y$ ,  $\lambda > 0$ , when the workers are unionized and when voice succeeds. But voice can also fail. In that case, productivity is not improved by unionization. We assume that the probability that voice succeeds depends on the quality of labor relations, which can be either “high” or “low”. The quality of labor relations is not observable. Workers only observe whether voice succeeds or fails.<sup>8</sup> In every period, voice can either be: (i) a success, in which case the productivity of *all* type- $y$  unionized workers is increased by a factor  $(1 + \lambda)$ , (ii) or a failure, in which case productivity is not increased by trade unions. More precisely, in each period  $t$ , the probability that voice succeeds or fails is:

$$\Pr(\text{voice succeeds}) = \begin{cases} 1 - \varepsilon & \text{if quality of labor relations is high} \\ \varepsilon & \text{if quality of labor relations is low} \end{cases}$$

$$\Pr(\text{voice fails}) = \begin{cases} 1 - \varepsilon & \text{if quality of labor relations is low} \\ \varepsilon & \text{if quality of labor relations is high} \end{cases}$$

where  $\varepsilon < 1/2$ .<sup>9</sup>

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<sup>8</sup>For the sake of simplicity, it is assumed that workers are able to extract the same information independently of the number of employees whose wage is bargained over by the trade union. Alternatively, one could assume that workers observe the outcome of negotiation with a probability that increases with the number of employees whose wage is bargained over in the period. Our results are robust to introducing this additional feature to the model.

<sup>9</sup>That “voice” does not succeed with probability one if the quality of labor relation is high, reflects the fact that the quality of labor relation is not perfect. That it may succeed with positive probability  $\varepsilon$  when the quality of labor relation is low, reflects the fact that workers may sometime overcome the non-cooperative nature of the employer and still manage to strike a good deal.

Unionization also provides bargaining power to workers. Unionized workers can negotiate their wage once they observe whether voice has succeeded. They get a share  $\beta \in (0, 1]$  of the surplus that they generate. If a wage agreement is not reached, workers are paid the minimum wage and voice does not work any more. Accordingly, when voice succeeds, the firm gets profits per worker equal to  $y(1 + \lambda) - w_t$  if an agreement is reached, and  $y - \bar{w}_t$  in the opposite case. Workers get  $w_t(1 - c)$  if wage negotiation succeeds and  $\bar{w}_t(1 - c)$  if it fails. Surplus sharing yields the wage<sup>10</sup>

$$w_t(y) = \bar{w}_t + \mu y,$$

where  $\mu = \beta\lambda/[1 - c(1 - \beta)] > 0$ . It turns out that the negotiated wage is equal to the minimum wage plus a share of the increase in productivity generated by voice when voice succeeds. When voice fails, wage bargaining yields the minimum wage  $\bar{w}_t$  because unionization does not generate any positive surplus.

#### *The dynamics of beliefs*

Upon deciding whether or not to unionize and thereby learn on the quality of labor relations, workers do not know whether they live in a cooperative economy where such learning will indeed lead to high quality of labor relations or if they live in a non-cooperative economy where learning is pointless. In other words, joining a union can be seen as a costly experimentation to improve labor relations and discover the true cooperative nature of the economy.

Let  $e \in \{C, N\}$  denote the type of the economy:  $C$  if the economy is cooperative and  $N$  if it is non cooperative. We let

$$\Pr_{t=0}(e = C) = q_0$$

denote workers' prior beliefs as to the cooperative nature of the economy at date zero.

A history  $h_t(n, s)$  at the beginning of period  $t$  consists in  $n \leq t$  past negotiations (between date 0 and date  $t - 1$ ),  $s \leq n$  of which have been successful, and  $n - s$  have been unsuccessful. The number  $n$  of periods with negotiation, may be smaller than  $t$  since there is no negotiation in the periods where nobody is unionized.

>From Bayes' rule, the probability that the economy is cooperative in period  $t$  is:

$$q_t = \Pr[e = C|h_t(n, s)] = \frac{(1 - \varepsilon)^s \varepsilon^{n-s} q_0}{(1 - \varepsilon)^s \varepsilon^{n-s} q_0 + (1 - \varepsilon)^{n-s} \varepsilon^s (1 - q_0)}. \quad (1)$$

Finally, using the fact that  $\Pr[e = C|h_t(n, s)] = 1 - \Pr[e = N|h_t(n, s)]$ , we can compute the probability that voice succeeds in period  $t$  when there have been  $n$  previous periods with

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<sup>10</sup>Note that the wages negotiated by the trade union depend upon workers' productivity, whereas the minimum wage is independent of productivity. Here we simply capture the idea that trade unions have a better information about workers' productivity than the government.

negotiations,  $s$  of which have been successful, namely:

$$p(q_t) = \varepsilon + (1 - 2\varepsilon)q_t. \quad (2)$$

In this framework, by unionizing, workers manage both to obtain wage increases and also to generate information about the possibility to increase the quality of labor relations. In periods in which some workers are unionized, the outcome of the negotiation reveals information on the type of economy. This in turn enables workers of the future generation to update their beliefs. When nobody is unionized in period  $t$ , workers of generation  $t + 1$  cannot update their beliefs.

Bayes' rule immediately implies a positive correlation between beliefs in successive periods as stated by:

**Lemma 1:** *The belief  $p(q_t)$  that bargaining succeeds in period  $t$  is non-decreasing with  $p(q_{t-1})$ .*

**Proof:** From the definition (2) of beliefs we know that  $p(q_t, I)$  increases with  $q_t = \Pr[e = C|h_t(n, s)]$ .

Let

$$a = \Pr[e = C|h_t(n, s)]; b = \Pr[e = C|h_{t-1}(n', s')]$$

where  $n' = n$ , or  $n' = n - 1$ , and  $s' = s$  or  $s' = s - 1$ . We have:

$$\begin{aligned} 1/a &= 1 + \left(\frac{1 - q_0}{q_0}\right)\left(\frac{1 - \varepsilon}{\varepsilon}\right)^{n-2s}, \\ 1/b &= 1 + \left(\frac{1 - q_0}{q_0}\right)\left(\frac{1 - \varepsilon}{\varepsilon}\right)^{n'-2s'}. \end{aligned}$$

Thus

$$1/a = (1/b) \left(\frac{1 - \varepsilon}{\varepsilon}\right)^{n-n'-2(s-s')} + 1 - \left(\frac{1 - \varepsilon}{\varepsilon}\right)^{n-n'-2(s-s')}.$$

In particular  $(1/a)$  and  $(1/b)$  are positively correlated, and thus so are  $a$  and  $b$ . QED.

### *Timing*

At the beginning of period  $t = 0$ , nature determines once for all the type of economy  $e \in \{C, N\}$  which is not observable. Then, in each period  $t \geq 0$ , the sequence of decisions can be described as follows:

1. Individuals vote to elect a government that sets a minimum wage  $\bar{w}_t \geq 0$ .
2. Workers decide whether or not to join the trade union.
3. Wages are set by employers for non unionized workers and by wage negotiation for unionized workers.

We first analyze the outcome of the wage negotiation and the decision to unionize when the minimum wage is exogenous. This first step will allow us to shed light on the effect of the minimum wage on the dynamics of beliefs. Then, we endogenize the minimum wage by making it a choice variable by the elected government.

### 3.2 The effect of minimum wage on the dynamics of beliefs

Unionization behavior is influenced by beliefs about the cooperative nature of labor relations and by the minimum wage regulation. Beliefs are themselves influenced by past unionization experience. In this section, we first analyze how the minimum wage influences unionization within each period  $t$ , taking beliefs are given. Then, we proceed to analyze the impact of the minimum wage on the dynamics of beliefs and unionization.

#### 3.2.1 Short run equilibrium

Here we analyze workers' decisions to unionize within any period  $t$ , with given belief  $q_t = \Pr[e = C|h_t(n, s)]$  and given minimum wage  $\bar{w}_t$ . All workers whose productivity is lower than the minimum wage  $\bar{w}_t$  are unemployed. Non unionized workers with productivity  $y \geq \bar{w}_t$  obtain the minimum wage  $\bar{w}_t \geq 0$ . Unionized workers with productivity  $y \geq \bar{w}_t$  expect to get the wage  $w_t(y) = \mu y + \bar{w}_t$  with probability  $p(q_t)$  and the minimum wage with probability  $1 - p(q_t)$ .

##### *Unionization decision*

Workers decide to join unions in period  $t$  if and only if the utility derived from union membership, equal to  $\{p(q_t)w_t(y) + [1 - p(q_t)]\bar{w}_t\}(1 - c)$ , is larger than the utility obtained without union membership, equal to the minimum wage  $\bar{w}_t$ .<sup>11</sup> Therefore, all workers whose productivity lies above the threshold

$$\hat{y}_t = \frac{c\bar{w}_t}{\mu(1 - c)p(q_t)} \quad (3)$$

decide to become union member. The share of workers who decide to join a union in period  $t$  is therefore equal to:

$$\pi_t = 1 - G\left(\frac{c\bar{w}_t}{\mu(1 - c)p(q_t)}\right). \quad (4)$$

In particular the share of unionized workers decreases with the minimum wage, the reason simply being that the gains from unionization are lower when the minimum wage is higher. More pessimistic beliefs about the chance of success of bargaining also lead to lower union density.

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<sup>11</sup>Note that the decision to join the trade union is motivated here by individual gains only and not by social custom as in the approach developed by Akerlof (1980), Booth (1985), Booth and Chatterji (1993), Corneo (1995), Naylor (1989) and Naylor and Crips (1993) and Naylor and Raaum (1993).

In particular,  $\pi_t = 0$  and therefore there will be no workers' experimentation on the scope for cooperation, whenever

$$q_t < \bar{q}_t = p^{-1}\left(\frac{c\bar{w}_t}{\mu(1-c)}\right).$$

### 3.2.2 The dynamics of beliefs, unionization and experimentation

We now proceed to analyze the dynamics of beliefs and unionization when the minimum wage is exogenously fixed at some level  $\bar{w}$ , for all periods  $t \geq 0$ . There are potentially two possible steady states:

- i) A steady state where  $\pi > 0$ ,
- ii) A steady state where  $\pi = 0$ .

If

$$q_0 < \bar{q} = \bar{q}_t = p^{-1}\left(\frac{c\bar{w}}{\mu(1-c)}\right),$$

then economy reaches its steady state immediately since beliefs are never revised thereafter.

Now suppose that

$$q_0 > \bar{q}.$$

and that the minimum wage is sufficiently low that experimentation occurs in period  $t = 0$ . In this case, the dynamics of experimentation *may* lead the economy to converge towards a steady state with positive union density. However, such optimistic beliefs in period zero are not sufficient to insure that the steady state with positive union density will indeed be reached.

More specifically, when  $q_0 > \bar{q}$ , the economy converges toward such steady state with a positive probability, which will be shown below to depend both upon the minimum wage  $\bar{w}$  and upon  $q_0$ . We now show that the economy converges toward such steady state with a positive probability, which will be shown below to depend both upon the minimum wage  $\bar{w}$  and upon  $q_0$ .

Note first that if negotiation succeeds in period zero, then we must have:

$$q_1 > q_0.$$

The same rise in workers' optimism occurs between periods  $t$  and  $t+1$  when negotiation succeeds in period  $t$ . The dynamics of beliefs is fully described by:

$$q_{t+1} = \begin{cases} \frac{(1-\varepsilon)q_t}{(1-\varepsilon)q_t + \varepsilon(1-q_t)} > q_t & \text{with probability } 1 - \varepsilon \\ \frac{\varepsilon q_t}{\varepsilon q_t + (1-\varepsilon)(1-q_t)} < q_t & \text{with probability } \varepsilon \end{cases} \quad (5)$$

if the economy is type-C, and

$$q_{t+1} = \begin{cases} \frac{(1-\varepsilon)q_t}{(1-\varepsilon)q_t + \varepsilon(1-q_t)} > q_t & \text{with probability } \varepsilon \\ \frac{\varepsilon q_t}{\varepsilon q_t + (1-\varepsilon)(1-q_t)} < q_t & \text{with probability } 1 - \varepsilon \end{cases} \quad (6)$$

if the economy is type- $N$ .

A first implication of the updating equation (5) is that as the experimentation history expands, the reference type ends up being learned with probability 1. More formally, the continuous mapping theorem (see Acemoglu et al, 2007) implies that  $s \rightarrow (1 - \varepsilon)t$  as  $t \rightarrow \infty$  when experimentation occurred in all periods  $0, 1, \dots, t - 1$ , which in turn implies that

$$\lim_{t \rightarrow \infty} \Pr [e = C | h_t(t, s)] = \lim_{t \rightarrow \infty} \frac{q_0}{q_0 + \left(\frac{\varepsilon}{1-\varepsilon}\right)^{t(1-2\varepsilon)}(1 - q_0)} = 1.$$

However, as we shall see below, experimentation may not occur in all periods even when the economy is cooperative ( $e = C$ ). And as a result the economy will not avoid falling into a no experimentation trap with probability one. The continuous mapping theorem also yields that  $\lim_{t \rightarrow \infty} \Pr [e = C | h_t(t, s)] = 0$  if  $e = N$ , which this time will imply that with probability one the economy falls into a no experimentation trap. From now on we shall concentrate on the case where the economy is truly cooperative (type- $C$ ).

A second implication of the updating equation (5), is that the probability of uninterrupted experimentation (and therefore of convergence toward full learning) increases with the value of the initial beliefs  $q_0$ . For example, if  $q_0$  is larger than the threshold value  $\bar{q}$  below which there is unionization, but close enough to  $\bar{q}$ , the probability that there unionization in period zero, but then no unionization in subsequent periods, can be high. To see this, imagine that  $q_0 > \bar{q}$  but that negotiation fails in period zero (this occurs with probability  $\varepsilon$ ). Then, equation (5) implies that  $q_1 < q_0$ . If  $q_1$  is smaller than  $\bar{q}$ , which will occur if  $q_0$  is close enough to  $\bar{q}$ , unionization is equal to zero in period one. In that case, the economy falls in a no-experimentation trap in period 1, after one period of experimentation, and from period zero this case is perceived to occur with probability  $\varepsilon$ .

For higher values of  $q_0$  it will take more than one failure to bring the economy to a no-experimentation trap. Such a scenario can occur after period 1 when there are successive failures for higher values of  $q_0$ . More precisely, we can show:

**Proposition 1:** *If the economy is of the cooperative type ( $e = C$ ) and if  $q_0 > \bar{q}$ , then the economy avoids the no-experimentation trap with probability  $Q(q_0, \bar{w})$  which is increasing in  $q_0$  and decreasing in  $\bar{w}$ .*

**Proof:** Let  $T(q_0, \bar{q})$  be defined by

$$\varphi(T, q_0) = \bar{q},$$

where:

$$\varphi(T, q_0) = \frac{1}{1 + \left(\frac{1-q_0}{q_0}\right)\left(\frac{1-\varepsilon}{\varepsilon}\right)^T}.$$

Since  $\varphi$  is decreasing in  $T$  and increasing in  $q_0$ , then  $T(q_0, \bar{q})$  is increasing in  $q_0$  and decreasing in  $\bar{q}$ .

Now the ex ante expected probability that  $q_t$  will eventually fall below  $\bar{q}$ , which in turn will lead to a no-experimentation trap, is equal to:<sup>12</sup>

$$\bar{P}(q_0, \bar{q}) = \frac{\sum_{n \geq 0} \sum_{s \leq \frac{n-T(q_0, \bar{q})}{2}} \binom{n}{s} (1-\varepsilon)^s \varepsilon^{n-s}}{\sum_{n \geq 0} \sum_{s \leq n} \binom{n}{s} (1-\varepsilon)^s \varepsilon^{n-s}}.$$

In particular it is easy to see that  $\bar{P}(q_0, \bar{q})$  is decreasing in  $T$ , and therefore decreasing in  $q_0$  and increasing in  $\bar{q}$ , and therefore

$$Q(q_0, \bar{w}) = 1 - \bar{P}(q_0, \bar{q})$$

is increasing in  $q_0$  and decreasing in  $\bar{q}$  and therefore in the minimum wage  $\bar{w}$ . QED.

Thus, when the economy is truly cooperative, the economy is more likely to converge toward a steady state equilibrium with positive union density if initial beliefs are sufficiently optimistic and the minimum wage is sufficiently low

### 3.3 Optimal minimum wage and the multiplicity of steady-state social regimes

In this section we analyze the reverse causality from current beliefs about cooperation to the minimum wage optimally chosen by a utilitarian government. We begin to define the optimal minimum wage set by the government in every period. Then, we proceed to analyze the short-run equilibrium, when the belief about the cooperative nature of labor relations is taken as given. Finally, we study the dynamics of beliefs unionization and we show that the model generates multiple (long-term) social regimes.

#### 3.3.1 The ex-ante social welfare function and the optimal minimum wage

It is assumed that the government, contrary to the trade union, does not observe the productivity of each individual. This assumption is meant to capture in a simple way the fact that trade unions gather information, thanks to the bargaining process, that is not available to the government. The cost of unionization can be interpreted as the cost of information obtained by the trade union.

Since the government does not observe productivity, the minimum wage can only be the lowest bound of the wage distribution. The election process is represented by a probabilistic

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<sup>12</sup>Here we use the fact that

$$q_t = \Pr [e = C | h_t(n, s)] = \frac{1}{1 + \left(\frac{1-q_0}{q_0}\right) \left(\frac{1-\varepsilon}{\varepsilon}\right)^{n-2s}}.$$

voting model which implies, under some assumptions assumed to be fulfilled, that the elected government maximizes the sum of the utilities of the workers.<sup>13</sup>

Given  $q_t$ , the government chooses the minimum wage  $\bar{w}_t = \bar{w}(q_t) \geq 0$  that maximizes the social welfare function equal to the sum of the gains of the workers minus the investment costs:

$$W_t = \left[ G \left( \frac{c\bar{w}_t}{\mu(1-c)p(q_t)} \right) - G(\bar{w}_t) \right] \bar{w}_t + \int_{\frac{c\bar{w}_t}{\mu(1-c)p(q_t, \bar{w}_t)}}^1 (1-c) \{p(q_t)w(y) + [1-p(q_t)]\bar{w}_t\} dG(y) \quad (7)$$

where  $p(q_t)$  is given by

$$p(q_t) = \varepsilon + (1-2\varepsilon)q_t.$$

When  $\frac{c\bar{w}_t}{\mu(1-c)p(q_t)}$  is greater than 1, then social welfare is equal to:

$$W_t = [1 - G(\bar{w}_t)]\bar{w}_t. \quad (8)$$

Maximizing welfare over the choice of minimum wage  $\bar{w}_t$ , we can establish the following

**Proposition 2:** *The optimal minimum wage  $\bar{w}(q_t)$  at date  $t$  is equal to:*

$$\bar{w}(q_t) = \begin{cases} \frac{p(q_t)\mu(1-c)^2}{2\mu(1-c)p(q_t)-c^2} & \text{if } p(q_t) \geq \frac{c}{2\mu(1-c)} \\ 1/2 & \text{if } p(q_t) \leq \frac{c}{2\mu(1-c)}. \end{cases} \quad (9)$$

**Proof:** Consider first the case when the welfare maximization program has an interior solution  $\bar{w}_t > 0$  such that

$$\frac{c\bar{w}_t}{\mu(1-c)p(q_t)} < 1.$$

Then the optimal minimum wage satisfies the first order condition:

$$\frac{\partial W_t}{\partial \bar{w}_t} = 0, \text{ or equivalently: } \bar{w}_t = \frac{p(q_t)\mu(1-c)^2}{2\mu(1-c)p(q_t)-c^2}. \quad (10)$$

The solution  $\bar{w}_t$  is truly interior if

$$\frac{c(1-c)}{2\mu(1-c)p(q_t)-c^2} < 1,$$

or equivalently

$$p(q_t) > \frac{c}{2\mu(1-c)}.$$

---

<sup>13</sup>This outcome can be derived from the simple case in which individuals are heterogeneous with respect to ideological biases towards the candidates. Then, following Persson and Tabellini (2000) it turns out that the outcome of the elections maximizes the utilitarian criterion if the ideological bias is represented by an additive term in the utility function and is distributed with a uniform distribution independent of the distribution of productivities.

Now suppose that

$$p(q_t) \leq \frac{c}{2\mu(1-c)},$$

then the optimal minimum wage  $\bar{w}_t$  maximizes

$$W_t = [1 - G(\bar{w}_t)]\bar{w}_t.$$

Note that in this case

$$\frac{\partial W_t}{\partial \bar{w}_t} = 1 - 2\bar{w}_t,$$

which is positive if  $\bar{w}_t < 1/2$  and negative otherwise. Thus in this case the optimal minimum wage is simply

$$\bar{w}_t = \frac{1}{2},$$

which establishes the proposition. QED.

### 3.3.2 Short run equilibrium, for given current beliefs about cooperation

We now proceed by backward induction. Consider first the government's choice of minimum wage for given beliefs  $q_t$ . Proposition 2 gives us the answer, namely, the government will choose

$$\bar{w}(q_t) = \begin{cases} \frac{[\varepsilon + (1-2\varepsilon)q_t]\mu(1-c)^2}{2\mu(1-c)[\varepsilon + (1-2\varepsilon)q_t] - c^2} & \text{if } \varepsilon + (1-2\varepsilon)q_t \geq \frac{c}{2\mu(1-c)} \\ 1/2 & \text{otherwise,} \end{cases} \quad (11)$$

which is decreasing in  $q_t$  since  $c < 1$ .

Let  $\tilde{q}$  be defined by

$$\tilde{q} = p^{-1}\left(\frac{c\bar{w}(\tilde{q})}{\mu(1-c)}\right).$$

Then, either  $q_t < \tilde{q}$ , in which case no worker unionizes and therefore the government sets minimum wage  $\bar{w}_t = 1/2$ , or  $q_t > \tilde{q}$  in which case the government sets

$$\bar{w}_t = \frac{[\varepsilon + (1-2\varepsilon)q_t]\mu(1-c)^2}{2\mu(1-c)[\varepsilon + (1-2\varepsilon)q_t] - c^2} < 1/2,$$

and workers experiment at date  $t$ . Since the minimum wage is lower in the second case, union density is positive in that case.

### 3.3.3 Comparative static results

Using Proposition 2 and plugging the equilibrium value of the minimum wage back into the expressions for welfare, employment and output, we can establish interesting comparative static results on how these three measures of aggregate performance vary with workers' belief on the type of the economy.

**Result 2:** *Employment and aggregate output are non-decreasing with the previous period's belief in the cooperative nature of the economy.*

**Proof:** Note that aggregate employment is simply given by

$$E_t = \begin{cases} 1 - G(\bar{w}_t) = \frac{\mu p(q_t)(1-c^2) - c^2}{2\mu p(q_t)(1-c) - c^2} & \text{if } p(q_t) \geq \frac{c}{2\mu(1-c)} \\ \frac{1}{2} & \text{otherwise.} \end{cases}$$

Thus  $E_t$  is non-decreasing in  $p(q_t)$  and thus in  $p(q_{t-1})$  according to Lemma 1 and to Corollary 1. Similarly, aggregate output

$$Y_t = \int_{\bar{w}_t}^1 y dG(y)$$

is non-decreasing in  $p(q_{t-1})$  since  $\bar{w}_t$  is non-increasing in  $p(q_{t-1})$ . QED.

When many workers were unionized in the previous generation, the government can set a low minimum wage because current expected gains of unionization are high. This situation, which is favorable to employment and output, is also good for aggregate welfare which is equal to total wages net of total unionization costs if the true nature of the economy is cooperative:

**Result 3:** *When the economy is type-C, aggregate workers' welfare is non-decreasing with the previous generation's belief.*

**Proof:** Past belief has no impact on current welfare if  $q_t$  is such that there is unionization in the current period, i.e. if  $q_t \leq \tilde{q}$ . Let us now suppose that  $q_t > \tilde{q}$  and that there is an equilibrium with positive union density in period  $t$ . Then, using the envelop theorem the derivative of  $W_t$  (defined equation (7)) at the optimal value of  $\bar{w}_t$  reads

$$\frac{dW_t}{dp(q_t)} = \begin{cases} \int_{\frac{c\bar{w}_t}{\mu(1-c)p(q_t)}}^1 (1-c)\mu y dG(y) > 0 & \text{if } p(q_t) \geq \frac{c}{2\mu(1-c)} \\ 0 & \text{otherwise.} \end{cases}$$

Since from Lemma 1  $p(q_t)$  increases with  $p(q_{t-1})$  when union density is positive,  $W_t$  also increases with  $p(q_{t-1})$  if  $p(q_t) \geq 2c$ . QED.

Thus, when the true nature of the economy is cooperative, more optimistic past beliefs about the cooperative nature of the economy, favor current involvement in collective action, and leads to higher social welfare because the action of trade unions is more efficient than the minimum wage to fight against the monopsony power of employers.

### 3.3.4 Dynamics of beliefs and minimum wage regulations and steady-state equilibria

This section analyzes the joint dynamics of beliefs and minimum wages regulation implied by the two-sided causal interaction between the two. We are particularly interested in the existence

of multiplicity of steady-state equilibria: low minimum wage and high unionization (a “Scandinavian” equilibrium) and equilibria with low unionization and high minimum wage (“French” equilibrium).

*“French” equilibrium*

When initial beliefs about the nature of the economy,  $q_0 = \Pr_{t=0}(e = C)$ , are pessimistic, the economy can be stuck in a situation with low unionization. This occurs for sure if  $q_0 \leq \tilde{q}$ . This situation persists over time since the absence of experimentation in period  $t = 0$  prevents the updating of beliefs in period 1, and then in the subsequent periods  $2, \dots, \infty$ . The minimum wage remains high, equal to

$$\bar{w} = 1/2,$$

and union density is equal to 0.

*“Scandinavian” equilibria*

When initial beliefs are sufficiently optimistic, i.e. when  $q_0 > \tilde{q}$ , union density in period zero is positive. Then, social experimentation takes place. From our analysis in the previous subsection, we know that with ex-ante probability

$$\bar{P}(q_0, \tilde{q}) = \frac{\sum_{n \geq 0} \sum_{s \leq \frac{n - T(q_0, \tilde{q})}{2}} \binom{n}{s} (1 - \varepsilon)^s \varepsilon^{n-s}}{\sum_{n \geq 0} \sum_{s \leq n} \binom{n}{s} (1 - \varepsilon)^s \varepsilon^{n-s}},$$

the economy will end up in a “French” trap, but with probability  $[1 - \bar{P}(q_0, \tilde{q})]$  it will converge toward the “Scandinavian” steady state.

If the economy reaches the “Scandinavian” steady state, the economy had to be of a cooperative type (otherwise, the economy could not have converged toward this steady state by the Continuous Mapping Theorem). The probability of success of voice is then equal to  $1 - \varepsilon$ . The minimum wage and the trade union density are consequently given by

$$\bar{w}^* = \frac{(1 - \varepsilon)\mu(1 - c)^2}{2\mu(1 - c)(1 - \varepsilon) - c^2} < \frac{1}{2}, \pi^* = \frac{2\mu(1 - c)(1 - \varepsilon) - c}{2\mu(1 - c)(1 - \varepsilon) - c^2} > 0.$$

*Welfare comparison*

Consider a type- $C$  economy so that the steady state with positive union density can be reached when the initial beliefs satisfy  $q_0 > \tilde{q}$ . Then, we know from Result 2 that aggregate welfare is increasing with  $p(q_t)$ . Since  $p(q_t)$  is higher in the equilibrium with positive union density than in the equilibrium with zero union density, aggregate welfare is higher in the “Scandinavian” steady state equilibrium than in a “French” equilibrium.

The following proposition summarizes the above discussion:

**Proposition 3:** *Assume a type-C economy. Then, there exists a steady state equilibrium with high unionization rate and low minimum wage. There also exist steady state equilibria with low union density and high minimum wage. In the steady state with positive union density, welfare is higher than in the steady-state with zero union density.*

*If initial beliefs  $q_0$  that the environment is cooperative are lower than  $\tilde{q}$ , the economy is stuck in a bad equilibrium with higher minimum wage  $\bar{w}_t = 1/2$  and no unionization.*

*If  $q_0 > \tilde{q}$ , the economy converges towards the equilibrium with positive union density, lower minimum wage  $\bar{w}^* = \frac{(1-\varepsilon)\mu(1-c)^2}{2\mu(1-c)(1-\varepsilon)-c^2}$ , with probability  $1 - \bar{P}(q_0, \tilde{q})$  that increases with  $q_0$ .*

In short, a high current minimum wage policy favors convergence towards the “low” equilibrium with low beliefs in cooperation and high minimum wage regulation, as it deters experimentation and thereby leads to future minimum wage increases. Our model thus explains why the stringency of government regulation of minimum wages is strongly negatively correlated with union density and with the quality of labor relations in cross-country regressions. Moreover, it accounts for the fact that beliefs about the quality of labor relations are shaped by past beliefs and past minimum wage regulations. And it predicts that there should be more demand for state regulation of minimum wages when people believe that the quality of labor relations is low. The model also explains the potential persistent effects of historical accidents: some failures in voice can lead to pessimistic beliefs that stuck the economy in the “French equilibrium” with low union density and no attempt to improve labor relations. Thus the predictions of this model are fully consistent with the evidence provided in Section 2.

## 4 Conclusion

In this paper, we have analyzed how the dynamics of beliefs and state regulations depends upon initial beliefs and initial regulations. In particular, we have characterized the probability that the economy will converge to the good steady-state with high beliefs in cooperation and low minimum wage regulations, as a function of initial beliefs and regulations. We showed the existence of two steady state equilibria: first, a good equilibrium corresponding to countries with highly cooperative labor relations and low minimum wage regulations. In such countries, there is no need for a strong legal minimum wage because social partners negotiate wages directly. Second, a bad steady-state equilibrium corresponding to countries with strong state regulation of the minimum wage, low incentives for social dialogue and low union density. In these countries, strong state regulation of the minimum wage crowds out social experimentation and learning about cooperation. This crowding out effect progressively undermines cooperation and leads

economies towards steady-state equilibria with bad labor relations and high minimum wage regulations.

This in turn suggests that state regulation of the minimum wage can have long run costs that have been largely disregarded by the economic literature so far. The contrast between Scandinavian countries, which display good labor relations and good labor market performance on the one hand, and Mediterranean countries with poor labor relations and poor labor market performance on the other hand, suggests that such costs might actually be large.

This analysis raises the broader question of the possibility for countries to export (well-functioning) social models to other countries. Decision makers or policy advisers often come up with a simple answer to this question: namely, that if some institution works well in country A, then it should automatically do well in country B and therefore be exported to that country in a ready-made fashion. Thus for example, based on the positive deregulation experiences in the US and the UK in the 1980s, western leaders and IFIs have pushed for outright deregulation in all other countries (the famous Washington Consensus). However, this approach misses at least two important considerations which emerge from the above analysis. First, institutional change induces an evolution in people's beliefs in the target country, which in turn will induce further changes in local institutions over time. Thus, moving towards more stringent and non-flexible minimum wage regulations may reduce workers' beliefs in labor cooperation and thereby increase further demand for labor regulation. Second, depending upon initial beliefs in the target country, this dynamic process may or may not converge towards the desired outcome. Thus in our analysis the same minimum wage regulation will result in a lower probability of converging to the good equilibrium, the more pessimistic workers' initial beliefs in cooperation. But then, moving beyond the particular case of the labor market, this implies that when deciding whether or how to export institutions to other countries, decision makers should look at the resulting dynamics of beliefs and institutions.

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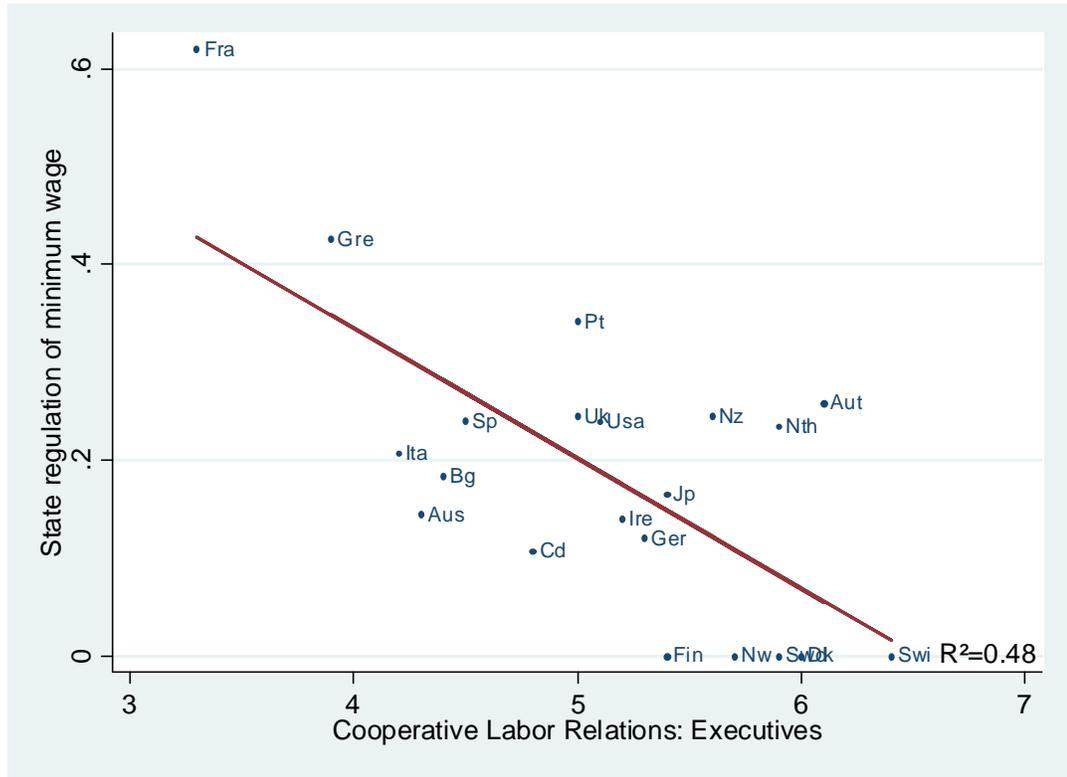


Figure 1: Correlation between State regulation of minimum wages and Executives' beliefs in Cooperative labor relations. Source: ILO and OECD 1980-2003, and GRC 1999.

## A Figures and Tables

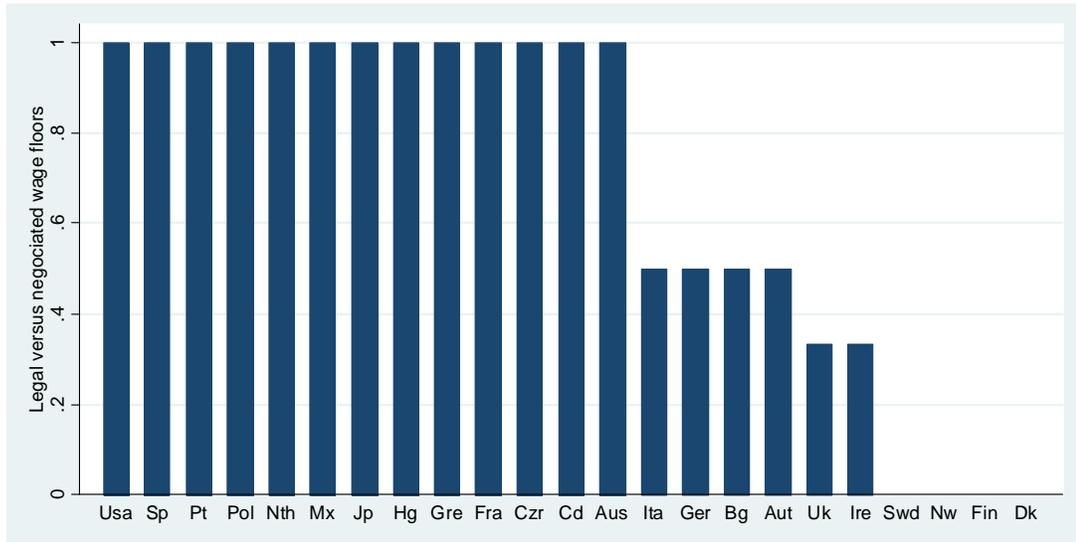


Figure 2: Legal statutory minimum wages or the degree of extension of negotiated wage floors. Period: 1980-2003.

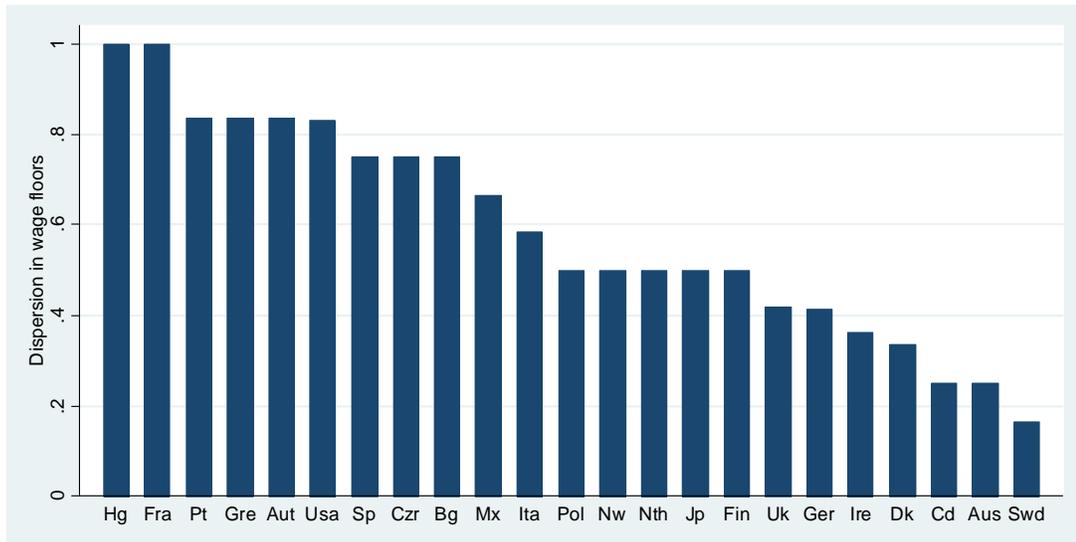


Figure 3: Degree of dispersion in wage floors by ages, qualifications, regions, sectors or occupations. Period 1980-2003.

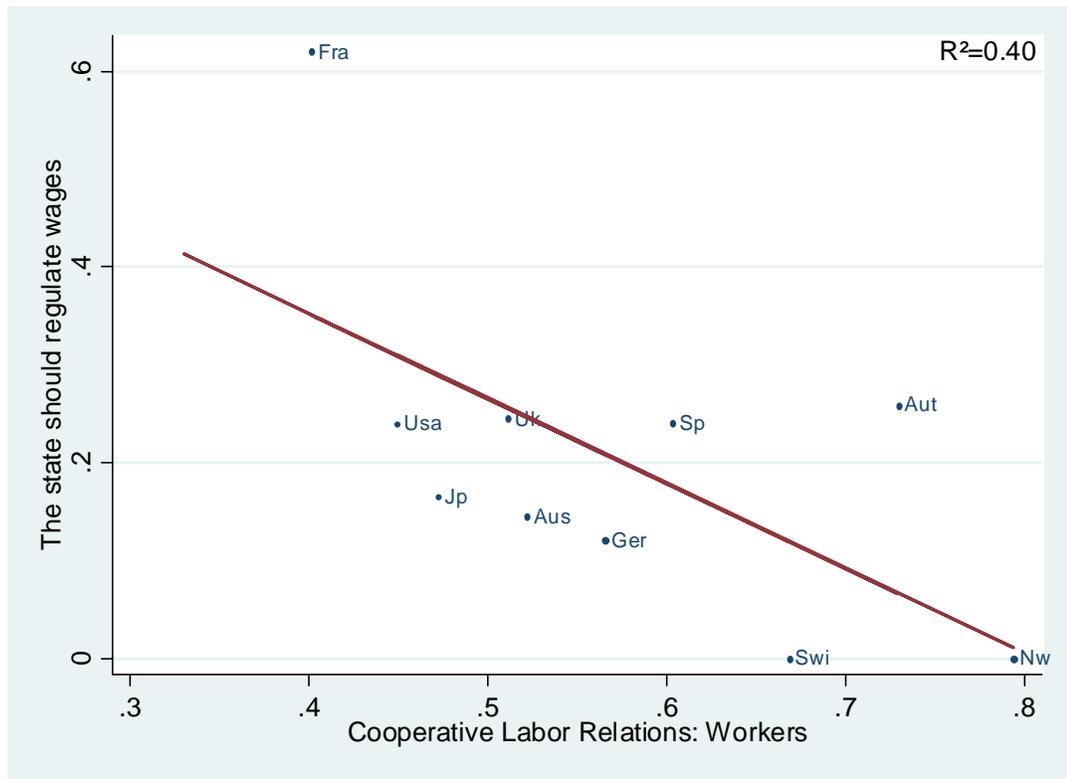


Figure 4: Correlation between state regulation of minimum wages and workers' beliefs in cooperative labor relations. Source: ILO, OECD, and ISSP 1999 database.

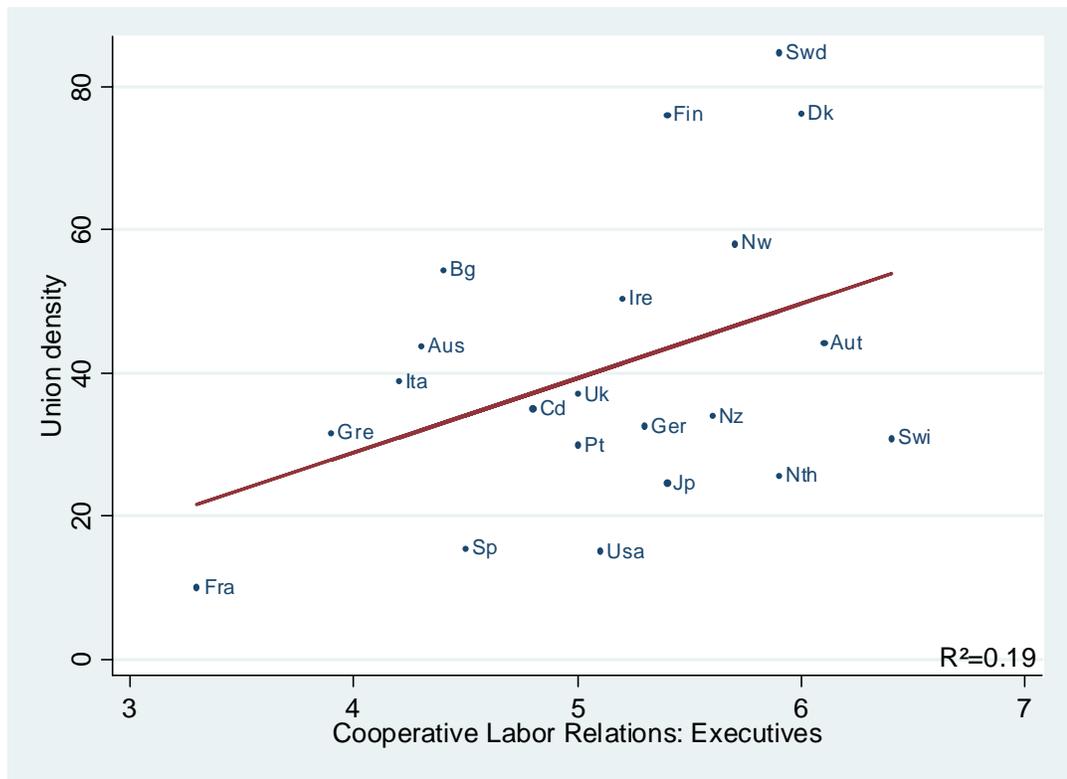


Figure 5: Correlation between union density and Executives' beliefs in cooperative labor relations. Source: OECD 1980-2003 and GRC 1999 database.

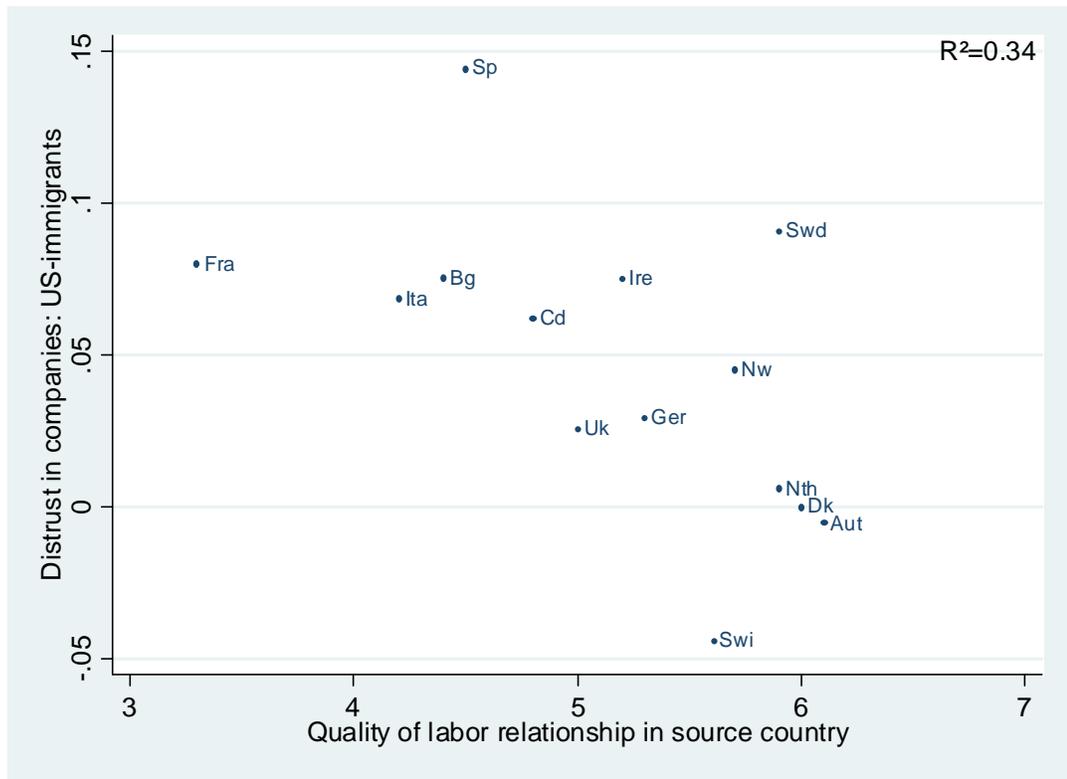


Figure 6: Correlation between US-immigrants' distrust in companies and the quality of labor relationships in the home country. Source: GSS 1977-2006 and GCR 1999.

Table 1: Quality of labor relations in OECD countries: 2000s. OLS estimates

Dependent variable	Quality of labor relation			
	(1)	(2)	(3)	(4)
Union density	2.091 <sup>***</sup> (.716)	2.140 <sup>**</sup> (.912)		
State regulation of minimum wages			-3.339 <sup>***</sup> (.876)	-2.821 <sup>***</sup> (.827)
Unemployment rate		-7.301 <sup>*</sup> (3.802)		-12.625 <sup>**</sup> (4.170)
Replacement rate		.555 (.941)		.422 (.860)
Benefit duration		-.466 (.570)		.235 (.437)
Employment protection		-.098 (.289)		.152 (.259)
Tax wedge		-1.810 (1.682)		-.366 (1.052)
R <sup>2</sup>	.34	.56	.46	.74
Observations	20	20	20	20

Table 2: Cross-country correlation between state regulation of minimum wage and union density: OECD countries 1980-2003. OLS.

Dependent variable	State regulation of minimum wages		
	Cross-country 1980, 1990, 2000	Within country 1980 and 2000	Within country 1980 and 2000
	(1)	(2)	(2)
Union density	-.518 <sup>***</sup> (.083)	-1.089 <sup>***</sup> (.312)	
Union density (-1)			-0.528 <sup>**</sup> (.262)
Country fixed effects	No	Yes <sup>***</sup>	Yes <sup>***</sup>
Time dummies	Yes <sup>***</sup>	Yes <sup>***</sup>	Yes <sup>***</sup>
R <sup>2</sup>	.441	.84	.82
Observations	58	36	36

Table 3: Impact of history on beliefs in cooperative labor relationships: Ordered probit estimates on US-immigrants

	Distrust companies (1)	Management and Workers will always be in conflict (2)
Quality of labor relations in home country - (I)	-.058 <sup>***</sup> (.013)	-.200 <sup>***</sup> (.053)
N	18164	836
R <sup>2</sup>	.081	.082
History of state attitudes towards unions and social dialogue in home country (II)		
Hostile	Reference	Reference
Neutral	-.049 <sup>*</sup> (.030)	-.182 <sup>*</sup> (.102)
Supportive	-.099 <sup>***</sup> (.019)	-.250 <sup>***</sup> (.098)
N	18164	836
R <sup>2</sup>	.042	.085
Ordered probit effects with robust standard error GSS : ***:1%, **: 5%, *: 10		
Additional controls: gender, age, education, employment status, income category		

## A.1 Data on minimum wage regulations

The data on minimum wages come from the OECD database and Neumark and Wascher (2004) for the levels, and from the International Labor Organization (ILO) for the legislation.

- *Minimum wage legislations*

The legislation differs mainly depending on the existence of a legal statutory minimum wages, and the dispersion of minimum wages. These distinctions are documented below.

### 1. Method of setting

We first measure the extent to which minimum wages are directly set by law or by collectively agreed minimum wages negotiated between social partners. Column 2 of table 5 indicates whether wage floors are set by statutory rules defined by the law or by collective negotiation. Column 3 of table 5 indicates the coverage of the minimum wage. This coverage is equal to one when the minimum wage is set by law. However, it can be smaller than one when there is no statutory minimum wage. In some countries the wage floor is negotiated at the sectorial level, but it is automatically extended in other countries. As a matter of fact, the coverage rates of collectively agreed minimum wage reach 70 percent in Norway, 80 percent in Sweden 81 percent in Denmark while they are equal

Table 4: Demand for wage regulation by law - Ordered probit estimates on US immigrants

	Government should control wages by law				
	(1)	(2)	(3)	(4)	(5)
Confidence in Business US-immigrants	-.198 <sup>***</sup> (.062)				
Quality of labor relations in home country - Index GCR		-.117 <sup>**</sup> (.044)			
Contemporaneous wage regulation in the home country					
State regulation of minimum wage			.387 <sup>***</sup> (.123)		
Union density				-.368 <sup>*</sup> (.202)	
History of state attitudes towards unions and social dialogue in home country					
Hostile					Reference
Neutral					-.235 <sup>***</sup> (.071)
Supportive					-.188 <sup>**</sup> (.076)
N	1191	1191	1191	1191	1191
R <sup>2</sup>	.042	.038	.043	.036	.022

Ordered probit effects with robust standard error GSS : \*\*\*:1%, \*\*: 5%, \*: 10  
Additional controls: gender, age, education, employment status, income category

to 99 percent in Austria and Italy. Eventually, almost all Anglo-Saxon countries have a statutory minimum wage. The United States recognized a statutory wage floor in 1938 by the Fair Act while United Kingdom established a national minimum wage in 1999 after having abolished the system of Wage Councils in 1993.

Table 5: Method of wage setting. Source: ILO.

	Determination	Coverage
Australia	Statutory, Provincial level	1
Austria	Negotiation, National extension	.9
Belgium	Negotiation, National level	1
Canada	Statutory, Federal and provincial levels	1
Denmark	Negotiation, Industry level	0.8-0.9
Finland	Negotiation, Industry level	0.9
France	Statutory, National level	1
Germany	Negotiation, National extension	0.9
Greece	Statutory, National level	1
Italy	Negotiation, National extension	1
Japan	Statutory, Prefectures	1
Netherlands	Statutory, National	1
Norway	Negotiation, Industry level	0.7
Portugal	Statutory, National	1
Spain	Statutory, National	1
Sweden	Negotiation, Industry level	1
Switzerland	Negotiation, Industry level	1
Uk	Negotiation, industries, Statutory, 1999	1
Usa	Statutory, Federal, States	1

## 2. Variation in wage floors

Wage floors can vary in five main dimensions: age, qualification, regions, sectors and occupations. Tables 6 indicates whether the minimum wage is set at the national level. It shows that most countries with a statutory minimum wage opt to set a single wage at the national level. Exceptions are Canada and the United States which sets minimum wages at both the federal and the regional level. In the United States, some States, mainly in the South, do not implement the Federal law and others set the minimum wage above the federal floor. In Canada, each province sets its own minimum wage, leading to a wide gap in statutory minimum wages. In Japan, the minimum wage is set at the prefecture level, with some different wages for different industries in a given prefecture. Mexico lies in between, the minimum wage being set at the regional level, but with only three broad regions and a quite narrow gap between different regional levels.

We also report the potential existence of sub-minimum rates for young workers and trainees. Such sub-minimum rates are quite common in OECD countries since they concern around half of them. Countries which exclude such provisions are: Czech Republic, Greece, Hungary, Japan and Mexico. But significant differences exist among countries authorizing sub-minimum wage provisions. The first difference lies in the range of ages covered by the provision. Basically provisions would extend until 24 years old in Sweden or 22 years in Netherlands while such reductions are permitted only for workers younger than 17 years in France and 18 years in Ireland. The second difference is the extent of reductions. United-Kingdom stands as a polar case with no minimum wage for people younger than 21 years. The Netherlands accepts a reduction up to 40 percent of standard minimum wage at 17 years old while the wage floor is set at 80 percent of the standard minim wage in France or Spain for this age.

Table 6: Variations in wage-setting. Source: ILO.

	Variations by:	Subminimum (Age limits, % of standard minimum wage)
Australia	Industries,Regions, Occupation, Age	
Austria	Industries, Occupation, Age	No
Belgium	Age	20:94%, 19: 88%, 18: 82% 17: 76%, <17: 70%
Canada	Industries, regions,occupations	No
Denmark	Industry, Age	<18: 40%
Finland	Industries, Age, Occupations	No
France	Age	17: 90%, <17: 80%
Germany	Region, Age, Qualifications	Trainees
Greece	Age, Marital status, Qualifications	No
Italy	Industry, Age	Trainees
Japan	Industry, Age, Occupation	No
Netherlands	Age	22: 85%, 21: 72,5%, 20: 61,5%, 19: 52,5%, 18: 45,5%, 17: 39,5%, 16:34,5%, 15: 30%
Norway	Industry, age, Occupation	No
Portugal	Age	<18: 75%
Spain	Age	<18: 89%, suppressed in1998
Sweden	Industry,Age, Occupation	<24: 89%
Switzerland	Industry,Age, Occupation	<24: 70%
Uk	Industry,Age	<21: 0%, Change in 1999
Usa	Age, Job tenure	No

- *Minimum wage levels*

The level of the minimum wages measured by the OECD refers in general to a full-time workers in the industry. The data for countries without statutory minimum wage floors correspond to the same definition, borrowed from Neumark and Wascher (2004).

#### *Australia*

The federal minimum weekly wage divided by the median gross weekly earnings of full-time workers. Prior to 1997, the federal minimum is extrapolated based on Metal Industry Award C14 wages and National Wage Case decisions. Source: OECD Minimum Wage Database. Method of setting: An independent Commission (Australian Industrial relations Commission or AIRC) is responsible for setting the federal minimum wage via an annual Safety Net Review. Although some state-level legislation also exists, the federal minimum wage is applicable to the majority of Australian workers. Other provisions: Minimum wages may differ by industry and occupation if the AIRC approves applications to vary minimum award rates from the federal level. There is also a youth subminimum, with rates ranging from 40 percent to 85 percent of the adult minimum depending on age.

#### *Belgium*

The minimum monthly wage for workers aged 21 and over divided by the median gross monthly earnings of full-time workers. Source: OECD Minimum Wage Database. Method of setting: The private-sector minimum wage (Revenue Minimum Mensuel Moyen Garanti) is set via a biennial national collective bargaining agreement between social partners (employers and unions) within the Conseil National du Travail. This minimum wage is then made mandatory for the entire private sector by royal decree. Between collective bargaining agreements, the minimum wage is indexed to the consumer price index, with a formula that adjusts up the minimum two months following a cumulative 2 percent increase in the CPI. Other provisions: The laws provide for a subminimum wage for employees less than 21 years of age. This subminimum wage is 70 percent of the adult minimum for employees aged 16 or under, with the proportion rising by 6 percentage points for each extra year of age.

#### *Canada*

Weighted average of provincial hourly minimum wage levels (weighted by the size of the labor force in each province) divided by median gross hourly earnings of full-time workers. Source: OECD Minimum Wage Database. Method of setting: Minimum wages are set separately in each province and territory either by minimum wage boards or by the Lieutenant-Governor in Council. Other provisions: In most provinces, a single minimum wage applies to workers aged 16 and over. An exception is Ontario, which allows a slightly lower minimum wage rate to be paid to students under 18 years of age.

#### *Denmark*

The average hourly minimum wage divided by an average hourly wage. Source: Dolado, et al. (1996). Method of setting: There is no legally-mandated national minimum wage. Instead, minimum hourly wage rates are set via centralized industry-level collective bargaining agreements, which may be supplemented by agreements at the plant level. Other provisions: Minimum wages may vary considerably at the industry level. In addition, workers under 18 years of age are generally subject to a lower minimum wage.

*Finland*

Average monthly minimum wage divided by an average monthly wage. Source: Dolado, et al. (1996). Method of setting: There is no legislated national minimum wage. Instead, minimum wage rates are set via centralized industry-level collective bargaining agreements. The law requires all employers (including non-union employers) to pay the minimum rates contained in these collective bargaining agreements. Other provisions: Minimum wages may vary considerably at the industry level.

*France*

Gross annual equivalent of the annual minimum wage divided by median gross annual earnings of full-time workers in the private and semi-private sector. Source: OECD Minimum Wage Database. Method of setting: The minimum wage (Salaire Minimum Interprofessionnel de Croissance, or SMIC) is set by the government. Administrative procedures are used to adjust the SMIC each July to reflect both consumer price increases and real wage increases in the hourly wages of manual workers. In addition, the government has sometimes enacted additional increases in the minimum wage. Other provisions: Limited youth subminimum wage rates are applicable to workers under the age of 18. Specifically, workers aged 16 can be paid 80 percent of the adult minimum, while workers aged 17 can be paid 90 percent of the adult minimum for six months.

*Germany*

Average monthly minimum wage divided by an average monthly wage. Source: Dolado, et al. (1996). Method of setting: There is no legislated national minimum wage. Instead, minimum wage rates are set via industry-specific collective bargaining agreements. These agreements can be extended to all employers in the industry if the workforce of the employers directly affected by the agreement comprises at least 50 percent of the total workforce in that industry. In addition, the government may call for a *Hauptausschuß* commission (consisting of the government, employers, and employees) to set minimum wage levels in industries where unions represent only a minority of employees. Other provisions: Minimum wages may vary considerably at the industry level. Some industry agreements include youth subminimum wage rates.

*Greece*

Minimum daily wage for an unqualified single worker with no work experience (converted to an hourly rate by assuming an 8 hour work day) divided by the mean hourly wage in manufacturing. Source: OECD Minimum Wage Database. Method of setting: The national minimum wage level is negotiated annually by representatives of the General Confederation of Greek Workers and the main employer organizations (facilitated by arbitration if necessary). The negotiated level is routinely ratified by the Ministry of Labor and is applicable to all workers. Other provisions: The minimum wage varies slightly by tenure and by marital status.

#### *Ireland*

Minimum gross hourly wage divided by median weekly earnings of full-time employees (converted to an hourly rate). Source: OECD Minimum Wage Database. Method of setting: The government enacted a national minimum wage in April 2000. This minimum wage is reviewed annually by the independent Low Pay Commission, which then recommends an increase for consideration by the government. Prior to that legislation, statutory minimum wages were set by Joint Labour Committees in a limited number of low-wage industries. These Labour Committees consisted of equal numbers of representatives of employers and workers appointed by the Labour Court and a chairman appointed by the Minister for Enterprise, Trade, and Employment. Other provisions: Under current law, workers under the age of 18 can be paid 70 percent of the adult minimum wage.

#### *Italy*

Average minimum monthly wage divided by an average wage. Source: Dolado, et al. (1996). Method of setting: There is no legislated national minimum wage. Instead, minimum wage rates typically are set via industry-specific national collective bargaining agreements, which then are applicable to all workers in the industry. Other provisions: Minimum wages may vary considerably at the industry level. Some industry agreements include youth subminimum wage rates. Japan Definition of minimum wage variable: Weighted average of prefectural hourly minimum wage levels (weighted by the size of the labor force in each prefect) divided by median gross monthly earnings (converted to hourly basis using average monthly hours worked). Source: OECD Minimum Wage Database.

#### *Netherlands*

Minimum weekly earnings for persons aged 23 to 64 divided by median gross annual earnings of full-time employees (divided by 52). Source: OECD Minimum Wage Database. Method of setting: The minimum wage (Minimumloon) is set by law and is normally updated in January and July of each year based on the average increase in wages negotiated in the private sector. The government may choose to suspend or alter the increase if the unemployment rate is above a certain level. Other provisions: The laws provide for a subminimum wage for employees less than 23 years of age. This subminimum wage

ranges from 85% of the adult minimum for employees aged 22 to 30 percent for those less than 17.

#### *Norway*

Average minimum hourly wage divided by an average wage. Source: Dolado, et al. (1996).

Method of setting: There is no legislated national minimum wage. Instead, minimum wage rates typically are set via industry-specific national collective bargaining agreements, which can then be extended to cover all workers in the industry. Other provisions: Minimum wages may vary considerably at the industry level.

#### *Portugal*

Minimum monthly wage for nonagricultural workers aged 20 and over divided by median gross annual earnings of full-time workers (divided by 12). Source: OECD Minimum Wage Database. Method of setting: The minimum wage (Salário Mínimo Nacional) is set annually by the government after consultation with the Permanent Commission for Social Cooperation. Other provisions: Under current law, workers under the age of 18 can be paid 75% of the adult minimum wage. Prior to 1987, workers aged 18 and 19 were also eligible for subminimum wage rates.

#### *Spain*

Minimum monthly wage for workers aged 18 and over divided by median gross annual earnings of full-time workers (divided by 12). Source: OECD Minimum Wage Database. Method of setting: The minimum wage (Salario Mínimo Interprofesional) is set annually by government decree, with the amount of any increase determined by the Council of Ministers. Other provisions: Under current law, all workers aged 16 and over are subject to the adult minimum wage. Prior to 1999, workers under the age of 18 could be paid less than the adult minimum wage.

#### *Sweden*

The average hourly minimum wage divided by an average hourly wage. Source: Dolado, et al. (1996). Method of setting: There is no legislated national minimum wage. Instead, minimum wage rates typically are set via industry-specific national collective bargaining agreements, which then are applicable to all workers in the industry. Other provisions: Private sector agreements typically specify separate minimum wage rates for adult workers (ages 24 and above) and youths.

#### *Switzerland*

There is no national minimum wage rate in Switzerland, minimum wage rates are set in: 1) collective agreements; or 2) standard contracts *contrat-types de travail*. Collective agreements and standard contracts may apply nation-wide; or to specific regions. A standard contract is a decision passed down by a competent body, following the request of a tripartite commission that establishes certain standards such as minimum wage rates for a particular sector or occupation. These contracts may be established

if the sector or occupation concerned is not covered by a collective agreement and the Commission finds that wages in that sector are persistently low and exploitative.

#### *United Kingdom*

Beginning in 1999, national hourly minimum wage divided by median hourly earnings of full-time adult employees. Source: OECD Minimum Wage Database. Prior to 1993, the average minimum wage in Wages Council sectors divided by an average wage. Source: Dolado, et al. (1996). There was no minimum wage from August 1993 through March 1999. Method of setting: Under current law, minimum wage levels are reviewed regularly based on recommendations from the independent Low Pay Commission. Prior to 1993, minimum wages were set in 25 certain industries by Wage Councils, which were originally set up to protect low-wage workers who were not covered by collective bargaining agreements. Other provisions: Under current law, workers aged 18 to 21 may be paid about 85 percent of the current adult minimum wage; workers under age 18 are exempt from the minimum wage. Prior to 1993, minimum wage rates differed substantially by industry, age, and region. Beginning in 1986, all workers under age 21 were exempt from minimum wage laws.

#### *United States*

Federal minimum hourly wage divided by median usual weekly earnings of full-time employees (converted to an hourly rate by assuming a 40 hour full-time workweek). Source: OECD Minimum Wage Database. Method of setting: The national minimum wage level is set by the government and can only be updated by legislative action. Other provisions: States have the ability to set a minimum wage above the federal level. Subminimum wage rates may be paid to selected full-time students and newly-hired youths (for 90 days).

## **B Indicators of state regulation of minimum wages**

We measure the stringency of state regulation of minimum wages through a composite index. A first component of this index is the stringency of the minimum wage legislation, including the existence of legal minimum wages and the extent of potential derogations. A second component is the level of the minimum wage. The overall regulation index is simply the product of these two components.

We document how we measure the stringency of minimum wage legislations. This is captured by two main indicators: 1°) *minwage\_legal* measures the existence of a legal statutory minimum wage, and if not, the degree of coverage of the minimum wage set by collective bargaining; 2°) *minwage\_dispersion* measures the degree of dispersion in minimum wages across ages, qualifications, regions, sectors or occupations. We scale each of these two indicators between zero and one, a higher value indicating more stringent law enforcement.

Figure 2 shows the first indicator, *minwage\_legal*, which captures the existence of a legal statutory minimum wage and the extent to which minimum wages negotiated in collective bargaining are extended to all workers. The indicator *minwage\_legal* equal to 1 if a statutory minimum wage exists, 0.5 if instead the wage floor is directly bargained over by unions and then extended, and 0 otherwise. We report the average value of this indicator for the period 1980-2003. A high degree of cross-country variation shows up along this dimension. A first group of countries, namely Scandinavian countries, do not have any legal minimum wage, and no legal automatic extension of the negotiated wage floors. Wage floors are determined as part of the collective agreements between unions, and then they apply to workers covered by these collective agreements only. A similar group of countries, made up of Austria, Germany and Italy, do not have any legal statutory minimum wages. But legal dispositions stipulate to what extent the negotiated wage floors should be extended to all other workers. Lastly, a legal statutory minimum wage is implemented by most Mediterranean and Anglo-Saxon countries. In the United States, this tradition dates back at least to the 1938 Fair Act while it is more recent in United Kingdom which established a legal minimum wage in 1999.

Figure 3 shows the indicator *minwage\_dispersion* which measures the extent of dispersion and derogations in minimum wage setting. Minimum wage can differ by ages, qualifications, regions, sectors or occupations. A more constraining minimum wage legislation is one that leaves little room for derogations and dispersion. We measure this characteristic by constructing two sub-indexes for age dispersion and other kind of derogations. The sub-indexes are ranked between 0 and 1, a higher score indicating that the country provides little derogation. The sub-index of dispersion across ages is constructed as follows. The score is equal to 1 if there is no provision at all for sub-minimum wages. It is equal to 0.5 if derogations are restricted to workers younger than 18 years old or if the derogation is less than half the official minimum wage. And it takes on the value 0 if the derogations can be extended to people older than 18 years or/and if the sub-minimum wages are lower than half the standard wage floor. The sub-index for other derogations equal 0 if the minimum wage is allowed to differ along at least the three dimensions of regions, sectors and occupations, 0.33 if there are two types of distinctions, 0.67 for one type of distinction, and 1 if no dispersion at all is allowed. The indicator *minwage\_dispersion* is the average of these two sub-indexes.

Figure 3 shows a great deal of cross-country heterogeneity in the *minwage\_dispersion* indicator over the period 1980-2003. Countries like France leaves no scope for derogations based on age, occupation, or industry. Other countries allow for subminimum wages. Thus, special wage floors extend up to age 24 in Sweden and to age 22 years in the Netherlands. The Netherlands accepts a reduction up to 40 percent of standard minimum wage at 17 years old. Nordic countries let unions negotiate the wage floor at the

industry level, without any automatic extension to other parts of the economy.

Henceforth, we measure the stringency of the overall minimum wage legislation using the composite indicator *minwage\_legislation*, obtained by multiplying the indicator of legal determination of the minimum wage, *minwage\_legal*, by the indicator of potential dispersion, *minwage\_dispersion*.

## C Data on US-immigrants

Table 7 reports the number of observations per country of origin for US-immigrants in the Generalized Social Survey. Results are reported for the three questions we focus on: i) “*Would you say you have a great deal of confidence, only some confidence, or hardly any confidence at all in companies?*”, ii) “*There will always be conflict between management and workers because they are really on opposite sides*” and iii) “*Here are some things the government might do for the economy. Please show which actions you are in favor of and which you are against: control wages by law?*”. We only select country of origins for which we have more than 10 observations. Table 8 reports the corresponding characteristics of the US-immigrants for each question.

Table 7: Samples for US-immigrants: GSS database 1977 - 2006

General Social Survey			
N	“Distrust companies”	“Managers and Workers always in conflict”	“State should control wage by law”
Austria	115		12
Belgium	40		
Canada	318	21	30
Denmark	211	12	19
Finland	145		
France	556	23	55
Germany	4,724	219	429
Ireland	3,141	128	267
Italy	1,401	61	133
Netherlands	404	18	42
Norway	469	32	53
Portugal	65		
Spain	169		27
Sweden	454	14	53
Switzerland	122		14
United Kingdom	4,467	210	413

Table 8: Descriptive statistics: GSS database 1977-2006

Variable	“Distrust companies”		“Managers and Workers always in conflict”		“State should control wage by law”	
	Mean	Std	Mean	Std	Mean	Std
Age	45.56	17.42	45.65	17.95	45.08	17.32
Men	.46	.49	.43	.49	.48	.49
Education	12.95	2.91	13.03	2.79	13.37	2.78
Income	9.91	2.74	10.48	2.40	10.54	2.35
Inactive	.35	.47	.35	.47	.29	.45
Unemployed	.03	.16	.02	.13	.03	.14
Employed	.62	.48	.63	.48	.68	.47