

Can Policy Influence Culture? Minimum Wage and the Quality of Labor Relations

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Abstract

Can public policy affect culture, such as beliefs and norms of cooperation? We investigate this question by evaluating how state regulation of minimum wage interacts with unionization behavior and social dialogue. International data shows a negative correlation between union density and the quality of labor relations on one hand, and state regulation of the minimum wage on the other hand. To explain this relation, we develop a model of learning of the quality of labor relations. State regulation crowds out the possibility for workers to experiment negotiation and learn about the true cooperative nature of participants in the labor market. This crowding out effect can give rise to multiple equilibria: a “good” equilibrium characterized by strong beliefs in cooperation, leading to high union density and low state regulation; and a “bad” equilibrium, characterized by distrustful labor relations, low union density and strong state regulation of the minimum wage. We then use surveys on social attitudes and unionization behavior to document that minimum wage legislation and union density do affect beliefs about the scope of cooperation in the labor market.

La politique économique peut-elle influencer le capital social? Salaire Minimum et Qualité des relations de travail

Résumé

Dans quelle mesure les politiques publiques peuvent-elles influencer les représentations et les normes de coopérations ? Nous répondons à cette question en étudiant les interactions entre la qualité du dialogue social et la régulation par l’Etat des salaires. Il existe en effet une forte corrélation négative dans les pays de l’OCDE entre le degré de syndicalisation et la qualité des relations de travail d’une part, et le degré d’intervention de l’Etat dans la fixation du salaire minimum d’autre part. Pour expliquer cette relation, nous développons un nouveau modèle décrivant le processus de révision des croyances par l’expérimentation du dialogue social. La fixation par l’Etat du salaire minimum évince les négociations salariales et empêche les travailleurs de réviser leurs croyances sur la nature plus ou moins coopérative des relations de travail. Cet effet d’éviction peut conduire à un cercle vicieux caractéristique de la situation du marché du travail français. Le caractère conflictuel des relations de travail et la faiblesse du taux de syndicalisation incitent les travailleurs à en appeler à l’Etat pour réguler le salaire minimum. Mais l’intervention de l’Etat peut évincer d’autant plus le dialogue social et entretenir la défiance entre travailleurs et entreprises.

1 Introduction

The role of social capital in explaining economic outcomes is gaining wider acceptance among economists. Defined by Putnam (2000), one of the founding father of this concept, as “the collective values of all social networks and the inclinations that arise from these networks to do things for each other”, social capital has been found to have a significant effect on a large set of economic outcomes such as growth (Knack and Keefer, 1997, Tabellini, 2005, Algan and Cahuc, 2007), institutions (La Porta et al., 1997), financial development (Guiso et al., 2004) and international trade (Guiso et al., 2006).

But if social capital plays such a key role in the economy, one should try to identify (some of) its determinants and ask to what extent it can be affected by policies. Actually Putnam (1993) already suggested that social capital is largely shaped by historical institutions. According to him, the contemporaneous differences in social capital between the North and the South of Italy are due to the culture of independence fostered by the free city states experienced in the North of Italy in the past.⁴ Similarly, since the seminal work of Putnam (2000) on the United States, sociologists and political scientists have tried to identify the role of public policies in explaining the strong decline in social capital since the postwar period, measured in particular by the sharp drop in association memberships.

From this perspective, it has been argued that policies that assign authority to a central agency to design rules can contribute to erode social capital. More precisely, Ostrom (2005) argues that such policies deteriorate social capital for two reasons. First, they induce individuals to be narrowly self-interested and to wait for externally imposed inducement of sanctions before voluntarily contributing to collective action. Second, they destroy the capacity of citizens to experiment with diverse ways of coping with multiple problems and to learn from this experimentation over time.

The aim of this paper is to bring this policy issue, traditionally limited to sociology and political science, into the context of the economic literature. We evaluate to what extent economic policy can influence social capital and cooperative attitudes, such as collective negotiation and membership association. We investigate this issue in the context of the labor market. One of the main dimension of cooperation in the labor market is the agents’ capacity to group together into trade unions (Freeman and Medoff, 1984). The sharp decline in unionization behavior in some countries has been identified as one of the key aspect of the decline in social capital (Put-

⁴Guiso et al. (2007) test Putnam’s conjecture that current differences in social capital between the North and South of Italy are due to the culture of independence fostered by the free city states experience in the North of Italy at the turn of the first millennium. They estimate that at least 50 percent of the North-South gap in social capital come from the lack of a free city state experience in the South. See also Tabellini (2007) for a theory and an estimation of the effect of past political institutions on current cooperation.

nam, 2000), while its increase in Scandinavian countries is an indicator of the development of cooperative attitudes in these countries. In this paper, we show that the state regulation of wages, through the minimum wage legislation, might be one element to understand unionization behavior and priors about the cooperative nature of labor relations.

As shown by Figure 1, OECD countries differ a lot in the extent to which they rely on direct state intervention rather than on social partners to regulate labor market. In particular, we see a strong negative correlation between union density and an index that measures the extent of direct state interventions in minimum wage regulation. This index encapsulates the existence of a legal statutory minimum wage, its level compared to the median wage, the existence of potential derogations from the law, such as the provision of sub-minimum wages for certain categories, and the existence of legal extensions of minimum wages set by collective agreements.⁵ Figure 1 shows that Scandinavian countries regulate their labor relations with powerful trade unions and very little state intervention to set minimum wage. At the other extreme, Mediterranean countries are characterized by stringent state regulations of the minimum wage and low union rates. This contrast is mirrored by an equally strong cross-country heterogeneity with regard to individuals' beliefs about the cooperative nature of labor relations between employers and employees. According to international surveys on the level of cooperative attitudes in the labor market, countries with high unionization rates are characterized by much higher confidence in unions and in the possibility of cooperation between employers and employees. By contrast, countries where union membership is low, and state regulation of wage is high, are also characterized by a high level of mistrust about unions and distrustful labor relations.⁶

To explain this negative relationship between state intervention and cooperation, we develop a model of learning of the quality of labor relations between employers and employees, which stresses the crowding out effect of state regulation on the possibility for agents to experiment direct negotiation and thereby learn about the scope for (future) cooperation in the labor market. The cooperative nature of labor relations is represented by the efficiency of unions in reaching collective agreements with employers. Workers can face two types of unions, either efficient or non-efficient, but they do not observe their type. They only observe whether the wage negotiation fails or succeeds, and they have to infer from this outcome the true cooperative nature of the labor relation, or in other words the true efficiency of the unions.⁷

This framework conveys the idea that the consequences of unionization are not limited to

⁵This index and the definition of union density are presented more precisely in section 3.1.

⁶Evidence about the perceptions of the quality of labor relations across OECD countries are given each year by the *Global Competitiveness Reports*. This index is presented more precisely in Section 3.

⁷See Blanchard and Philippon (2006) for a stimulating analysis of the effect of cooperative priors on wage negotiation.

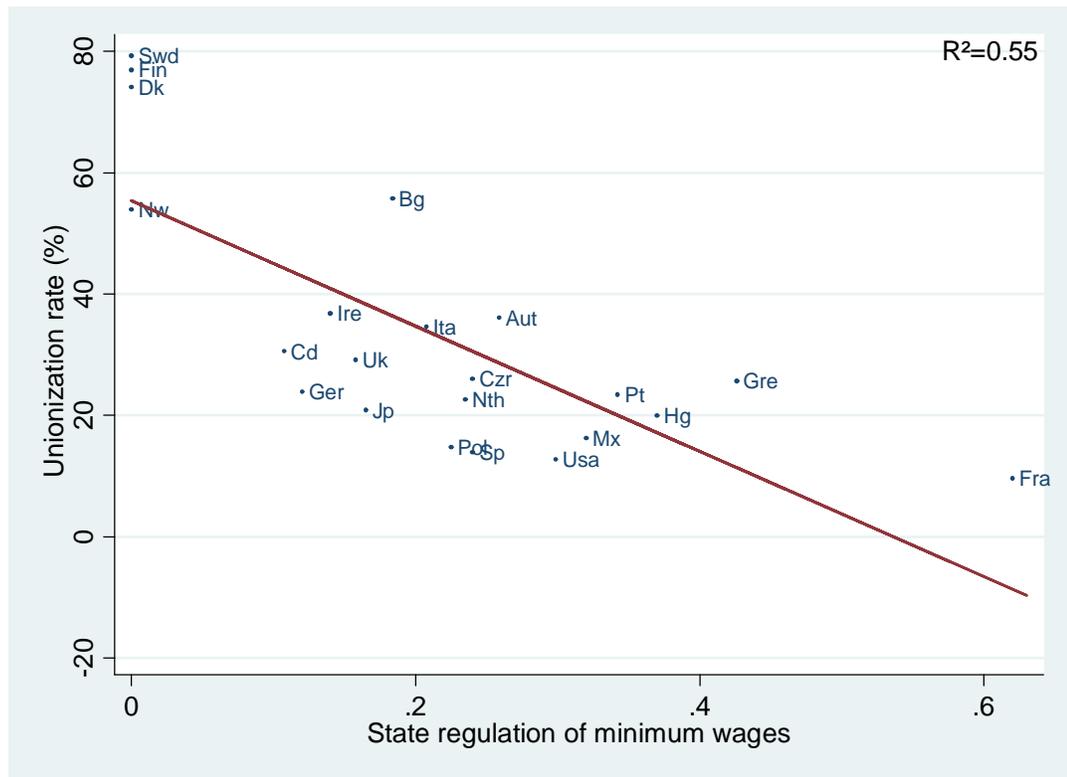


Figure 1: Union density and the index of state regulation of minimum wage. The index includes the stringency of the legislation and of the level of minimum wages. Period 1980-2000. Source: OECD and ILO.

wage increases. Spending time in associations and negotiations makes it possible to gather information about the true cooperative nature of the other participants in the labor market. This in turn helps workers to update their beliefs about the cooperative nature of labor relations. On the other hand, when nobody decides to join unions and to be involved in direct negotiations, then it becomes impossible to update beliefs about the value of cooperation and as a result the country may be trapped in persistent distrustful labor relations. This view of learning and cooperation-building is quite in line with Tocqueville's description of associations⁸ as small social laboratories for experimenting cooperation and building up democracy.

The state regulation of minimum wages in our model has similar effects on social capital as those identified by the above-mentioned political science literature on centralized rules regulating the civil society (Ostrom, 2005). First, high legal minimum wage directly reduces the incentives to become a union member: it is not worth paying the cost of union membership when the worker can rely on state regulation (Checchi and Lucifora, 2002). But this policy also erodes social capital in the future by preventing individual agents from experimenting collective action and social dialogue, which in turn makes it more difficult to learn over time about the scope for cooperation in the labor market.

Now, if in addition the minimum wage is set by an elected government that maximizes social welfare each period, this negative interplay between state regulation of wages and the dynamics of cooperative beliefs can give rise to multiple equilibria. This can explain the polarization of countries reported in Figure 1. In countries where the beliefs in the possibility of cooperation are too low to sustain involvement in trade unions, there is a strong demand for active state interventions in minimum wage regulation. But the intervention of the state contributes itself to destroy social capital by preventing social experimentation and the resulting updating of beliefs. In that case, countries can be stuck in an equilibrium with high minimum wage and low union density. The absence of negotiation in such countries does not mean that labor market participants are not cooperative. It may just reflect the fact that participants have not been able to learn their true cooperative nature, as public policy left no room for experimentation. At the other extreme, in countries where beliefs about cooperation are optimistic enough to sustain unions and negotiations, the demand for the legal minimum wage is lower. The low level of the minimum wage provides incentives to experiment social dialogue by joining unions and thereby learning about the true cooperative nature of labor relations. Such countries can thus converge towards an equilibrium with low minimum wage and high union density.

This also suggests that the joint dynamics of the legal minimum wage and union density could exhibit dynamic paths with increasing union density and decreasing minimum wage on

⁸See Tocqueville, *Democracy in America* (1835).

one hand, and decreasing union density and increasing minimum wage on the other hand. In the presence of multiple equilibria, these dynamic paths are history-dependent: countries starting with low social capital will typically converge toward equilibria with low union density and high minimum wage, whereas countries starting with high social capital will converge to high unionization and low minimum wage steady states.

This representation of the building-up of social capital as resulting from experimentation in collective action can explain the high degree of persistence in cooperative values found by Putnam (1993). In particular, if the initial beliefs about cooperation are too low, a country can be persistently trapped in a no-experimentation equilibrium characterized by strong state regulation of the minimum wage, low union rates and distrustful labor relations. More generally, our model can account for the fact that countries with a long tradition of state regulation of various dimensions of the economic life, such as the labor market, are now characterized by much more distrustful relations. This explanation is complementary to the one proposed by Tabellini (2007a) where parents rationally choose what values to transmit to their offspring, and this choice is influenced by the quality of external enforcement of values. In Tabellini's framework, values evolve gradually over time and if the quality of external enforcement is chosen under majority rule, there is hysteresis in the dynamics of values: adverse initial conditions, with weak enforcement, may lead to an equilibrium path where external enforcement remains weak and individual values discourage cooperation.

In the second part of the paper we discuss the empirical relevance of the model. We first provide detailed evidence on the existence of a trade-off between unionization rates and the extent of state regulation of minimum wages both in cross-section and in time variation. The analysis is run on OECD countries and across US states over the last decades. Second, we show evidence of a relationship between beliefs in union efficiency and in the quality of labor relations on one hand and past minimum wage policies and past unionization rates on the other hand. More specifically, we show that contemporaneous Americans' beliefs about the value of unionization and about cooperation, are influenced by past unionization rates and also by the legal minimum wages in the country of origin of their forbearers. Moreover, we show that these beliefs are highly correlated with the current beliefs in the country of origin as long as first-generation and second-generation Americans are considered. But the correlation no longer shows-up when we consider older waves of immigration. This result suggests that individuals do update their beliefs about cooperation from one generation to the next, based on local (American) experience.

2 The model

2.1 The environment

We consider an infinite horizon economy where individuals live one period. Each generation is made of a continuum of measure one of risk neutral individuals. There are two non storable goods: 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 differ in their 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 can belong to a trade union. The utility of an individual paid a wage w_t in period t amounts to the wage w_t if he is not unionized and to

$$v_t = w_t - c$$

if he is unionized, where $c \in (0, 1)$ denotes the cost of unionization.

Workers face a monopsonistic representative firm. The firm makes take-it-or-leave-it offers to non unionized workers. In this context, non unionized workers get the minimum wage $\bar{w}_t \geq 0$ set by the government if their productivity y is higher than the minimum wage and get no job offer otherwise. Unionization can allow workers to capture a share of output if the trade union is sufficiently efficient. The efficiency of the trade union can be related to the ability of its leaders and to the cooperative attitudes of the members. But the ability of the trade union to get wage increases can also depend on the features of the employer. For instance, the trade union is more likely to get wage increases if the employer is cooperative. More generally, the efficiency of the trade union in negotiation captures the quality of labor relations between the employer and the trade union. Henceforth we shall refer to the efficiency of unions as a short-cut for describing the quality of labor relations or the quality of negotiations between employers and employees.

The efficiency of the trade union is not observed by workers. We assume that its type u can be either efficient ($u = E$) or non efficient ($u = N$). The type of the trade union, which is not observable, is the same in all periods $t = 0, \dots, \infty$. Workers only observe the outcome of the bargaining.⁹ In every period, the bargaining can be either a success ($b_t = S$), such that *all* type- y workers get a wage $w_t(y) = y$,¹⁰ or a failure ($b_t = F$), such that $w_t(y) = \bar{w}_t$. In each

⁹For the sake of simplicity, it is assumed that workers are able to extract the same information about the outcome of negotiation independently of the number of employees whose wage is bargained over by the trade union. It could be possible to 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 can hold with such an assumption.

¹⁰We assume that the worker gets all the surplus if bargaining succeeds for the sake of simplicity. Assuming that the worker get a share $\beta \in [0, 1]$ of the surplus would lead to similar results.

period t , the probability of success and failure of bargaining depends on the type of union

$$\Pr(b_t = S) = \begin{cases} 1 - \varepsilon & \text{if } u = E \\ \varepsilon & \text{if } u = N, \end{cases}$$

$$\Pr(b_t = F) = \begin{cases} 1 - \varepsilon & \text{if } u = N \\ \varepsilon & \text{if } u = E. \end{cases}$$

where $\varepsilon < 1/2$. This implies that the probability to have s successes in n past negotiations with an efficient (resp. non efficient) union is given by the Bernoulli sequence with parameter $1 - \varepsilon$ (resp. ε), which reads $(1 - \varepsilon)^s \varepsilon^{n-s}$ (resp. $(1 - \varepsilon)^{n-s} \varepsilon^s$).

We let

$$\Pr_{t=0}(u = E) = q_0.$$

A history $h_t(n, s)$ in the beginning of period t consists in $n \leq t$ past negotiations (at dates $0, 1, \dots, t-1$), $s \leq n$ of which have been successful, and $n - s$ have been unsuccessful. The number of negotiations n can be smaller than the number of periods t , because there is no negotiation in the periods where nobody is unionized. We know that, by Bayes' rule

$$\Pr[u = E|h_t(n, s)] = \frac{(1 - \varepsilon)^s \varepsilon^{n-s} q_0}{(1 - \varepsilon)^s \varepsilon^{n-s} q_0 + (1 - \varepsilon)^{n-s} \varepsilon^s (1 - q_0)}, \quad (1)$$

Noticing that $\Pr[u = N|h_t(n, s)] = 1 - \Pr[u = E|h_t(n, s)]$, we can write the probability that bargaining succeeds in period t when there have been n previous periods with negotiations, s of which being successful:

$$p_t(n, s) = \Pr[b_t = S|h_t(n, s)] = (1 - 2\varepsilon) \Pr[u = E|h_t(n, s)] + \varepsilon. \quad (2)$$

In this framework, the decision to unionize allows workers to get wage increases but also to gather information about the union's type and the quality of labor relations. In periods in which some workers are unionized, the outcome of the negotiation reveals information on the union's type. This helps workers of the future generations to update their beliefs. When nobody is unionized in period t , workers of generation $t + 1$ cannot update their beliefs.

When beliefs can be updated, it is worth noticing that Bayes rule implies that the evolution of beliefs exhibits some inertia as stated by:

Lemma 1: *The belief $p_t(n, s)$ that bargaining succeeds in period t is non-decreasing with $p_{t-1}(n', s')$, where $n' = n$, or $n' = n - 1$, and $s' = s$ or $s' = s - 1$.*

Proof: Let

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

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.

In each period t , the sequence of decisions is the following:

1. Individuals vote to elect a government that offers to set a minimum wage $\bar{w}_t \geq 0$.
2. The government sets the minimum wage.
3. Once the minimum wage is set, workers can decide to join trade unions.
4. Wages are set by employers for non unionized workers and by wage negotiation for unionized workers.

The model is solved backward. We thus begin by describing the outcome of wage negotiation and the decision to unionize when the minimum wage is exogenously fixed. This first step will allow us to shed light on the relations between the minimum wage, unionization behavior and beliefs. Then, we shall study how the minimum wage is chosen by the elected government.

2.2 How the minimum wage affects unionization and the dynamics of beliefs

Unionization behavior is influenced by beliefs about the efficiency of the trade union and by the minimum wage. But beliefs are themselves influenced by the past unionization experience. In this section, we begin to show how the minimum wage influences unionization behavior within each period t , when the beliefs are given. Then, we proceed to analyze the impact of the minimum wage on the dynamics of beliefs and unionization.

2.2.1 Short run equilibrium

Let us begin to analyze unionization/ experimentation behaviors within any period t , when the belief $p_t(n, s)$ is given. In the presence of a minimum wage, all workers whose productivity is lower than the minimum wage \bar{w}_t are unemployed. Non unionized workers with productivity $y \geq \bar{w}_t$ get the minimum wage $\bar{w}_t \geq 0$. Unionized workers with productivity $y \geq \bar{w}_t$ expect

to get the wage $w_t(y) = y$ with probability $p_t(n, s)$ and the minimum wage with probability $1 - p_t(n, s)$.

Unionization decision

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

$$\hat{y} = \bar{w}_t + \frac{c}{p_t(n, s)} \quad (3)$$

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

$$\pi_t = 1 - G\left(\bar{w}_t + \frac{c}{p_t(n, s)}\right). \quad (4)$$

It turns out that union density decreases with the minimum wage because 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. Henceforth, it will be useful to consider that nobody is unionized when the union is known to be non efficient with probability one and when the minimum wage is equal to zero. Since the probability that negotiation succeeds when the union is non efficient amounts to ε , this assumption boils down to assuming that

$$c > \varepsilon. \quad (5)$$

The minimum wage policy and the no experimentation trap

High minimum wage can prevent workers from experimenting the consequences of unionizations.

Lemma 2: *Union density is equal to zero if*

$$\bar{w}_t \geq 1 - \frac{c}{1 - \varepsilon}.$$

Proof: We know from (2) that the highest possible value of $p_t(n, s)$ is $1 - \varepsilon$. Then, (3) implies that nobody is unionized if $\bar{w}_t + \frac{c}{1 - \varepsilon} \geq 1$. QED.

When the minimum wage is very high, larger than $1 - \frac{c}{1 - \varepsilon}$, nobody is unionized whatever the beliefs, because the cost of unionization is too high with respect to its expected gains, even for the most optimistic workers ($q_t = 1$) with the highest productivity ($y = 1$). When the minimum

¹¹It should be noticed that the decision to join the trade union is motivated by individual gains 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).

wage is lower than $1 - \frac{c}{1-\varepsilon}$, experimentation of social dialogue does not always occur. It depends on the beliefs and on the value of the minimum wage:

Lemma 3: *When $\bar{w}_t < 1 - \frac{c}{1-\varepsilon}$, the threshold value \bar{q}_t of*

$$q_t = \Pr [u = E|h_t(n, s)]$$

below which unionization (and therefore social experimentation) stops occurring, is increasing in the minimum wage \bar{w}_t .

Proof: From (3) above we know that for $p_t(n, s) \leq \bar{p}_t$, where

$$\bar{w}_t + \frac{c}{\bar{p}_t} = 1,$$

unionization and therefore social experimentation stop occurring. Using this and (2) above, we get that unionization stops whenever

$$q_t < \bar{q}_t = \left(\frac{c}{1 - \bar{w}_t} - \varepsilon \right) \frac{1}{1 - 2\varepsilon}, \quad (6)$$

where \bar{q}_t is obviously increasing in \bar{w}_t . QED.

Workers consider that it is not worth paying the cost c to be unionized when they believe that the probability that the union is efficient is below \bar{q}_t . In this situation, workers are too pessimistic to experiment social dialogue. The value of \bar{q}_t depends on the minimum wage. It is only if the minimum wage is sufficiently low *and* if workers are sufficiently optimistic that social experimentation can occur.

The cost of the no-experimentation trap

It appears that the lack of experimentation is detrimental when the union is actually efficient to the extent that social welfare is higher in the equilibrium with positive union density. In the equilibrium without unionization, all workers get the minimum wage \bar{w}_t . In the equilibrium with positive union density workers get $(1 - \varepsilon)y + \varepsilon\bar{w}_t - c$ if they are unionized and \bar{w}_t otherwise. Thus, all workers whose productivity y is above $\bar{w}_t + \frac{c}{1-\varepsilon}$ gain from unionization. Therefore, we can state that

Result 1: *Per period steady state welfare gains due to experimentation amount to*

$$\int_{\bar{w}_t + \frac{c}{1-\varepsilon}}^1 [(1 - \varepsilon)(y - \bar{w}_t) - c] dG(y) > 0.$$

2.2.2 The dynamics of beliefs and unionization

Let us now analyze the evolution of beliefs and of unionization when the minimum wage is exogenously fixed as some level $\bar{w} \geq 0$ for all periods $t \geq 0$.

From equation (6), we know that when initial beliefs about the efficiency of the trade union are sufficiently optimistic,

$$q_0 > \bar{q} = \left(\frac{c}{1 - \bar{w}} - \varepsilon \right) \frac{1}{1 - 2\varepsilon},$$

unionization (and therefore experimentation) takes place at date zero. In this case, the dynamics of experimentation can lead the economy to a steady state with a positive union density. However, optimistic beliefs are not sufficient to ensure that the steady state with positive unionization is reached. Actually, when $q_0 > \bar{q}$, the economy converges toward this steady state with a positive probability that depends on the minimum wage.

To show this, let us suppose that $q_0 > \bar{q}$. Then, if negotiation succeeds in period zero, $q_1 = \Pr_{t=1}(u = E) > 0$ and $p_1(1, 1) > p_0$. This implies that union density in period one is higher than in period zero. The same type of change between periods t and $t + 1$ occurs when negotiation succeeds in period t . More generally, denoting by $q_t = \Pr_t(u = E)$, we get:

$$q_{t+1} = \begin{cases} q_t & \text{if } q_t \leq \bar{q} \\ \frac{(1-\varepsilon)q_t}{(1-\varepsilon)q_t + \varepsilon(1-q_t)} > q_t & \text{with probability } 1 - \varepsilon \text{ if } q_t > \bar{q} \\ \frac{\varepsilon q_t}{\varepsilon q_t + (1-\varepsilon)(1-q_t)} < q_t & \text{with probability } \varepsilon \text{ if } q_t > \bar{q}, \end{cases} \quad (7)$$

if the union is type- E , and

$$q_{t+1} = \begin{cases} q_t & \text{if } q_t \leq \bar{q} \\ \frac{(1-\varepsilon)q_t}{(1-\varepsilon)q_t + \varepsilon(1-q_t)} > q_t & \text{with probability } \varepsilon \text{ if } q_t > \bar{q} \\ \frac{\varepsilon q_t}{\varepsilon q_t + (1-\varepsilon)(1-q_t)} < q_t & \text{with probability } 1 - \varepsilon \text{ if } q_t > \bar{q}, \end{cases} \quad (8)$$

if the union is type- N .

These two last equations, which describe the dynamics of q_t , indicate that there exists sequences of beliefs such that the economy converges to a steady state where workers discover the type of the trade union when the trade union is efficient. More precisely, it appears that as the experimentation history expands, the reference type is learned with probability 1. In particular, if $u = E$, applying the continuous mapping theorem (see Acemoglu et al, 2006) which implies that $s \rightarrow (1 - \varepsilon)t$ as $t \rightarrow \infty$ when experimentation occurred in all periods $0, 1, \dots, t - 1$, we get

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

It can be shown similarly that $\lim_{t \rightarrow \infty} \Pr[u = N | h_t(t, s)] = 0$ if $u = E$.

Accordingly, when there is a type- E union, the probability of convergence toward full learning increases with the value of the initial beliefs q_0 . Now, if q_0 is larger than the threshold value \bar{q}

below which there is no negotiation, but close enough to \bar{q} , the probability that workers begin to experiment collective action in period zero, but then give up experimentation in subsequent periods, can be high. To see this, imagine that the union is of type- E , that $q_0 > \bar{q}$ but negotiation fails in period zero (this occurs with probability ε). Then, equation (7) 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} , union density is equal to zero in period one. In that case, the economy falls in a no-union/no-experimentation trap in period 1, after one period of experimentation, with probability ε . Such a scenario can occur after period 1 when there are successive failures for higher values of q_0 . More generally, if $q_0 > \bar{q}$, the economy avoids the no-unionization/no-experimentation trap with some probability $Q(q_0, \bar{w})$ which satisfies:

Proposition 1: *If the trade union is of the efficient type ($u = E$) and if $q_0 > \bar{q}$, then for given minimum wage $\bar{w} < 1 - \frac{c}{1-\varepsilon}$ the economy avoids the no unionization/ 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 φ 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-unionization/no-experimentation trap, is equal to¹²:

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

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.

According to Proposition 1, when the trade union is truly efficient, the economy can converge toward two steady state equilibria if the initial minimum wage is lower than $1 - \frac{c}{1-\varepsilon}$ and if initial

¹²Here we use the fact that

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

beliefs are sufficiently optimistic to induce some workers to unionize at date zero. In steady state, Result 1 implies that the equilibrium with zero union density is dominated by the equilibrium with positive unionization. Now, we will show that the multiplicity of steady state equilibria which shows up when the minimum wage is exogenous can also appear when the minimum wage is optimally chosen by an elected government.

2.3 Optimal minimum wage and the two steady-state social regimes

In this section we endogeneize the minimum wage as being chosen by a utilitarian government. This in turn generates multiple (long-term) social regimes as we now establish.

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

Since the productivity of each individual is not observed by the government, the minimum wage cannot hinge on productivity. The minimum wage can only be the lowest bound of the wage distribution. The election process is represented by the probabilistic voting model which implies, under some assumptions assumed to be fulfilled, that the elected government maximizes the sum of the utilities.¹³ Accordingly, the government chooses the minimum wage $\bar{w}_t \geq 0$ that maximizes the social welfare function:

$$W_t = \left[G\left(\bar{w}_t + \frac{c}{p_t(n, s)}\right) - G(\bar{w}_t) \right] \bar{w}_t + \int_{\bar{w}_t + \frac{c}{p_t(n, s)}}^1 [p_t(n, s)y + [1 - p_t(n, s)]\bar{w}_t - c] dG(y). \quad (9)$$

When $\bar{w}_t + \frac{c}{p_t(n, s)}$ is greater than 1, then social welfare is equal to:

$$W_t = [1 - G(\bar{w}_t)]\bar{w}_t. \quad (10)$$

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

Proposition 2: *The ex ante optimal minimum wage \bar{w}_t at date t is equal to:*

$$\bar{w}_t = \begin{cases} \frac{c+1-p_t(n, s)}{2-p_t(n, s)} & \text{if } p_t(n, s) \geq 2c \\ 1/2 & \text{if } p_t(n, s) \leq 2c. \end{cases} \quad (11)$$

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

$$\bar{w}_t + \frac{c}{p_t(n, s)} < 1.$$

¹³This 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.

Then the optimal minimum wage satisfies the first order condition:

$$\frac{\partial W_t}{\partial \bar{w}_t} = 0 \Leftrightarrow \bar{w}_t = \frac{c + 1 - p_t(n, s)}{2 - p_t(n, s)}. \quad (12)$$

The solution \bar{w}_t will then truly be interior if

$$\frac{c + 1 - p_t(n, s)}{2 - p_t(n, s)} + \frac{c}{p_t(n, s)} < 1,$$

or equivalently

$$p_t(n, s) > 2c.$$

Now suppose that

$$p_t(n, s) \leq 2c;$$

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

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

This establishes the proposition.

Plugging the value of \bar{w}_t defined equation (11) into equation (4) we get:

Corollary 1: *The unionization rate at date t is given by:*

$$\pi_t = \begin{cases} \frac{p_t(n, s) - 2c}{p_t(n, s)[2 - p_t(n, s)]} & \text{if } p_t(n, s) \geq 2c \\ 0 & \text{if } p_t(n, s) \leq 2c. \end{cases} ; \quad (13)$$

in particular $\partial \pi_t / \partial p_t \geq 0$.

2.3.2 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 the belief on the efficiency of unionization.

Result 2: *Employment and aggregate output are non-decreasing with the previous period's belief on the efficiency of unionization.*

Proof: Note that aggregate employment is simply given by

$$E_t = \begin{cases} 1 - G(\bar{w}_t) = \frac{1-c}{2-p_t(n,s)} & \text{if } p_t(n,s) \geq 2c \\ \frac{1}{2} & \text{otherwise.} \end{cases}$$

Thus E_t is non-decreasing in $p_t(n,s)$ and then in the share of unionized workers in the previous generation 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_{t-1} since \bar{w}_t is non-increasing in p_{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 equal to aggregate production net of unionization costs:

Result 3: *Aggregate welfare is strictly increasing with the previous generation's belief in the efficiency of unionization if $p_t \geq 2c$.*

Proof: This can be easily checked by computing the derivative of W_t (defined equation (9)) at the optimal value of \bar{w}_t . Using the envelop theorem one has

$$\frac{dW_t}{dp_t(n,s)} = \begin{cases} \int_{\bar{w}_t + \frac{c}{p_t(n,s)}}^1 (y - \bar{w}_t) dG(y) > 0 & \text{if } p_t(n,s) \geq 2c \\ 0 & \text{otherwise.} \end{cases}$$

Since we know from Lemma 1 that $p_t(n,s)$ increases with p_{t-1} , W_t is increasing with p_{t-1} if $p_t(n,s) \geq 2c$. QED.

Thus, past belief about the efficiency of unions, which favors current involvement in collective action thanks to the evolution of beliefs, 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.

2.3.3 Equilibrium unionization dynamics and steady-state welfare

In this section we proceed to analyze the dynamics of union density and minimum wage. We are particularly interested by the potential multiplicity of steady-states, one with high unionization (a “Scandinavian” equilibrium) and one with low unionization (a “Mediterranean” equilibrium), and the welfare comparison between these steady states.

“Mediterranean” equilibria

When initial beliefs about the efficiency of the trade unions, $q_0 = \Pr_{t=0}(u = E)$, are pessimistic, the economy can be stuck in a situation with zero union density and high minimum

wage even if the union is actually efficient. Namely, from Proposition 1 and Corollary 1, when $p_0 \leq 2c$, nobody joins unions and the government sets a high minimum wage, equal to $1/2$. In this situation, the condition $p_0 \leq 2c$ is equivalent, according to equations (2) and (11), to

$$q_0 \leq \frac{2c - \varepsilon}{1 - 2\varepsilon} = \bar{q}. \quad (14)$$

This situation is persistent, since the absence of experimentation in period $t = 0$ prevents the revision of beliefs in period 1, and then in the subsequent periods $2, \dots, \infty$.

“Scandinavian” equilibria

When initial beliefs are sufficiently optimistic, i.e. when $q_0 > (2c - \varepsilon) / (1 - 2\varepsilon)$, union density in period zero is positive and the minimum wage is lower than $1/2$.¹⁴ Then, social experimentation takes place. From our analysis in the previous subsection, we know that with ex ante probability

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

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

If the economy reaches the “Scandinavian” steady state, the trade union is necessarily efficient (otherwise, the economy could not converge toward this steady state). The probability of success of negotiation is equal to $p^* = 1 - \varepsilon$. The condition $1 - \varepsilon > 2c$ has to be satisfied to ensure the existence of the steady state equilibrium with positive union density. Under these conditions, the minimum wage and the trade union density are respectively

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

Welfare comparison

Aggregate welfare differs in the steady state equilibrium with high union density and in the equilibrium without unionization. Let us assume a type- E union and that condition $1 - \varepsilon > 2c$ is fulfilled so that both steady states can exist when the initial beliefs satisfy $q_0 > \bar{q}$. Then, we know from Result 3 that aggregate welfare is increasing with p_t . Since p_t is higher in the equilibrium with high union density than in the equilibrium with zero union density, aggregate welfare is higher in the “Scandinavian” steady state equilibrium than in the “Mediterranean” one. We have thus established:

¹⁴One gets: $\pi_0 = (p_0 - 2c) / p_0(2 - p_0)$, $\bar{w}_0 = (c + 1 - p_0) / (2 - p_0)$ with $p_0 = (1 - 2\varepsilon)q_0 + \varepsilon$.

Proposition 3: *Assume $1 - \varepsilon > 2c$, $q_0 > \bar{q}$, and $u = E$. Then, there are two steady state equilibria, one with a high unionization rate and another with a low unionization rate equal to zero. At the high unionization steady state welfare is higher than at the low unionization steady-state. If the initial probability q_0 that the trade union is efficient is lower than \bar{q} , the economy is stuck in the bad equilibrium with low union density. If $q_0 > \bar{q}$, the economy converges towards the equilibrium with high union density with probability $P(q_0)$ that increases with q_0 .*

It is worth stressing that the dynamics of the unionization rate is driven by the revision of beliefs which influence the unionization behavior and by the minimum wage policy. The minimum wage policy favors convergence towards the “bad” equilibrium to the extent that minimum wage hikes induce a drop in union density in the current period and in the future that themselves lead to future minimum wage increases. Convergence towards the bad equilibrium is thus the consequence of a vicious circle in the dynamics of beliefs in which the minimum wage plays a key role.

3 Empirical evidence

This section documents the main predictions of the model. First, we provide detailed evidence on the existence of a trade-off between unionization rates and the extent of state regulation of minimum wages across OECD countries over the period 1975-2003. Next, we look at the dynamics of unionization rates depending on minimum wage policies. As predicted by the model, we find that legal minimum wages hikes are associated with drops in unionization rates over the period 1970-2003. We provide further evidence of such a negative relationship between unionization rates and state regulation of minimum wages in the United States by exploiting the heterogeneity in minimum wage levels across states. We end this section by documenting the main channel of the model, which relies on the revision of beliefs about the efficiency of unions and the quality of labor relations depending on past minimum wage policies and past unionization rates. For that purpose, we show that the beliefs about unions of Americans are influenced by the past levels of unionization rates and legal minimum wages in their country of origin. Furthermore, we show that the beliefs of Americans are highly correlated with the current beliefs in their countries of origin as long as first-generation and second-generation Americans are considered. But such a correlation no longer shows-up when considering older waves of immigration of American, which suggests that individuals do up-date their beliefs about unions depending on the environment.

3.1 The minimum wage - union density trade-off

3.1.1 Data on state regulation of minimum wage and union density

We evaluate the stringency of state regulation of minimum wages by constructing a composite index. This index intends to measure the extent to which the minimum wage is a constraint that binds on collective and individual wage bargaining. The index cover two areas. The first area is the stringency of the minimum wage legislation, including the existence of legal minimum wages and the extent of potential derogations. The second area is the level of the minimum wage. The data are borrowed from the International Labor Organization (ILO) and from the OECD database. The ILO database provides detailed description of the different legal procedures through which the minimum wages are determined. The OECD database adds information on the level of real minimum wages and the ratio of minimum wages relative to average wages and median wages. Below we briefly describe the indicators, the complete details being reported in Appendix A.1.

Minimum wage legislation

We start by looking at the stringency of minimum wage legislation. This we measure by two main indicators, namely: 1°) the existence of legal statutory minimum wages and the degree of extensions of minimum wages negotiated in collective bargaining; 2°) 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 a more stringent law enforcement.

The first indicator covers the existence of a legal statutory minimum wage and the extent to which minimum wages negotiated in collective bargaining are extended to all workers. A high degree of cross-country variation shows up along this dimension. A first group, corresponding to the Scandinavian countries, do not have any legal minimum wage, and no legal automatic extension of the negotiated wage floors. The wage floors are determined as part of the collective agreements between unions, and then applied 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. To account for these different dimensions of the law, we create an indicator *minwage_legal* equal to 1 if a statutory minimum wage exists, 0.5 if instead the wage floor is directly bargained by unions and then extended, and 0 otherwise.

Typically Scandinavian countries have a score of 0 along this dimension, countries like Italy or Germany have a score of 0.5, and countries like France or the United States have a score of 1. The average value of this indicator for the period 1980-2003 is reported in Figure 2.

The second indicator measures potential variations in minimum wage-setting between ages, qualifications, regions, sectors or occupations. A more constraining minimum wage legislation is one that leaves little room for derogations and dispersion. We construct an indicator *min-wage_dispersion* to capture this dimension.

One key element of dispersion is the existence sub-minimum rates for particular groups of workers such as young workers or trainees. We measure this dimension by a first sub-index of minimum wage dispersion. An important cross-country heterogeneity shows up along this line. Some countries do not allow any official derogations, like France and Greece, while other countries provide a large set of subminimum wages. Moreover, the extent of derogations within these sub-minimum wages also differs across countries. The first difference lies in the range of ages covered by the derogations. Basically, special wage floors would extend until 24 years old in Sweden and 22 years in Netherlands while such sub-minimum wages are only allowed for workers younger than 18 years old in Ireland. The second difference has to do with the extent of reductions. 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 minimum wage in Spain for this age. 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.

Minimum wage dispersion also applies across regions, sectors or occupations. We thus construct a second sub-index of dispersion to capture this dimension. In most cases, countries which do have a statutory minimum wage would set it at the national level, with the exception of the United States and Canada. In contrast, the Nordic countries let unions negotiate the wage floor at the industry level, without any automatic extension to other parts of the economy. We construct a sub-index which equals 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. Figure 3 reports the average value of the index of dispersion in minimum wage-setting for the period 1980-2003.

Having assembled these two sub-indexes of minimum wage dispersion, we measure the overall variation in minimum wage determination as the average of these two sub-indexes. Henceforth, the indicator of dispersion will be denoted as *minwage_dispersion*.

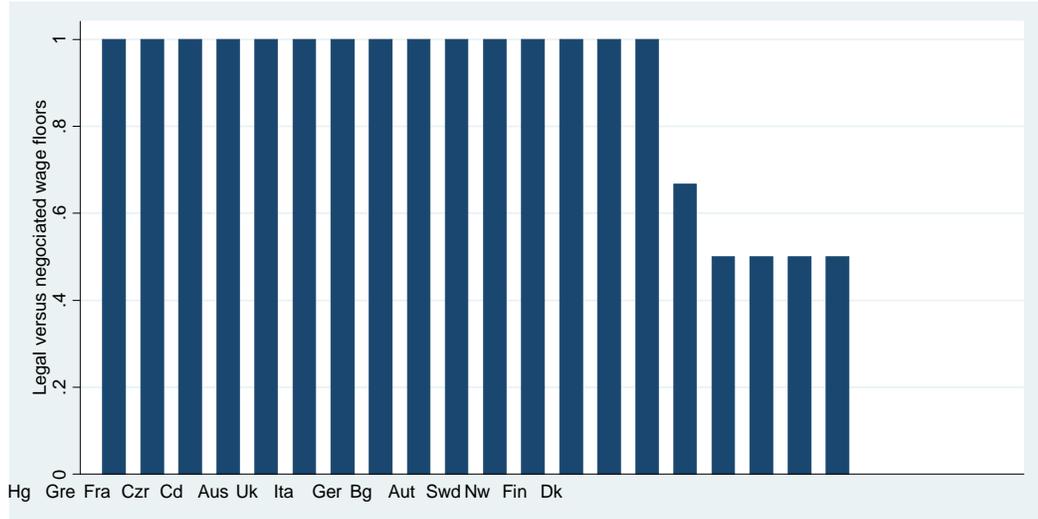


Figure 2: Legal statutory minimum wages or the degree of extension of negotiated wage floors. Period: 1980-2003.

Then we measure the stringency of the overall minimum wage legislation through the 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*.

Minimum wage levels

We now focus on the level of minimum wages. This we capture by an index, *minwage_level*, measuring the ratio of the minimum wage rate over the median wage rate in the economy. Since this ratio might be influenced by union density through the effect of unions on average wages in the economy, we also look at an indicator of real minimum wages. The values of minimum wage levels are provided by the OECD database since the mid-1970s. Unfortunately, the OECD only reports countries which have a legal statutory minimum wage. We thus complete these data by using Neumark and Wascher (2004) indicators for other countries. These data cover two periods, the 1975s and the 2000s. The exact definition of the minimum wage variables used to calculate the real value of national minimum wages are reported in Appendix. As we have mentioned above, some dispersion in minimum wage levels exists within the different countries. The OECD database reports the average value for full-time minimum wage workers who are not subject to any derogations, as a percentage of average wages of full-time workers in industry sectors (see Immervoll, 2007, and Neumark and Washer, 2004).

At the end, we construct a composite index of the extent of state regulation of minimum wages by combining information on the stringency of the legislation *minwage_legislation* and

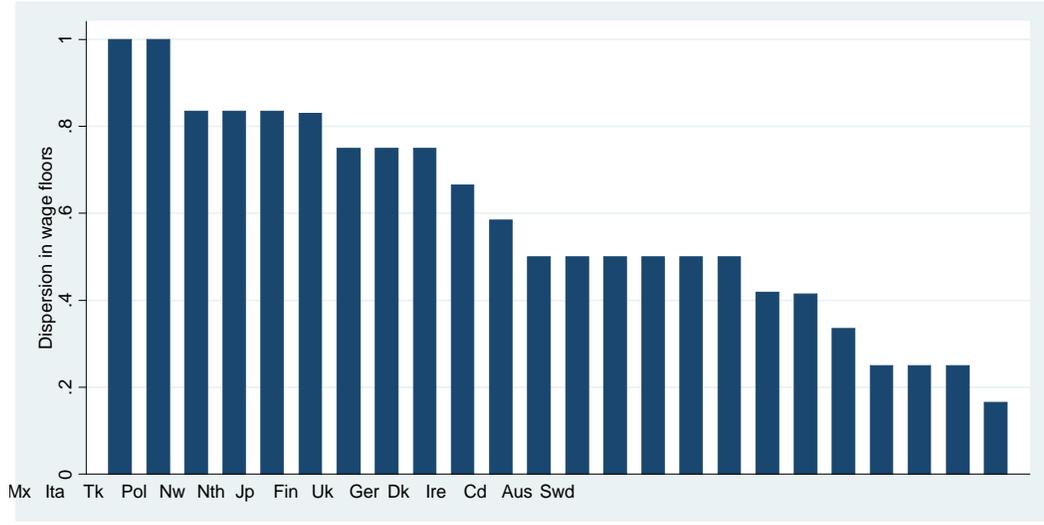


Figure 3: Degree of dispersion in wage floors by ages, qualifications, regions, sectors or occupations. Period 1980-2003.

information on the minimum wage levels *minwage_level*. The global composite index *minwage* is defined as the interaction between the two indexes *minwage_legislation* and *minwage_level*.

Union density and wage negotiations

Finally, to measure workers involvement in unions, we use unionization rates, provided by OECD at a yearly frequency since the 1960s. We also use data from Boeri et al. (2003) to track back the evolution of unionization rates since the early 1950s. We shall be clear at this point that our subject of interest is to measure to what extent workers are able to cooperate and to group together into associations rather than relying on state intervention to defend their wage. In that regard, the union density indicator appears to be a more relevant indicator than the degree of coverage of union negotiations. Obviously, the coverage indicator provides potential information on the bargaining power of unions. The role of unions in regulating wages might be 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. It thus appears to be a somewhat flawed indicator to measure the ability of workers to get involved in associations and to coordinate themselves to defend their rights instead of looking for state intervention.

3.1.2 Cross-country trade-off between unionization behavior and state regulation of minimum wage

This section documents the observed cross-country trade-off between workers' involvement in unions and state regulation of wage floors in OECD countries over the period 1980-2002, as reported in Figure 1.

Figure 1 shows on the y-axis the average union densities by country over that period. Nordic countries display the highest unionization rates over that period, reaching 82 percent in Sweden and 77 percent in Denmark. Continental European countries like Austria and Germany fall in the middle of the picture with union density rates around 40 percent. The same pattern holds for Anglo-Saxon countries like United-Kingdom or Canada, the United States lagging behind. Mediterranean countries are characterized in general by the lowest unionization rates, reaching no more than 10 % in France or Spain. Note that Italy is a clear outlier along this dimension, with a unionization rate close to 40 %.

Figure 1 reports on the x-axis the index of state regulation of minimum wage. As it happens the correlation turns out to be strongly negative with the unionization rates. Nordic countries display the weakest state regulation. There is no legal minimum wage, and the wage floor is negotiated at the industry level, with a substantial amount of dispersion across regions, industries, qualifications and ages. The same picture holds for European Continental countries like Austria and Germany, which combine relatively high union density rates and the absence of statutory minimum wage. In contrast, Mediterranean countries display the highest level of state intervention to set minimum wages. Countries like France not only set minimum wages by law but also provide very few derogations and room for negotiations by social partners. It is worthwhile to note that the only clear exception among Mediterranean countries is Italy. This country does not have a statutory minimum wage, and thus has a much lower ranking regarding the index of state regulation. However, in Italy, wage floors negotiated at the industry level are automatically extended to other industries. Eventually, the group of Anglo-Saxon countries is much more dispersed. Anglo-Saxon countries with high index of state regulation like the United States are also characterized by low union densities. In contrast, a country like Great-Britain used to have much more powerful unions compared to other Anglo-Saxon countries before the 1980s. And contrary to the United States, the wage floor used to be directly set by the wage councils in United Kingdom before 1993, explaining the low score in the index of state regulation over the period 1980-2000.

We then explore further this correlation pattern by running OLS estimates of the correlation between unionization rate and state regulation of minimum wage. To get the maximum number of observations, we run this estimation on three periods, by taking the average of the composite

index over the period 1980-84, 1990-94 and 2000-2002. We also decompose the correlation with the two sub-indexes measuring the existence of a legal statutory minimum wage and the degree of dispersion in minimum wages. We evaluate the correlation pattern with the two sub-indexes taken separately, and with the interaction terms between the sub-indexes and the indicator of the level of minimum wages.

Table 1- Column (1) reports the cross-country estimated correlation between unionization rates and the extent of state regulation of minimum wage over the period 1980-2002. The correlation with the composite index turns out to highly negative, and statistically significant at the 1 percent level. Almost 45 percent of the cross-country variation observed in the extent of state regulation of minimum wage is associated with differences in unionization rates. Table 1- Columns (2)-(5) show that the same negative correlation pattern holds when we look at the sub-indicators on the legal determination of wage floors and the dispersion in wage floors, or when we combine these sub-indicators with the level of minimum wage. In conclusion, this first picture suggests a strong negative correlation between unionization rates and the extent to which the state strictly regulates minimum wage.

Table 1: Cross-country correlation between state regulation of minimum wage and Unionization rates: OECD countries 1980-2002. OLS.

Dependent variable	State regulation of minimum wages				
	Composite index (1)	Legal (2)	Dispersion (3)	Legal*Level (4)	Dispersion*Level (5)
Unionization rate	-.518*** (.083)	-1.568*** (.156)	-.587*** (.134)	-.606*** (.099)	-.214*** (.099)
R ²	.441	.658	.262	.442	.102
Observations	58	58	58	58	58

3.1.3 Dynamics of state regulation of minimum wage and unionization rates in OECD countries

We now look at the time-variation dimension of the trade-off between state regulation of minimum wage and unionization rates. We check whether the unionization process is consistent with the predictions of the model according to which unionization rates are positively correlated with past unionization rate and negatively correlated with past state regulation of minimum wages.

Figure 4 first shows the evolution pattern of union densities since the 1950s, displaying a great deal of heterogeneity across countries. The unionization rate has decreased in the majority of OECD countries over that period, with an acceleration since the 1980s. But the fall in union rates has not been shared by all countries. In particular, the unionization rates has sharply

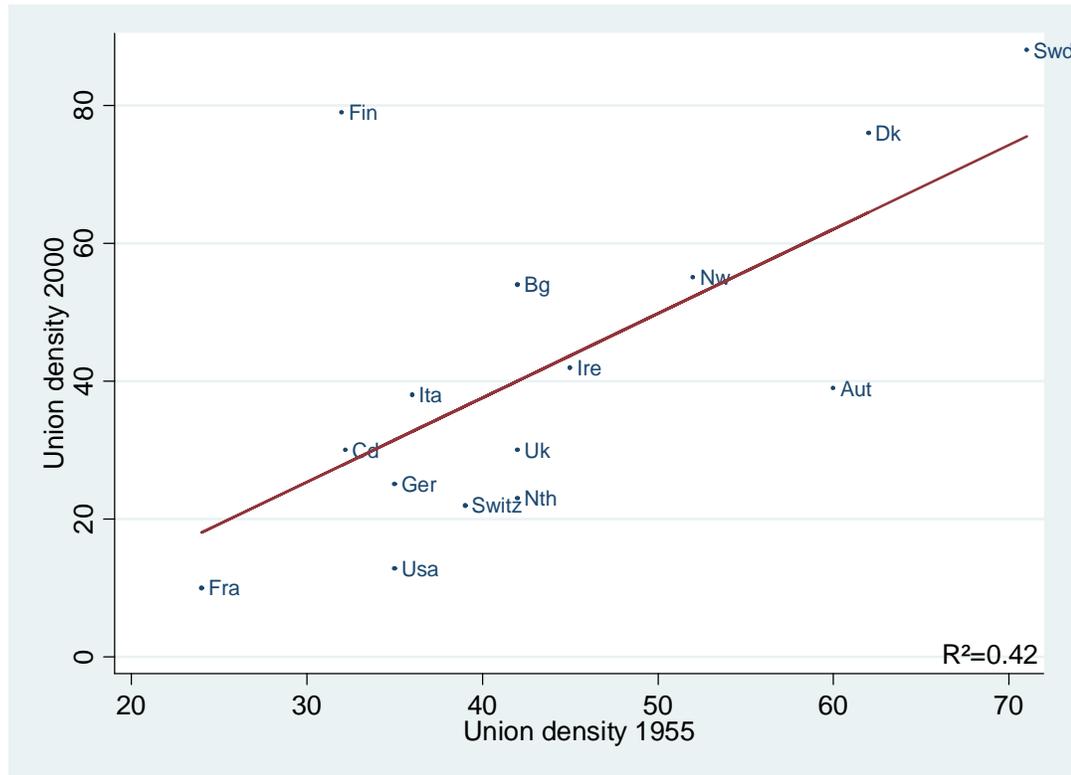


Figure 4: Evolution of unionization rates in OECD countries between 1955 and 2000. Source: OECD and Boeri et al. (2003)

increased in Scandinavian countries. The most prominent example is that of Finland with an up-surge in the unionization rate from 30 percent in the mid 1950 to 79 percent in 2000. The union density has also increased by more than 10 points in Denmark and Sweden, and to a lesser extent in Norway, over that period.

Furthermore, this figure is consistent with the time-dependency of unionization behavior predicted by the model. Countries which started with initially relatively high level of union rates, like Nordic countries, are characterized by a rise in union rates in the subsequent periods. In contrast, countries which started with low initial union rates, in particular France, are characterized by a decrease in unions over the period.

Next, we investigate to what extent this evolution pattern of union densities is related to the evolution of state regulation of minimum wage. *A priori*, the relation can run in both ways. It might be the case that union densities have mainly increased in countries without legal minimum wage, like Scandinavian countries, since workers were not able to rely on state regulation and had strong incentives to coordinate themselves to defend their wages. By doing so, the workers

learned about the degree of efficiency of unions and labor negotiations, and had more incentive to join unions. But conversely, the evolution of union densities could have triggered changes in minimum wage legislations. United Kingdom is a recent example of such an evolution pattern. Following the crackdown on strikes by Margaret Thatcher in 1982, the unionization rate has fallen from 50 % in 1980 to less than 30% in 2000. 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 in 1999.

To gauge this interplay between state regulation of minimum wage and union density, we estimate the within correlation between these two indicators over the period 1980-2002. We get rid of short-run business cycles fluctuations by looking at three periods: 1980-84, 1990-94 and 2000-2002. Table 2 reports the OLS regression of unionization rates on state regulation of minimum wages.

Table 2 - Column (1) reports the within correlation between unionization rate and state regulation of the minimum wage when we control for country fixed effects and specific country time trends. The correlation turns to be negative and statistically significant at the one percent level. Thus unionization behavior and minimum wage regulation by the state have evolved in the opposite direction over the last 2 decades.

Table 2 - Columns (2) and (3) report the correlation between the index of state regulation of minimum wage and the lagged value of the unionization rate. For the period 1980, we use the unionization rate of the early 1970s (1970-74). Column 2 reports the correlation without country fixed effects. The estimated coefficient is strongly negative and statistically significant at the one percent level. Lower unions rates during a decade are associated with more stringent minimum wage regulation by the state ten years after. Column 3 shows that a similar negative correlation holds in time variations by including country fixed effects.

Table 2 - Columns (4) and (5) report the correlation between the index of state regulation of minimum wage and the advanced value of union density. Note that this regression associates the correlation between the minimum wage composite index in the 1980s and the 1990s with the unionization rates in the 1990s and the 2000s respectively. Column (4) reports the advanced correlation without country fixed effects, while Column (5) controls for it. The estimated correlation turns out to be also negative, suggesting that higher state regulation of the minimum wage is associated with lower unionization behavior in the future.

3.1.4 Evidence from the United States

This section provides additional evidence about the existence of a trade-off between state regulation of minimum wage and unionization behavior by looking at the United States. Since

Table 2: Time variations in unionization rates and state regulation of minimum wages. OECD countries: 1980-2002. OLS

Dependent variable	Unionization rate		Unionization rate		Unionization rate	
	(1)	(2)	(3)	(4)	(5)	(6)
State regulation of minimum wages	-0.108 ^{***} (.009)	-0.555 ^{***} (.090)	-0.064 ^{***} (.020)	-0.532 ^{***} (.011)	-0.092 ^{***} (.070)	
Fixed effects	Yes ^{***}	No	Yes ^{***}	No	Yes ^{***}	
Time trends	Yes ^{***}	No	Yes ^{***}	No	No	
R ²	.98	.42	.992	.412	.991	
Observations	58	58	58	37	37	

some states have increased their wage floor above the federal level, it is possible to exploit time variation information to disentangle the specific correlation between minimum wage policies and unionization rates.

The federal minimum wage remained unchanged at \$3.35 from 1981 to 1990, when it was increased to \$3.80. During the eighties, some states like Alaska, Connecticut and Massachusetts began to institute a higher minimum wage and by 1989, 15 states had their minimum wage floors higher than the federal ones. After the rise in federal minimum wage to \$4.25 in 1991, as many as 10 states (and DC) began to implement floors above the federal level. A considerable increase in the federal level to \$5.15 in 1997 reduced the number of states with floors higher than the federal minimum. >From 1997 to July 2007, the federal minimum wage has remained stable at \$5.15, before increasing to \$5.85. During that time, more states than before began to set their minimum wage above the federal minimum wage. They were 32 states (and DC) in May 2007. We can suspect that such catch-up effect between states and the federal government will occur following the rise in the federal level at \$7.25 that is scheduled for July 2009. The appendix reports the full story of the evolution of the minimum wage in dollars by state and at the federal level between 1990 and 2007.

The issue of interest is how does this evolution in different states relates to the evolution of unionization behavior? If we look at the correlation in cross-section, it turns out that wage floors tend to be higher in states where union density is also higher. Yet this correlation pattern might be driven by specific state factors co-determining both wage floors and unionization behavior. We thus focus on the time variation heterogeneity within states to identify the link between the two phenomena.

To begin with, we focus on the states which increased their wage floors above the federal minimum wage between 1997 and 2007, while the federal minimum wage remained fixed. We evaluate to what extent this variation is associated to variations in union density across that

period. As shown by Figure 5, a strong negative correlation shows up between changes in minimum wage and the evolution of unionization rates. The states which implemented the highest increases, such as New Jersey, Connecticut or Washington, are in general those which experienced the most dramatic decline in unionization rates.

We explore further this correlation pattern by running OLS estimates on the period 1997-2007 and by controlling for state fixed effects and specific trends which could co-determine the joint evolution of wage floors and union rates. The coefficients estimated thus measure the time variation correlation between union densities and wage floors within states. We also test the robustness of the relation by including states which stick to the federal minimum wages over this decade.

Table 3 - Column (1) reports the within correlation pattern between unionization rates and minimum wage levels for the sub-sample of 32 states which increased the wage floors during that period. The correlation is negative and statistically significant at the one percent level. The size effect is also important. An increase by one dollar in the wage floor is associated with a decline by 6 points of percentage in unionization rates. Table 3 - Column (2) reports the estimated correlation when we control for state specific trends. The same negative and statistically significant correlation pattern holds. Lastly, Table 3 - Columns (3) and (4) report the estimated correlation for the whole sample of states, including those who stick to the federal wage floor. The same negative correlation still shows up between the evolution of unionization rate and that of wage floors, even after controlling for state specific trends as in Column (4).

Table 3: Time variation in unionization rates and wage floors in the United States: 1990-2007

Dependent variable	Unionization rate (States with wage floors higher than the federal level)		Unionization rate (All states)	
	(1)	(2)	(4)	(5)
Level of minimum wages	-.060 ^{**} (.030)	-.069 ^{***} (.026)	-.156 ^{***} (.021)	-.044 ^{**} (.022)
State fixed effects	Yes ^{***}	Yes ^{***}	Yes ^{***}	Yes ^{***}
State specific trends	No	Yes ^{***}	No	Yes ^{***}
R ²	.80	.89	.61	.87
Observations	127	127	330	330

3.2 Beliefs in cooperation, policies and learning

This section tests the main channel of the model by documenting to what extent the observed trade-off between negotiation versus state regulation on the labor market is associated with

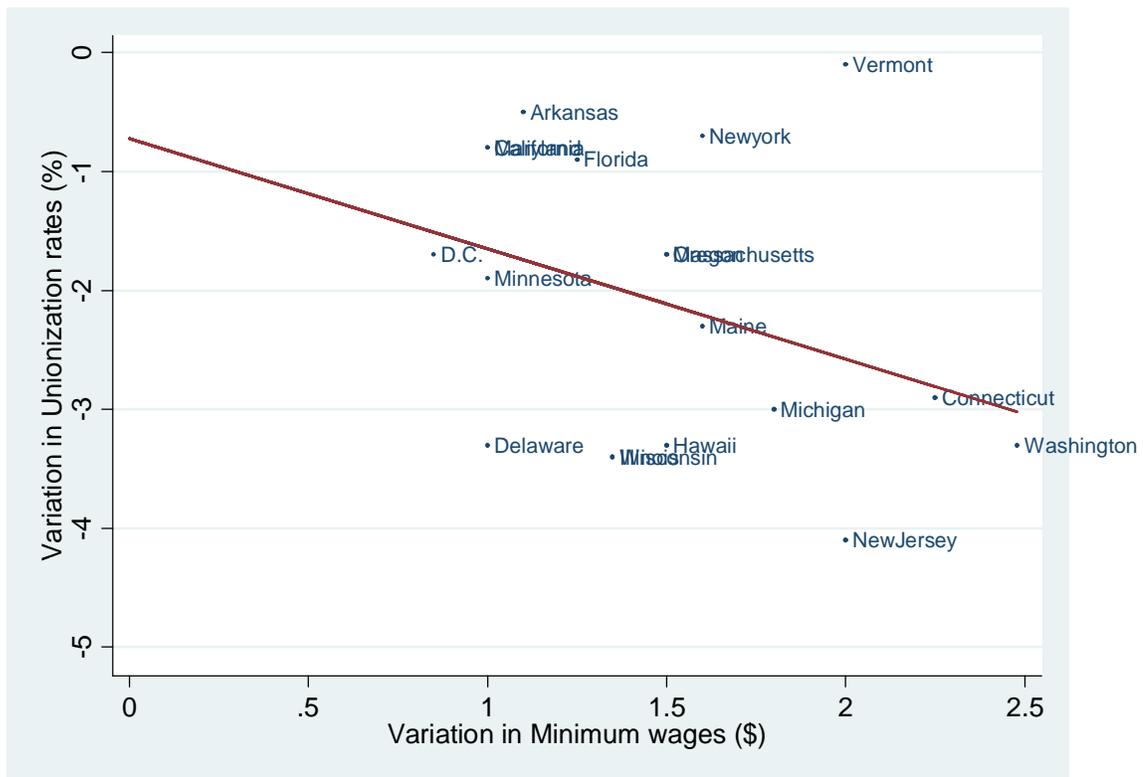


Figure 5: Correlation between variation in unionization rates and minimum wage levels. Period 1997-2007. Sample of states which increased the wage floor above the federal level.

different beliefs about unions and the scope for cooperation. The model predicts that when the beliefs about the level of cooperation in the labor market are rather weak, individuals rely directly on state intervention rather than on negotiation. But conversely, by directly regulating the wages, the state makes it impossible for individuals to experiment a social dialogue and to learn about the efficiency of unions and about the quality of labor relations. We estimate the empirical relevance of these two relations.

3.2.1 Beliefs in cooperation, unionization rates and minimum wages

We measure the perceived level of cooperation in the labor market by focusing on the quality of relationships between workers and managers. We first use the *Global Competitiveness Reports*, a survey sent to thousands of executives each year in over 50 countries. Besides various other questions, the executive 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 worry about the fact that this stand only reflects the perception of executives. We thus use additional information from the *International Social Survey program* (ISSP), which asks similar questions but for all categories of citizens. 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”. Henceforth we will focus on the answer given by workers only, to contrast these results with the survey based on executives’ perception of social cooperation.

Figure 6 reports the correlation between the executives’ beliefs in cooperative labor relations and the level of unionization rates across OECD countries. As it happens, the correlation is strongly positive, the perceived level of cooperation being all the more important that union density is higher. We do the same exercise but by looking at the workers’ beliefs in cooperative labor relations. The same correlation shows up in Figure 7. Higher unionization rates are associated with higher perception of cooperation in the labor market by both managers and workers.

The picture is completely reversed when we look at the correlation between the beliefs in the quality of labor relations and the degree of state regulation of the minimum wage. Figure 8 reports the correlation between the state regulation of minimum wage and the executives’ perception of cooperation in the labor market, while Figure 9 reports this correlation pattern with workers’ perception of cooperation in the labor market. In both cases, the correlations are strongly negative, suggesting that priors about cooperative labor relations are all the more

important in societies in which the state regulation is less important in the labor market.

Naturally, this relation between the beliefs in cooperation and the extent of state regulation could go in both directions. On one hand, we should expect higher support for state intervention, rather than collective negotiations, in societies where the beliefs in cooperative labor relations are weak. Figure 10 documents this point by looking at the correlation between the share of people who thinks that it is not the role of the government to set wages and the beliefs in cooperative labor relations. The indicator of support for wage regulation by the state derives from the wave 1996 of the *International Social Survey program* database. We use the following question: “*Here are some things the government might do for the economy. Please show which actions you are in favour of and which you are against: control wages by law?*”. The answers are ranged from 1, for a strong agreement, to 5 for a strong disagreement. Figure 10 reports on the y-axis the mean answer to this question for each country against the index of perception of cooperative labor relations on the x-axis. As it happens the correlation is strongly negative and 41 percent of the variation in public support for state regulation of wages across-countries is associated with different perceptions about the cooperative nature of labor relations. This result thus provides empirical support to the political economy model linking the support for minimum wages to beliefs about the efficiency of negotiation.

But as predicted by the model, higher state regulation could also crowd out the scope for negotiation and precludes any possibility for learning the true cooperative nature of labor relations. The next section investigates the empirical relevance of this up-dating process of beliefs in cooperation depending on the extent of state regulation.

3.2.2 Policies and learning

We now estimate to what extent past minimum wage policies and past unionization rates could influence the current beliefs concerning the efficiency of unions. For that purpose, we focus on the level of confidence in unions of Americans depending on the historical institutions in their home country. We use the General Social Survey database which provides information on unionization attitudes of Americans as well as detailed information on the country of origin of their ancestors and the wave of immigration. This database 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 almost all European countries.

The GSS also asks whether the respondent has confidence in labor unions with the following questions: “*Would you say you have a great deal of confidence, only some confidence, or hardly any confidence at all in organized labor institutions?*”. We measure the extent of confidence in

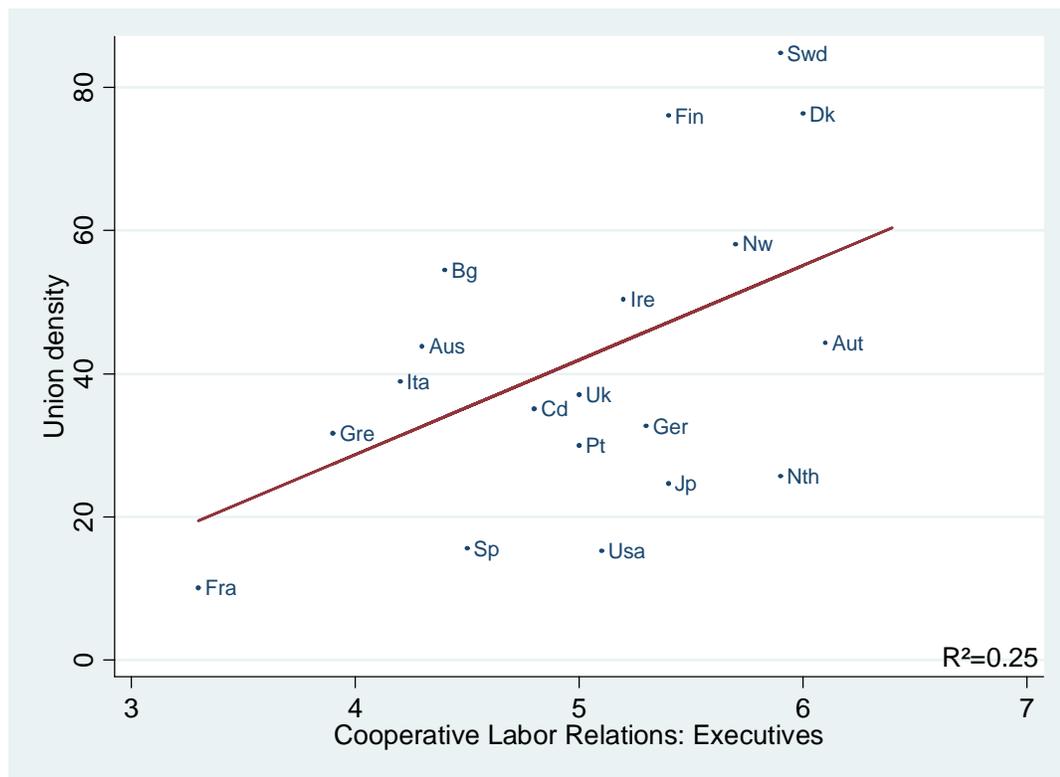


Figure 6: Correlation between Union density and Executives' beliefs in Cooperative labor relations. Source: OECD and GRC 1999 database.

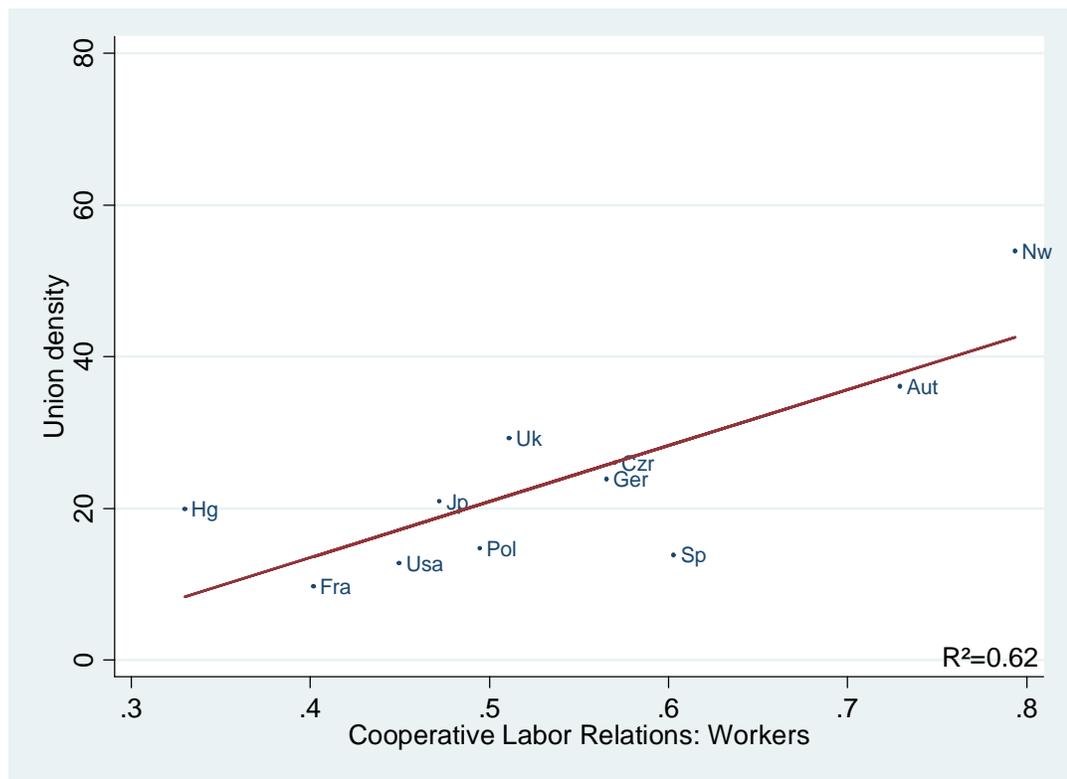


Figure 7: Correlation between Union density and Workers's beliefs in Cooperative labor relations. OECD and ISSP 1999 database.

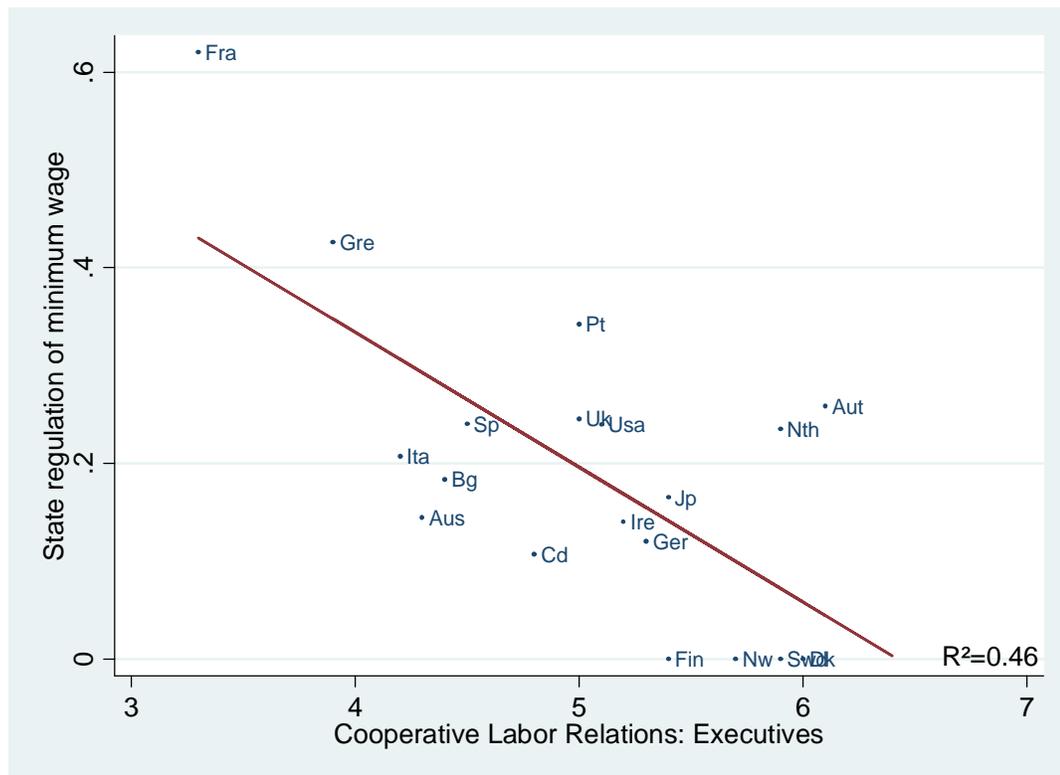


Figure 8: Correlation between State regulation of minimum wages and Executives' beliefs in Cooperative labor relations. Source: ILO, OECD, and GRC 1999 database.

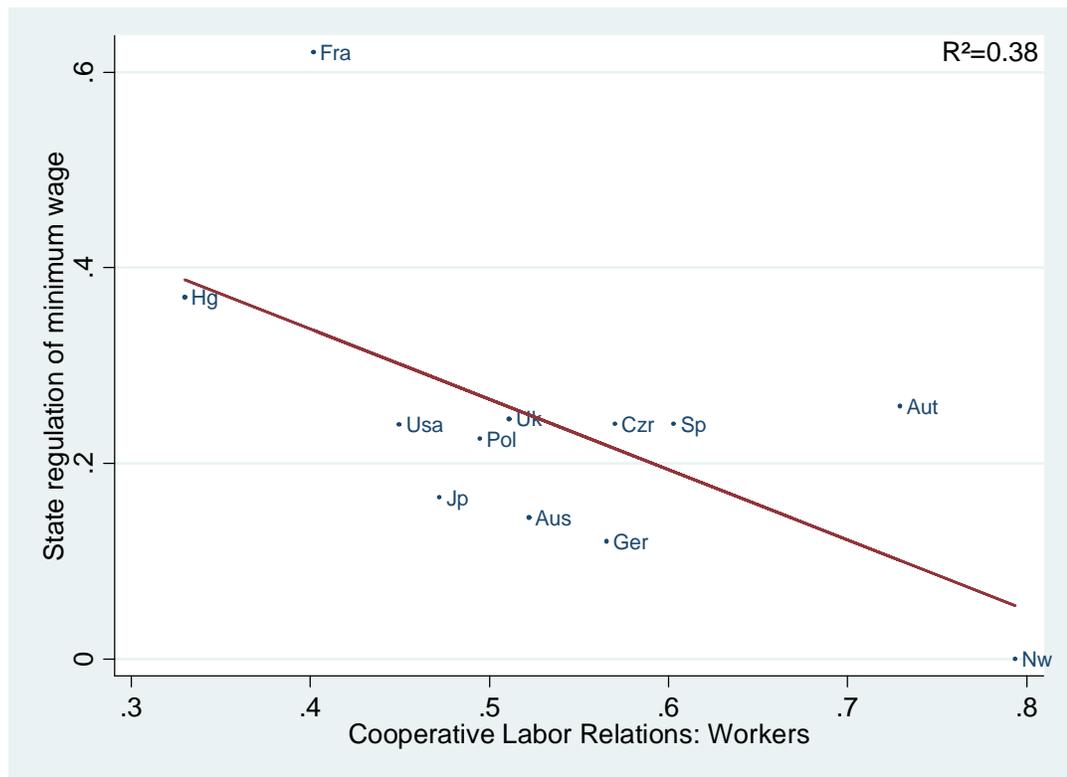


Figure 9: Correlation between State regulation of minimum wages and Workers' beliefs in Co-operative labor relations. Source: ILO, OECD, and ISSP 1999 database.

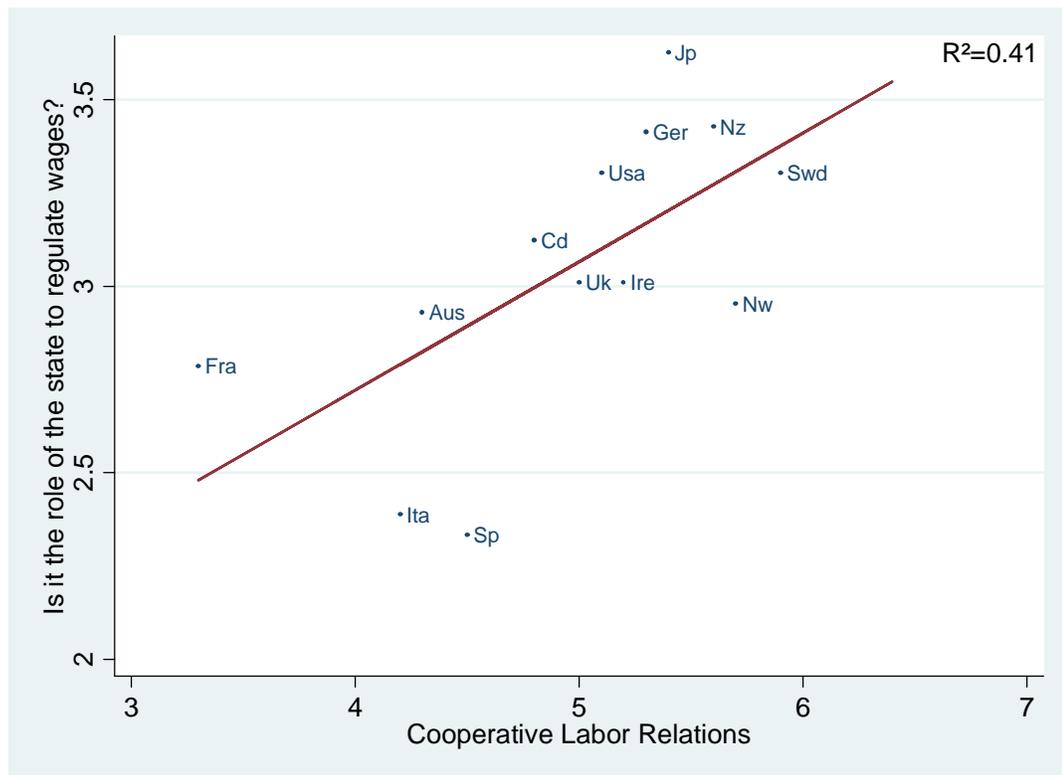


Figure 10: Correlation between the extent of cooperative labor relation (GCR 1999) and the share of people who disagree with the following question: "Is it the role of the government to directly set wages?" (ISSP 96).

unions with a dummy variable equal to 1 if the respondent answers a great deal of confidence, and zero otherwise. We also have information on whether the respondent belongs to a labor union or not.

We also use the information about the past unionization rates and the existence of statutory minimum wage in the home country from the early 1950. Note that we do not have data on the level of minimum wage, but only on the existence of statutory wage floor in some countries such as France or the United States. To assess the effect of these historical institutions on current attitudes towards unions, we focus on second and first generations of Americans born after 1950, and whose parents or themselves are likely to have been influenced by these historical institutions. In order to get interpretable results, we only select country of origin with more than 15 observations, which leaves us with the following set of country of origins: Austria, France, Germany, Ireland, Italy, Japan, Netherlands, Sweden, and the United Kingdom. The data description are reported in Appendix.

Table 4 - Line (I) reports the probit marginal estimates of the effect of past levels of unionization rate in the home country on the current level of trust in unions, and on the probability of belonging to a union. We control for age (age squared), gender, number of years of education, income categories, and the number of years of education of the parents. Standard errors are clustered at the level of the country of origin. Column (1) shows a strong correlation between past union rates in the home country and the probability that the respondent has confidence in unions now. The relation is statistically significant at the one percent level. The size of the effect is also large, a one percent increase in past union rates in the home country being associated with 0.18 percent increase in the probability that the respondent has a great deal of confidence in this institution. Column (2) reports the correlation between past unionization rate in the home country and the current probability of belonging to a union. The correlation is also positive and statistically significant at the one percent level. Remarkably enough, past union density is one of the only variable to predict current unionization behavior, and its effect is economically an order of magnitude higher than most other individual characteristics.¹⁵

Table 4 - Line (II) reports the correlation between past regulation of minimum wages by the state in the country of origin and current unionization behavior in the United State. As reported in Column (I), the fact that the country of origin had a statutory legal minimum wage in the early 1950s strongly reduce the probability that the respondent trust unions.

¹⁵Similar results about the influence of the country of origin on beliefs are found in Rice and Feldman (1997) and many others (see: Fernandez and Fogli (2005), Fernandez (2007) and Algan and Cahuc (2006) for a presentation of this literature).

Table 4: Historical labor market institutions in the home country and current unionization attitudes of Americans by country of origin. Probit estimates

	Confidence in unions (=1)	Union membership (=1)
	(1)	(2)
Union density (I) in home country 1950	.186*** (.057)	.248** (.113)
N	1175	1015
R ²	.030	.019
Legal minimum wage (II) in home country 1950	-.447*** (.139)	-.192 (.178)
N	928	871
R ²	.054	.021
Marginal effects with robust standard error GSS : ***:1%, **: 5%, *: 10		
Additional controls: gender, age, education, income category		

3.2.3 Learning and up-date of beliefs in cooperation

The previous section has shown that the beliefs about unions are strongly influenced by past unionization rates and minimum wage policies. This finding is consistent with the predictions of the model concerning the persistent effect of historical institutions on current beliefs. Yet the model also stresses that this historical dependence runs through a learning process and the up-date of beliefs towards the efficiency of unions and cooperation in the labor market. We document in this section to what extent we can find evidence of such an up-dating of beliefs process.

To measure the evolution of beliefs across generations, we use information on the waves of immigration of the respondents. Respondents are asked if they are born in the United States and how many of their parents and grand-parents were born in the country. The question on parents birthplace is scaled 0 if both parents are born in the US, 1 if only the mother is born in the US, and 2 if only the respondent’s father is born in the country. The answer on grand-parents birthplace is scaled from 0 to 4 indicating the number of grandparents born in the US. To get representative samples, we group together the first generation and second generation Americans in one group, and the third generation and fourth generation Americans in another group.

Furthermore, to capture potential learning process depending on the environment, we also measure the beliefs about unions in the home country. The *World Values Survey* database reports a similar question about the confidence in unions than the *GSS* database. The question reads as follow: “*Do you have a great deal of confidence, quite a lot of confidence, not very much confidence or none at all confidence in unions?*”. We create a dummy variable equal to one if the respondent answers “*a great deal of confidence*” or “*quite a lot of confidence*”, and

zero otherwise.

Table 5 reports the probit estimates of the probability that Americans do have confidence in unions. We focus on first and second generation Americans. The coefficients associated with the country of origin correspond to the marginal probit estimates. To explore further the specific role of the country of origin in the formation of beliefs, we control for individual characteristics, including age, age squared, employment status and income category. Americans with Swedish origins are considered as the reference group. The first result is that the country of origin plays a statistically significant role on the level of confidence in unions. All the country of origin dummies are statistically significant at the one percent level. Next, the coefficients are economically sizeable, the probability to trust unions being reduced by more than 10 percent for Americans coming from France for instance.

We then explore to what extent these beliefs are consistent with those at stakes in the country of origin and what is their rate of convergence. Figure 11 reports the correlation between the level of confidence in union in the home country and the corresponding level of confidence of the first generation and second generation Americans by country of origin. The x-axis reports the fraction of individuals who have confidence in unions in the home country, while the y-axis reports the fraction of Americans who trust unions depending on their country of origin. As it happens, a strong positive correlation shows up between the beliefs in the home country and beliefs of the beliefs of Americans by country of origin. The coefficient of correlation is equal to 0.38, and 20 percent of the variation in Americans' beliefs towards unions is associated with differences in beliefs across the different countries of origin. Moreover, the variation in the level of confidence in unions across Americans from different country of origin is quite large, the share of confidence ranging between 0.05 percent and 0.25 percent.

We then assess potential convergence of beliefs by focusing on older waves of immigration. Figure 12 reports on the y-axis the level of confidence in unions of third generation and fourth generation Americans, against the level of confidence in the home country on the x-axis. It turns out that the correlation between the beliefs of Americans by country of origin and the belief in the home country is close to zero and no longer significant. Moreover, the range of variation in the level of confidence between Americans from different countries of origin is much lower compared to the first generation and second-generation, the range lying in the interval $[0.075, 0.145]$.

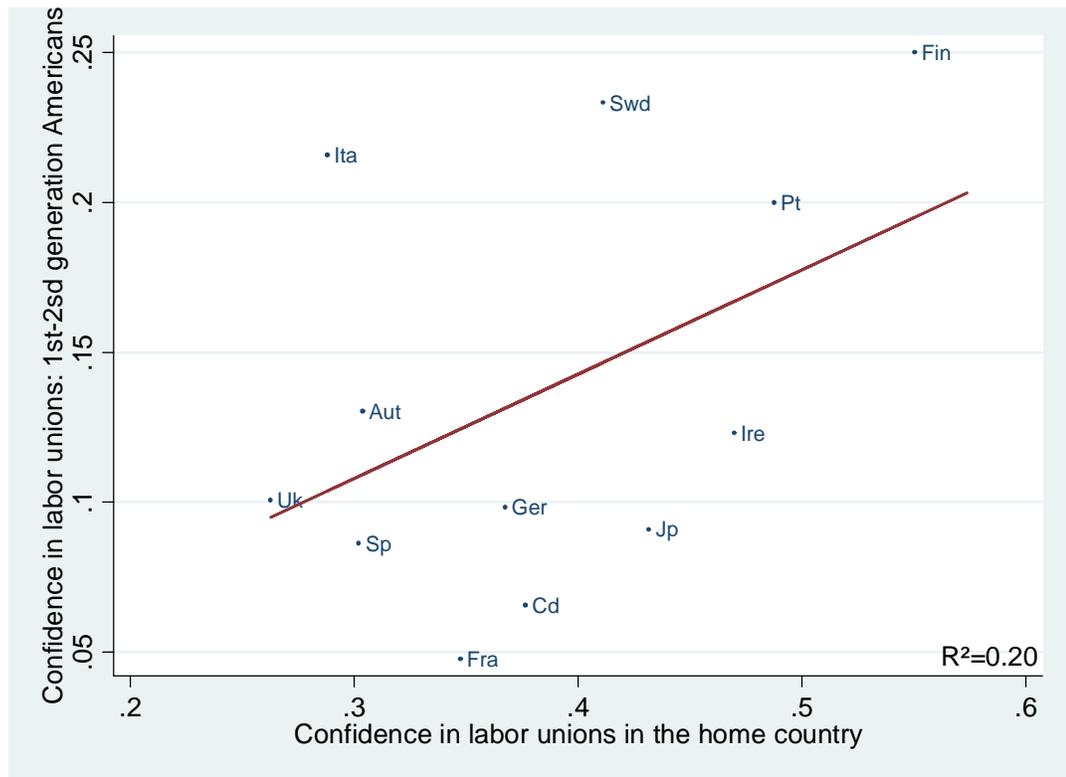


Figure 11: Confidence in unions in the home country and by Americans of first or second generations. Source: WVS 1980-2000, GSS 1977-2004.

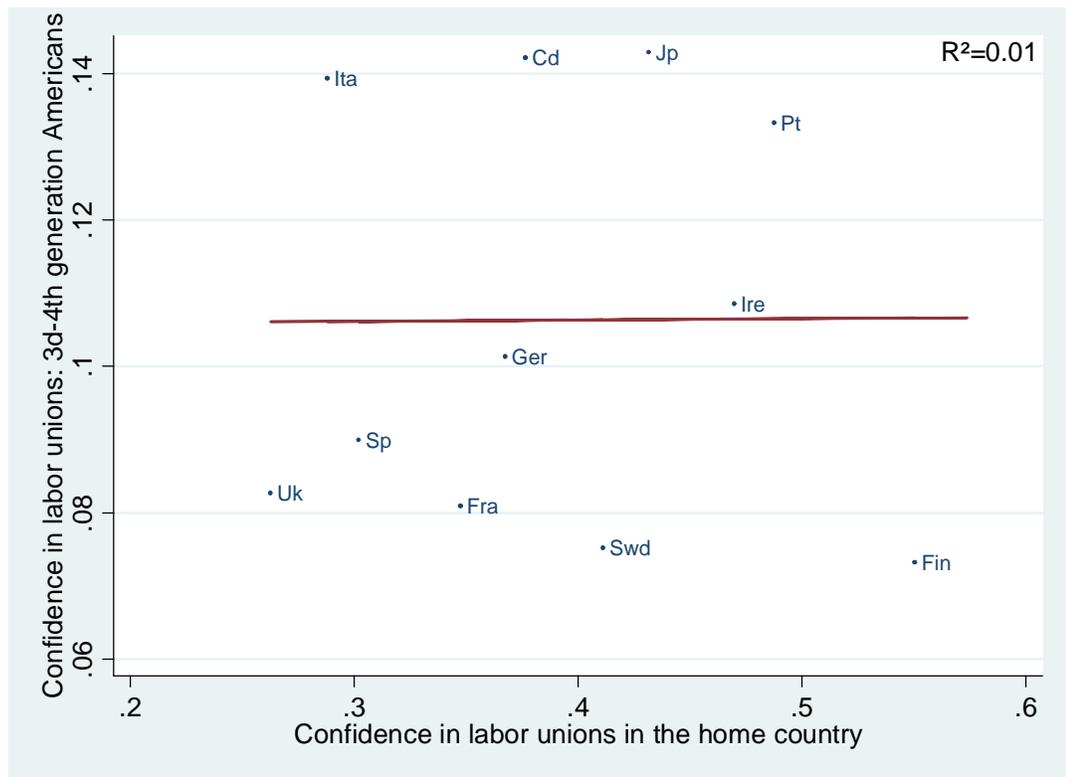


Figure 12: Confidence in unions in the home country and by Americans of third or fourth generations. Source: WVS 1980-2000, GSS 1977-2004.

Table 5: Confidence in unions of 1st and 2nd generation Americans by country of origin. Marginal effects

	Confidence in unions =1	
	Coeff	Std Error
Austria	-.071 ^{***}	(.004)
Canada	-.108 ^{***}	(.003)
Finland	-.028 ^{***}	(.007)
France	-.109 ^{***}	(.008)
Germany	-.091 ^{***}	(.007)
Ireland	-.071 ^{***}	(.004)
Italy	-.043 ^{***}	(.009)
Japan	-.088 ^{***}	(.013)
Portugal	-.068 ^{***}	(.019)
Spain	-.099 ^{***}	(.012)
Sweden		Reference
United Kingdom	-.089 ^{***}	(.003)
Pseudo-R ²		.070
Observations		921

Marginal effects with robust standard error. GSS database
 Controls: age, age2, education, employment status, income
 ***.1%, **: 5%, *: 10%

4 Conclusion

In countries with very high union density and with highly cooperative labor relations, the state typically does not regulate the minimum wage. In such countries, there is no need for a legal minimum wage because social partners negotiate wages in a cooperative way. In countries with strong state regulation of the minimum wage, social dialogue tends to be less developed, union density is low and so is the quality of labor relations. Our paper develops an explanation for these contrasting situations. We argue that strong state regulation of the minimum wage crowds out social experimentation and learning about cooperation. This crowding out may thus progressively undermines cooperation and lead economies towards steady-state equilibria characterized by bad labor relations and high minimum wage regulations. Thus state regulation of the minimum wage can have large long run costs that have been largely disregarded by the economic literature so far. The importance of the contrast between Scandinavian countries, which display good labor relations and good labor market performance on one hand, and the Mediterranean countries, with bad labor relations and bad labor market performance on the other hand, suggests that such costs might actually be large.

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A Appendix

A.1 Minimum wage regulations in OECD countries

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

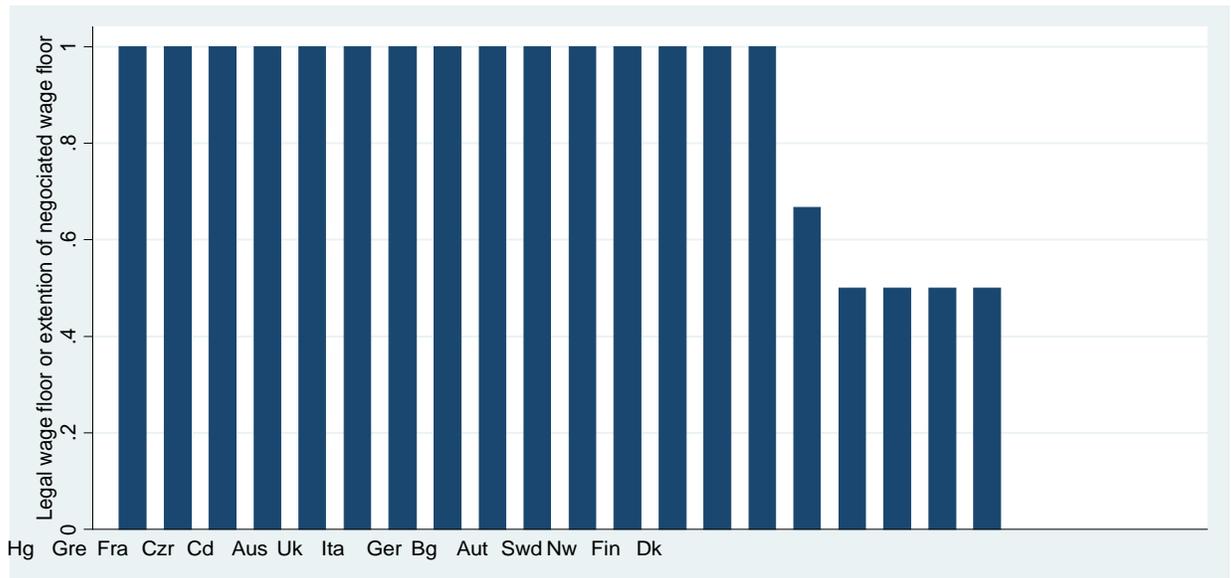
We first measure the extent to which minimum wages are directly set by law or by collectively agreed minimum wages negotiated between social partners. Column 2 of table 6 indicates whether wage floors are set by statutory rules defined by the law or by collective negotiation. Column 3 of table 6 indicates 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 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.

2. Variation in wage floors

Wage floors can vary in five main dimensions: age, qualification, regions, sectors and occupations. Tables 7 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.

Table 6: 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
Czr	Statutory, National level	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
Hg	Statutory, National level	1
Italy	Negotiation, National extension	1
Japan	Statutory, Prefectures	1
Mexico	Statutory, National	1
Netherlands	Statutory, National	1
Norway	Negotiation, Industry level	0.7
Poland	Statutory, National	1
Portugal	Statutory, National	1
Spain	Statutory, National	1
Sweden	Negotiation, Industry level	1
Turkey	Statutory, National	1
Uk	Negotiation, industries, Statutory, 1999	1
Usa	Statutory, Federal, States	1



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.

- *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).

Table 7: 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
Czr	Occupation	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
Hg	No	No
Italy	Industry, Age	Trainees
Japan	Industry, Age, Occupation	No
Mexico	No	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
Poland	No	No
Portugal	Age	<18: 75%
Spain	Age	<18: 89%, suppressed in1998
Sweden	Industry,Age, Occupation	<24: 89%
Turkey	Age	<16: 85%
Uk	Industry,Age	<21: 0%, Change in 1999
Usa	Age, Job tenure	No

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 (Revenu 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.

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).