Search, Unions and the Quality of Industrial Relations

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Abstract

We study a labour market with a monopoly union and search imperfections. We find that, if the union can not commit over future wages, steady state employment is nil. By contrast, if the union commits, employment turns out to be positive and rising with respect to the credibility of the commitment.

Finally, we document the empirical consistency of these results by using cross-country information on unemployment and industrial relations quality.

1 Introduction

This paper is motivated by the objective of studying the relationship between the quality of industrial relations and the performance of the labour market. We believe that this issue deserves investigation both for its own relevance and for the connections with the recent large body of research that links aggregate economic performance to social and cultural variables.

In our view, good quality industrial relations are akin to a bargaining environment where conflicts of interests are resolved by mutual trust on the future behaviour of parties. In this vein, we build a model where one party, the firm sector, is vulnerable to future opportunistic behaviour by the other party, the union. The opportunistic behavior of the union relates to a possible future deviation from a preannounced policy of wage moderation. More explicitly, in our model the union has an incentive to announce low wages for the future to boost job creation at current time and to renege on the announcement when jobs have been created. It is well known that, in this type of situation, the risk for the vulnerable party of being exploited leads to a suboptimal outcome. Efficiency can then be restated only if a commitment technology is available or if the vulnerable party trusts the other party, i.e. expects that the other party will not exploit its own vulnerability.

To build a model with these features we resort to a very standard description of the labour market, which is the one popularised by D. Mortensen and C. Pissarides (1999). In fact, we introduce a wage-
setting union in an otherwise standard search and matching environment. In this context, firms become automatically vulnerable to their counterpart. To create a job and hire a worker, firms spend resources; these resources are lost in case the match is dissolved. The union can then announce low wages to stimulate entry and renege on the announcement once matching has taken place. So, it is the irreversible nature of searching expenses that makes firms vulnerable.

Since we connect search imperfections with union power, a further point of interest of the model relates to its suitability in describing the labour market in European economies. In the Mortensen-Pissarides paradigm, firms and workers search for a suitable partner. After matching, the pair receives a surplus in the form of a joint production flow higher than the flow when the pair was separated. In turn, the surplus is split according to a Nash rule which subsumes the assumption that wage bargaining is decentralised and uncoordinated across bargaining units.

Formal and informal evidence suggests that this set of assumptions fits a number of industrialised economies and, notably, the United States. In many European economies, however, wages are determined through centralised collective bargaining dominated by strong unions. In these countries, bargaining is also coordinated across units and outcomes are often automatically extended to agents that have not directly participated to the bargaining activity. Thus, in the light of these observations, we believe that studying the impact of search imperfections in presence of union power represents a meaningful exercise in itself.

What are the main results of our investigation? First, we study the equilibrium when the union is simply not trusted so that it does not announce any policy and sets wages period by period. We show that this discretionary equilibrium exhibits zero employment in the long run. Second, we study the equilibrium when the union can announce future wages but its credibility is limited in the sense that firms do not fully trust the announcement. We show that, in the steady state, lower trust leads to an higher wage level and to an higher unemployment rate.

Finally, the explore whether this prediction regarding the link between trust and unemployment is consistent with some basic cross-country evidence.

A few well known labour economists have already produced some contributions in this area of research. Blanchard and Philippon (2006) blame low quality industrial relations as the main cause for high and persistent unemployment in Europe during the eighties and the nineties. In their view, bad industrial relations slow down the adjustment of wages to recessionary shocks and prolong the unemployment impact
of these shocks. Cahuc et al. (2007) provide a microeconomic theory that endogenises the quality of industrial relations. They explain that cooperative relations lead actors to experiment whether the partner is trustworthy. In turn, these experiments allow to build even more cooperation. As a result, two equilibria emerge, one with high cooperation and one with low cooperation. Equilibrium selection is a by-product of non-economic historical events.

The paper is organised as follows. In section 2 we present the equilibrium under discretion. In section 3 we introduce the concept of trust and study the equilibrium when the policy announced by the union is not perfectly credible for the firm sector. In section 4 we check the empirical consistency of our predictions. Section 5 presents some concluding remarks.

2 Wages and Employment under discretion

2.1 The economy

The economy is similar to the one in Mortensen and Pissarides (1994) with the exception that wages are determined by an utilitarian monopoly union instead of being Nash-bargained by single workers and firms. There is a unit mass of workers that can be either employed or in search for employment. Utility is linear and workers do not access financial markets. Employed workers produce in every period $p$ units of a final good which is the numeraire of the economy. The employed receives a wage flow $w_t$ while the unemployed receives a constant flow of benefits $b$ ($p > b$). There is a large mass of firms but only some of them participate to market activity. Those that do not participate can freely access the market by posting vacancies and by searching for suitable workers. Holding a vacancy presents a constant per-period search cost $c$. The formation of successful matches is governed by the aggregate matching function $M_t = v_t^{1-\eta}(1-n_t)^\eta$ with $0 < \eta < 1$. $M_t$ represents the number of matches that are created at time $t$ while $v_t$ and $1-n_t$ represent respectively the number of searching firms and unemployed searching workers at time $t$. From this function, the job finding rate for the unemployed is given by $\theta_t^{1-\eta}$ with $\theta_t \equiv v_t/(1-n_t)$ while the vacancy filling rate for searching firms is given by $\theta_t^{-\eta}$. In the reminder, $\theta_t$ will be referred as labour market tightness. Matches that initiate at time $t$ become productive at time $t+1$, during the productive phase matches dissolve at the exogenous per period rate $\rho(<1)$. At the beginning of every period wages are set unilaterally by a union which is endowed with an utilitarian objective function. Union
and firms discount the future by using the same discount factor $\beta$. In this section we assume that the union enjoy no trust so it can not commit to future wages.

### 2.2 Equilibrium

Let $w_{t+j}$ represent firms’ expectation at time $t$ over the wage that will be charged by the union at time $t+j$, $j > 1$. The expected value of a vacancy $V_t$ and of a filled job $J_t$ result from these Bellman equations:

$$V_t = -c + \beta E_t \left[ \theta_t^\eta J_{t+1} + (1 - \theta_t^\eta) V_{t+1} \right]$$

$$J_t = (p - w_t) + \beta E_t \left[ (1 - \rho) J_{t+1} + \rho V_{t+1} \right]$$

Free entry of firms implies $V_t = 0$ if $v_t > 0$ and $v_t = 0$ if $V_t \leq 0$. In words, if entry entails positive net returns, free entry drives these returns to zero. By contrast, if entry entails zero or negative returns, the number of vacancies is nil. In short, free entry and the Bellmans give the so called job creation condition:

$$v_t \geq 0 - c \theta_t^\eta + \beta \sum_{j=1}^{\infty} (\beta(1 - \rho))^{j-1} (p - w_{t+j}) \leq 0 \quad \text{plus comp. slackness} \quad (3)$$

In this economy, inactive firms have to decide whether to open a vacancy or not, active firms have to decide whether to remain in operation or to close and, finally, the union has to decide the wage rate. The timing of decisions is as follows. In every period, firms make their decisions after the union has set the wage.

The absence of a commitment means that the union sets wages period by period. Thus, we study the economy by using the equilibrium concept often referred as Markov equilibrium. In this equilibrium, every decision is made conditional only upon the current state.

Let $n_t$ represent the current number of employed workers, this is also the only relevant variable which summarises the state of economy. Given $n_t$, it is straightforward to observe that the union has no incentive to set a wage $w_t$ lower than $p$. In fact, $n_{t+1}$ depends on whether firms currently active decide to stay open and on whether currently inactive firms decide to enter. Firms currently active remain open for any $w_t$
lower or equal to $p$ and may consider exit only for $w_t$ larger than $p$. Thus, given that active firms remain open with $w_t = p$, preserving the number of active firms offers no incentive to set $w_t < p$. When one considers inactive firms at time $t$, the dynamics of entry implies that these firms are interested on wages from period $t + 1$ onwards. Thus, the current wage $w_t$ does not affect $n_{t+1}$ through the entry mechanism. In short, stimulating entry at time $t$ again does not offer any incentive to set $w_t < p$.

Having proved that the union has no incentive to set $w_t < p$ we now study whether the union has an incentive to set $w_t > p$. Since previous discussion holds for any employment level $n_t$, wages will never be set below $p$ both at current time and in all future periods. This means that, for firms that are currently active, the discounted stream of profits from period $t + 1$ onwards is non-positive. In turn, this implies that they remain open only if $w_t = p$ but exit immediately if $w_t > p$. Facing this discontinuity in firms strategy the optimal strategy of the union is to set $w_t = p$. In fact, $w_t > p$ would imply the dismissals of the $n_t$ workers that are currently employed. Once dismissed, these would earn the unemployment benefit $b$ instead of the larger wage $p$.

Thus, in equilibrium, the union sets the wage at the productivity level $p$ in every period. Active firms decide to remain open unless they are hit by a bad idiosyncratic shock. Inactive firms decide not to enter since there is no chance to make positive profits. Along this equilibrium path, the number of active firms declines at rate $\rho$ so that, in the steady state, production and employment are nil.

The inability to commit over future wages generates a large welfare loss.

3 Commitment with Limited Credibility

3.1 Set up

In this section we characterise the equilibrium in a context where the union can bind itself to a pre-announced wage sequence. The announcement, however, is not fully credible for the firm sector. As it will become clear, this assumption allows us to bring into the model a parameter that captures the concept of trust and credibility in an intuitive way and with a clear empirical counterpart. Exploring the reasons that determine the credibility of the union is beyond the scope of the paper. Rather, our objective is to study in a setting as simple as possible the economic impact of differential degrees of trust and cooperation that characterise industrial relations in developed countries.
More in detail, we assume that the union announces at time 0 the whole stream of wages \( \{w_t\} \) that will be charged in the current and in all future periods. Firms, in turn, expect that the union deviate from the announcement with a per-period probability \((1 - \alpha)\). If the union deviates, firms also expect that from the time of deviation onwards the union charges the optimal wage under discretion. That is, deviations completely destroy trust so that the equilibrium path reverts immediately to the one under discretion. Parameter \( \alpha \) represents our measure of credibility, to the extent that \( \alpha \) is lower than one, credibility is imperfect.

Since the per-period probability of deviating, conditional on not having deviated before, is \((1 - \alpha)\) the expectation of firms at time \( t \) on the wage charged at time \( t + j \) is \( w_{t+j}^c = \alpha^j w_t + (1 - \alpha^j) p \). This implies that the expected discounted stream of profits for a firm that is currently active is:

\[
J_t = \sum_{j=0}^{\infty} [\alpha^j(1 - \rho)]^j (p - w_{t+j})
\]

Thus, imperfect credibility operates by decreasing the discount factor of firms over future profits. The union is harmed in that, for given preannounced wages, job creation is reduced. Heavier discounting also implies that announcing low wages in the future is not so effective in stimulating job creation.

When the union announces the wage sequence it obviously takes account of the entry and the exit behaviour of firms. This is summarised by the following equations:

\[
\begin{align*}
    n_0 & = \begin{cases} \pi & \text{if } J_0 \geq 0 \\ 0 & \text{if } J_0 < 0 \end{cases} \\
    n_{t+1} & = \begin{cases} (1 - \rho) n_t + [v_t/(1 - n_t)]^{-\eta}(1 - n_t) & \text{if } E_t J_{t+1} \geq 0 \\ 0 & \text{if } E_t J_{t+1} < 0 \end{cases}
\end{align*}
\]  

Equation 4 implies that, after the announcement, the \( \pi \) firms inherited from the past shut down if the discounted sum of their profits is negative. Thus, employment in the first period is either nil or \( \pi \). Equation 5 reports a similar survival condition for all other periods. In addition, the equation describes the law of motion of employment in case future profits are non-negative and entry proceeds according to what stated in equation 3.
3.2 The wage policy

As employment drops discontinuously to zero for negative expected profits, it is safe to conjecture that along the optimal wage sequence the discounted profit flow is never negative. The reason is the following. For any wage sequence that leads to the exit of firms at some future date \( \tau \), there exist a better sequence which is similar to the original up to \( \tau \) and that, from \( \tau + 1 \) onwards, has wages equal to \( p \). The alternative sequence is better since firms do not exit and workers receive a wage \( p \) instead of the subsidy \( b \) until the match dissolves. Thus, a sequence with implies negative discounted profits at some point in the future can never be optimal. This conjecture allows us to express the union program as follows:

\[
\max_{w_t} \sum_{t=0}^{\infty} \beta^t [n_t w_t + (1 - n_t)b] \quad (6)
\]

\[
n_0 = \pi \quad n_{t+1} = (1 - \rho)n_t + \theta_t^{1-\eta}(1 - n_t) \quad (7)
\]

\[
v_t \geq 0 \quad -c\theta_t^n + \alpha\beta \sum_{j=1}^{\infty} [\alpha \beta (1 - \rho)]^{j-1} (p - w_{t+j}) = 0 \quad (8)
\]

\[
w_0 = p + \sum_{j=1}^{\infty} [\beta (1 - \rho)]^j (p - w_j) \quad (9)
\]

Equation 6 specifies that the union is utilitarian as it attaches the same weights to the welfare of employed and unemployed members. Equation 7 describes the dynamics of employment under the stated conjecture while equation 8 describes the entry behaviour of firms. By definition, the number of vacancies can not be negative. Furthermore, since the stream of profits has been conjectured to be non-negative, either the stream is positive and entry occurs up to the point it equals entry costs \( c\theta_t^n \) or the stream is nil and, as a consequence, no vacancy is posted \( \theta_t^n = 0 \). Observe that both cases are covered by equation 8. Finally, equation 9 describes the determination of the wage in the first period. Since there is no gain from letting the \( \pi \) existing firms to earn positive profits and since \( w_0 \) does not affect entry, \( w_0 \) must be set at the level that makes these firms indifferent form remaining or leaving the market.

The program 6-9 is subject to a backward dynamic constraint (equation 7), to a forward dynamic constraint (equation 8) and, finally, to a forward static constraint (equation 9). It is well know that
forward constraints make the optimal policy time inconsistent and, more generally, prevent the adoption of standard dynamic programming. For this purpose, we resort to the approach developed by Marcet and Marimon (1992) and write the program recursively by adding an extra state variable. This variable summarises the impact of future wages on current vacancy posting (see the appendix for details):

$$W(n_t, M_t) = \max_{w_t, v_t, \lambda_t} [n_t w_t + (1 - n_t) b] - \lambda_t c[v_t/(1 - n_t)]^\eta + M_t(p - w_t) + \beta W(n_{t+1}, M_{t+1})$$  \hspace{1cm} (10)

\begin{align*}
M_0 &= 0 \\
M_{t+1} &= \alpha (1 - \rho) M_t + \alpha \lambda_t \\
v_t &\geq 0 \\
n_{t+1} &= (1 - \rho) n_t + [v_t/(1 - n_t)]^{-\eta} v_t
\end{align*}  \hspace{1cm} (11)

In this program, $\lambda_t$ represents the (current value) lagrange multiplier associated to constraint 8. As a consequence, $\alpha \lambda_t$ can be interpreted as the utility loss at time $t$ from a small increase in the wage rate $w_{t+1}$. In turn, the utility loss results either from less vacancies $v_t$ at current time or from lower future wages with unchanged current vacancies.

A small increase in $w_{t+1}$, however, discourage vacancy posting not only at time $t$ but also in all previous periods. The variable that summarises the overall vacancy cost from an increase in the current wage is $M$. Observe that the evolution of $M$ depends on the rate at which jobs are destroyed and on the extent of trust. With a low destruction rate, $M$ accumulates at a fast rate. Intuitively, with high job persistence the announcement on $w_t$ is relevant for entry at previous dates. By contrast, if the firm sector does not trust very much the union - i.e. if $\alpha$ is small - $M$ accumulates at a slow rate. This means that the announcement on $w_t$ has a small impact on entry at previous dates. Why should firms pay much attention to future announced wages if they regard the announcement as largely non credible?

The first order and Euler conditions for the program are as follows:
\[ n_t = M_t \] (13)

\[ v_t \geq 0 - \eta t \theta_t^{\eta - 1} + (1 - \eta) \theta_t^{-\eta} (1 - n_t) \beta W_n(n_{t+1}, M_{t+1}) \leq 0 \text{ plus comp. slackness} \] (14)

\[ \theta_t^{\eta} = \alpha \beta W_M(n_{t+1}, M_{t+1}) \] (15)

\[ W_M(n_t, M_t) = (p - w_t) + \alpha \beta (1 - \rho) W_M(n_{t+1}, M_{t+1}) \] (16)

\[ W_n(n_t, M_t) = (w_t - b) - \eta t \theta_t^{\eta} (1 - n_t)^{-1 - \eta} + \beta \left[ (1 - \rho) - \eta \theta_t^{1 - \eta} \right] W_n(n_{t+1}, M_{t+1}) \] (17)

Equation 13 represents the optimal condition for the wage rate \( w_t \) as it equates the marginal cost \( M_t \) and the marginal benefit \( n_t \) from an higher current wage. Equation 14 represents the optimal condition for the number of vacancies \( v_t \). Opening an extra vacancy may entail a net negative return for the union, in this case the union sets wages so as to induce no vacancy posting. By contrast, if the net return is positive, vacancies are posted up to the point the net return is driven to zero. The net return could either be negative or positive since an extra vacancy brings forth a cost and a benefit. The benefit is due to the increase in next period employment. In particular, a marginal increase in \( v_t \) raises next period employment by \((1 - \eta) \theta_t^{-\eta} (1 - n_t)\). The benefit is obtained by multiplying this variation by \( \beta W_n(n_{t+1}, M_{t+1}) \) as the latter represents the discounted value of an extra employed worker in the next period. The cost of an extra vacancy is due to the fact that to induce its opening the union needs to reduce future wages with an overall utility loss measured by \( \eta t \theta_t^{\eta - 1} \).

Equation 15 represents the optimal condition for the lagrange multiplier \( \lambda_t \). This equation needs to be interpreted in conjunction with the Euler condition for the state variable \( M \) (equation 16). It is straightforward to show that by combining the two equations one obtains the dynamic constraint 8.

Finally, equation 17 describes the Euler condition for the state variable \( n \), it gives the shadow price of employment for the union.
3.3 Steady state

In this section we focus on the steady state of the equilibrium with imperfect credibility. Let us indicate with \( v_{ss} \) the number of vacancies that are posted in the steady state. A relevant feature of the equilibrium is that \( v_{ss} \) must be positive. This is formally stated in the following proposition.

**Proposition 1**

\[ v_{ss} > 0 \]

**Proof**

Suppose \( v_{ss} = 0 \). Zero vacancies lead to zero employment by equation 12 and to \( w = p \) by equations 15 and 16. In turn, zero employment requires \( \lambda = 0 \) by equation 13 and the dynamics of \( M \). Finally, \( \lambda = 0 \) implies that

\[
\lim_{v \to 0} (1 - \eta) \theta^{-\eta} \beta W_n(0, 0) \leq 0
\]

This is impossible since \( \theta^{-\eta} \) goes to infinity while, with \( w = p \), \( W_n(0, 0) > 0 \).

Intuitively, with zero employment there is no incentive to extract the whole match surplus, by setting \( w = p \), simply because there are no ongoing matches. This means that there is no incentive to block job creation.

Proposition 1 allows us to summarise the steady state equilibrium in the following terms (see the appendix for derivation):

\[
W_M = \frac{p - w}{1 - \alpha \beta (1 - \rho)} \quad (18)
\]

\[
W_n = \frac{w - b}{1 - \beta (1 - \rho - \theta^{1-\eta})} \quad (19)
\]

\[
\frac{\rho + (1-\alpha)(1-\rho)}{\rho} W_M \eta = (1 - \eta) W_n \quad (20)
\]

Equations 18 and 19 give respectively the market value of a matched firm and the net worker’s value.
from being matched in the steady state. To interpret equation 20 notice that the utilitarian union can be regarded as a social planner which operates under the constraints imposed by the limited endowment of labour and by the limited credibility of announcements. Since the equilibrium is governed by the decisions of the social planner, matching externalities from an extra hiring counterbalance. As a consequence, the private net value from being employed $W_n$ coincides with the social value of having an extra matched worker. By contrast, since the planner is constrained by the limited credibility of firms, the social and the private value of matched firms do not coincide. In particular, $W_M$ represents the private value of firms while $\frac{\rho + (1-\alpha)(1-\rho)}{\rho}W_M$ gives the social value. The wedge between the two evaluations mirrors the difference in expected destruction. The union expects destruction at rate $\rho$ while firms expect destruction at rate $\rho + (1-\alpha)(1-\rho)$. More in detail, firms expects genuine destruction at rate $\rho$ and, conditional on survival, expect reversion to discretion at rate $(1-\alpha)$. The latter event, however, turns out to be similar to genuine destruction since both events lead to zero profits.

From the vantage point of this interpretation, it is straightforward to look at equation 20 as representing the efficient surplus sharing rule. It generalises the Hosios condition in a context where the planner and the firm sector apply different discount rates. Once we substitute equations 18 and 19 in equation 20, the surplus sharing rule can be regarded as a condition that determines wages $w$ for given $\alpha$ and $\theta$. In turn, this condition can be coupled with the one that determines market tightness $\theta$ for given $w$ and $\alpha$ - i.e. equation 8 - to determine the steady state equilibrium $\theta(\alpha)$ and $w(\alpha)$:

$$F(\alpha, \theta) = \frac{w-b}{p-w}$$

$$F(\alpha, \theta) \equiv \frac{\rho + (1-\alpha)(1-\rho)}{\rho} \eta \frac{1-\beta(1-\rho-\theta^{1-\eta})}{1-\alpha\beta(1-\rho)}$$

$$c\theta^\eta = \frac{\alpha\beta}{1-\alpha\beta(1-\rho)}(p-w)$$

In line with the tradition, we refer to the first expression as the wage setting condition and to the second as the job creation condition. These conditions are depicted in figure 1.

The job creation condition is downward sloping since an higher wage discourages entry and reduces market tightness. By contrast, the wage setting condition is upward sloping since an higher market tightness increases the probability of re-matching after destruction and, for given wages, reduces the net gain from being employed instead of unemployed. As a consequence, to restate the efficient sharing of
match surplus the wage has to rise. In equilibrium, market tightness is at level $\theta^\ast$.

Figure 1 also depicts the comparative statics following an increase in credibility. As $\alpha$ increases the job creation condition moves upward. This is due to the fact that firms attach a lower probability to the reversion to a zero profit discretionary equilibrium. Thus, the same level of market tightness can be attained through higher announced wages. By contrast, as $\alpha$ increases the wage setting condition moves downward. Technically, an increase in $\alpha$ increases the private value of firms for given wages but reduces the gap between the private and the social value. The net effect is a reduction in the social value so that, to restate efficiency, wages must decrease. More intuitively, the gain in credibility raises the incentive for the union to announce low future wages in the future to stimulate current job creation. When $\alpha$ is low, the lack of credibility leads firms to discount future profits at a very high rate. Thus, low wages are not so effective in stimulating current job creation. By contrast, when $\alpha$ is large, future profits are discounted at a lower rate and wages are more effective for current job creation. From this perspective, the downward movement of the wage setting condition is due to a stronger union incentive to wage moderation.

The picture illustrates the interaction of the two effects in moving equilibrium market tightness to the
right. As a result of wage moderation and of increased entry, equilibrium market tightness increases from \( \theta^* \) to \( \theta^{**} \). In turn, since steady state unemployment is inversely linked to market tightness (equation 7), we conclude that higher credibility produces a lower rate of unemployment. We summarise these results in proposition 2.

**Proposition 2**

In steady state equilibrium, higher credibility leads to lower unemployment.

### 4 Empirical Analysis

#### 4.1 Empirical strategy and data

In the section above we have presented a model that allows to predict a negative relationship between unemployment and the credibility of wage announcements. In this section we would like to check whether this prediction is consistent with some basic cross-country evidence.

To accomplish this task we need primarily to measure the sentiment of trust or credibility that surrounds the announcements and, more generally, the actions of unions. For this purpose, we observe that, in the real world, the notions of trust and credibility overlap with that of cooperation. Indeed, James (2002) explains that trust represents a way to obtain a pareto-efficient cooperative solution in a prisoner dilemma context. Thus, from the perspective of our model, we conjecture that high credibility tends to be associated with cooperative industrial relations whereas low credibility with adversarial relations.

We test the prediction of the model by exploiting time-series and cross-country variability in unemployment and quality of industrial relations. In particular, we augment a standard phillips-type equation by adding a measure of industrial relations quality to the vector of regressors.

We use a panel that includes 20 OECD countries observed for 15 years, from 1990 to 2004; annual data are averaged over 5-years periods in order to clear for short run movements. Information regarding the rate of unemployment and its main determinants - inflation, unemployment benefits, labour taxation, employment protection, bargain institutions - is the one provided by the OECD and largely used in the macro-labour empirical literature (Nuziata 2003, for instance). The OECD, however, does not provide systematic information on the climate of industrial relations for member countries. To fill the gap, we resort to the index of "perceived" cooperation in industrial relations computed by the World Economic
Forum (WEF). This index is constructed by asking a panel of qualified operators to quantify over a given scale the degree of cooperation in their country. For instance, in 1997 respondents were asked to express their opinion on the sentence "Labor-employer relations are generally cooperative" (answers: 1=strongly disagree, 7=strongly agree).

Due to the subjective nature of these answers doubts may arise regarding the reliability of the index. This issue, however, has been already addressed by Blanchard and Philippon (2006), who conclude that the index is a good approximation for an ideal objective measure in light of the high correlation with lagged measures of strike activity. The WEF index is available annually for a large number of countries since 1985. However, the wording of the question asked by the interviewers has changed over time, especially in early years. Thus, to preserve a certain degree of uniformity, we have decided to drop observations for years 1985-1989. This explains the reason for our dataset to begin with the year 1990. Finally, for the purpose of estimation, a weakness of the WEF indicator is the small degree of variability. To get around this problem we have re-scaled the index over a 4-points array (0,1,2,3) by using quartile thresholds.

4.2 Evidence

In table 1 we summarise results from OLS estimation. In model 1, we condition unemployment on the index of industrial relations quality (I.R. Quality), on the change in inflation and, finally, on a set of institutional determinants. In model 2, we add four union variables that contribute to the description of the bargaining environment (union centralisation, union coordination, union coverage and union density).

Observe that, consistent with our prediction, the quality of industrial relations has a negative impact on unemployment. In particular, this variable turns out to be the one with the highest statistical significance. Furthermore, the size of the coefficient decreases only marginally when other union variables are added to the conditioning vector.

We are aware that unobserved country heterogeneity could bias estimation by affecting both the rate of unemployment and the cooperative climate of the bargaining environment. Yet, by its own nature, I.R. quality does not exhibit much time variability so we can not disentangle the impact of heterogeneity by using country dummies. In spite of this warning, however, we regard the evidence in the table as basically consistent with our model.
Table 1: Robust standard errors in parenthesis; *** 1% significance, ** 5% significance, * 10% significance.

<table>
<thead>
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<th>Model</th>
<th>I</th>
<th>II</th>
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<tr>
<td>I.R. Quality</td>
<td>-1.590***</td>
<td>-1.516***</td>
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<td></td>
<td>(.288)</td>
<td>(.307)</td>
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<td>Inflation(t) - Inflation(t-1)</td>
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<td>-1.031*</td>
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<tr>
<td></td>
<td>(.608)</td>
<td>(.619)</td>
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<td>.121**</td>
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<tr>
<td>Nr. Obs.</td>
<td>60</td>
<td>60</td>
</tr>
</tbody>
</table>

Informal and formal evidence show that countries with cooperative industrial relations exhibit a good performance in the labour market. In this paper, we show that this evidence can be explained through a very intuitive mechanism and by means of a standard labour market description. In the model at the core of the paper, firms hold up from creating jobs since they attach some probability to the fact that the union may renege on pre-announced low wages. The reason from holding up relates to the irreversible nature of searching expenses. Firms can not recoup these expenses if they wish to dissolve the match face to high wage claims. In this context, job creation gains momentum if firms trust the union or, more in general, if industrial relations are characterised by a cooperative climate that favours the building of trust.

This explanation for the link between unemployment and industrial relations is quite general as it only requires union power and search imperfections. The first ingredient is common to many European economies. The second ingredient is thought to be a feature common to all labour markets.

The paper offers an alternative to the explanation advanced by Blanchard and Philippon (2006). In their framework, bad industrial relations lead to higher unemployment only in presence of recessionary shocks. This is due to the fact that bad relationships slow down the adjustment of wages face to these shocks. By the same token, however, bad industrial relationships should also lead to lower unemployment if the economy is hit by expansionary shocks. Or, more in general, their model does not imply any long
run relationship between labour market performance and the quality of industrial relations.

In sharp contrast with this conclusion, our model does imply a long-run positive link between performance and quality. Thus, a necessary follow up of this research is to check the consistency of our prediction over long time intervals.
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