Unions: Rent Extractors or Creators?

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Abstract

This paper proposes a model of workplace-specific unions that integrates two (conflicting) views of what unions do. One view holds that unions mainly engage in rent extraction. Another view holds that unions mainly engage in rent creation by providing agency services that increase workplace productivity. In our model, the union leadership makes a choice between the two types of activities, and we demonstrate why it is optimal to engage in both: rent extraction increases the bargained wage rate, while rent creation secures higher employment. More importantly, the choice between the two activities depends systematically on the economic and regulatory environment in which the union operates. Unions operating in an environment of intense product market competition are mainly engaged in rent creation. Labour market deregulation induces unions to focus more on rent extraction. Our model thus suggests that the economic and regulatory environment is an important determinant of "what unions do," and that changes/differences in this environment can explain changes/differences in union behaviour across time and space.

Keywords: unions; rent creation; rent extraction; product market competition.

JEL classification: J5; L5.

Unions: Rent Extractors or Creators?

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1 Introduction

More than 20 years ago, Freeman and Medoff (1979) pointed out that unions have two faces – a monopoly face and a collective response face. Although both faces are typically present at the same time, the relative importance varies with circumstances and so does the impact that unions have on the welfare of workers, on the performance of firms, and on society more broadly. The hypothesis of this paper is that the relative importance of the two activities is systematically related to external factors such as product market competition.

The monopoly face is associated with the traditional economic view of unions as organizations devoted to rent extraction (see, for example, Sapsford and Tzannatos, 1993: p. 325-38; and Booth, 1995: chapters 3-5). By monopolizing labor supply, a union can force the wage rate above the competitive level to the benefit of those of its members who retain employment. The wider welfare implications of the induced reallocation of workers to nonunion sectors (Rees, 1963) or to the unemployment benefit system are largely ignored by the union, as is the adverse impact on firms' incentives to invest in capital (Grout, 1984).

This view that unions necessarily distort resource allocation has been challenged by the so-called collective response view of unions. According to this view, unions show their "collective response face" by providing various agency services that enhance workplace productivity and create rents. This can happen through a number of complementary channels. Freeman and Medoff (1984) emphasize that unions are institutions of collective voice that communicate worker preferences directly to management and participate in the establishment of work rules and seniority provisions in the internal labor market. This changes the exit-voice trade-off of workers by providing a channel through which they can express

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their grievances without having to leave the firm. This reduces turnover and increases the incentive of employers to provide firm-specific training (Faith and Reid, 1987). Malcomson (1983) argues that unions can improve efficiency by serving as contract enforcers. For example, unions may help making promises from management to retain workers in the face of negative shocks credible, thereby encouraging workers to accumulate firm-specific skills. In addition, unions can help enhance firm productivity by promoting changes in working methods or production techniques to the benefit of both workers and the company.[3]

What determines how much weight a union will attach to rent extraction and how much it will attach to rent creation; that is, what determines the face of the union? The purpose of this paper is to provide some answers to this question that go beyond arguing that it depends on the "quality" of industrial relations. In particular, we argue that the balance between the two activities to a large extent is determined by external factors related to the legal and economic environment in which the union operates.

To formalise these ideas, we propose a simple model of union behaviour that can account for both types of activities within a unified framework, each being the outcome of rational decisions made by the union leadership in response to the legal (regulation of collective bargaining) and the economic environment (product market competition) in which the union operates. We consider a workplace-specific union that is located in a monopolistic firm. The union can, in principle, devote resources to two activities: on the one hand, it may try to improve its bargaining position in order to extract a larger share of the rent that the parent firm earns from its monopoly position in the product market (*rent extraction*); on the other hand, it may try to increase productivity at the workplace in order to increase the rent available for sharing (*rent creation*). The union leadership is faced with the task of allocating a (fixed) budget of resources (time) between the two activities.

We demonstrate (proposition 1) that it is optimal for a union to devote resources to both activities: rent extraction increases the bargained wage rate, while rent creation secures higher employment at a given wage rate. More importantly, the optimal resource allocation rule depends systematically on the

[3] See Aidt and Tzannatos (2002: chapter 3) for a more detailed discussion of the collective response view of unions.

economic and regulatory environment in which the union operates, and so, the "face" of the union is determined by these factors. We demonstrate (proposition 2) that a union devotes more resources to rent creation when its parent firm is exposed to intense product market competition. From a time series perspective, this suggests that deregulation of product markets can have a socially beneficial impact on union behaviour and, in a sense, bring out the best of unions. From a cross-section perspective, the suggestion is that unions, located in sectors of the economy where product market competition is intense, focus more on rent creation than unions located in sectors with a low degree of competition. We also show how labour market legislation affects the union's behaviour. Labour market reforms that weaken the bargaining position of a union induce it to devote more resources to rent extraction. Union militancy may therefore go hand in hand with labour market deregulation.

The rest of the paper is organized as follows. Section 2 introduces the model. The equilibrium is characterized in Section 3, while the impact of product competition and labour market deregulation is analysed in Sections 4 and 5, respectively. Section 6 discusses the robustness of the results with respect to the assumed bargaining model. Finally, section 7 contains some concluding remarks and a discussion of the empirical implications and available evidence.

2 The model

Our starting point is the well-known union model studied by Layard et al. (1991: chapter 2) among many others. We extend the model to capture the notion that unions are engaged in two types of activities at the workplace. On the one hand, they spend time and effort improving their bargaining position in an attempt to capture more of the rent that the parent firm earns from its monopoly position in the product market. On the other hand, they spend time and effort on activities that increase productivity at the workplace in an attempt to increase the rent available for sharing. We refer to the former activity as *rent extraction* and to the latter as *rent creation*.

2.1 Firms and consumers

We consider a single industry with a fixed number of firms, indexed $i = 1, .., N$. Each firm produces a differentiated good and faces a downwards sloping demand

curve. The demand for good i[4]

$$p_i = y_i^{\theta-1}\overline{y}^{1-\theta}, \tag{1}$$

where p_i is the real price of good i, y_i is the supply of good i, $\overline{y}$ is an index of overall market demand and $-\eta \equiv \frac{-1}{1-\theta}$ is the elasticity of demand. We assume that $\theta = 1 - \frac{1}{\eta} \in [0,1]$ such that $-\eta > -1$. We interpret θ as an indicator of product market competition. A high θ is an indication that product market competition is intense. Good i is produced by means of a Cobb-Douglas technology:

$$y_i = A_i l_i^{\alpha}, \quad \alpha \in (0,1], \tag{2}$$

where l_i is the number of workers employed by firm i and A_i is an index of firm-specific productivity.[5] The profit of firm i is

$$\pi_i = p_i y_i - w_i l_i. \tag{3}$$

2.2 The unions

Unions are workplace specific. Each union runs a closed shop, and has n_i members. If the firm does not employ all the members of the union, the "unemployed" union members receive income Q from the unemployment benefit systems or from employment in a secondary, competitive labor market. We assume that the workers that do not get a job in the firm are picked at random among the members. Accordingly, the probability of obtaining "a union job" is $\frac{l_i}{n_i}$ for $l_i < n_i$ and 1 otherwise. The objective of the union is to maximize the expected wage income of the members:[6]

$$V_i(w_i, A_i) = \frac{l_i(.)}{n_i} w_i + (1 - \frac{l_i}{n_i})Q. \tag{4}$$

[4] This demand function can easily be derived from first principles by assuming that consumers (workers and profit earners) maximize a Dixit-Stiglitz utility function subject to given income.

[5] We implicitly assume that the capital stock is fixed, and have normalized it to 1 in each firm. This assumption implies that we are focussing on the short-run. In the long-run, firms can adjust their capital stock in response to changes in the economic environment. The interaction between this and the union's investment in rent creation versus rent extraction might be important, but more research is needed to work out fully the long-run implications.

[6] We implicitly assume that the utility function of a worker is linear in the aggregate consumption good.

The union and the firm bargain over the wage rate only. This assumption has two implications. First, the firm retains the right to manage, i.e., to decide on employment after the wage rate has been agreed. This implies that the wage rate is playing an allocative role in contrast to the case where the firm and the union enter a (privately) efficient contract by bargaining over wages and employment simultaneously. It turns out that our main result holds for both types of bargaining (see section 6) so the choice of bargaining structure is not essential for the point we want to make.[7] Second, we do not allow the union to bargain over the conditions of work such as manning levels and other work rules. Securing favorable work conditions is, in reality, one of the mechanisms through which unions attempt to extract rents.[8] To simplify the analysis, we disregard this mechanism, and assume that unions mainly extract rents through the wage they secure.[9]

We adopt the asymmetric Nash bargaining solution to describe the outcome of the negotiations between a particular union and its parent firm. We assume that the firm's fall back option yields zero profit. As for the union, we assume that the union members can move into the competitive, secondary labour market or draw on unemployment benefits in case of a breakdown of the negotiations and so, the fall back option for the union is Q. The asymmetric Nash product can now be written as

$$\begin{aligned} \Omega_i(w_i) &= \left(\frac{l_i(.)}{n_i}w_i + (1-\frac{l_i(.)}{n_i})Q - Q\right)^{1-\beta_i} \pi_i(w_i)^{\beta_i} \qquad (5) \\ &= \left(\frac{l_i(.)}{n_i}(w_i - Q)\right)^{1-\beta_i} \pi_i(w_i)^{\beta_i}, \end{aligned}$$

where β_i is the bargaining power of firm i and $1-\beta_i$ is the bargaining power of union i.

The new feature of the model is that we allow the union to be engaged in two types of activities *prior to* the wage bargaining: rent extraction and rent creating. We imagine that the union has a given amount of resources (time) available. This is meant to capture the idea that, at least in the short-run, the attention span of the leadership of the union is limited, and that the leaders

[7] Oswald (1985) has in addition shown that the efficient bargaining solution eventually moves to the labour demand curve when membership turnover is taken into account.

[8] Layard et al. (1991, p. 118-124) provides a theoretical discussion.

[9] This assumption is less realistic for occupational and craft unions where favorable work rules is one of the major channels of rent extraction (see, e.g., Webb and Webb (1897)).

need to devote their attention to competing ends.[10] The leadership cannot devote much time to discovering workplace innovations nor can it effectively give voice to the grievances of the members if all or most of its attention is directed towards building up bargaining power and vice versa.[11] The time devoted to rent extraction is denoted by T_i^E while the share devoted to rent creation is denoted by T_i^C. Normalizing the total amount of time to 1, we can write the resource constraint as

$$T_i^E + T_i^C = 1. \tag{6}$$

The time devoted to rent extraction determines the relative bargaining power of the union ($\frac{1-\beta_i}{\beta_i}$). Part of the union's bargaining power is based on the fact that it has monopolized labor supply in the relevant labour market and can call a strike. Since the right to call a strike is upheld by the institutional features of the bargaining system, then this part of the union's bargaining power can be considered as being beyond the influence of the individual union.[12] However, in addition to these exogenous factors, we argue that each union can augment its bargaining power if time and effort are devoted to the task. The parameter of the asymmetric Nash product, β_i, can be related to asymmetries in the bargaining procedures of the underlying (non-cooperative) bargaining game. Let Δ_i^u be the length of the time interval that elapses between the union reacts to the firm's wage proposal and the next time the union makes a proposal to the firm, and let Δ_i^f be the length of time interval that elapses between the firm reacts to the union's wage proposal and the next time the firm makes a proposal to the union. Then, Binmore et al. (1986) show that the relative bargaining power of the union ($\gamma_i \equiv \frac{1-\beta_i}{\beta_i}$) can be expressed as $\frac{\Delta_i^f}{\Delta_i^u}$, and thus that the union can improve its bargaining position if it somehow can speed up its responses to offers

[10] In the longer term, it is clear that the leadership can be expanded and more total time can be made available. This, however, does not remove the fact that for a given pool of resources, the leadership needs to decide how best to utilize it.

[11] The two types of activities, of course, do not necessarily conflict, but to a first approximation, it seems reasonable to assume that they do. After all, what we refer to as rent creating activities require cooperation and trust between the union and the parent firm, whereas what we refer to as rent extraction activities are largely confrontational.

[12] It is clear that the unions have a collective interest in how the legal and institutional framework is designed and so, would have an incentive to attempt to seek political influence via, say, a confederation of unions to further their interests in this respect. Investigating this possibility is, however, beyond the scope of the present paper, but would make for an interesting research topic in the future.

made by the firm.[13] Doing so clearly requires that more attention and time are devoted to this activity. To capture these ideas in a simple way, we assume that the relative bargaining power of union i is determined by

$$\gamma_i(T_i^E) = \underline{\gamma} + \Gamma_i(T_i^E), \tag{7}$$

where $\gamma_i' > 0$, $\gamma_i'' \leq 0$, $\gamma_i(0) = \underline{\gamma} \geq 0$, $\lim_{T^E \to 1} \gamma_i(.) = \overline{\gamma}_i > \underline{\gamma}$. That is, the more the union invests in rent extraction, the more relative bargaining power it obtains but at a decreasing rate. If $T_i^E = 0$, the union retains the bargaining power derived from the legal and institutional framework ($\underline{\gamma}$) only. We might therefore think of $\underline{\gamma}$ as an index of labour market regulation, but, of course, it could be related to other exogenous factors such as technology. If all available resources are spent on rent extraction, then the union obtains maximum bargaining power ($\overline{\gamma}_i$), but the firm always retains some power. In addition, we assume that the following Inada conditions hold: $\lim_{T^E \to 0} \gamma_i'(.) = \infty$ and $\lim_{T^E \to 1} \gamma_i'(.) = 0$. That is, spending the "first" unit of time on rent extraction is very rewarding, while spending the "last" is not. The "bargaining power function" is illustrated in Figure 1.

The productivity level of firm i is at least partly determined by the motivation of the work force, and the organization of work procedures within the firm, but is also affected by the speed at which new ideas and workplace innovations are adopted. We imagine that the union can, if time is devoted to the task, improve the motivation of the work force by providing a collective voice to workers' grievances, therefore facilitating long-term working relationships to the benefit of all parties (Freeman and Medoff, 1984). In addition it can help to identify and implement better and more efficient work procedures that can be beneficial to both parties. To capture this, we assume that the time devoted by the union to rent creation affects productivity positively, i.e.,

$$A_i = A_i(T_i^C), \tag{8}$$

[13] The parameter β can also be related to differences in the beliefs about the risk of breakdown of negotiations. Here, the higher the union's estimate of the probability of breakdown, the lower is its relative bargaining power.

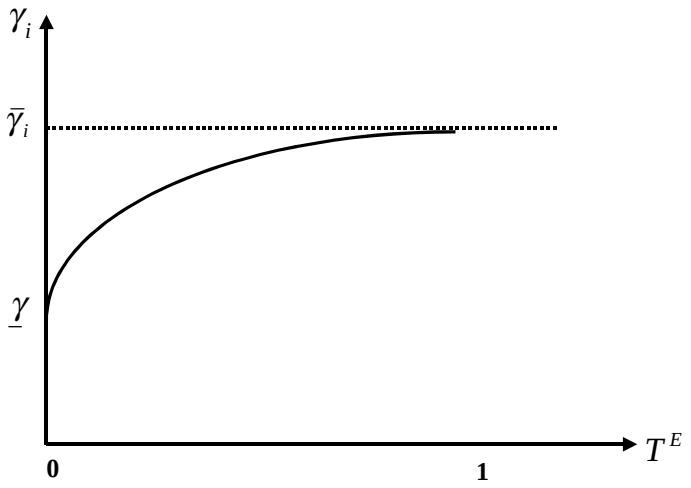

Figure 1: The "bargaining power function" for union i.

where $A_i' > 0$, $A_i'' \leq 0$, $A_i(0) = \underline{A}_i$ and $A_i(1) = \overline{A}_i$. The more resources are devoted to rent creation, the more productive the firm becomes but at a decreasing rate. Productivity is bounded from below and above. It should be noted that in this formulation, productivity is an attribute of the job (firm) rather than an attribute of the worker. As we shall see, external factors in the product market are going to play a key role in determining "job characteristics" as captured by A_i. This is similar to many theories of segmented labour markets (see McNabb and Ryan, 1990).

This completes the description of the model, and we can summarize the timing of events as follows. First, the union allocates its resources (time) between the two activities. Second, the union and the firm bargain over the wage rate and an agreement is reached. Third, the firm decides how many workers to hire at the agreed wage.

3 Equilibrium

We look for a subgame perfect equilibrium and so analyze the model by backward induction. In stage three, both w_i and A_i have already been determined, and firm i decides on how many workers to hire taking those as given. Substituting equations (1) and (2) into equation (3) yields:

$$\pi_i = (A_i l_i^{\alpha})^{\theta} \overline{y}^{1-\theta} - w_i l_i, \tag{9}$$

and so labor demand is determined by

$$\frac{\partial \pi_i}{\partial l_i} = \alpha\theta A_i^{\theta} l_i^{\alpha(\theta-1)} \overline{y}^{1-\theta} - w_i = 0, \tag{10}$$

and the labor demand function is

$$l_i(w_i, A_i) = (\alpha\theta)^{\frac{1}{1-\theta\alpha}} \, w_i^{\frac{-1}{1-\theta\alpha}} A_i^{\frac{\theta}{1-\theta\alpha}} \overline{y}^{\frac{1-\theta}{1-\theta\alpha}}. \tag{11}$$

We notice that employment in firm i is decreasing in w_i and increasing in A_i. The profit function can be found by substituting equation (11) into equation (9) and using equation (10) to simplify:

$$\pi_i(w_i, A_i, k_i) = \frac{1-\theta\alpha}{\theta\alpha} w_i l_i(.). \tag{12}$$

The wage share is determined uniquely by technology (α) and product market conditions (θ), i.e., $\frac{w_i l_i}{\pi_i} = \frac{\theta\alpha}{1-\theta\alpha}$. For a given wage and given employment, profits are lower, the more competitive the product market is.

In stage two, the union and the firm negotiate a wage contract that maximizes the Nash Product given in equation (5). The first order condition is[14]

$$\begin{aligned} \frac{\partial \Omega_i}{\partial w_i} &= \left(\frac{l_i}{n_i}\right)^{1-\beta_i} \left\{ (1-\beta_i)(w_i - Q)^{-\beta_i} \pi_i(.)^{\beta_i} + \beta_i (w_i - Q)^{1-\beta_i} \frac{\partial \pi_i}{\partial w_i} \pi_i(.)^{\beta_i - 1} \right\} \\ &\quad + (w_i - Q)^{1-\beta_i} \pi_i(.)^{\beta_i} \left\{ (1-\beta_i) \left(\frac{l_i}{n_i}\right)^{-\beta_i} \frac{1}{n_i} \frac{\partial l_i}{\partial w_i} \right\} \qquad (13) \\ &= 0 \end{aligned}$$

Using the fact that $\pi_i(w_i, A_i) = \frac{1-\theta\alpha}{\theta\alpha} w_i l_i(.)$ and $\frac{\partial l_i}{\partial w_i} \frac{w_i}{l_i} = \frac{-1}{1-\alpha\theta}$, we get

$$(1-\beta_i) w_i - \beta_i (w_i - Q) \frac{\alpha\theta}{1-\alpha\theta} - (1-\beta_i)(w_i - Q) \frac{1}{1-\alpha\theta} = 0. \tag{14}$$

[14] The second order condition is satified.

Solving this equation, we get the (partial) equilibrium wage function

$$w_i(\gamma_i) = \frac{Q(\alpha\theta + \gamma_i)}{\alpha\theta(1+\gamma_i)}. \tag{15}$$

We notice that the wage rate depends on the relative bargaining power of the union but not directly on productivity. This is due to the Cobb-Douglas production function. Notice also that the wage is an increasing function of the relative bargaining power of the union and is decreasing in production market competition.

In stage one, the union decides on the allocation of its resources between rent extraction and rent creation. In doing so, it internalizes the impact on both the wage bargaining and the employment situation of its members. We can substitute equations (11) and (15) into the union's objective function and use the fact that γ_i and A_i are functions of T_i^E to get:

$$\overline{V}_i(T_i^E) = \frac{l_i(w_i(\gamma_i(T_i^E)), A_i(T_i^E))}{n_i}\left\{w_i(\gamma_i(T_i^E)) - Q\right\}. \tag{16}$$

The next proposition summarizes how the union allocates its resources.

Proposition 1 *The union allocates $T_i^{E^*} \in (0,1)$ of its time to rent extraction and the remainder to rent creation. Moreover, $T_i^{E^*}$ is a differentiable function of θ, $\overline{\gamma}$, and α.*

Proof. The first order condition associated with maximizing $\overline{V}_i(T_i^E)$ is

$$\begin{aligned}\frac{\partial \overline{V}_i}{\partial T_i^E} &= \frac{\left\{w_i(\gamma_i(T_i^E)) - Q\right\}}{n_i}\left\{\frac{\partial l_i}{\partial w_i}\frac{\partial w_i}{\partial \gamma_i}\frac{\partial \gamma_i}{\partial T_i^E} + \frac{\partial l_i}{\partial A_i}\frac{\partial A_i}{\partial T_i^E}\right\} \\ &\quad + \frac{l_i}{n_i}\left\{\frac{\partial w_i}{\partial \gamma_i}\frac{\partial \gamma_i}{\partial T_i^E}\right\} \\ &= 0\end{aligned} \tag{17}$$

Simplifying, we get

$$\frac{\partial \gamma_i}{\partial T_i^E}\frac{(1-\alpha\theta)\alpha}{(\alpha\theta + \gamma_i(T_i^E))(1+\gamma_i(T_i^E))^2} - \gamma_i(T_i^E)\frac{\partial A_i}{\partial T_i^C} = 0 \tag{18}$$

Define

$$\Lambda_i(T_i^E) = [1-\alpha\theta]\,\alpha\frac{\partial \gamma_i}{\partial T_i^E}(.) - \gamma_i(.)\left[\{\alpha\theta + \gamma_i(.)\}\{1+\gamma_i(.)\}^2\right]\frac{\partial A_i}{\partial T_i^C}(.) = 0 \tag{19}$$

Evaluate

$$\lim_{T_i^E \to 1} \Lambda_i(1) = -\overline{\gamma}_i \left[\{\alpha\theta + \overline{\gamma}_i\} \{1 + \overline{\gamma}_i\}^2 \right] \frac{\partial A_i}{\partial T_i^C}(0) < 0 \tag{20}$$

as $\lim_{T_i^B \to 1} \frac{\partial \gamma_i}{\partial T_i^E} = 0$ and $\frac{\partial A_i}{\partial T_i^C}(0) > 0$. Evaluate

$$\lim_{T_i^E \to 0} \Lambda_i(0) = \infty > 0 \tag{21}$$

as $\lim_{T_i^B \to 0} \frac{\partial \gamma_i}{\partial T_i^E} = \infty$ and $\frac{\partial A_i}{\partial T_i^C}(1)$ is finite. Calculate,

$$\begin{aligned} \frac{\partial \Lambda_i}{\partial T_i^E} &= [1 - \alpha\theta]\, \alpha \frac{\partial^2 \gamma_i}{\partial T_i^E \partial T_i^E} - \left[\left\{ \alpha\theta + \gamma_i(T_i^E) \right\} \left\{ 1 + \gamma_i(T_i^E) \right\}^2 \right] \\ &\quad * \left[\frac{\partial \gamma_i}{\partial T_i^E} \frac{\partial A_i}{\partial T_i^C} - \frac{\partial^2 A_i}{\partial T_i^C \partial T_i^C} \gamma_i(T_i^E) \right] \\ &\quad -\gamma_i(T_i^E) \frac{\partial A_i}{\partial T_i^C} \frac{\partial \gamma_i}{\partial T_i^E} \left[(1 + \gamma(.))(1 + 2\gamma(.) + 2\alpha\theta) \right] \\ &< 0 \text{ for all } T_i^E. \end{aligned} \tag{22}$$

Hence, there exist a unique value of T_i^E such that $\Lambda_i(T_i^{E^*}) = 0$. Moreover, the conditions of the Implicit Function Theorem are satisfied, and we can write $T_i^{E^*}$ as a differentiable function of the three key parameters of the model $\{\theta, \overline{\gamma}, \alpha\}$, i.e., $T_i^{E^*}(\theta, \overline{\gamma}, \alpha)$ ■

In deciding how best to utilize its scarce resources, the union faces a trade off. The more time is spent on finding better work procedures, on providing voice and on innovating in the workplace, the less can be devoted to augment the bargaining power of the union. The consequence is a lower wage. On the other hand, as better procedures are found, employment among unionized workers increases and on balance it pays up to a point to allocate time to rent creation. We notice that rent extraction is about getting a higher wage (accepting that this will lead to lower employment as the firm moves down its labor demand curve), while rent creation is about increasing employment at a given wage.

4 Union behavior and product market competition

The intensity of competition in the product market is affected by many different factors, some of which are related to economic policy and some of which are

related to consumer taste. Among the policy related factors we find tariffs and other artificially created barriers to entry that reduce competition, as well as policies that advance competition by introducing product standardization and by increasing transparency. Broadly speaking, we can think of these factors as representing product market regulation. Among the taste related factors we notice that firms can escape competition by exploiting the fact that consumers typically have a preference for variety and particular brands. In our model, the degree of product market competition is captured by the parameter θ. An increase in θ represents an increase in product market competition, and the closer θ goes to 1, the more competitive the product market becomes. From a temporal perspective, we can think of an increase in θ as representing deregulation of the product market such as it has taken place in the European Union and elsewhere in recent decades[15], or from a cross-section perspective, we can think of different $\theta's$ as referring to the competitive conditions in different industries.

It is clear that product market competition affects the size of the rent available for sharing, and that a smaller rent is available in a more competitive product market.[16] In deciding how to allocate its resources, the union will respond to the economic environment in which it operates, and in particular to the degree of product market competition. The next proposition investigates this in more detail.

Proposition 2 *An increase in the degree of product market competition ($\theta \uparrow$) encourages the union to spend more resources on rent creation and less resources on rent extraction, i.e.,*

$$\frac{\partial T_i^{E^*}}{\partial \theta} < 0. \tag{23}$$

Proof. Using the Implicit Function Theorem, we find that

$$\frac{\partial T_i^{E^*}}{\partial \theta} = -\frac{\frac{\partial \Lambda_i}{\partial \theta}}{\frac{\partial \Lambda_i}{\partial T_i^E}}. \tag{24}$$

where $\Lambda(.)$ is defined in the proof of Proposition 1. Since $\frac{\partial \Lambda_i}{\partial T_i^E} < 0$, sign$\left\{ \frac{\partial T_i^{E^*}}{\partial \theta} \right\}$

[15] In the model, the parameter θ strictly speaking derives from the preferences of consumers. However, it is customary to give it a broader interpretation (see, e.g., Layard et al., 1991: chapter 2; Blanchard and Giavazzi, 2001), and this is the approach we follow here.

[16] This is consistent with the results of a study by Abowd and Lemieux (1993), who find that increased foreign competition reduces wages in a panel of Canadian firms.

$= \text{sign}\left\{\frac{\partial \Lambda_i}{\partial \theta}\right\}$. From equation (18), we get

$$\frac{\partial \Lambda_i}{\partial \theta} = -\alpha^2 \frac{\partial \gamma_i}{\partial T_i^E} - \{1 + \gamma_i (T_i^E)^2\} \alpha \gamma_i (T_i^E) \frac{\partial A_i}{\partial T_i^C} < 0. \tag{25}$$

■

The rent that the union shares with the firm derives from the latter's monopoly position in the product market. When this monopoly position is weakened and the rent available for sharing is reduced, proposition 2 shows that the union shifts its attention away from rent extraction towards rent creation. By doing so, the union attempts to compensate the membership for the rent lost by making it more attractive for the firm to retain more of its members. Loosely speaking, the union wants to make the pie to be divided between the two parties larger, rather than trying to capture a larger share of a smaller pie. Proposition 2 has a number of interesting implications, which we discuss in turn below.

- Our model integrates the two views of what unions (mainly) do within a unified framework. Proposition 1 demonstrates that unions attempt to capture a share of existing rents, but that they also attempt to augment the rents available for sharing. As discussed in section 1, rent extraction is associated with a number of external effects that do harm the economy at large. Proposition 2 shows that product market competition brings out the best in unions, in the sense that they shift their attention away from rent extraction towards rent creation. This carries the policy implication that product market deregulation can have beneficial spill-over effects on the behaviour of unions.

- Product market conditions are in many theories of segmented labour markets seen as an important influence on the type of jobs created, ranging from "attractive" primary sector jobs to "unattractive" secondary sector jobs (see McNabb and Ryan, 1990, for a survey of this literature). Our model highlights the role that unions might play as an intermediary between external product market conditions and job creation. The bahaviour of unions – and the conduct of industrial relations more generally – interacts systematically with product market conditions, and more intense product market competition induces unions to focus on rent creation and in effect on creating (or maintaining) jobs in the unionised sectors.

- We may interpret the rent creation activities that the union engages in as workplace innovations. With this interpretation, it is interesting to notice the *positive* correlation between product market competition and innovation. This is in contrast to Schumpterian effect whereby competition reduces innovation (R&D) because the innovator – under competitive conditions – can only appropriate little of the rent ex post (see, Aghion and Howitt, 1992). The contrasting results can, by and large, be attributed to differences in the objective function of the "innovator".[17] In the Schumpterian framework, the innovator is the firm, which cares directly about the profit that the innovation might generate. In our model, the innovator is the union, which cares about the expected wage bill and so takes employment directly into account.[18] Without stressing our result too much, proposition 2 points to a positive link between product market competition and, at least, certain types of (workplace-related) innovations.

- Empirically there is a strong, positive correlation between the degree of product market and labor market regulation (see, e.g., Boeri et al., 2000). That is, imperfections in product markets tend to go hand in hand with imperfections in the labor market. We might interpret γ_i as an index of the degree of labor market competitiveness.[19] With this interpretation, proposition 2 demonstrates that industries with little product market competition (low θ) would be associated with highly distorted (local) labor markets. This is because the firm-specific unions of that industry would devote most of their attention to rent extraction (high γ). Hence, our model provides an interpretation of the observed empirical correlation, which can complement other explanations based on the political activities of unions (see, for example, Rama and Tabellini, 1998).

[17] Aghion et al. (1999) demonstrate how, within a Neo-Schumpterian growth model, delinking the incentive to innovate from expected profits by introducing non-profit maximizing managers can generate a positive correlation between competition and innovation.

[18] Within our model, we can show that if we allow the firm to spend time on rent creation (increase A) and rent protection (decrease γ), it would respond to more product market competition by increasing the time devoted to rent protection, i.e., we would get a *negative* correlation between (workplace) innovation and product market competition also within our model. This underscores the unique role played by the union.

[19] When γ_i is close to zero, the union has lost all bargaining power and the labour market is basically perfectly competitive.

- Blanchard and Giavazzi (2001) argue that product market deregulation (in the sense of an increase in θ) is self-defeating because in the long-run where firms are free to enter and exit the industry, the profit rate is determined uniquely by the (proportional) entry cost. Only in the short-run, for a fixed number of firms, does an increase in θ have an impact. While our model strictly speaking only applies to the short-run, it points to another reason why product market deregulation might have lasting effects on employment: the focus of unions is shifted towards workplace innovations that increase productivity and ultimately employment, and to the extent that these innovations are persistent, some of the beneficial employment effects should survive also in the longer term. It would of considerable interest to formalise this conjecture in future research.

5 Union behaviour and labour market deregulation

The environment in which workplace-specific unions operate is not only determined by the degree of product market competition. It is also affected by labor market regulation, and institutions that affect the framework of collective bargaining. In our model, this aspect is captured by $\underline{\gamma}$ in equation (7), and we can think of a reduction in $\underline{\gamma}$ as representing labor market deregulation. The next proposition shows how the union reacts to this.

Proposition 3 *Deregulation of the labor market induces the union to devote more time to rent extraction, i.e.,*

$$\frac{\partial T_i^E}{\partial \underline{\gamma}} < 0. \tag{26}$$

Proof. The proof is similar to that of proposition 2. A simple calculation shows that

$$\frac{\partial \Lambda_i}{\partial \underline{\gamma}} = -\frac{(1+\gamma_i)^2}{\gamma_i}\left[1+(\alpha\theta+\gamma_i)\gamma_i+\frac{2\alpha\theta}{1+\gamma_i}\right]\frac{\partial A_i}{\partial T^C} < 0 \tag{27}$$

and so,

$$\frac{\partial T_i^{E^*}}{\partial \underline{\gamma}} = -\frac{\frac{\partial \Lambda_i}{\partial \underline{\gamma}}}{\frac{\partial \Lambda_i}{\partial T_i^E}} < 0. \tag{28}$$

■

Proposition 3 shows that each union would attempt to compensate for the loss of bargaining power caused by labour market deregulation by devoting more time to the task of building up (union-specific) bargaining power.[20] Identifying an increase in Γ_i with an increase in union militancy, this explains why labour market deregulation often causes unrest in the labour market and a period of increased conflict. On the other hand, the proposition also implies that building up a regulatory and institutional framework that grants unions a basic level of bargaining power can be helpful in directing unions towards rent creating activities.

6 Efficient Contracts

Above we assumed that the union and its parent firm bargain over the wage rate only, and so that the firm decides the level of employment at the labor demand curve ex post. It is well-known that these contracts are (privately) inefficient and that each firm and union can do better by moving off the labor demand curve and bargain about employment as well as about wages (see, e.g., McDonald and Solow, 1981). To test the robustness of propositions 1 to 3, we allow each firm and union to enter (privately) efficient contracts. The union's objective function is still given by equation (4).[21] The firm, however, does not decide on employment ex post, and so, it enters the bargaining process with the view to maximize its profit as given by

$$\pi_i = p_i A_i l_i^{\alpha} - w_i l_i = (A_i l_i^{\alpha})^{\theta} \overline{y}^{1-\theta} - w_i l_i, \tag{29}$$

where we have used the demand function to derive the revenue function. The asymmetric Nash product is now given by

$$\ln \Omega_i = (1-\beta_i)\left[\ln l_i + \ln(w_i - Q) - \ln n_i\right] + \beta_i \ln\left[(A_i l_i^{\alpha})^{\theta} \overline{y}^{1-\theta} - w_i l_i\right]. \tag{30}$$

[20] To establish whether γ_i increases, i.e., whether the union "overcompensates", requires specific assumptions about the functional form of $\Gamma_i(.)$ and $A(.)$, and we shall not pursue the issue further here.

[21] We restrict attention to the case in which employment in equilibrium is less than the membership of the union.

The two first order conditions determining the wage rate and employment are

$$\frac{\partial \ln \Omega_i}{\partial l_i} = \frac{1-\beta_i}{l_i} + \frac{\beta_i}{\pi_i}\left[\theta\alpha(A_i l_i^{\alpha})^{\theta-1} A_i l_i^{\alpha-1} \overline{y}^{1-\theta} - w_i\right] = 0. \tag{31}$$

$$\frac{\partial \ln \Omega_i}{\partial w_i} = \frac{1-\beta_i}{w_i - Q} - \frac{\beta_i l_i}{\pi_i} = 0 \tag{32}$$

Solving these two equations, we find the outcome of the bargaining to be

$$l_i(A_i) = \left[\frac{Q}{\theta\alpha}\overline{y}^{-(1-\theta)} A^{-\theta}\right]^{\frac{1}{\alpha\theta-1}} \tag{33}$$

and

$$w_i(\gamma_i) = \frac{Q(\alpha\theta+\gamma_i)}{\theta\alpha(1+\gamma_i)}. \tag{34}$$

We notice the wage is the same as before, but that employment is higher under efficient bargaining than under right-to-manage bargaining. More importantly, we see that employment is independent of γ_i (basically because the wage rate does not play a role in allocating labor) and only depends on A_i. Hence, under efficient bargaining it is absolutely clear that rent creation works via employment and rent extraction works via the wage rate.

The union allocates its time between rent extraction and rent creation to maximize

$$V_i = \frac{l_i(A_i)(w_i(A_i) - Q)}{n_i} \tag{35}$$

Calculate,

$$\begin{aligned} \frac{\partial \ln V_i}{\partial T_i^E} &= -\frac{1}{l_i}\frac{\partial l_i}{\partial A_i}\frac{\partial A_i}{\partial T_i^C} + \frac{1}{w_i - Q}\frac{\partial w_i}{\partial \gamma_i}\frac{\partial \gamma_i}{\partial T_i^E} \\ &= \frac{-\theta}{(1-\alpha\theta)\,A_i}\frac{\partial A_i}{\partial T_i^C} + \frac{1}{\gamma_i(1+\gamma_i)}\frac{\partial \gamma_i}{\partial T_i^E} \end{aligned} \tag{36}$$

It is clear that $\frac{\partial \ln V_i}{\partial T_i^E} = 0$ has a unique solution since $\lim_{T_i^E \to 0}\frac{\partial \ln V_i}{\partial T_i^E} = \infty$, $\lim_{T_i^E \to 1}\frac{\partial \ln V_i}{\partial T_i^E} = \frac{-\theta}{(1-\alpha\theta)A_i}\frac{\partial A_i}{\partial T_i^C} < 0$, and

$$\begin{aligned} \frac{\partial^2 \ln V_i}{\partial^2 T_i^E} &= \frac{-\theta}{(1-\alpha\theta)\,A_i^2}\left(\frac{\partial A_i}{\partial T_i^C}\right)^2 + \frac{\theta}{(1-\alpha\theta)\,A_i}\frac{\partial^2 A_i}{\partial^2 T_i^C} \\ &\quad + \frac{1}{\gamma_i(1+\gamma_i)}\frac{\partial^2 \gamma_i}{\partial^2 T_i^E} - \frac{1+2\gamma_i}{(\gamma_i(1+\gamma_i))^2}\left(\frac{\partial \gamma_i}{\partial T_i^E}\right)^2 \\ &< 0 \end{aligned} \tag{37}$$

If we call the solution $T^{E^{**}}(\theta, \underline{\gamma})$, we can use the Implicit Function Theorem to show that

$$\frac{\partial T_i^E}{\partial \theta} < 0 \tag{38}$$

since

$$\frac{\partial \ln V_i}{\partial T_i^E \partial \theta} = \frac{-1}{(1-\alpha\theta)^2 A_i} \frac{\partial A_i}{\partial T_i^C} < 0. \tag{39}$$

Hence, an increase in product market competition induces union i to focus more on rent creation and less on rent extraction, also under efficient bargaining. Moreover,

$$\frac{\partial \ln V_i}{\partial T_i^E \partial \underline{\gamma}} = -\frac{1+\gamma_i}{(\gamma_i(1+\gamma_i))^2} \frac{\partial \gamma_i}{\partial T_i^E} < 0 \tag{40}$$

We see that labor market deregulation has a similar effect on the union's resource allocation policy as in proposition 3.

7 Conclusion

The role that unions play in economic systems has long been debated. On one hand, the traditional economic view has emphasised how unions create distortions in the labour market by attempting to extract rents; on the other hand, many economists and industrial relations scholars have argued that unions often enhance productivity by providing a host of agency services. In this paper, we have presented a model of union behavior that bridges the gap between these views. The main contribution of the paper is to show formally how the behavior of a union - its face - is systematically related to conditions in the product market and to labor market regulation.

The model has a clear empirical prediction: unionised workplaces, settled in more competitive product market environments, should experience a higher productivity level than similar workplaces in less competitive environments, *ceteris paribus*. In addition, to some extent the induced change in the emphasis that a union attaches to each of the two activities can be interpreted as an endogenous change in the conduct of industrial relations. Finally, the model suggests that the wage mark-up that unions can secure is decreasing in the degree of product market competition. This property is a standard feature

of union models, and it derives from the fact that unions share in product market rents. In our model, this effect is augmented by an additional effect that arises because unions decide to invest less in building up bargaining power in a competitive product market environment.

To what extent does the existing empirical evidence support these predictions? Bellman (1992), in a survey on 17 studies from US, concludes that in those industries where firms are subject to substantial product market competition, unionised firms have higher productivity levels than non-unionised ones. While there exist a substantial, but largely inconclusive literature on the relationship between unions and productivity for other countries than the US,[22] the role of product market competition as a determinant of the impact of unions on productivity has been researched less intensively. Some important indirect evidence is, however, available from the UK labour market. Brown *et al.* (1997), for example, argue that more intense product market competition was at least as important as the industrial relations legislation introduced during the 1980s and 1990s in the UK in reshaping industrial relations. This suggests that changes in product market conditions do affect what unions do as well as the way in which they do it. Stewart (1990) investigates the impact of product market conditions on the rent extracting capacities of unions in the UK in the mid 1980s. Using a direct measure of the intensity of product market competition faced by different establishments, as reported in the 1984 Workplace Industrial Relations Survey, he finds that the average wage mark-up is higher in establishments which are the main supplier to the relevant market or which face only few competitors. This supports the view that product market competition constrains the rents available for sharing and thereby limits the scope for rent extraction. These studies, however, do not allow us to identify directly whether the behaviour of unions change in the way predicted by our model. To investigate this question empirically, we need to combine reliable information on total factor productivity at the workplace or establishment level with the survey information contained in the Workplace Industrial Relations Surveys. Additional empirical analysis aimed at measuring the impact of product market deregulation and competition on union

[22] Booth (1995, chapter 7) surveyes evidence from the UK and concludes tentatively that British unions appear to have a negative impact on the level of productivity, but this conclusion is far from robust (see, for example, Denny, 1997). Aidt and Tzannatos (2002: p. 68-72) discuss evidence from other countries, such Japan, Germany and Malaysia, and, again, the evidence is not conclusive.

behaviour and firm productivity would be valuable.

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