ENDOGENOUS SCOPE OF BARGAINING IN OLIGOPOLY

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Abstract———————————————————————————————

In this paper the scope of firm-union decentralized bargaining is shown to be endogenously determined in industries with market power. We consider a homogenous industry where firms compete in quantities. Efficient Bargains may only occur if both, the firm and its own union, unanimously agree to negotiate over employment as well as wages. Right-to-Manage bargaining takes place, if either the firm or its union choose to bargain only over wages, leaving employment decision at the firm's discretion. We show that Right-to-Manage emerges, as a subgame perfect equilibrium bargaining institution, only if the union's bargaining power is sufficiently high. If, however, the union's bargaining power is low enough, Efficient Bargains is always chosen by a subset of firm/union pairs. A firm/union pair prefers to conduct Efficient Bargains, because the firm can thus commit to a particular quantity, and hence enjoy a sufficient portion of the Stackelberg leader's profits in the product market.

Key words
Scope of Bargaining, Oligopoly, Efficient Bargains, Stackelberg Game.

1. Introduction

The scope of bargaining, i.e. the issues over which firms and unions negotiate, is a crucial institutional factor for the wage and employment determination in unionized labour markets. While in most real-life situations bargaining takes place over wages alone, there is some evidence that negotiations may also involve employment directly, or indirectly through manning ratios, crew sizes etc[1]. The latter bargaining setup typically leads to Pareto efficient outcomes where the correlation among long-run unemployment and real wage inflation rates is non-necessarily positive (McDonald & Solow (1981), Oswald (1985)). For this Efficient Bargains institution to emerge however, firms and unions (inside each collective bargaining unit) should unanimously agree to negotiate over employment as well as wages. Otherwise, the unions should in some way be able to "force" firms to set employment at the efficient level for a given wage bargain. The literature, so far, seem to seek an explanation for the emergence of Efficient Bargains along the lines of the latter postulate. That is, as long as only wage bargains are contractually binding, unions can "convince" firms to set employment along the contract curve by using punishment strategies. Then firms, faced with the unions´ credible threats, have no incentive to renege (after the wage bargain had been struck) and set employment along their labour demand curve (Espinoza & Rhee (1989), Eberwein & Kollintzas (1995)).

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[1] see e.g. Ashenfelter & Brown (1986), MaCurdy & Pencavel (1986), Alogoskoufis & Manning (1991), Johnson (1990), Daniel & Millward (1983), Millward & Stevens (1986).

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Our postulate is that labour market institutional arrangements emerge as long as a "winning" coalition of agents (firms and unions), each acting for its own interest, finds their establishment beneficial (see also Petrakis & Vlassis (1996)). In a decentralized firm-union bargaining environment, this postulate requires that (inside each firm/union bargaining unit) efficient bargaining emerges only if the firm and its own union unanimously agree on this arrangement[2]. Universal efficient bargaining therefore emerges only if all collective bargaining units choose this institution. Otherwise, Efficient Bargains may coexist with other institutional arrangements (e.g. Right-to-Manage) within a single, or across different, labour markets. For instance, under an EU-wide decentralized bargaining regime firms may be acting under various scope-of-bargaining setups inside their national labour markets. Which in turn, may generate various long-run relationships between real wage inflation and unemployment rates across EU countries.

We consider a homogenous good industry where firms, endowed with possibly asymmetric technologies, compete in quantities. In the labour market, firms negotiate with their own unions at the firm level alone (decentralized bargaining) and unions possess identical bargaining power. Right-to-Manage bargaining takes place if either the firm, or its union, choose to bargain only over wages, leaving employment decision at the firm's discretion. Efficient Bargains emerge only if both, the firm and its union, unanimously agree to negotiate

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[2] In this paper, we assume that the level-of-bargaining setup (the degree of bargaining centralization) is given (decentralized bargaining). In previous work (Petrakis and Vlassis(1996)),we have shown that asymmetries in productive efficiency and bargaining power are responsible for the emergence of various degrees of bargaining centralization.

about both, employment and wages. Negotiations are conducted in parallel sessions between each firm and its own union. Employment decisions follow, only if a subset of firms (or, their unions) choose Right-to-Manage. If however, a subset of firms and their own unions agree on Efficient Bargains, their employment decisions are also taken during the parallel negotiations sessions. Finally, firms decide simultaneously on their production plans.

Our central result is that if the unions´ bargaining power is low enough, Efficient Bargains is always chosen by a subset of firm/union pairs in a subgame perfect equilibrium. A firm, by choosing to conduct simultaneous wage-employment bargaining, is able to *precommit* to a particular production plan while negotiating. A firm has incentive to do so as long as it would enjoy a sufficient portion of the ensuing, Stackelberg leader's, additional profits in the product market. Unions, on the other hand, always prefer Efficient Bargains. Hence, if the union´s portion of the profit differential is sufficiently low to make it worthwhile for its firm to become a Stackelberg leader, Efficient Bargains emerge for at least a section of the labour market. As a result, production and employment decisions of ex-ante identical firms differ in equilibrium. If, on the other hand, the unions' bargaining power is sufficiently high, firms always choose to bargain over wages alone, and universal Right-to-Manage emerges as the subgame perfect equilibrium bargaining institution.

So far, the trade unions literature (see e.g. Oswald (1985)) seems to imply that it is the union´s bargaining power per se (or, as in Manning (1987), the differences in the union´s power over different issues, e.g. wages/employment) that leads to inefficient outcomes. This literature, however, takes as exogeneously given the labour market institution which is often

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ex-ante inefficient. These studies, therefore, seem to suffer from identification problems: Is it the union´s bargaining power, the union´s power configuration, or the labour market institutional setup, responsible for the emergence of inefficient outcomes? If, for instance, a powerful union is considered to generate inefficient outcomes, why then the same union's activities may be compatible with Efficient Bargains? Or, what if a union's power is the same over different issues, but still leads to inefficient outcomes, as long as the institutional setup does not, at first place, provide an employment negotiation stage[3]?

Our analysis highlights the critical role of the unions´ bargaining power for the endogenous determination of the scope of bargaining. We argue that, in imperfectly competitive industries, the overall unions' militancy is the main factor responsible for the relative efficiency of the emerging labour market institutions. Further, given the institutional setup, a union's bargaining power, which represents its share of control over favorable outcomes inside the bargaining unit, determines the relative efficiency of wage/employment outcomes. Naturally then, in a symmetric world the union's bargaining power identifies both, the bargaining institution and the wage/employment outcomes.

The rest of the paper is organized as follows: In Section 2 our model is developed and the case of universal Right-to-Manage Bargains is derived as the subgame perfect equilibrium labour market institution, whenever the unions' share of control inside their bargaining units is

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[3]The first of the above two enquiries refers to the dichotomy implied by the "Monopoly Union" and the "Efficient Bargains" models (McDonald & Solow (1981)). In Oswald (1985), this dichotomy is resolved via the, rather special, assumption of horizontal union´s indifference curves. The second enquiry concerns Manning's (1987) "Sequential Bargaining Framework".

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greater than the firms' share. In Section 3 we show that all firm/union units conducting Efficient Bargains cannot be sustained as a pure strategy subgame perfect equilibrium outcome. Section 4 provides our key proposition; as long as the unions' bargaining power is less than the firms', a subset of firm/union pairs will always opt for Efficient Bargains, with the rest choosing Right-To-Manage. In the concluding Section 5, our findings are briefly evaluated.

2. The Model

We consider a homogeneous good industry where two firms, on principle endowed with asymmetric technologies, compete in the product market by choosing quantities. For simplicity, we assume that the production technology exhibits constant returns to scale and requires only labour input to produce the good[4]. Firm i's production function is $y_i = N_i/A_i$, $i=1,2$, where y_i is the output, N_i the labour input, and $1/A_i > 0$ the labour productivity in firm i. We further assume, for tractability reasons, that the market demand is linear and is given by $P(Y)=a-Y$, where Y is the aggregate output ($Y=y_1+y_2$). Labour is assumed to be firm-specific. Therefore, each firm's employees form a separate union, which always enter into negotiations (about wages alone, or wages and employment) with its own firm[5]. That is, bargaining is

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[4]This is equivalent to a two-factor Leontief technology where the amount of capital is fixed in the short run and is large enough not to induce zero marginal product of labor.

[5] In a symmetric word formation of firm-specific unions is better justified by assuming firm-specific labour force. In the presence, however, of asymmetries (e.g. technological or in

decentralized. Assume that unions are identical, each being of the utilitarian type (Oswald (1982)). Then union i's objective is to maximize

$$U_i\ (w_i, N_i) = (w_i - w_0)^\varphi N_i \qquad (1)$$

with $\varphi \in (0,1]$ being the representative member's relative rate of risk aversion, provided that union membership is fixed. Considering economy-wide real arguments, and assuming that the industry is small enough relative to the macroeconomy, w_i is the negotiated wage and w_0 is the outside option. (The latter can be thought as a weighted average of the competitive wage and the unemployment benefits with weights the probability of being employed, or not, in the competitive sector). Unions are endowed with the same bargaining power, b, during the negotiations with their firms.

Let us start taking the scope of bargaining to be exogeneously given. Suppose that Right-to-Manage Bargains is the "existing" labor market institution. Firm/union pairs bargain in parallel sessions about wages alone, leaving employment decisions to the firms' discretion. We may then ask: Is this a "stable" institution under any labour and product market conditions? If no firm/union pair has incentive to switch to Efficient Bargains (by including employment in the scope of bargaining), then Right-to-Manage is stable. Equivalently, Right-to-Manage will emerge as an *endogenous* (i.e. forming part of the subgame perfect equilibrium) institution in case that institutions regarding the scope of bargaining are absent at first place.

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bargaining powers), this is the only natural assumption, given that such asymmetries usually generate conflicts of interests among firm's unions.

In Right-to-Manage Bargains, the timing of the game is as follows. In the first stage, firm/union pairs bargain simultaneously over wages. Employment and production decisions are subsequently taken, simultaneously by the firms. Note, that given our one-factor linear technologies, and that firms compete in quantities, a firm's employment decision also determines its output. In this second stage, firm i chooses y_i to maximize its profits

$$\pi_i = (a - y_i - y_j)y_i - w_i A_i \, y_i \qquad\qquad (2)$$

taking as given the output of its rival y_j, and the vector of negotiated wages (w_i, w_j), in the previous stage. The first order conditions (focs) of (2) provide firm i's reaction function, $R_i(y_j) = (a - A_i \, w_i - y_j)/2$. Then the equilibrium outputs, profits and employment levels are, $i,j = 1,2$,

$$y_i^*(w_i, w_j) = (a - 2A_i w_i + A_j w_j)/3 \qquad \pi_i^*(w_i, w_j) = y_i^{*2} \qquad N_i^*(w_i, w_j) = A_i y_i^* \qquad (3)$$

Turning to the first stage, firm/union pairs bargain about firm-specific wages in parallel sessions, each taking into account how its decision will influence the competitiveness of its firm in the subsequent production game. For instance, union i, when pushing for a wage increase above that of its rival firm's union, takes into account that such an increase in its own firm's unit cost of production may significantly reduce its sales, and thus the number of the union's members employed. The negotiated wage in each bargaining session is derived using the Generalized Nash Bargaining solution. Taking as given the equilibrium outcomes of the production game (3), firm/union pair i chooses w_i to maximize

$$[\pi_i^*(w_i, w_j)]^{(1-b)}[(w_i - w_0)^{\varphi} N_i^*(w_i, w_j)]^b \qquad\qquad (4)$$

given the wage negotiated in the firm/union pair j, w_j. The foc of (4) is

$$(2-b)[\partial y_i^*/\partial w_i]/y_i^* + b\varphi/(w_i-w_0) = 0 \qquad (5)$$

Solving for the negotiated wages, we get

$$w_i^* = [2(2-b+b\varphi)\{ab\varphi + 2A_iw_0(2-b)\} + b\varphi\{ab\varphi + 2A_jw_0(2-b)\}]/A_iD \qquad (6)$$

$i,j=1,2$, where $D=(4-2b+b\varphi)(4-2b+3b\varphi)$. Then from (3), the firms´ outputs in the subgame

perfect equilibrium are,

$$y_i^* = [2(2-b)\{a(4-2b+3b\varphi) + 2A_jw_0(2-b)-A_iw_0(8-4b+3b\varphi)\}]/3D \qquad (7)$$

Then, again, $N_i^*=A_iy_i^*$, $\pi_i^*=(y_i^*)^2$. It can be checked that $U_i^*=\{3b\varphi/2(2-b)\}^\varphi A_i^{1-\varphi}y_i^{*1+\varphi}$.

The Right-to-Manage institution forms part of the subgame perfect equilibrium only if

no firm/union pair has incentives to unilaterally deviate by including employment in its

negotiations agenda. Of course, such an inclusion must be profitable for both the firm and the

union, otherwise anyone of them will veto it. Suppose, for instance, that firm/union 2 stick to

Right-to-Manage, but firm/union 1 decide to conduct Efficient Bargains. It is easy to see that

firm 1 becomes now a Stackelberg leader in the product market. Firm 1´s employment level,

and thus its output, is decided during the firm/union 1´s bargaining session, which precedes

firm 2´s output decision. In this way, firm 1 precommits to an output level, and thus increases

its revenues in the product market, by agreeing to include employment as a negotiation

argument. Firm 1, however, has also to evaluate the loss resulting from being away from its

labor demand curve. The higher the bargaining power of the union is, the higher the loss from

paying wages above the marginal revenue of labor. A weak enough, in the negotiation table,

firm will, therefore, lose more than what it could gain by becoming Stackelberg leader in the

product market. This is indeed summarized in the following proposition.

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Proposition 1: *Right-to-Manage Bargains (Scope of Bargaining about wages alone) is*

the subgame perfect equilibrium institution if, and only if, $b \geq 0.5$.

Proof: (see Appendix).

On the other hand, if the union's bargaining power is small enough ($b < 0.5$), firm 1

has more to gain by becoming Stackelberg leader than losing from employment concessions. In

fact, firm/union 1, by conducting Efficient Bargains, can jointly achieve the profits of a

Stackelberg leader. A strong firm 1 then enjoys the bulk of those joint profits, and thus has

incentive to bargain about employment as well as wages. Further, union 1 will also opt for

Efficient Bargains, because it achieves the same percentage share as before, but of a larger

"pie". Therefore, both the firm and its own union unanimously decide to switch to Efficient

Bargains whenever b is small enough.

If Right-to-Manage Bargains is the endogenously chosen institution ($b \geq 0.5$), how does

aggregate employment vary with the unions' bargaining power? Restricting attention to the

symmetric case (i.e. $A_i = A_j = A$), aggregate employment is given by

$$Y_R^* = 2y_i^* = 4(2-b)(a-Aw_0)/3(4-2b+b\varphi)$$

As $\partial Y_R^*/\partial b < 0$, aggregate employment decreases with the unions' bargaining power. An

increase in b results to higher negotiated wages, which in turn leads to lower employment

levels, as firms choose employment from their downward sloping labour demand curves.

3. Efficient Bargains

If, as shown above, Right-to-Manage Bargains cannot be the endogenously chosen institution, whenever unions are weak enough, then one alternative might be that all firm/union pairs choose Efficient Bargains. We assume, therefore, that Efficient Bargains is the "given" institution, and then we question its stability. A firm, or a union, that is against the inclusion of employment in the negotiations is able to veto it. The respective firm/union pair will then necessarily switch to Right-to-Manage bargaining. Note, that the Efficient Bargains institution is more vulnerable, as it has to resist to unilateral deviations (of a firm, *or* a union), than the Right-to-Manage institution, that needs only to resist to bargaining pair deviations (of a firm *and* its union).

In Efficient Bargains firm/union i pair chooses w_i and N_i (or, equivalently y_i) to maximize the generalized Nash product,

$$[(a-y_i-y_j)y_i - w_iA_iy_i]^{(1-b)}[(w_i-w_0)^{\varphi}A_iy_i]^b \tag{8}$$

The focs are as follows, $i,j=1,2$,

$$b\varphi/[w_i-w_0] = (1-b)A_i/[a-y_i-y_j-w_iA_i]; \quad 1/y_i = (1-b)/[a-y_i-y_j-w_iA_i] \tag{9}$$

Solving the above system we get, $i=1,2$,

$$w_i^* = [ab\varphi(1-b+b\varphi)+w_0\{A_jb\varphi+A_i(3-4b+b^2+2b\varphi-b^2\varphi)\}]/A_iF \tag{10}$$

$$y_i^* = [a(1-b+b\varphi)-w_0\{A_i(2-b+b\varphi)-A_j\}]/F \tag{11}$$

where $F=(2-b+b\varphi)^2-1$. It can be also checked that firm i's profits are, $\pi_i^*=(1-b)y_i^{*2}$

To check if (universal) Efficient Bargains can be sustained as an equilibrium institution, assume that firm/union 2 negotiate about both wages and employment. Does firm 1, or union 1, has incentive to veto the inclusion of employment into firm/union 1 pair´s negotiations? As the following proposition shows, there are always incentives to exclude employment from the firm/union 1 bargaining agenda whenever firm/union 2 conducts Efficient Bargains.

Proposition 2: *Efficient Bargains (Scope of Bargaining about both wages and employment) can never universally be the endogenously chosen institution in a subgame perfect equilibrium.*

Proof: (see Appendix).

In fact, firm 1 will always veto employment negotiations. The intuition is as follows. Universal Efficient Bargains result to a relatively high aggregate output, and thus a low market price. The firm 1, which vetoes employment negotiations, is transformed to a Stackelberg follower, since its employment (and production) decisions will be taken at a later stage. Firm 1 will then reduce employment and output, thus pushing the market clearing price up. In addition, it will save on the excess labour costs (from paying its workers above their marginal revenue product of labour). It turns out that firm 1, by unilaterally imposing Right-to-Manage Bargains, can always increase its profits, whatever the union´s bargaining power is[6].

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[6] This is a strong result which, however, persists in generalizations of the model. It can be checked that universal Efficient Bargains cannot be a pure strategy equilibrium institution even if unions differ in their bargaining powers.

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In summary, Efficient Bargains is never a universally endogenously chosen institution. Right-to-Manage, on the other hand, is universally chosen only if the unions´ bargaining power is larger than, or equal to, the firms´ bargaining power. It, therefore, remains to be determined which would be the endogenously chosen institution whenever unions are relatively weaker than firms in the negotiation table. As it is shown in the next section Efficient Bargains and Right-to-Manage may in fact coexist, even when product and labour market conditions are ex-ante symmetric.

4. Coexistence of Right-to-Manage and Efficient Bargains.

In this section we show that if the unions´ bargaining power is sufficiently low, a subset of firms and their unions negotiate about both wages and employment, while the rest bargain about wages alone, leaving employment to their firms´ discretion. Different scope of bargaining will therefore be endogenously chosen by different subsets of firm/union pairs in equilibrium. This result holds even with ex-ante identical firm/union pairs. In the latter case, the ex-ante identical firms´ market shares and profits will differ ex-post. Further, employment and wages will differ across firms, and the ex-ante identical unions will ex-post achieve different levels of welfare in the subgame perfect equilibrium[7].

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[7] These are always observed in an asymmetric subgame perfect equilibrium where firm/union 1 choose Right-to-Manage, while firm/union 2 choose Efficient Bargains, or vice versa. They are also observed with positive probability in the symmetric mixed strategy equilibrium where firm/union i mixes between Efficient Bargains and Right-to-Manage. Given that the analysis of

Let firm/union 1 choose to negotiate about both wages and employment. Let firm/union 2 choose to bargain about wages alone[8]. As we show, this is an equilibrium scope of bargaining configuration, whenever unions are weaker than firms in the negotiation table. Firm/union 1 pair chooses w_1 and y_1 (equivalently, N_1) to maximize

$$[(a-y_1-R_2(y_1))y_1 - w_1A_1y_1]^{(1-b)}[(w_1-w_0)^\varphi A_1y_1]^b \qquad (12)$$

taking as given the negotiated wage w_2, and the firm 2´s optimal response to its employment (and thus output) decision in the subsequent production stage, $R_2(y_1)=(a-w_2A_2-y_1)/2$. Substituting $R_2(y_1)$ in (12), taking the focs and solving for w_1 and y_1 as functions of w_2 we get,

$$w_1=[ab\varphi +2A_1(2-b)w_0 +b\varphi A_2w_2]/2A_1(2-b+b\varphi)$$

$$y_1=[a -2A_1w_0+A_2w_2]/(2-b+b\varphi) \qquad (13)$$

For any w_2, (13) describes the optimal wage and employment/output responses of the firm/union 1 pair. As w_2 increases both w_1 and y_1 increase. That is, w_2 is strategic complement to w_1. An increase in the negotiated wage of firm/union 2 pair makes more profitable the increase of the negotiated wage for the firm/union 1 pair. Also, it leads to an increase in firm 1´s output as it makes firm 2 less competitive.

On the other hand, firm/union 2 pair chooses w_2 to maximize

$$[(a-y_1-R_2(y_1))R_2(y_1) - w_2A_2R_2(y_1)]^{(1-b)}[(w_2-w_0)^\varphi A_2R_2(y_1)]^b \qquad (14)$$

the mixed strategy equilibria is complicated and does not add much to our conclusions, we will not pursue it here.

[8] This is w.l.og. since, according to our assumptions, A_1 can be larger, equal, or smaller than A_2.

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taking as given w_1, y_1, and also the firm 2´s optimal output in the subsequent production stage (given by $R_2(y_1)$). The foc of (14) then implies

$$w_2 = [ab\varphi + A_2(2-b)w_0 - b\varphi y_1]/A_2(2-b+b\varphi) \tag{15}$$

As firm 1 commits to a higher level of output (by committing to a higher employment level), the firm/union 2 pair lowers its wage to preserve the competitiveness of firm 2, which in turn would guarantee a sufficient level of employment for union 2´s members. Solving (13) and (15), we obtain the equilibrium wages and outputs.

$$w_1^* = [ab\varphi \ (2-b+2b\varphi) + w_0\{2A_1((2-b)^2 + b\varphi(3-b)) + A_2 b\varphi(2-b)\}]/2A_1 G$$

$$w_2^* = [ab\varphi \ (1-b+b\varphi) + w_0\{A_2(2-b)^2 + 2b\varphi(A_1+A_2) - A_2 b^2 \varphi\}]/A_2 G$$

$$y_1^* = [a(2-b+2b\varphi) - w_0\{2A_1(2-b+b\varphi) - A_2(2-b)\}]/G$$

$$y_2^* = [(2-b)\{a(1-b+b\varphi) - w_0(A_2(3-b+b\varphi) - 2A_1)\}]/2G \tag{16}$$

where $G = \{b\varphi + (b\varphi - b + 2)^2\}$. It can be also checked that $\pi_1^* = (1-b)y_1^{*2}/2$, and $\pi_2^* = y_2^{*2}$. Note, that the firm/union 1 pair, via the firm 1´s Stackelberg leadership in the product market, achieve now higher joint rents than if firm 1 had behaved as a Cournot competitor (via Right-to-Manage in the labour market). Therefore, as long as firm 1 enjoys a sufficiently high share of these joint rents, there is a clear incentive for firm 1 to stick to Efficient Bargains. Further, in this case, union 1´s welfare proves to be higher, since it now enjoys a higher employment level, at the same wage if it had left employment decisions at the employer´s discretion. The condition under which Right-to-Manage and Efficient bargains coexist in a subgame perfect equilibrium, where firm/union pairs choose the scope of their bargaining, is given in the following proposition.

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Proposition 3: *If the union´s bargaining power b≤0.5, Right-to-Manage Bargains and Efficient Bargains coexist, each chosen by a different subset of firm/union pairs, in a subgame perfect equilibrium.*

Proof: (see Appendix).

The intuition is as follows. Given that firm/union 1 conduct Efficient Bargains, firm 2 has no incentive to propose to its union the inclusion of employment in their negotiations. Switching to Efficient Bargains strengthens the market competition, as both firms precommit to a higher output, via employment agreements above their marginal revenue product of labour. Further, firm 2 loses because it also pays a wage above its marginal revenue productivity of labour. On the other hand, given that firm/union 2 pair bargains about wage alone, firm 1 has incentive to veto the inclusion of employment into the negotiations only if its union enjoys most of the pie obtained through Efficient Bargains.

Note, that neither the exact magnitude of union members´ relative risk aversion (φ), nor the presence of technological asymmetries among firms (if $A_i \neq A_j$) play a role in the endogenous determination of the scope of bargaining institutions. It is only the (symmetric, in our context) unions´ strength *(b)* that effectively determines the choice of these institutions. Note, further, that for $b=0.5$, there are two equilibrium scope of bargaining institutions. Both Universal Right-to-Manage (Proposition 1) and Coexistence of Efficient Bargains with Right-to-Manage Bargains (Proposition 3) can be sustained as subgame perfect equilibrium outcomes.

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If Efficient Bargains coexist with Right-to-Manage $(b \leq 0.5)$, how aggregate employment varies with the unions´ bargaining power? Restricting attention again to ex-ante symmetric firms $(A_i=A_j=A)$, we get from (16) the aggregate employment level $(Y_C^*=y_1^*+y_2^*)$,

$$Y_C^* = (6-5b+b^2+6b\varphi-b^2\varphi)(a-Aw_0)/2G$$

Contrary to the Universal Right-to-Manage Bargains, aggregate employment in this case may increase, or decrease, with the unions´ bargaining power b, depending on the value of the parameter φ. In fact, if unions´ members are sufficiently risk-averse (e.g. $\varphi < 0.6$), aggregate employment increases with b. The opposite is true if unions´members are close to be risk neutral (e.g. $\varphi > 0.8$). For intermediate values (e.g. $\varphi=0.7$), aggregate employment initially decreases, and then increases with b. Finally, for $b=0.5$, under Universal Right-to-Manage Bargains aggregate employment is $Y_R^*=4(a-Aw_0)/(6+\varphi)$, while under coexistence of institutions is $Y_C^*=(15+11\varphi)(a-Aw_0)/2(9+8\varphi+\varphi^2)$, with $Y_C^* > Y_R^*$ for all values of φ. Summarizing, as the unions´ bargaining power decreases, aggregate employment increases continuously initially, then jumps up for $b=0.5$. For further decreases of b, however, aggregate employment may decrease or increase.

5. Conclusions

In this paper the scope of firm-union (decentralized) bargaining is shown to be endogenously determined in an imperfectly competitive industry. The scope of bargaining emerges as a subgame perfect equilibrium arrangement among firms and their unions inside

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each collective bargaining unit. Universal efficient bargaining never emerges as a pure strategy equilibrium outcome. Efficient Bargains, however, can in fact coexist with other inefficient arrangements (Right-to-Manage) within the labour market of a single industry. Union's bargaining power, which in a symmetric environment identifies the unions' overall militancy as well, is shown to generate various scope of bargaining setups. Our conjecture is that, even in the presence of bargaining power asymmetries among unions, it is the unions' overall strength that determines the relative efficiency of the emerging institutions.

Our findings are in line with the observation that there is consistent causality among unions' activity, efficiency of labour market institutions, and long-run unemployment rates. As our static decentralized bargaining framework predicts, militant unions generate inefficient institutions, which in turn lead to higher long-run unemployment. This seems to explain to some degree the recent evidence from Europe, where persistently high unemployment rates are accompanied with increasing decentralization on wage bargains (Jackman *et al* (1990), Jimeno (1992)). The reason may be that unionization rates have risen in Europe during the last decades, increasing in turn the unions' militancy, and thus making the bargaining setups overall more inefficient, especially in an increasingly decentralized environment. This prediction also fits the stylized facts showing significant variability in unemployment rates across countries. Given that unionization rates are not evenly distributed, one should not expect the efficiency of existing bargaining institutions to be the same across national labour markets. Even under an EU-wide, effectively decentralized bargaining environment,

unionization rates may still significantly differ, so as to sustain various rates of unemployment across EU sectors.

Several important implications can be drawn from our results regarding particularly issues of labour market legislation and unemployment policies. First, regarding the scope of bargaining, labour market agents (firms and unions) are always self-motivated to specify the institutional setup which is consistent with their own interests. Second, provided that labour market legislation allows for the interested parties to choose their bargaining agenda, policies aiming to fight long-run unemployment should typically concentrate on measures to restrain the unions' militancy. Restricting the unions' overall bargaining power may prevent the labour market setup to switch to more inefficient arrangements (universal Right-To-Manage), and thus to higher long-run unemployment rates. Such policies will also lead to lower unemployment rates whenever unions´ members are rather risk neutral, or the union´s bargaining power is initially too high. Our predictions are in contrast with the popular trade unions literature, where restricting the union´s power often reduces long-run employment in case that Efficient Bargains is the given institution. Third, given that a variety of labour market official setups exist across EU countries (De la Croix (1992), Hartog & Theeuwes (1992)), coordination of labour market legislation along the previous lines is needed before a unified labour market can effectively emerge.

Appendix

Proof of Proposition 1:

We need to find the conditions under which no firm/union pair has incentives to switch to Efficient Bargains. Suppose, w.l.o.g., that firm/union 1 unilaterally deviate by bargaining over employment as well. By determining N_1^d, and thus y_1^d, firm 1 becomes a Stackelberg leader. Given that the negotiated wage of firm/union 2 is w_2^* (given in (6)), and that firm 2's optimal response to y_1^d is $R_2(y_1^d) = (a-w_2^*A_2-y_1^d)/2$, firm/union 1 choose (y_1^d, w_1^d) to maximize,

$$[(a-y_1^d-R_2(y_1^d))y_1^d - w_1^d A_1 y_1^d \,]^{(1-b)}[(w_1^d-w_0)^\varphi A_1 y_1^d]^b \tag{A1}$$

Taking the focs, substituting w_2^* from (6), and solving the system of equations we get:

$$y_1^d = [2\{a(4-2b+3b\varphi)+2A_2w_0(2-b)-A_1w_0(8-4b+3b\varphi)\}]/D \tag{A2}$$

$$w_1^d = [2(2-b+b\varphi)\{ab\varphi+2A_1w_0(2-b)\}+b\varphi\{ab\varphi+2A_2w_0(2-b)\}]/A_1D \tag{A3}$$

where $D = (4-2b+b\varphi)(4-2b+3b\varphi)$. Note that $w_1^d = w_1^*$ (given in (6)). It can be also checked that $\pi_1^d = (1-b)(y_1^d)^2/2$. Then

$$\pi_1^d/\pi_1^* = (1-b)(y_1^d)^2/2(y_1^*)^2 = 9(1-b)/2(2-b)^2 \tag{A4}$$

where y_1^* is given in (7). Firm 1 does have incentives to switch to Efficient Bargains as long as $\pi_1^d > \pi_1^*$, which is true whenever $b<0.5$. Nonetheless, union 1 always prefers bargaining over employment as well, since $U_1^d/U_1^* = 3/(2-b) > 1$ always. Therefore, if $b \geq 0.5$, Right-to-Manage Bargains is the subgame perfect equilibrium institution.   Q.E.D

Proof of Proposition 2:

Does a firm or a union has incentive to exclude employment from the negotiations agenda? W.l.o.g. we need only to show that firm 2 enjoys higher profits by opting for Right-to-Manage Bargains. Given that firm/union 1 choose (w_1*, y_1*) (given in (10)), and that firm 2 will optimally respond to y_1* in the product market, $R_2(y_1*) = (a-w_2^d A_2 - y_1*)/2$, firm/union 2 negotiate over w_2^d according to:

$$Max[(a-y_1*-R_2(y_1*))R_2(y_1*) - w_2^d A_2 R_2(y_1*)]^{(1-b)}[(w_2^d - w_0)^\varphi A_2 R_2(y_1*)]^b \qquad (A5)$$

Taking the foc and substituting y_1* from (10), we obtain

$$w_2^d = [ab\varphi(1-b+b\varphi) + w_0\{A_1 b\varphi + A_2(3-4b+b^2+2b\varphi-b^2\varphi)\}]/A_2 F \qquad (A6)$$

where $F = (2-b+b\varphi)^2 - 1$. Then from firm 2's reaction function we get,

$$y_2^d = [(2-b)\{a(1-b+b\varphi) - w_0(A_2(2-b+b\varphi) - A_1)\}]/2F \qquad (A7)$$

Note that $w_2^d = w_2*$. Further, it can be checked that $\pi_2^d = (y_2^d)^2$. Then $\pi_2^d/\pi_2* = (y_2^d)^2/(1-b)y_2*^2 = (2-b)^2/4(1-b)$, which is always greater than 1. Hence, firm 2 has always incentives to veto the inclusion of employment into negotiations. That is, Efficient Bargains can never be the universally chosen institution in the subgame perfect equilibrium. Q.E.D.

Proof of Proposition 3:

We first prove that firm/union 2 have no incentives to switch to Efficient Bargains. To do so, we need only to show that firm 2 enjoys lower profits by including employment into negotiations. Given firm/union 1's choice of (w_1*, y_1*)(given in (16), firm/union 2 choose (w_2^d, y_2^d) to maximize

$$[(a-y_1* - y_2^d)y_2^d - w_2^d A_2 y_2^d]^{(1-b)}[(w_2^d - w_0)^\varphi A_2 y_2^d]^b \qquad (A8)$$

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Taking the focs, substituting (w_1*,y_1*) from (16), and solving the system of equations we get:

$$w_2^d = [ab\varphi\ (1-b+b\varphi) + w_0\{A_2(2-b)^2 + 2b\varphi(A_1+A_2) - A_2b^2\varphi\}]/A_2G \qquad (A9)$$

$$y_2^d = [a(1-b+b\varphi) - w_0(A_2(3-b+b\varphi) - 2A_1)]/2G \qquad (A10)$$

where $G = \{b\varphi + (b\varphi - b + 2)^2\}$. Note again that $w_2^d = w_2*$. It can be also checked that

$\pi_2^d = 4(1-b)(y_2^d)^2$. Then $\pi_2^d/\pi_2* = 4(1-b)(y_2^d)^2/y_2*^2 = 4(1-b)/(2-b)^2$, which is less than 1 for all b.

Hence, firm 2 prefers Right-to-Manage always.

We next show that neither firm 1, nor its union have incentives to switch to Right-to-Manage Bargains if $b<0.5$. Given that firm/union 2 choose w_2* (given in (16)), and then leave employment decisions to firm 2´s discretion, whenever firm/union 1 bargains over wages (w_1^d) alone, firm 1 chooses y_1^d to maximize its profits at the subsequent production game. Then from (3) we have $y_1^d = (a-2A_1w_1^d + A_2w_2*)/3$, with $\pi_1^d = (y_1^d)^2$. Taking this into account, firm/union 1 choose w_1^d to maximize,

$$[\pi_1^d\ (w_1^d,w_2*)]^{(1-b)}[(w_1^d-w_0)^\varphi\ A_1\ y_1^d\ ]^b \qquad (A11)$$

Taking the foc, substituting w_2* from (16), and solving for w_1^d we get,

$$w_1^d = [ab\varphi\ (2-b+2b\varphi) + w_0\{2A_1((2-b)^2 + b\varphi(3-b)) + A_2b\varphi(2-b)\}]/2A_1G \qquad (A12)$$

Note again that $w_1^d = w_1*$. Also,

$$y_1^d = [(2-b)\{a(2-b+2b\varphi) - w_0(2A_1(2-b+b\varphi) - A_2(2-b))\}]/3G \qquad (A13)$$

It can be checked that $\pi_1^d = (y_1^d)^2$. Therefore, $\pi_1^d/\pi_1* = 2(y_1^d)^2/(1-b)y_1*^2 = 2(2-b)^2/9(1-b)$, which is ≤ 1 as long as $b \leq 0.5$. Further, $U_1^d/U_1* = y_1^d/y_1* = (2-b)/3 < 1$ for all b. Hence, neither firm 1, nor union 1, has incentive to switch to Right-to-Manage if $b \leq 0.5$. Q.E.D.

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