Union Delegation and Incentives for Merger [*]

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Abstract

We analyze a unionized duopoly model to examine how unions affect the incentives for merger. We find that, once the union has the option to delegate, an increase in the union bargaining power can create incentives for the firms to merge.

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1 Introduction

Labor market organization plays an important role in determining wage levels and product market structure (see e.g. Horn and Wolinsky, 1988). This paper incorporates the option for unions to delegate the wage bargaining and analyzes how it affects the incentives for merger.

Up to now the literature has mainly focused on strategic delegation on behalf of shareholders. Fershtman and Judd (1987) were first to address the issue of strategic managerial delegation in the context of oligopolistic industries with Cournot competition (see also Sklivas, 1987). More recently, González-Maestre and López-Cuñat (2001) have considered the interactions between the use of strategic managerial delegation and mergers. They have shown that the incentives for merger, under managerial delegation, are considerably increased with respect to the setting without delegation. Regarding strategic union delegation, Conlin and Furusawa (2000) have provided an explanation of why senior union members may represent the union in contract negotiations with a monopolist. By strategically delegating contract negotiations to wage-maximizing individuals, the surplus-maximizing union may be better off than if surplus-maximizing individuals negotiate the contract.

In this paper we go further by dealing with the interactions between the strategic use of union delegation and the incentives for merger in duopolistic markets. In what follows we show that unionization does not always reduce the incentives for merger as advocated in Horn and Wolinsky (1988). Indeed, we find that, once the union has the option to delegate, an increase in the union bargaining power can create incentives for the firms to merge. Precisely, both firms may find profitable to merge and negotiate the wage with surplus-maximizing delegates in order to avoid having to bargain with wage-maximizing delegates. Moreover, we show that in such equilibrium the option of strategic delegation harms both the unions and the firms.

An important consequence of those findings is that one should question the wisdom that unionization decreases incentives for merger and that strategic union delegation increases benefits for the union.

2 The Basic Model

Consider a duopolistic market for a single homogenous product, where the demand is linear and is given by $P = a - b \cdot Q$, P is the market price, and Q is the aggregate quantity demanded. There are two firms indexed by i, $i = 1, 2$. Let Q_i denote the quantity produced by firm i, and let Π_i denote the profit level of each firm i. The only variable input is labor. Technology exhibits constant returns to scale and is normalized in such a way that $Q_i = L_i$, where L_i is labor input, and the unit production cost of each firm is the wage W_i. Thus, the profit of each firm is given by

$$\pi_i = (a - bQ)Q_i - W_i \cdot Q_i.$$

Each firm belongs to and is controlled by one risk-neutral owner. The objective of each owner is to maximize profits. In addition, each firm is unionized, and enters into a closed-shop agreement with its risk-neutral union. The workforce for each firm is drawn from separate pools of labor, and the union objective is to maximize the union surplus, taking as given the wage obtained by the other union:

$$U_i = L_i \cdot (W_i - \overline{W}),$$

where $\overline{W}$ is the reservation wage.

We study a four-stage game. In stage one, the owners of the firms decide whether or not to merge both firms.[1] In stage two, the surplus-maximizing union (of each firm simultaneously) chooses whether to use surplus-maximizing delegates or to use wage-maximizing delegates (such as senior union members) who will negotiate the wage with the employer. The objective of a wage-maximizing delegate is simply $V_i = W_i - \overline{W}$. In stage three, the wage bargaining occurs. Finally, in stage four the employer chooses the output level. The model is solved backwards.

In the last stage of the game, two cases have to be distinguished. First, we consider the case in which the firms have not merged, i.e. the duopoly case. Then, knowing that the wage levels (W_1 and W_2) have already been determined, the employers of the two firms compete by choosing simultaneously their outputs to maximize their profits. The Nash equilibrium of this stage game yields:

$$Q_{1D}(W_1; W_2) = \frac{a + W_2 - 2W_1}{3b}, \quad Q_{2D}(W_1; W_2) = \frac{a + W_1 - 2W_2}{3b},$$
$$P_D(W_1; W_2) = \frac{a + W_1 + W_2}{3},$$

where the subscript "D" identifies the duopoly. Second, we consider the case in which the firms have merged to form a monopoly. Then, knowing that the wage level (W) has already been determined, the monopolist chooses:

$$Q_M(W) = \frac{a - W}{2b}, \quad P_M(W) = \frac{a + W}{2},$$

where the subscript "M" identifies the monopoly.

[1] To keep the model as simple as possible it is assumed that once both firms merge both unions merge too. This could be derived endogenously by allowing both unions to choose whether or not to merge once both firms have already merged (see Horn and Wolinsky, 1988). Another interpretation is that a merger implies the concentration of all activities in a single plant.

3 The Duopoly Case

In the third stage wage bargaining occurs. Inside each firm the employer and the union delegate negotiate the wage level foreseeing perfectly the effect of wages on output and employment levels. The two negotiations take place simultaneously and independently. That is, when negotiating the wage, the employer and the union delegate take the other firm's wage as given. We model the outcomes of the bargaining by using the formula of an asymmetric Nash bargaining solution which is interpreted as the limit of the subgame perfect equilibrium of the Rubinstein (1982) bargaining model when the lag between offers converges to zero (see Binmore et al., 1986).

First, we consider the case in which in both firms the union sends surplus-maximizing delegates whose interest is the same as the union's objective. Then, the predicted wages are given by

$$\begin{cases} W_1 = \arg\max \left[L_1(W_1;W_2)\cdot(W_1 - \overline{W}) \right]^{\gamma} \cdot \left[(P - W_1)\cdot Q_1(W_1;W_2) \right]^{1-\gamma} \\ W_2 = \arg\max \left[L_2(W_1;W_2)\cdot(W_2 - \overline{W}) \right]^{\gamma} \cdot \left[(P - W_2)\cdot Q_2(W_1;W_2) \right]^{1-\gamma} \end{cases}$$

where $\gamma \in (0;1)$ is the union bargaining power and the disagreement points of both firms and unions are zero. Solving these simultaneously yields the following solution for wages, ouputs, profits and unions payoffs:

$$\begin{aligned} W^{ss}_{1D} &= W^{ss}_{2D} = \overline{W} + \frac{\gamma}{4-\gamma}(a - \overline{W}),\; Q^{ss}_{1D} = Q^{ss}_{2D} = \frac{2(2-\gamma)(a-\overline{W})}{3b(4-\gamma)}, \\ \Pi^{ss}_{1D} &= \Pi^{ss}_{2D} = \frac{1}{9b}\left[\frac{2(2-\gamma)(a-\overline{W})}{(4-\gamma)}\right]^2,\; U^{ss}_{1D} = U^{ss}_{2D} = \frac{2\gamma(2-\gamma)(a-\overline{W})^2}{3b(4-\gamma)^2}, \end{aligned}$$

where the superscript "ss" means that union 1 chooses surplus-maximizing delegates and union 2 chooses surplus-maximizing delegates.

Second, we consider the case in which in both firms the union sends wage-maximizing delegates. Then, the predicted wages are given by

$$\begin{cases} W_1 = \arg\max \left[(W_1 - \overline{W}) \right]^{\gamma} \cdot \left[(P - W_1)\cdot Q_1(W_1;W_2) \right]^{1-\gamma} \\ W_2 = \arg\max \left[(W_2 - \overline{W}) \right]^{\gamma} \cdot \left[(P - W_2)\cdot Q_2(W_1;W_2) \right]^{1-\gamma} \end{cases}$$

Solving these simultaneously yields the following solution for wages, outputs, profits and unions payoffs:

$$\begin{aligned} W^{ww}_{1D} &= W^{ww}_{2D} = \overline{W} + \frac{\gamma}{4-3\gamma}(a - \overline{W}),\; Q^{ww}_{1D} = Q^{ww}_{2D} = \frac{4(1-\gamma)(a-\overline{W})}{3b(4-3\gamma)}, \\ \Pi^{ww}_{1D} &= \Pi^{ww}_{2D} = \frac{1}{9b}\left[\frac{4(1-\gamma)(a-\overline{W})}{(4-3\gamma)}\right]^2,\; U^{ww}_{1D} = U^{ww}_{2D} = \frac{4\gamma(1-\gamma)(a-\overline{W})^2}{3b(4-3\gamma)^2}, \end{aligned}$$

where the superscript "ww" means that union 1 chooses wage-maximizing delegates and union 2 chooses wage-maximizing delegates.

Finally, we consider the asymmetric cases in which the union of firm i chooses wage-maximizing delegates and the union of firm j chooses surplus-maximizing delegates. Then, the predicted wages are given by

$$\begin{cases} W_i = \arg\max \left[(W_i - \overline{W})^{\gamma} \cdot [(P - W_i) Q_i(W_i; W_j)]^{1-\gamma} \right] \\ W_j = \arg\max \, L_j(W_i; W_j) \cdot \left[(W_j - \overline{W})^{\gamma} \cdot [(P - W_j) Q_j(W_i; W_j)]^{1-\gamma} \right] \end{cases}$$

Solving these simultaneously yields the following solution for wages and unions payoffs:

$$W^{ws}_{1D} = W^{sw}_{2D} = \overline{W} + \frac{\gamma(4+\gamma)}{8(2-\gamma)-\gamma^2}(a - \overline{W}), \quad W^{ws}_{2D} = W^{sw}_{1D} = \overline{W} + \frac{\gamma(4-\gamma)}{8(2-\gamma)-\gamma^2}(a - \overline{W}),$$

$$U^{ws}_{1D} = U^{sw}_{2D} = \frac{\gamma(4+\gamma)(16-12\gamma-4\gamma^2)(a-\overline{W})^2}{3b[8(2-\gamma)-\gamma^2]^2},$$

$$U^{ws}_{2D} = U^{sw}_{1D} = \frac{\gamma(4-\gamma)(16-12\gamma+2\gamma^2)(a-\overline{W})^2}{3b[8(2-\gamma)-\gamma^2]^2},$$

where the superscript "ws (sw)" means that union 1 (2) chooses wage-maximizing delegates and union 2 (1) chooses surplus-maximizing delegates. Comparing the equilibrium wage expressions confirms our expectations. Wage-maximizing delegates obtain higher wage levels than surplus-maximizing delegates do: $W^{ww}_{1D} > W^{ws}_{1D} > W^{sw}_{1D} > W^{ss}_{1D}$ and $W^{ww}_{2D} > W^{sw}_{2D} > W^{ws}_{2D} > W^{ss}_{2D}$.

In the second stage, the unions simultaneously choose whether to use surplus-maximizing delegates or wage-maximizing delegates to negotiate the wage with the employer. The profile in which both unions choose surplus-maximizing delegates is a Nash equilibrium of the stage game if and only if $U^{ss}_{1D} \geq U^{ws}_{1D}$ and $U^{ss}_{2D} \geq U^{sw}_{2D}$. Hence, there is a $\tilde{\gamma}$ such that the profile in which both unions choose surplus-maximizing delegates is a Nash equilibrium if and only if $\gamma \geq \tilde{\gamma} \approx .79$. The profile in which both unions choose wage-maximizing delegates is a Nash equilibrium of the stage game if and only if $U^{ww}_{1D} \geq U^{sw}_{1D}$ and $U^{ww}_{2D} \geq U^{ws}_{2D}$. Hence, there is a γ_D such that the profile in which both unions choose wage-maximizing delegates is a Nash equilibrium if and only if $\gamma \leq \gamma_D \approx .81$.

Two remarks have to be made. First, an asymmetric profile where one union chooses a surplus-maximizing delegate and the other union chooses a wage-maximizing delegate is never a Nash equilibrium. Second, for $\gamma \in [\tilde{\gamma}; \gamma_D]$ we have two Nash equilibria but only one seems to be a reasonable outcome. Indeed, one can easily show that the outcome where both unions send wage-maximizing delegates is the unique coalition-proof Nash equilibrium outcome (because of $U^{ww}_{iD} \geq U^{ss}_{iD}$, $i = 1; 2$). Bernheim et al. (1987) have defined a Nash strategy combination as a coalition-proof Nash equilibrium if no coalition of players could form a self-enforcing agreement to deviate from it. To summarize, the union in each firm will choose a wage-maximizing delegate if and only if the union bargaining power is not too strong, $\gamma \le \gamma_D$.

4 The Monopoly Case

In case the union sends surplus-maximizing delegates, the predicted wage is given by

$$W = \arg\max \left[L(W)\cdot(W - \overline{W}) \right]^{\gamma} \cdot [(P - W)\cdot Q(W)]^{1-\gamma},$$

which yields :

$$W_M^s = \overline{W} + \frac{\gamma}{2}(a - \overline{W}), \; Q_M^s = \frac{(2-\gamma)(a-\overline{W})}{4b},$$

$$\Pi_M^s = \frac{1}{4b}\left[\frac{(2-\gamma)(a-\overline{W})}{2}\right]^2, \; U_M^s = \frac{\gamma(2-\gamma)(a-\overline{W})^2}{8b},$$

where the superscript "s" means that the union sends surplus-maximizing delegates to negotiate with the monopolist.

In case the union sends wage-maximizing delegates, the predicted wage is given by

$$W = \arg\max \left[(W - \overline{W}) \right]^{\gamma} \cdot [(P - W)\cdot Q(W)]^{1-\gamma},$$

which yields :

$$W_M^w = \overline{W} + \frac{\gamma}{2-\gamma}(a - \overline{W}), \; Q_M^w = \frac{(1-\gamma)(a-\overline{W})}{(2-\gamma)b},$$

$$\Pi_M^w = \frac{1}{b}\left[\frac{(1-\gamma)(a-\overline{W})}{(2-\gamma)}\right]^2, \; U_M^w = \frac{\gamma(1-\gamma)(a-\overline{W})^2}{(2-\gamma)^2 b},$$

where the superscript "w" means that the union chooses wage-maximizing delegates.

In the second stage, the union chooses whether to use surplus-maximizing delegates or wage-maximizing delegates to negotiate the wage with the monopolist. The union will choose wage-maximizing delegates if and only if $U_M^w \ge U_M^s$, that is, if and only if $8(1-\gamma) - (2-\gamma)^3 \ge 0$. Hence, there is a γ_M such that the outcome where the union chooses wage-maximizing delegates is an equilibrium outcome of the stage game if and only if $\gamma \le \gamma_M \approx .76$.

5 Merger Incentives and Competition Policy

In this section we investigate how the option the union has to use strategic delegation will affect the incentives for merger. Before answering this question we consider the benchmark where unions do not have the option of strategic delegation. We say that both firms have incentives or it is profitable for them to merge if and only if $\Pi_M \geq \Pi_{1D} + \Pi_{2D}$. Without the option of strategic delegation, both firms are going to merge if and only if $\Pi_M^s \geq \Pi_{1D}^{ss} + \Pi_{2D}^{ss}$. Hence, a merger will take place if and only if unions are weak, $\gamma \leq \frac{12-8\sqrt{2}}{3} \simeq 0.23$. Indeed, when unions are strong enough, then firms have no incentives to merge because by merging the wage spillover effects which before were pushing down the wages would disappear.

Proposition 1 *If unions cannot use strategic delegation, then firms have incentives to merge if and only if unions have a weak bargaining power,* $\gamma \leq \frac{12-8\sqrt{2}}{3}$.

One would be tempted to conclude that unionization or strong unions will decrease the incentives for merger. Then, by giving the option of strategic delegation to the union, one would expect that the profitability of mergers would decrease even more. As we show next there is no clear answer.

If $\gamma \leq \gamma_M$ then both under the duopoly and the monopoly situations wage-maximizing delegates are sent. Firms have incentives to merge if and only if $\Pi_M^w \geq \Pi_{1D}^{ww} + \Pi_{2D}^{ww}$. Hence, a merger will occur if and only if $\gamma \leq \frac{12-8\sqrt{2}}{9-4\sqrt{2}} \simeq 0.205$. This result seems to suggest that strategic union delegation would reduce incentives for merger. But this is not always true.

If $\gamma \in [\gamma_M; \gamma_D]$ then a merger enables both firms to switch from a duopolistic equilibrium in which wage-maximizing delegates are sent to a monopolistic equilibrium in which surplus-maximizing delegates are sent. That is, a merger switches the equilibrium regime with respect to the choice of delegates. Since $\Pi_M^s \geq \Pi_{1D}^{ww} + \Pi_{2D}^{ww}$ for $\gamma \in [\gamma_M; \gamma_D]$, it is optimal for the firms to merge and negotiate the wage with surplus-maximizing delegates in order to avoid a duopoly where negotiations would take place with wage-maximizing delegates.

Proposition 2 *If unions can use strategic delegation, then firms are going to merge if and only if the union bargaining power is weak,* $\gamma \leq \frac{12-8\sqrt{2}}{9-4\sqrt{2}}$, *or the union bargaining power is strong but not too strong,* $\gamma \in [\gamma_M; \gamma_D]$.

Finally, one should notice that the option of strategic delegation will harm both the firms and the unions when $\gamma \in [\gamma_M; \gamma_D]$. Indeed, we observe that the equilibrium outcome with strategic delegation is Pareto-dominated by the one without strategic delegation: $\Pi_M^s < \Pi_{1D}^{ss} + \Pi_{2D}^{ss}$ and $U_M^s < U_{1D}^{ss} + U_{2D}^{ss}$.

To summarize, strategic union delegation will decrease the incentives for merger when the union bargaining power is weak. However, if the union has a strong bargaining power, then strategic delegation might create incentives for the firms to merge.

In terms of competition policy, one should be careful when drawing conclusions with respect to unions and incentives for merger. Indeed, an increase in the union bargaining power will tend to diminish the incentives for merger. But, once we allow for strategic delegation (for example, by means of laws protecting union delegates from being dismissed), firms might be pushed to merge even if unions are strong, because a merger enables them to switch from bilateral negotiations with wage-maximizing delegates to a single negotiation with surplus-maximizing delegates. Moreover, they might end up in a situation where both the firms and the unions are worse off compared to the case without the possibility of delegation.

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