A Note on Unionized Firms’ Incentive to Integrate Vertically

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Abstract: In this paper I analyze a vertically structured monopolized market with unionized firms. I compare two types of contracts: vertical integration and franchising. With franchising and wage bargaining at the firm level the union in the downstream firm is either very powerful or has no bargaining power at all, depending on the specific time structure of the model. These arguments could make integration preferable for the profit owners even if integration is accompanied by small transaction costs.

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Introduction

When discussing firms’ incentives to integrate vertically double marginalization plays a dominant role. Two vertically connected monopolies would be better off, if the two monopolies would integrate. (Consumers would also prefer this situation). This argument is valid, if linear pricing of the upstream monopoly is the only form of contract considered. But the upstream monopoly can for example impose a two-part tariff, choosing a franchise fee in such a way that all the profit is extracted from the downstream firm. Setting the wholesale price to marginal costs, the downstream firm will produce a quantity that is optimal for the upstream monopoly. So, if vertical integration is accompanied by transaction costs, even small ones, such a non-linear price would maximize the overall firm profits and would result as the equilibrium industry structure. (This can be found in many textbooks, for example Tirole (1988)). Hart and Tirole (1990) have argued that double marginalization would be no motive for integration, when a two-part tariff were allowed. The industry structure for oligopolistic markets is analyzed for example in Lin (1988), Gal-Or (1991), Irmen (1997) and Abiru, Nahata, Raychaudhuri and Waterson (1998).

The above argumentation is based on the assumption that the cost functions of both firms are independent of the specific contract form. If wages for example are bargained at the firm level, this assumption may not be acceptable. (There exists a long list of articles analyzing the impact of different wage bargaining arrangements in oligopolistic markets. For example Dowrick (1989), De Fraja (1993), Dobson (1994), Corneo (1995), Santoni (1996), Vannetelbosch (1997) and Grandner (2000a). In Grandner (2000b) the effects of unions in vertically connected oligopolies are analyzed). Here I analyze the effects of some specific institutional arrangements of wage bargaining at the firm level on firms’ incentive to integrate vertically.

The argument is quite simple: assume downstream firm wages are bargained before the upstream firm chooses the optimal franchise fee. The downstream monopolist knows that all of the possible profit will be extracted by the upstream firm. So, the downstream monopolist has no incentive to restrict union’s wish for higher wages. As a result, the union can act like a monopoly union driving wages up. In such a setting vertical integration would limit the bargaining power of the downstream firm’s union and this advantage might overcompensate transaction costs otherwise deterring vertical integration.

If the time structure is reversed and wage bargaining takes place after the upstream firm’s decision about the two-part tariff, the situation differs completely. The upstream firm can now also extract all the rent from the downstream firm’s union, no matter what the bargaining power of the union is. The union has to accept the lowest possible wage (the reservation wage), otherwise the downstream firm’s profit would be negative. This means even a strong union cannot gain any rent. Contrary to the situation in the downstream firm, the union in the upstream firm participates from this rent extraction. In the case where both unions have (theoretically) the same bargaining power, all the rent that is extracted from the downstream firm’s union is captured by the union of the upstream firm.
No Integration: Wage Bargaining before Price Setting

To simplify the analysis assume that the downstream monopoly faces a linear demand.

\[ P_d = A - sQ \]

Using a simple technology - the downstream firm needs exactly one unit of the upstream product and \( 1/c \) units of labor input to produce one unit of output - the profit of the downstream monopolist can be written as:

\[ \pi_d = \left( P_d - P_u - \frac{w_d}{c} \right) Q - F \]

where \( P_u \) is the wholesale price, \( F \) the franchise fee chosen by the upstream monopolist, and \( w_d \) the wage paid in the downstream firm.

Profit maximization results in:

\[ Q = \frac{A - P_u - \frac{w_d}{c}}{2s} \]

The best the upstream monopolist can do, is set \( F \) in such a way that the downstream monopoly makes zero profit.

\[ F = \left( P_d - P_u - \frac{w_d}{c} \right) Q = \left( \frac{A - P_u - \frac{w_d}{c}}{2} \right) \left( \frac{A - P_u - \frac{w_d}{c}}{2s} \right) = Q^2 s \]

The technology of the upstream firm is assumed to be as simple as for the downstream firm, one unit output is produced by one unit of work. The optimal wholesale price \( P_u \) demanded by the upstream monopolist is given by:

\[ \max_{P_u} (P_u - w_u)Q(P_u) + F(Q(P_u)) \Rightarrow P_u = w_u \]

With this contract, industry output is equal to the output in the integrated scenario. Unions are interested in their rents, \( L(w - \bar{w}) \), where \( \bar{w} \) is the exogenously given reservation wage. Firms are interested in their profits. They only bargain over wages. This is the right to manage model. In the efficient bargaining model instead wages and employment are objects of the negotiation (see Farber (1986)). But by selecting employment the produced quantity is fixed. In the presented paper output depends on the decisions of two independent firms and this collides with two independent output decisions.

Profit is zero in the downstream industry in any case, because the whole potential profit is absorbed by the upstream firm demanding \( F \). Therefore the downstream monopolist has no incentive to resist the wage claims of the union. If wage bargaining
takes place before the franchise fee is fixed, the union can act like a monopoly union. (One of the axioms of the Nash bargaining concept is that the solution has to be efficient. In the presented case this means that the wage should be selected in such a way that the utility of the union is as high as possible).

$$\max_{w_d} \frac{Q}{c}(w_d - w)$$

The optimal wage depends on the wage in the upstream monopoly and is described by the reaction function:

$$w_d = \frac{(A - w_u)c + w}{2}$$

The wage bargaining in the upstream industry is described by a generalized Nash bargaining:

$$\max_{w_u} (Q(w_u - w))^{\alpha_u} \pi_u^{1-\alpha_u}$$

where $\alpha_u$ is the exogenously given bargaining power of the upstream firm’s union. The bargaining solution leads to the reaction function:

$$w_u = \frac{\alpha_u\left(A - \frac{w_u}{c}\right) + (2 - \alpha_u)w}{2}$$

If wages are bargained simultaneously the solution is given by the intersection of the two reaction functions:

$$w_d = \frac{(2 - \alpha_u)cA + (2 - (2 - \alpha_u)c)w}{4 - \alpha_u}$$

$$w_u = \frac{\alpha_uA + (2(2 - \alpha_u)c - \alpha_u)w}{4 - \alpha_u}$$

**No Integration: Wage bargaining after Price Setting**

When the upstream firm can set the franchise fee before wages are bargained, the situation changes dramatically. The upstream firm can calculate the optimal fee on basis of the lowest possible wage rate in the downstream firm, which is $w$. As before the wholesale price $P_u$ is set optimally equal to $w_u$.

$$F = \left(P_d(Q(w)) - w_u - \frac{w}{c}\right)Q(w) = \left(\frac{A - w_u - \frac{w}{c}}{2}\right)\left(\frac{A - w_u - \frac{w}{c}}{2s}\right) = Q(\bar{w})^2s$$
Given $F$ the union of the downstream firm has to accept the wage rate $\bar{w}$, otherwise the firm will be closed. With the wage rate set to the reservation wage the downstream firm supplies the following quantity.

$$Q(\bar{w}) = \frac{A - w_u - \bar{w}}{2s}$$

In the upstream firm bargaining is described like before by the generalized Nash bargaining solution. Simultaneous bargaining results in:

$$w_d = \bar{w}$$

$$w_u = \frac{\alpha_u A + ((2 - \alpha_u)c - \alpha_u)\bar{w}}{2}$$

**Integration**

With the two-stage production process the profit of a vertically integrated firm is given by:

$$\pi_I = \left(P_d - \left(1 + \frac{1}{c}\right)w_I\right)Q_I$$

And the profit maximizing quantity is given by:

$$Q_I = \frac{A - \left(1 + \frac{1}{c}\right)w_I}{2s}$$

As before wage bargaining can be described by the Nash bargaining solution, but only one bargaining takes place.

$$\max_{w_I} \left(\left(1 + \frac{1}{c}\right)Q_I(w_I - \bar{w})\right)_{\alpha}^{\alpha} \pi_I^{1-\alpha}$$

and results in:

$$w_I = \frac{\alpha \frac{c}{1+c} A + (2 - \alpha)\bar{w}}{2}$$

**Conclusion**

Table 1 summarizes the results of the three scenarios.
Comparing the integration scenario (C) with the scenario where franchise fee is set before wages are bargained (B), we see that profit is the same in the two scenarios, if the bargaining power of the unions of the downstream and upstream firm is the same. If the union of the upstream firm has a higher (exogenously given) bargaining power than a union of an integrated firm would have, the integrated profit would be higher than the non-integrated profits. The same is true for the equilibrium quantity and, with reversed sign, for consumer price.

But a non-integrated scenario where wage bargaining takes place before the franchise fee is fixed would result in lower profit and higher consumer prices for all possible values of unions’ bargaining power. If transaction costs accompanied with integration are small, vertical integration would be the preferable scenario for the monopolists in that case. The difference in consumer prices between scenario A and scenario B or C (with the same bargaining power of the unions in all three scenarios) is given by:

$$\Delta P_d = \frac{(2 - \alpha)^2 \left(A - (1 + c) \frac{\bar{w}}{2}\right)}{4(4 - \alpha)}$$

In this simple model the uneven distribution of rents by a franchise fee raises no problem. But it might add an argument in favor of an integrated solution in more complicated models, for example considering the arguments of efficiency wage theory.

### References


