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Unions, Taxes and the structure of multinational enterprises

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This note analyzes how a firm's relationship with unions or tax authorities influences its basic structure. In particular, it is shown that the prospect of capture by unions or tax authorities of part of the rents associated with the firm's investments leads it to open more plants than is technologically efficient. Thus unions and taxes are an independent reason for a firm's expansion nationally and for foreign direct investment.

1. Introduction

Recently several papers have investigated the firm's investment decision in the presence of unions or tax authorities that may or may not be able to precommit to future wages or tax rates. Dewatripont (1988), Grout (1984), and Van der Ploeg (1987) analyze how the ability of unions to capture part of the rents associated with any new capital alters the investment decision. Huizinga (1989), and Bond and Samuelson (1989) analyze how the inability of countries to precommit to future tax rates influences foreign direct investment. This note analyzes how the number of plant locations rather than the capital investment at any one plant is affected by the prospective capture of investments by unions and tax authorities. The main result is that if unions (tax authorities) at different plant locations do not coordinate their wage (tax) demands, then the firm is induced to open more plants than is technologically efficient. Thus the absence of binding contracts between firms and unions (or tax authorities) is shown to provide a partial explanation for firms' expansion nationally and for the foreign direct investment of multinational enterprises. [See Kujawa (1979) for a discussion of possible policy responses to the lessening of union bargaining strength vis-à-vis firms that operate plants abroad.] The model focuses on a firm that faces unionization at its various plants, but it easily can be amended for the case where the threat to the firm is higher taxes.

2. The model

Consider a firm that, as in Salop (1979), wishes to deliver one unit of a good to consumers located on a circle of circumference one. The firm's problem is to deliver the goods to the consumers at minimum cost. The costs to the firm consist of three parts: The fixed costs of building a number of plants at different points on the circle, the costs of producing goods at each of the plants, and the costs of transporting the goods from the plants to the consumers. The firm is assumed to incur a

fixed cost f per plant built. At each plant, the firm can use a technology that converts one unit of labor into one unit of the good. The transportation costs of servicing a distance d starting from the plant is assumed to be given by $g(d)$, where $g'(d) > 0$, $g''(d) > 0$. If the firm has n equally spaced out plants along the circle, then total transportation costs t are equal to $2ng(1/(2n))$. Note that the total transportation cost t decreases with the number of plants, i.e. $dt/dn < 0$, and that $d^2t/dn^2 > 0$.¹

Let us now consider how union wage demands depend on the number of plants. Assume there are n equally spaced out plants on the circle and that the wage at each plant but plant i is equal to w^* . Union i is assumed to set the wage w_i so as to maximize the excess of the union wage bill over the opportunity cost of labor given by $(w_i - \hat{w})l_i$, where $\hat{w}$ is the alternative wage available to members of union i and where l_i is employment at plant i .² Employment l_i is determined by the condition that the firm minimizes the sum of the wage bill and transportation costs as in the following optimality condition

$$w + g'(l_i/2) = w^* + g'((1/n) - (l_i/2)), \quad (1)$$

which shows the firm is indifferent between supplying the marginal consumer between two plants from either plant.

From (1) we see that employment l_i depends negatively on the wage w_i , as

$$\frac{dl_i}{dw_i} = -2 \left[g''\left(\frac{l_i}{2}\right) + g''\left(\frac{1}{n} - \frac{l_i}{2}\right) \right]^{-1} < 0. \quad (2)$$

The union's optimality condition is straightforwardly given as follows:

$$w_i = \hat{w} - l_i / (dl_i/dw_i). \quad (3)$$

Note from (1) that $\delta l_i / \delta n < 0$, and from (2) that $\delta l_i^2 / \delta w_i \delta n \leq 0$ if $g''' \geq 0$. Using these partial derivatives and (2) and (3), we find that $dw_i/dn < 0$ for $g''' \geq 0$. In symmetric equilibrium we have $w_i = w^*$, and thus we see that each union's wage w , which equals the firm's total wage bill, is negatively related to the number of firms n .³ This reflects that, as the firm increases the number of plants, the unions at the various plants are brought in more direct competition with each other for employment within the firm. As a result, unions labor becomes cheaper for the firm.

The firm's total costs c can now be written as

$$c = w(n) + t(n) + nf. \quad (4)$$

The firm chooses n so as to minimize c in (4), which yields the optimality condition

$$(dw/dn) + (dt/dn) + f = 0. \quad (5)$$

The unique technologically efficient number of plants is found from (5) by setting $dw/dn = 0$. However, with unions the firm can reduce the wage bill by building additional plants, i.e. $dw/dn < 0$, and thus the firm is induced to build more than the efficient number of plants.

¹ $\frac{dt}{dn} = \frac{g(1/(2n))}{1/(2n)} - g'\left(\frac{1}{2n}\right) < 0$, $\frac{d^2t}{dn^2} = \frac{1}{2n^3} g''\left(\frac{1}{2n}\right) > 0$.

It is ignored that n strictly speaking has to be an integer.

² The analysis goes through with minor modifications if the firm faces tax authorities that maximize tax revenues $\tau_i l_i$ (where τ_i is the tax rate at locale i) and can hire labor at a given wage w .

³ A sufficient condition for a unique symmetric union wage w is $g''' = 0$, as then $(d^2 l_i)/(dw dw^*) = 0$ from (2), so that generally $dw_i/dw^* > 0$, and $dw_i/dw^* = 1/2$ for $w_i = w^*$ from (3).

For the case where the cost of transportation to a point simply equals the distance traveled, we have $g(d) = (1/2)d^2$. If n symmetrically spaced plants are built, then the corresponding total transportation costs t are equal to $1/(4n)$. Equation (3) now becomes $w_i = (\hat{w} + w^* + 1/n)/2$, and the symmetric wage as a function of n is solved as $w = \hat{w} + 1/n$. When union power can be ignored [i.e., $dw/dn = 0$ in (5)], then the optimal number of plants n is given by $\sqrt{(1/4f)}$. With unions, the optimal number of plants is given by $\sqrt{(5/4f)}$, which show that unionization enlarges the number of plant locations by a factor $\sqrt{5}$.

The firm's incentive to open plants beyond the efficient number is eliminated if the unions at the firm's various plants are able to coordinate their wage demands. Most countries at this point appear to have firm-wide or industry-wide unions at the national level. International harmonization of wage demands towards a multinational firm, however, is still the exception rather than the rule. Thus the ability of multinationals to soften union power remains an important rationale for the existence of the multinational enterprise, even among countries with comparable labor market conditions and technological state of development.

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