DEPARTMENT OF ECONOMICS

Working Paper

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FOREIGN DIRECT INVESTMENTS?

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UNIVERSITY OF AARHUS • DENMARK

INSTITUT FOR ØKONOMI

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Should Trade Unions Appreciate Foreign Direct Investments?[*]

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November 15, 1999

Abstract

It is often argued that FDI hurt workers in the home country simply because jobs are moved abroad. Contrary to that view, businessmen often argue that FDI benefit home workers because there will be an expansion in the firm. In this paper, we show that both views may be correct, and whether home workers end up gaining or losing on FDI depend on which kinds of activities the firm moves to the host country. If there is a big degree of substitutability (complementariness) between the activities in the home country and the host country, it is likely that the workers lose (gain) on FDI.

Keywords: Foreign direct investment, multinational enterprise, wage bargaining, trade union

JEL Classification no: J51, L20, F23

1 Introduction

One of the most topical issues in economics is labour market effects of globalization, and recently the role of multinationals has also come into focus (see e.g. Lawrence, 1994, Riker and Brainard, 1997, and Brainard and Riker, 1997). In the public debate there seems to be at least two very different views on what are the labour market effects in the home country of foreign direct investments (FDI). Some argue that FDI give rise to a lower demand for certain kinds of labour, and in Europe and the US in particular unskilled labour. The reason being that firms move activities involving a lot of unskilled labour to less developed countries where the wage rate for this kind of labour is lower. The other

view, which is often heard from managers in firms which consider to undertake FDI, is that these investments will be to the advantage of workers in the home country. The lower wage costs in the host country make the firm more competitive, and the implied production expansion will be sufficiently large to benefit workers in the home country. In this paper, we show that both views may be correct, and it depends on which kinds of activities the firm moves to the host country. If there is a big degree of complementariness between the activities which are moved to the host country and the activities which remain in the home country, it is very likely that the firm and the home workers agree on whether or not it is preferable to undertake FDI. On the other hand, if there is a big degree of substitutability between the activities in the host country and the activities in the home country, it is likely that the firm gains but the workers lose from FDI. These results are interesting since empirical results indicate that activities in home and host countries are complements as long as we consider FDI in developing countries undertaken by firms situated in industrialized countries (see e.g. Riker and Brainard, 1997)[1]. On the other hand, if investments are in countries which are similar to the home country, activities appear to be substitutes. Hence, it seems as if European and American workers should fear FDI in Europe and the US much more than FDI in developing countries.

We set up a very simple model of one firm which at the labour market faces a trade union, and these two parties bargain over the wage rate. Our way of modelling the wage bargaining is sufficiently general to embrace labour markets where trade unions are strong as well as competitive labour markets. The production in the firm can be split up in two kinds of activities, and the firm has the opportunity to become multinational and move one of the activities to another country. In the foreign country, the firm also faces a trade union at the labour market, but this trade union may have less (or more) bargaining power than the trade union in the home country, and it may also be the case that the competitive wages in the two countries differ. Our main focus is on when the firm chooses to become multinational, and whether the trade union in the home country appreciates that the firm becomes multinational. We find that, in general, the firm prefers to be multinational if the foreign trade union is weak, or if the foreign competitive wage is relatively low, implying that foreign wages are low, but besides that our results turn out to be very sensitive to the degree of substitutability between the two kinds of activities in the firm. If there is a high degree of substitutability between the two activities, the firm tends to prefer to become multinational, but in this case there is always a loss for the trade union in the home country. With a lower degree of substitutability between the two kinds of activities, it is more likely that the trade union appreciates that the firm becomes multinational, and in the special case where the two kinds of activities are perfect complements, the firm and the home trade union always agree on whether the firm should become multinational. The reason is that, when the activities are complements, the firm cannot expand foreign activities at the cost

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[1] Kravis and Lipsey (1988) get a related result. They find for US firms that an increase in production in foreign affiliates tends to give rise to higher average wages (but lower employment) in parent firms.

2

of domestic activities if it finds the home wage to be too high. This, combined with the fact that the relative importance of home wage costs decreases when the firm becomes multinational, the home trade union exploits to bargain for a higher wage rate[2]. This wage increase may dominate an employment loss so that the trade union becomes better off if the firm becomes multinational. Moreover, we show that it is possible that not only the home wage but also employment increases if the firm becomes multinational.

There are a few papers in the literature which analyze the implications of FDI when labour markets are unionized. Two examples are Zhao (1995,1998), but the set up and focus in these papers are very different from ours. Specifically, Zhao considers the effects of intra-industrial FDI. There is one domestic firm and one foreign firm, and the symmetric equilibrium where both the foreign and the home firm become multinational is compared to the equilibrium with intra-industrial trade without FDI[3]. On the contrary, we only consider the incentives of a single firm to undertake FDI. Another central difference is that Zhao only considers the case where domestic and foreign activities are perfect substitutes whereas a central aspect in our analysis is to uncover the importance of the degree of substitutability/complementariness between home and foreign activities. A third difference is that Zhao considers the case of symmetric labour markets, whereas a central element in our analysis is a potential asymmetry between foreign and home labour markets. Fourth, Zhao assumes efficient bargaining whereas we assume wage bargaining. Finally, we get different results. Zhao finds that FDI give rise to lower wages to trade union members, whereas we find that it depends on the degree of substitutability between foreign and domestic activities.

Similar to Zhao (1995,1998), Naylor and Santoni (1998) look at the implications of reciprocal FDI. In specific, they consider a game where two firms of different nationality can choose between the two strategies: undertake FDI or not. They consider the importance of the degree of substitutability between goods produced by the domestic firm and goods produced by the foreign firm. A higher degree of substitution tends to make it less likely that there are FDI in equilibrium. Similarly for the bargaining power of the union: the stronger trade unions the less likely it is that firms will choose the FDI strategy.

Finally, Bughin and Vannini (1995) consider the implications of unions for the incentives to undertake FDI. However, there perspective is also very different from ours as they consider the incentives of a foreign multinational to invest in the domestic (unionized) country. Moreover, a central aspect in Bughin and Vannini is, as in Zhao (1995,1998), that there are firms of different nationality producing the same good.

The rest of the paper is organized as follows. In section 2, we set up the

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[2] This result is related to what is found in Horn and Wolinsky (1988) concerning the patterns of unionisation. They find that, if two different kinds of labour are sufficiently close substitutes in production, it is optimal for the two kinds of workers to go together in a single trade union. On the other hand, if the two kinds of labour are sufficiently complementary, it is optimal to form two trade unions with separate bargaining.

[3] Zhao (1995) also considers the case where only one of the two firms undertakes FDI.

basic model, and in section 3 we analyze the implications of FDI. Finally, we conclude in section 4.

2   The Model

We consider a two country partial equilibrium model where a single monopolistic firm faces the following inverse demand function[4]:

$$p = C * Q^{-b}, 0 < b < 1, \tag{1}$$

where p is the price and C and b are positive parameters. Q is total world demand, and we assume that there are no transport or other costs of international trade.

In order to start up production, the firm has to pay a cost G. This can represent a cost to research and development or it can be interpreted as a wage cost to (skilled) workers whose relationship to the firm is based on a long term contract. We assume that the whole firm cannot be moved abroad, and one reason for this may be that the firm needs skilled workers who cannot be found abroad. Therefore, either the firm chooses to be a local firm with all production in the home country, or the firm chooses to be multinational with some production abroad and some production in the home country.

We assume that the production process as such can be split into two kinds of activities, and an intermediate good is produced in each activity. The two activities need the same kind of labour as input (for instance unskilled labour). There is some substitution possibilities between the two intermediate goods in final production which are captured by the following CES production function[5]:

$$q = [a_1 y_1^\rho + a_2 y_2^\rho]^{1/\rho}, a_1 + a_2 = 1, \rho \in [-\infty, 1]. \tag{2}$$

$$y_i = l_i, \qquad i = 1, 2 \tag{3}$$

where y_i is production of the intermediate good i, l_i is labour input in activity i, and q is final output. The elasticity of substitution between the two intermediate goods in production of final output is given as $\sigma = \frac{1}{1-\rho} \in [0, \infty]$. We will assume that activity 1 needs the input of the skilled labour which is only present in the home country. Therefore, activity 1 must take place in the home country, but the firm can choose to become multinational and move activity 2 to a foreign country (from now on, the host country). We further assume that plant-specific fixed costs associated with activity 2 are the same in the home and in the host

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[4] The model can also be set up as a two sector general equilibrium model with quasi-linear preferences and perfect competition in the sector which we do not focus on. However, for simplicity we restrict attention to partial equilibrium.

[5] For simplicity we assume that production of the final output only requires the two intermediate goods as input.

4

country (and they are included in G)[6], and we assume that the extra fixed costs when activity 2 is taking place in both countries are sufficiently high that the firm will never choose to split up activity 2. I.e. the firm will only produce intermediate good 2 in either the home or the host country[7].

The variable cost function is

$$c(w_1, w_2, q) = [(w_1/a_1)^r + (w_2/a_2)^r]^{1/r} * q, \qquad (4)$$

where $r = \rho/(\rho - 1)$. By Shephard's lemma we get the following conditional factor demands:

$$l_1(w_1, w_2, q) = q * a_1^{-r} w_1^{r-1}[(w_1/a_1)^r + (w_2/a_2)^r]^{(1-r)/r}, \qquad (5)$$

$$l_2(w_1, w_2, q) = q * a_2^{-r} w_2^{r-1}[(w_1/a_1)^r + (w_2/a_2)^r]^{(1-r)/r}. \qquad (6)$$

The firm maximizes the following profit function wrt. q:

$$\pi = C * q^{1-b} - [(w_1/a_1)^r + (w_2/a_2)^r]^{1/r} * q - G, \qquad (7)$$

which leads to the first order condition:

$$q = [(w_1/a_1)^r + (w_2/a_2)^r]^{-1/b*r} * K_1, \qquad (8)$$

where $K_1 = [(1-b)C]^{1/b}$.

Substituting for q in (7) yields:

$$\pi = K_2 * [(w_1/a_1)^r + (w_2/a_2)^r]^{(b-1))/rb} - G, \qquad (9)$$

where $K_2 = CK_1^{1-b} - K_1$.

The workers in the home country as well as in the host country are organized in trade unions which seek to maximize an objective function of the form:

$$U_i = L_i * (w_i - \overline{w_i}), i = f, h \qquad (10)$$

where f and h denote foreign (host) and home country, respectively. $\overline{w_i}$ is the competitive wage in country i, and it is implicitly assumed that trade union members who do not get a job in the firm in focus get the competitive wage in some alternative job. L_i is total employment in activity 1 as well as 2 in country i. Hence, we assume that workers in the two activities, in the same country, get the same wage. We make this assumption in order to simplify the

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[6]We do not deny the importance of extra fixed costs associated with becoming multinational as well as the importance of trade costs. But the importance of these costs have been analyzed intensively elsewhere (see e.g. Markusen et.al., 1996).

[7]In section 3.3 we consider the case where intermediate goods 1 and 2 are perfect substitutes in production of final output. Hence, our analysis is sufficiently general to embrace cases where the firm chooses to have the same activity in the home as well as in the host country.

analysis, and it have no qualitative implications for our results[8]. One way to defend the assumption may be that it is the same kind of labour in the two activities. Therefore, within the same country, the firm is able to move workers between the two activities making it impossible for the trade union to sustain different wages in the two activities.

Wages are determined in negotiations between the firm and the trade unions. If the firm is local, there is only bargaining with the home trade union, and the outcome is assumed to be given by the asymmetric Nash bargaining solution (see e.g. Binmore, Rubinstein and Wolinsky, 1986). The bargaining power of the trade union (firm) is assumed to be s_h $(1 - s_h)$. In case of disagreement, the firm has to pay the fixed costs (G), implying that the fall back profit is $-G$. Under a conflict, the trade union members are assumed to get the competitive wage $(\overline{w_h})$ which implies that the fall back pay off to the trade union is 0.

If the firm is multinational, there are simultaneous bargaining with the home and the foreign trade union. We assume Nash behaviour in the sense that the foreign wage is assumed to be given when solving the bargaining problem in the home country, and the home wage is assumed to be given when solving the bargaining problem in the foreign country. The bargaining power of the domestic trade union is assumed to be the same as when the firm is local (i.e. s_h), and the bargaining power of the foreign trade union is assumed to be s_f. The fall back profit of the firm in the bargaining with the home trade union is the maximum profit of the firm, given that there is no employment in the home country. The fall back profit of the firm in the bargaining with the foreign firm is defined in a similar way.

To be more precise, the outcome of the bargaining in country i is given as

$$w_i = \arg \max U_i^{s_i} \left(\pi - \overline{\pi_i} \right)^{1-s_i}, i = h, f. \tag{11}$$

where $\overline{\pi_h} = -G$ if the firm is local. If the firm is multinational, it is easily shown that

$$\overline{\pi_i} = -G, \qquad \qquad if \quad \sigma \leq 1, \quad i = h, f \tag{12}$$

$$\overline{\pi_i} = K_2 a_k^{\frac{1-b}{b}} w_j^{\frac{b-1}{b}} - G, \quad if \quad \sigma > 1, \quad i, j = h, f,$$

$$i \neq j, \ k = 1 \text{ for } i = f, \ k = 2 \text{ for } i = h \tag{13}$$

The intuition is that, in the case of a conflict at one of the plants, the firm is still able to produce at the plant where there is no conflict if the two activities are sufficiently close substitutes (i.e. $\sigma > 1$). On the other hand, if the activities are sufficiently close complements ($\sigma \leq 1$), the firm closes down all production in case of a conflict.

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[8]We have looked at an alternative specification of the utility of the trade union. In this specification the utility is $U = l_1 * (w_1 - \overline{w_h}) + l_2 * (w_2 - \overline{w_h})$. I.e. the union and the firm bargain over both a wage to workers in activity 1 and a wage to workers in activity 2. With this specification we get similar results to what we find below.

6

2.1 No FDI

In this section, we assume that the firm remains local implying that $w_1 = w_2 = w_h$. The profit can then be written as:

$$\pi = \widetilde{K_2} w_h^{\frac{b-1}{b}} - G, \tag{14}$$

where $\widetilde{K_2} = K_2 \left(1/a_1^r + 1/a_2^r\right)^{\frac{b-1}{rb}}$.

Since the home trade union supplies workers to both activities in the firm, total employment which the union takes into account is $L_h = l_1 + l_2$. This leads to the following payoff function:

$$U = \widetilde{K_1} w_h^{-1/b} (w_h - \overline{w_h}), \tag{15}$$

where $\widetilde{K_1} = K_1 \left(1/a_1^r + 1/a_2^r\right)^{\frac{b-1}{rb}}$.

By inserting (14) and (15) into (11), the first-order condition to the maximization problem implies that

$$w_h = \overline{w_h}(1 + \frac{s_h b}{1 - b}) \tag{16}$$

We get the intuitive results that the wage is increasing in the bargaining power of the trade union (i.e. s_h) and it is increasing in the alternative wage of trade union members (i.e. $\overline{w_h}$).

2.2 FDI

We now turn to the case where the firm chooses to move activity 2 to the host country. The firm's profit is given by (9) where $w_1 = w_h$, and $w_2 = w_f$. The payoff to the home union and foreign union are respectively:

$$U_h = K_1 a_1^{-r} w_h^{r-1} \left[(w_h/a_1)^r + (w_f/a_2)^r\right]^{\frac{b(1-r)-1}{rb}} (w_h - \overline{w_h}), \tag{17}$$

$$U_f = K_1 a_2^{-r} w_f^{r-1} \left[(w_h/a_1)^r + (w_f/a_2)^r\right]^{\frac{b(1-r)-1}{rb}} (w_f - \overline{w_f}). \tag{18}$$

By inserting into (11) and maximizing wrt. w_h, we get the following first-order condition

$$\left(r - (r-1) w_h^{-1} \overline{w_h} + \frac{b(1-r)-1}{b} w_h^{r-1} a_1^{-r} \left[\left(\frac{w_h}{a_1}\right)^r + \left(\frac{w_f}{a_2}\right)^r \right]^{-1} \right) (w_h - \overline{w_h}) +$$

$$\frac{K_2 (1 - s_h) \frac{b-1}{b} a_1^{-r} \left[w_h^{r-1} \left[\left(\frac{w_h}{a_1}\right)^r + \left(\frac{w_f}{a_2}\right)^r \right]^{\frac{b(1-r)-1}{rb}} (w_h - \overline{w_h}) \right]}{s_h \left[K_2 \left[\left(\frac{w_h}{a_1}\right)^r + \left(\frac{w_f}{a_2}\right)^r \right]^{\frac{b-1}{rb}} - G - \overline{\pi_h} \right]} = 0 \tag{19}$$

For the foreign country an equivalent expression can be obtained. We can now in principle solve for the Nash equilibrium in w_h and w_f, but the complexity of the two first-order conditions implies that we cannot get closed form solutions.

3 The Effects of FDI

Since we cannot get closed form solutions to the bargained wages in the general case with FDI, we turn to consider some special cases. In order to analyze the importance of the elasticity of substitution between the two intermediate goods in production of final output, we look at the two extreme cases of perfect substitutes (i.e. $\sigma \to \infty$) and the Leontief case of perfect complements (i.e. $\sigma \to 0$). Note that the former case corresponds to a horizontal multinational enterprise while the latter case corresponds to a vertically integrated multinational enterprise. However, before we turn to look at these two extreme cases, we consider the Cobb-Douglas case ($\sigma = 1$) which can be interpreted as the intermediate case.

3.1 The Cobb-Douglas case

In the special case of $\sigma = 1$ ($\rho = r = 0$), we have the Cobb-Douglas production function. The demand of labour for the two kinds of activities becomes:

$$l_1 = \widehat{K_1} w_1^{\frac{-1+a_2(1-b)}{b}} w_2^{\frac{-a_2(1-b)}{b}}, \tag{20}$$

$$l_2 = \widehat{K_2} w_1^{\frac{-a_1(1-b)}{b}} w_2^{\frac{-1+a_1(1-b)}{b}}, \tag{21}$$

where $\widehat{K_1} = K_1 K^{-\frac{1}{b}} \left(\frac{a_1}{a_2}\right)^{a_2}$, $\widehat{K_2} = K_1 K^{-\frac{1}{b}} \left(\frac{a_1}{a_2}\right)^{-a_1}$, and $K = a_1^{-a_1} a_2^{-a_2}$. Hence, we see that, even though labour in the two kinds of activities are substitutes, total labour demand in both activities are decreasing in w_1 as well as in w_2.

Without FDI, the home wage is given by (16), and in the case of FDI by (19) which in the Cobb-Douglas case becomes

$$w_h = \overline{w_h} \left(1 + \frac{s_h b}{a_1(1-b)}\right). \tag{22}$$

Similarly, the foreign wage becomes:

$$w_f = \overline{w_f} \left(1 + \frac{s_f b}{a_2(1-b)}\right). \tag{23}$$

By comparing (16) to (22), we see immediately that

$$w_h \mid_{FDI} \geq w_h \mid_{noFDI}. \tag{24}$$

8

The reason for this is that, when workers are split up in two groups, the size of the home wage becomes less important for the firm and the demand elasticity for home labour decreases. This, the home trade union exploits in the wage bargaining to get a higher wage[9].

The profit of the firm, if it remains local, is given by (14), where $\widetilde{K_2} = K_2 \left(a_1^{a_1} a_2^{a_2} \right)^{\frac{1-b}{b}}$. By using (22) and (23), the profit of the firm, if it becomes multinational (i.e. (9)), turns out to be:

$$
\pi = \widetilde{K_2} \left(\left(1 + \frac{s_h b}{a_1 (1-b)} \right) \overline{w_h} \right)^{\frac{-a_1 (1-b)}{b}} \left(\left(1 + \frac{s_f b}{a_2 (1-b)} \right) \overline{w_f} \right)^{\frac{-a_2 (1-b)}{b}} - G.
$$
(25)

The firm chooses to become multinational if the profit in this case is higher than if it remains local. By comparing (14) and (25), and using (16), this implies that the firm becomes multinational if the following condition is satisfied:

$$
\left(\frac{\overline{w_h}}{\overline{w_f}} \right)^{a_2} > \frac{\left(1 + \frac{s_h b}{a_1(1-b)} \right)^{a_1} \left(1 + \frac{s_f b}{a_2(1-b)} \right)^{a_2}}{1 + \frac{s_h b}{1-b}}.
$$
(26)

The right hand side of this inequality is decreasing in s_h and increasing in s_f. In other words, the higher the bargaining power of the domestic trade union, and the lower the bargaining power of the foreign trade union, the more likely it is that the firm becomes multinational. Similarly, it follows that a high $\overline{w_h}$ and a low $\overline{w_f}$ make it more likely that the firm becomes multinational. These results are quite intuitive since the firm only chooses to become multinational if such a move implies lower wage costs. It is also easily seen that, if $\overline{w_h} = \overline{w_f}$ and $s_h = s_f$, the above condition will not be satisfied. Hence, a necessary condition for FDI is that $\overline{w_f} < \overline{w_h}$ or $s_f < s_h$. If this condition is not satisfied, the firm gets higher wage costs in both activities and obviously lower profit if it becomes multinational.

Next we turn to consider how the home trade union will be affected by FDI. By inserting (16) into (15), the utility of the trade union when the firm is local becomes:

$$
U_h = \left(\widehat{K_1} + \widehat{K_2} \right) \left(1 + \frac{s_h b}{1-b} \right)^{-\frac{1}{b}} \frac{s_h b}{1-b} \overline{w_h}^{\frac{b-1}{b}}.
$$
(27)

Similarly, when the firm is multinational, the trade union pay off turns out to be:

$$
U_h = \widehat{K_1} \left(1 + \frac{s_h b}{a_1 (1-b)} \right)^{\frac{-1 + a_2 (1-b)}{b}} \frac{s_h b}{a_1 (1-b)} \overline{w_h}^{\frac{(b-1) a_1}{b}} \left(\left(1 + \frac{s_f b}{a_2 (1-b)} \right) \overline{w_f} \right)^{\frac{-a_2 (1-b)}{b}}.
$$
(28)

---

[9] The equality arises when the bargaining power of the union, s, is zero.

9

By comparing (27) and (28), we find that the trade union prefers the firm to be multinational if:

$$\left(\frac{\overline{w_h}}{\overline{w_f}}\right)^{a_2} > \frac{\left(1 + \frac{s_h b}{a_1(1-b)}\right)^{\frac{1-a_2(1-b)}{1-b}} \left(1 + \frac{s_f b}{a_2(1-b)}\right)^{a_2}}{\left(1 + \frac{s_h b}{1-b}\right)^{\frac{1}{1-b}}}. \tag{29}$$

First of all, we see that it is possible that the domestic trade union prefers that the firm becomes multinational. The reason for this is that the domestic trade union then succeeds in getting a higher wage. This may be at the cost of some employment (see below), but the wage effect may dominate the employment effect. Second, we see that the above condition is more likely to be satisfied if $\overline{w_f}$ is low relatively to $\overline{w_h}$. The reason for this is that employment in the home country is decreasing in the wage in the host country (see (20)). Hence, if $\overline{w_f}$ is low, the employment loss for domestic workers, if the firm becomes multinational, is smaller. For the same reason, the condition is more likely to be satisfied if the bargaining power of the foreign trade union is low (i.e. s_f is low). Fourth, it is easily shown that a high s_h makes it less likely that the home trade union prefers that the firm becomes multinational (i.e. the right hand side in the above inequality is increasing in s_h). In other words, it is more likely that a relatively weak domestic trade union prefers that the firm becomes multinational.

The conditions (26) and (29) look quite similar, but by comparison it follows that the right hand side in (29) is always larger than the right hand side in (26). Hence, it is always more likely that the firm prefers to become multinational than that the trade union appreciates that the firm becomes multinational. This implies that, if there is only a small advantage for the firm to become multinational, the trade union will always be against it.

Finally, let us turn to employment. By using (16), (22), (20) and (21), we find that domestic employment is higher when the firm is multinational than when it is local if

$$\left(\frac{\overline{w_h}}{\overline{w_f}}\right)^{a_2} > \frac{\left(1 + \frac{s_h b}{a_1(1-b)}\right)^{\frac{1-a_2(1-b)}{1-b}} \left(1 + \frac{s_f b}{a_2(1-b)}\right)^{a_2}}{a_1^{\frac{b}{1-b}} \left(1 + \frac{s_h b}{1-b}\right)^{\frac{1}{1-b}}}. \tag{30}$$

We see that it is possible that FDI give rise to higher domestic employment. It is more likely if $\overline{w_f}$ is low relatively to $\overline{w_h}$ and if s_f is relatively low. The reason for this is that domestic employment is increasing in foreign employment. Moreover, it is easily shown that the right hand side is increasing in s_h. Hence, it is more likely that domestic employment increases if the bargaining power of the domestic trade union is relatively low.

10

3.2 The Leontief case

If $\sigma \to 0$ ($\rho \to -\infty$ and $r \to 1$), we have the Leontief production function. By using (19), we find that, if the firm is multinational, the domestic wage becomes:

$$w_h = \frac{1}{1 - \frac{s_f s_h b^2}{(1-b)^2}} \left(\overline{w_h} \left(1 + \frac{s_h b}{1-b} \right) + \frac{a_1}{a_2} \frac{s_h b}{1-b} \left(1 + \frac{s_f b}{1-b} \right) \overline{w_f} \right). \quad (31)$$

There is a similar expression for the foreign wage. By comparing (16) and (31), it is easily seen that

$$w_{h|FDI} \geq w_{h|noFDI}. \quad (32)$$

The cost associated with production in the home country is, relatively speaking, less important for the firm when it is multinational than when it is local, and the trade union exploits that to get a higher wage in the multinational firm.

By following the same procedure as in the Cobb-Douglas case, we find that the firm prefers to be multinational if

$$\frac{\left(a_1^{-1} + a_2^{-1} \right) \overline{w_h}}{a_1^{-1} \overline{w_h} + a_2^{-1} \overline{w_f}} > \frac{1 + \frac{s_f b}{1-b}}{1 - \frac{s_f s_h b^2}{(1-b)^2}}. \quad (33)$$

The left hand side of this inequality is increasing in $\overline{w_h}$ and decreasing in $\overline{w_f}$, and the right hand side is increasing in s_f as well as s_h. Hence, as in the Cobb-Douglas case, it is more likely that the firm prefers to be multinational if $\overline{w_h}$ is high relatively to $\overline{w_f}$ and if s_f is low. This is so because the foreign wage costs are then relatively low. However, contrary to the Cobb-Douglas case, a strong domestic trade union makes it less likely that the firm prefers to be multinational. This counter intuitive result arises because of the Leontief production function. There is no substitution possibility between the two kinds of activities, and when the firm moves activity 2 to the host country, a strong domestic trade union is able to increase the wage a lot in the wage negotiations without the firm being able to move a bigger fraction of the production activities to the host country.

Again, following the same procedure as in the Cobb-Douglas case, we find that the home trade union prefers the firm to be multinational if (33) is satisfied. Hence, the trade union always agrees with the firm concerning when it is preferable that the firm is multinational. The reason for this result is that, whenever the foreign wage costs are sufficiently low so that the firm prefers to be multinational, the domestic trade union is able to get a much higher wage without a big employment decrease as described above.

Finally, let us turn to employment. Home employment is higher with FDI than without FDI if

$$\frac{\left(a_1^{-1} + a_2^{-1} \right) \overline{w_h}}{a_1^{-1} \overline{w_h} + a_2^{-1} \overline{w_f}} > \left(1 + \frac{a_1}{a_2} \right)^b \frac{1 + \frac{s_f b}{1-b}}{1 - \frac{s_f s_h b^2}{(1-b)^2}}. \quad (34)$$

The only difference between this expression and (33) is that the right hand side is multiplied by a number larger than one. Hence, we see that it is possible that domestic employment increases if the firm becomes multinational, but the advantage for the firm (and the union) to become multinational has to be sufficiently large (i.e. foreign wage costs have to be sufficiently low).

3.3 The case of perfect substitutes

If $\sigma \to \infty$ ($\rho \to 1$, $r \to -\infty$), the two intermediate goods are perfect substitutes in production of the final good. In this case it seems most reasonable to assume that the marginal product of the intermediate goods are equal (i.e. $a_1 = a_2 = \frac{1}{2}$), and the production function becomes

$$q = \frac{1}{2} \left(y_1 + y_2 \right). \tag{35}$$

To make the case interesting, let us also assume that the competitive wage in the host country is lower than the bargained wage in the home country when the firm is local, i.e.

$$\overline{w_f} < \overline{w_h} \left(1 + \frac{s_h b}{1-b} \right), \tag{36}$$

and similarly we assume that

$$\overline{w_h} < \overline{w_f} \left(1 + \frac{s_f b}{1-b} \right). \tag{37}$$

These two conditions make sure that the firm will not simply behave as a local firm when it is multinational.

If the firm is multinational, the trade unions in the two countries will be in a Bertrand competition where the two kinds of labor are perfect substitutes. If the home trade union accepts a wage which is an ε lower than the foreign wage, all employment will be placed in the home country. Similarly, if the foreign trade union accepts a wage which is an ε lower than the home wage, all employment will be in the foreign country. However, the home trade union will never accept a wage below $\overline{w_h}$, and the foreign trade union will never accept a wage below $\overline{w_f}$. Therefore, we get the following equilibrium:

If $\overline{w_f} > \overline{w_h}$, then

$$w_h = \overline{w_f}, \tag{38}$$
$$l_h = K_1 2^{\frac{b-1}{b}} \overline{w_f}^{-\frac{1}{b}}, \tag{39}$$
$$l_f = 0. \tag{40}$$

If $\overline{w_f} < \overline{w_h}$, then

$$w_f = \overline{w_h}, \tag{41}$$

$$l_h = 0, \tag{42}$$

$$l_f = K_1 2^{\frac{b-1}{b}} \overline{w_h}^{-\frac{1}{b}}. \tag{43}$$

If $\overline{w_f} = \overline{w_h}$, then

$$w_h = w_f = \overline{w_h}, \tag{44}$$

$$l_h = l_f = \frac{1}{2} K_1 \overline{w_h}^{-\frac{1}{b}}. \tag{45}$$

All employment will be in the country where the competitive wage is lowest, and the trade union in this country accepts a wage equal to the competitive wage in the other country. If the competitive wage is the same in the two countries, we assume that employment is shared equally among the two activities. All workers employed in the firm get the same wage, and by using (36) and (37), it follows that

$$w_{FDI} \leq w_{noFDI}. \tag{46}$$

In the case where the firm is local as well as in the case where the firm is multinational, the profit is given by (14). Therefore, since the wage is lowest in the multinational case, the firm always prefers to be multinational. For the same reason, it is easily seen that the trade union always becomes worse off if the firm chooses to be multinational. If $\overline{w_f} < \overline{w_h}$, there will be no employment in the home country. If $\overline{w_f} > \overline{w_h}$, all employment will be in the home country, exactly as in the case where the firm is local, but the wage will be lower than the bargained wage when the firm is local. Finally, if $\overline{w_f} = \overline{w_h}$, the pay off to the domestic trade union will be zero. Therefore, we can conclude that in this case where the two activities are perfect substitutes, the firm and the trade union always disagree on whether FDI are preferable.

The effect of FDI on domestic employment is ambiguous. If $\overline{w_f} < \overline{w_h}$, FDI give rise to lower home employment. If $\overline{w_f} > \overline{w_h}$, FDI give rise to higher home employment, and if $\overline{w_f} = \overline{w_h}$, the effect is ambiguous.

4 Conclusion

In this paper we have shown that it is possible that a firm and a local trade union agree on whether the firm should become multinational and move a part of the production abroad. They will always agree if the activities which are moved abroad are perfect complements to the activities which remain in the home country. If the elasticity of substitution between the two activities placed in the home and host country is higher than in the case of perfect complements, it is still possible that the trade union agrees with the firm concerning whether

the firm should become multinational, but it is more likely that the firm finds it attractive to become multinational than that the trade union appreciates that the firm becomes multinational. If the activities in the host and the home country are perfect substitutes in the production of the final good, the firm and the local trade union always disagree on whether the firm should become multinational.

The reason why it is possible that the local trade union may find it attractive that the firm becomes multinational is that the total wage cost of the home workers is becoming less important for the firm. The trade union in the home country exploits that to get a higher wage in the bargaining with the firm. Although employment in the home country may decrease, the higher wage may compensate for the employment loss. Moreover, a high degree of complementarity reduces the employment loss in the home country when the firm expands the activities in the foreign country. Finally, if the wage costs in the host country are sufficiently low, employment in the home country may actually increase if the firm becomes multinational.

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