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Unionisation structure and strategic foreign direct investment

by

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Abstract

It is often argued that if the substitutability between workers is sufficiently high, labour is better off under a centralised labour union than under decentralised unions. We show that this may not be the case in an open economy with foreign direct investment as the incentive for outward FDI is higher under a centralised union than under decentralised unions. If the number of firms undertaking FDI under a centralised union is higher than under decentralised unions, their wage rates charged by the labour union and the union utility may be higher under decentralised unions than under a centralised union, and the comparison may depend on the competitiveness of the industry. We also show that there are situations where both the domestic industry and the labour unions prefer decentralised unions over a centralised union.

JEL Classifications: J51; L20; F23

Key Words: Trade union; Wage bargaining; Union structure; FDI

Outline

Non-Technical Summary

It is often argued that if the substitutability between workers is sufficiently high, labour is better off under a centralised union than under decentralised unions. In this paper, we argue against the conventional wisdom and show that this is not always the case in an open economy with foreign direct investment. We consider an economy where the firms from a home (or domestic) country and a foreign country compete in the foreign country. The firms in the home country may serve the foreign country either through exports or FDI and the labour market in the home country is unionised, whereas the foreign labour market is perfectly competitive.

We show that labour can be better off under decentralised unions than under a centralised union if the incentive for outward FDI under a centralised union is higher than under decentralised unions. If the number of firms undertaking FDI under a centralised union is higher than under decentralised unions, their wage rates charged by the labour union and the union utility may be higher under decentralised unions than under a centralised union, and the comparison may depend on the competitiveness of the industry. We also show that a conflict of interest between the domestic industry and the labour unions may not always arise. There are situations in which both parties prefer a decentralisation than a centralisation structure.

1. Introduction

Labour markets differ substantially between countries with respect to the degree of centralised wage setting (Calmfors and Driffill, 1988, Moene and Wallerstein, 1997, Flanagan, 1999 and Wallerstein, 1999). A decentralised wage setting is often contrasted with a centralised wage setting.[1] While the centralised wage setting is egalitarian in nature and generally makes the workers better off if the workforce consists of sufficiently substitutable workers (Horn and Wolinsky, 1988 and Davidson, 1988),[2] it is commonly believed that the rigidity associated with this system is generally bad for overall economic performance (Nickell, 1997 and Siebert, 1997).

While the existing theoretical literature is showing the relationship between unionisation structure and the union utility in closed economies, the overwhelming growth of foreign direct investment (FDI) in recent decades makes it important to analyse this issue from an open economy perspective. With this background and motivated by the institutional diversity of unionisation structure and the significant growth of FDI in recent decades, this paper examines the relationship between unionisation structure and utility of the unions in an international oligopoly.

We consider an economy where the firms from a home (or domestic) country and a foreign country compete in the foreign country market. The firms in the home country

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[1] Under a decentralised wage setting, wages are set between a single employer and a firm-level union, while under a centralised wage setting, an industry-wide union negotiates a standard wage for the entire industry (Haucap and Wey, 2004).

[2] Ulph (1989) shows that if the firm and the workers cannot commit to a long-term contract, decentralised unions induce the firms to increase their investments, and may benefit the workers. As mentioned in Katz (1993), unions often prefer firm-level bargaining over industry-level bargaining since the former gives them a power advantage. Mukherjee and Pennings (2005) show that if the firms differ in terms of production technologies, the presence of technology licensing may make the workers better off under decentralised labour union. They also show the effects of unionisation on a firm's incentive for innovation.

may serve the foreign country either through exports or FDI. The labour market in the home country is unionised, whereas the foreign labour market is perfectly competitive.

We show that the incentive for outward FDI by the home firms is higher under a centralised labour union than under decentralised labour unions. Whether the wage rate charged by the labour unions and the union utility are higher under a centralised union is ambiguous. If all home firms serve the foreign country market through exports irrespective of the unionisation structure, their wage rates charged by the labour union and the union utility are higher under a centralised union than under decentralised unions. However, the wage rate charged by the labour union and the union utility may be higher under decentralised unions if, in equilibrium, the number of firms undertaking FDI is higher under a centralised union than under decentralised unions, and the comparison may depend on the competitiveness of the industry. Using an example, we show that if the difference between the number of firms undertaking FDI under a centralised and decentralised unions is not very large, the union utility is higher under a centralised (decentralised) union if the industry is sufficiently (not sufficiently) competitive.

If the home firms undertake outward FDI, there is a loss of demand for labour in the home country, which tends to reduce the wage rate in the home country and may also be detrimental to the union utility. Since the incentive for FDI is higher under a centralised union, this negative effect is more likely to be higher under a centralised union than under decentralised unions. However, a centralised union, by internalising competition between separate unions, helps to raise the wage rate, thus providing a positive effect on the union utility. The negative effect of a centralised union is more likely to dominate the positive effect provided the difference between the numbers of

firms undertaking FDI under a centralised union is sufficiently larger than under decentralised unions.

We also show that if no home firm undertakes FDI irrespective of the unionisation structure, there is a conflict of interests between the domestic industry and the labour union, since the former prefers a decentralised unionisation structure, while the latter prefers a centralised unionisation structure. However, this conflict may not arise if there is more FDI under a centralised union than under decentralised unions.

The present paper has a clear relevance in the contemporary world which shows that the Western European countries, where the labour unions are generally highly centralised, are being the world's major foreign direct investors over the past few decades. UNCTAD (2006) shows that, since 1980, the EU has always been the major world investor experiencing a remarkable growth in outward FDI. Its outward FDI accounted for almost 55 per cent of the world outward FDI in 2005.

In contrast, while the labour markets in both the US and Japan are highly decentralised, their importance as a source of outward FDI have declined considerably in the past two decades by 24 per cent and 15 per cent, respectively, and accounted for only 16 per cent and 5 per cent in 2005.[3] Further, our result of higher utility of the union under decentralised unions than under a centralised union also supports the move of several countries such as Sweden, Australia, the former West Germany, Italy, the UK and the USA towards a more decentralised unionisation structure, as shown in Katz (1993). The OECD Jobs Study also recommends making the wages and labour costs more flexible to

[3] Besides the structure of unionisation, there are several other factors such as government policies that affect the incentive for outward FDIs. The above statistics should be considered as an indication showing the possibility of higher outward FDIs in countries with a centralised union compared to countries with decentralised unions.

reflect local conditions (OECD, 1996, p. 15). The trend over the past decades towards more decentralised unions can also be found in OECD (2004).

The growing policy interventions for increasing outward FDI[4] have started to attract attentions from researchers in recent years. Skaksen and Sorensen (2001) examine the preference of workers and a firm for FDI. Considering a monopolistic firm and decentralised labour unions, they show that both the workers and the firm share the same interest for FDI if there is a big degree of complimentarily between activities in the home and the host countries. On the other hand, conflicting interests arise if there is a big degree of substitutability between activities in the home and the host countries where the firm gains but the workers lose from FDI.

Ishida and Matsushima (2005) examine the welfare impacts of outward FDI. In a duopoly market structure with decentralised unions, they show that while first FDI is always welfare improving, second FDI is always welfare reducing.

However, unlike those two papers, we consider the effects of different types of unionisation on FDI and the union utility, thus addressing a completely different issue. Further, unlike Skaksen and Sorensen (2001) which determine whether home workers and the firm agree if the firm should undertake FDI, we examine whether both parties share the same preference toward the unionisation structure.

Previously, Leahy and Montagna (2000) also show the effects of centralised and decentralised labour unions in presence of inward FDI. However, our paper differs from theirs in several important ways. First, we consider outward FDI from a country with unionised labour market, while they consider FDI into a country with a unionised labour

[4] For example, the Canadian Trade Commissioner Service and the Japan External Trade Organization provide support respectively to the Canadian and Japanese firms for expanding overseas.

market. Hence, FDI in their analysis increases the number of firms in the unionised labour market, while in our analysis it reduces the number of firms in the unionised labour market, and may have different implications for the equilibrium outcomes. In a comparable situation to ours (i.e., for symmetric firms and product market competition), their analysis suggests that the wage rates charged by the labour unions are lower under decentralised unions. In contrast, we show that the wage rate charged by the labour union may be higher under decentralised unions when the incentive for outward FDI is higher under a centralised union, and if the number of firms undertaking FDI is higher under a centralised union than under decentralised unions. Secondly, unlike the present paper, they do not consider the effects of unionisation structure on the union utility. Thirdly, they ignore exporting as an alternative to FDI and assume that the alternative payoff to FDI as an exogenous variable, thus ignoring the wage determination problem under exporting, whereas we consider both exporting and FDI, and therefore, the payoff alternative to FDI is endogenous in our analysis. Finally, while we consider multiple firms deciding on FDI and exporting, and endogenously determine the equilibrium number of firms undertaking FDI, they consider a single firm deciding on FDI and exporting, thus ignoring competition between the firms undertaking FDI and exporting.

More generally, the present paper is related to the literature on FDI in unionised labour market (Bughin and Vannini, 1995, Zhao, 1995, 2001, Leahy and Montagna, 2000, Skasen and Sorensen, 2001, Naylor and Santoni, 2003, Lommerud et al., 2003 and Ishida and Matsushima, 2005).[5] However, the present paper generally differs from the

[5] There is another literature on international unionised oligopoly without FDI, which includes Brander and Spencer (1988), Naylor (1998, 1999), Straume (2002, 2003), Lommerud et al. (2006), Skaksen (2004), to name a few.

existing literature in at least two important ways. First, the existing studies consider a particular type of union structure rather than considering the effects of different unionisation structures. Second, unlike the present paper which determines the equilibrium number of firms undertaking FDI, the existing literature generally focuses on a single firm undertaking FDI.

The remainder of the paper is organised as follows. Section 2 describes the model. Section 3 derives the equilibrium outcomes under different unionisation structures. Section 4 compares the effects of decentralised and centralised unions on the incentive for FDI and union utility. Section 5 concludes.

2. The model

We consider a two-country model, which comprises of a home and a foreign country. There are $n(>1)$ firms in the home country. These firms are denoted by firm H_i, $i=1,2,..n$. There are $m(\geq 0)$ firms in the foreign country, and these firms are denoted by F_j, $j= 1,2,..m$. We assume that the firms compete in the foreign country like Cournot oligopolists with homogeneous products. However, the home firms can serve the foreign market either through export or through FDI. We assume that FDI by any home firm requires a fixed investment f.

We assume that labour is the only factor of production and the firms are symmetric with respect to the production technology. For simplicity, one unit of final output requires one unit of labour input and the cost of labour input is equal to the wage rate. We assume that the labour market in the foreign country is perfectly competitive, and the firms producing in the foreign country face the competitive wage rate $\overline{w}_f$, which

is, for simplicity, assumed to be 0. However, the labour market in the home country is unionised and all the exporting home firms employ labour from the labour unions. Concerning the unionisation structure in the home country, which is the main focus of this paper, we will consider two types of unionisation structure: (i) a decentralised union and (ii) a centralised union. Under decentralised unions, each firm in the home country bargains separately with a labour union, whereas under a centralised union, all firms in the home country are organised under a single (or national) union, and face a uniform wage rate (Leahy and Montagna, 2000 and Haucap and Wey, 2004).[6] In the following analysis, U_i, $i = 1,2,...,n$, refers to the union that is attached to firm H_i under the decentralised wage setting.

We assume that the reservation wage rate in the home country is $\overline{w}_h$, and is equal to $\overline{w}_f$, i.e., $\overline{w}_h = \overline{w}_f = 0$. This assumption of $\overline{w}_h = \overline{w}_f = 0$ is made for simplicity and in order to emphasise the effects of trade unions on outward FDI incentives. In particular, in our analysis, no home firm has the incentive to undertake FDI if the wage rate paid at home is not greater than the foreign wage rate. Since the labour market is unionised in the

[6] There could be another possibility where a centralised union charges different wages to different firms. However, in our analysis, the symmetry of the firms producing in the home country would generate the same wage rates under this situation and under a centralised union with a uniform wage rate. Moreover, empirical evidence suggests that in many situations, a labour union charges a uniform wage irrespective of the differences between the firms. As discussed in Haucap et al. (2000 and 2001), a common feature of many labour markets in the continental Europe is 'coverage extension rules', which implies that some or all employment terms are made generally binding for all industry participants and not only for the members of unions and employers' associations. "In Germany, for example, collective wage agreements between a union and an employers' association can be made compulsory even for independent employers through so-called *Allgemeinverbindlicherklärung* (AVE) … The Ministry of Labor can, on application of either unions or employers' associations, use an AVE to make some or all terms of a collectively negotiated employment contract generally binding for an entire industry, where otherwise only those unions, employers and employers' associations that have actually negotiated and signed the contract would be directly bound by it (§3 I TVG)" (Haucap et al., 2001). It is also noted in Haucap et al. (2001) that the number of AVEs almost continuously increased from 448 in 1975 to 588 in 1998. Thus, this justifies our analysis with uniform wage setting by the labour union.

home country, the assumption $\overline{w}_h = \overline{w}_f = 0$ will certainly ensure higher wage rate in the home country than in the foreign country. Although it is possible that the wage rate in the home country can be higher than the foreign wage rate even if $\overline{w}_h$ is either greater than or lower than $\overline{w}_f$, our qualitative results will not be affected due to the simplified assumption of $\overline{w}_h = \overline{w}_f$.

As in Leahy and Montagna (2000) and Haucap et al. (2004), to show our results in the simplest way, we assume that the unions have full bargaining power.[7] We assume that the unions set the wage rate to maximise their utility (which is the wage bill in our analysis) and the firms hire workers according to their needs. Hence, we assume that the firms have the right-to-manage autonomy over employment as in the works by Bughin and Vannini (1995), Vannini and Bughin (2000) and López and Naylor (2004), to name a few.

We assume that the inverse market demand function in the foreign country is $P = a - q$, where the notations have usual meanings. We consider the following game. At stage one, the home firms decide whether to export or undertake FDI. We assume that the home firms take decision on export and FDI sequentially.[8] At stage two, the union(s) in the home country determines the wage rate subject to the unionisation structure (i.e., centralised or decentralised). At stage three, all firms take their output decisions simultaneously and the profits are realised. We solve the game through backward induction.

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[7] For earlier works on monopolistic labour unions, we refer to Dunlop (1944) and Oswald (1982).

[8] If the home firms take decision on export and FDI simultaneously, this may generate multiple equilibria about the foreign investment decision, which can be eliminated if the home firms decide on export and FDI sequentially. Since the possibility of multiple equilibria does not add any new insight to our analysis, we consider sequential move of the home firms for FDI.

3. Export vs. FDI

3.1. Export by all home firms

If all home firms export to the foreign market, the profit of each home firm is:

$$\pi_{hi}^{x} = (a - q - w_i^{u,x}) q_{hi}^{x},\ i = 1,...,n, \tag{1}$$

where q_{hi}^{x} represents export by firm H_i and $w^{u,x}$ is the wage rate subjected to the type of union setting. In the following analysis, we will use the superscripts c and d to denote the outcomes under centralised and decentralised unions respectively.

The profit of firm F_j is equal to:

$$\pi_{fj}^{x} = (a - q) q_{fj}^{x},\ j = 1,...,m \tag{2}$$

where q_{fj}^{x} denotes the output of firm F_j.

Given the wage rates, the equilibrium outputs of the firms are:

$$q_{hi}^{x} = \frac{a - (m+n) w_i^{u,x} + \sum_{\substack{s=1 \\ i \neq s}}^{n} w_s^{u,x}}{m+n+1} \tag{3}$$

$$q_{fj}^{x} = \frac{a + \sum_{s=1}^{n} w_s^{u,x}}{m+n+1}. \tag{4}$$

The total output produced by the home firms is

$$Q_h^x = \sum_{i=1}^{n} \left[\frac{a-(m+n)w_i^{u,x} + \sum_{\substack{s=1 \\ i \neq s}}^{n} w_s^{u,x}}{m+n+1} \right].^{9} \quad (5)$$

3.1.1. A centralised union

If there is a centralised union in the home country, the labour union chooses the uniform wage rate for the home firms. Therefore, the labour union in the home country chooses the wage rate to maximise the following expression:

$$U^{c,x} = w^{c,x} Q_h^{c,x} = w^{c,x} n \left(\frac{a-(m+1)w^{c,x}}{m+n+1} \right). \quad (6)$$

The equilibrium wage rate is $w^{c,x} = \frac{a}{2(m+1)}$. Hence, the equilibrium outputs and profits are:

$$q_{hi}^{c,x} = \frac{a}{2(m+n+1)} \text{ and } q_{fj}^{c,x} = \frac{a(2m+n+2)}{2(m+n+1)(m+1)} \quad (7)$$

$$\pi_{hi}^{c,x} = \left(\frac{a}{2(m+n+1)} \right)^2 \text{ and } \pi_{fj}^{c,x} = \left(\frac{a(2m+n+2)}{2(m+n+1)(m+1)} \right)^2. \quad (8)$$

3.1.2. Decentralised unions

Under the decentralised wage setting, the ith union chooses its wage rate to maximise its utility. Therefore, the ith union chooses its wage rate to maximise the following expression:

[9] The second order conditions for all the maximisation problems of this paper are satisfied.

$$U_i^{d,x} = w_i^{d,x} q_i^{d,x} = w_i^{d,x} \left(\frac{a - (m+n) w_i^{d,x} + \sum_{\substack{j=1 \\ i \neq j}}^{n} w_j^{d,x}}{m+n+1} \right). \quad (9)$$

Maximising (9) with respect to $w_i^{d,x}$ and using $w_1^{d,x} = w_2^{d,x} .. = w_n^{d,x}$, due to the symmetry of the home firms and the unions, yields the equilibrium wage rate of the ith union as $w_i^{d,x} = \frac{a}{2m+n+1}$. Hence, the equilibrium outputs and profits are:

$$q_{hi}^{d,x} = \frac{a(m+n)}{(m+n+1)(2m+n+1)} \text{ and } q_{fj}^{d,x} = \frac{a(2m+2n+1)}{(m+n+1)(2m+n+1)} \quad (10)$$

$$\pi_{hi}^{d,x} = \left(\frac{a(m+n)}{(m+n+1)(2m+n+1)} \right)^2 \text{ and } \pi_{fj}^{d,x} = \left(\frac{a(2m+2n+1)}{(m+n+1)(2m+n+1)} \right)^2. \quad (11)$$

3.2. FDI by k home firms

Let us now consider the situation under FDI by some home firms. Assume that k home firms undertake FDI and the remaining home firms export. Hence, the profit of each of the k home firms undertaking FDI and each of the foreign firms is

$$\pi_{hi}^{f} = (a-q) q_{hi}^{f} - f \ , \ i = 1,...,k \quad (12)$$

$$\pi_{fj}^{f} = (a-q) q_{fj}^{f}. \quad (13)$$

The profit of each of the remaining $(n-k)$ home firms, who are exporting to the foreign market, is:

$$\pi_{kt}^{f} = (a - q - w_t^{u,f}) q_{kt}^{f}, \ t = k+1,...,n. \quad (14)$$

Given the wage rates, the equilibrium outputs of the firms are:

$$q_{hi}^{f} = q_{fj}^{f} = \frac{a + \sum_{t=k+1}^{n} w_t^{u,f}}{m+n+1},\ i = 1,...,k \tag{15}$$

$$q_{ht}^{f} = \frac{a - (m+n)w_t^{u,f} + \sum_{\substack{s=k+1 \\ t \neq s}}^{n} w_s^{u,f}}{m+n+1},\ t = k+1,...,n. \tag{16}$$

3.2.1. A centralised union

Since a centralised union chooses uniform wage rate, it chooses the wage rate to maximise the following expression:

$$U^{c,f} = w^{c,f}\left(n-k\right)\left(\frac{a-\left(m+k+1\right)w^{c,f}}{\left(m+n+1\right)}\right) \tag{17}$$

The equilibrium wage rate under a centralisation is $w^{c,f} = \frac{a}{2(m+k+1)}$. Therefore, the equilibrium outputs and profits of these firms are respectively:

$$q_{hi}^{c,f} = q_{fj}^{c,f} = \frac{a(2m+k+n+2)}{2(m+n+1)(m+k+1)},\ i = 1,...,k \text{ and } j = 1,...,m \tag{18}$$

$$q_{ht}^{c,f} = \frac{a}{2(m+n+1)},\ t = k+1,...,n \tag{19}$$

$$\pi_{hi}^{c,f} = \left[\frac{a(2m+k+n+2)}{2(m+n+1)(m+k+1)}\right]^2 - f,\ i = 1,...,k \tag{20}$$

$$\pi_{fj}^{c,f} = \left[\frac{a(2m+k+n+2)}{2(m+n+1)(m+k+1)}\right]^2,\ j = 1,...,m \tag{21}$$

$$\pi_{ht}^{c,f} = \left(\frac{a}{2(m+n+1)}\right)^2,\ t = k+1,...,n. \tag{22}$$

3.2.2. Decentralised unions

Under decentralised unions, the tth union, $t = k+1,...,n$, chooses the wage rate $w_t^{d,f}$ to maximise its utility. Hence, the tth union, chooses $w_t^{d,f}$ to maximise the following expression:

$$U_t^{d,f} = w_t^{d,f} q_t^{d,f} = w_t^{d,f} \left(\frac{a-(m+n)w_t^{d,f} + \sum_{\substack{s=k+1 \\ t \neq s}}^{n} w_s^{d,f}}{m+n+1} \right). \tag{23}$$

The equilibrium wage rate charged by the tth union, $t = k+1,...,n$, is $w_t^{d,f} = \frac{a}{2m+n+k+1}$. Therefore, the equilibrium outputs and profits are:

$$q_{hi}^{d,f} = q_{fj}^{d,f} = \frac{a(2m+2n+1)}{(m+n+1)(2m+n+k+1)},\ i = 1,...,k \text{ and } j = 1,...,m \tag{24}$$

$$q_{ht}^{d,f} = \frac{a(m+n)}{(m+n+1)(2m+n+k+1)},\ t = k+1,...,n \tag{25}$$

$$\pi_{hi}^{d,f} = \left(\frac{a(2m+2n+1)}{(m+n+1)(2m+n+k+1)} \right)^2 - f,\ i = 1,...,k \tag{26}$$

$$\pi_{fj}^{d,f} = \left(\frac{a(2m+2n+1)}{(m+n+1)(2m+n+k+1)} \right)^2,\ j = 1,...,m \tag{27}$$

$$\pi_{ht}^{d,f} = \left(\frac{a(m+n)}{(m+n+1)(2m+n+k+1)} \right)^2,\ t = k+1,...,n. \tag{28}$$

4. The incentive for FDI

4.1. The incentive for FDI under a centralised unionisation structure

If there is a centralised union, FDI is profitable up to the k th home firm provided that:

$$\pi_k^{c,f} > \pi_k^{c,x}$$

or $$\left(\frac{a(2m+k+n+2)}{2(m+n+1)(m+k+1)}\right)^2 - f > \left(\frac{a}{2(m+n+1)}\right)^2$$

or $$\left(\frac{a(2m+k+n+2)}{2(m+n+1)(m+k+1)}\right)^2 - \left(\frac{a}{2(m+n+1)}\right)^2 = f_{c,k} > f \qquad (29)$$

and

$$\pi_{k+1}^{c,f} < \pi_{k+1}^{c,x}$$

or $$\left(\frac{a(2m+(k+1)+n+2)}{2(m+n+1)(m+(k+1)+1)}\right)^2 - f > \left(\frac{a}{2(m+n+1)}\right)^2$$

or $$\left(\frac{a(2m+(k+1)+n+2)}{2(m+n+1)(m+(k+1)+1)}\right)^2 - \left(\frac{a}{2(m+n+1)}\right)^2 = f_{c,k+1} < f\,, \qquad (30)$$

where $f_{c,k+1} < f < f_{c,k}$.

The critical value $f_{c,k}$ ($f_{c,k+1}$ respectively) represents the difference between the gross profits under FDI and under export for the k th firm ($(k+1)$ th firm respectively) when $(k-1)$ firms (k firms respectively) have decided to undertake FDI. If these critical values increase, it implies that the gross profit differences between FDI and exporting also increase, thus increasing the incentive for outward FDI by more firms.

Similarly, under decentralised unions, FDI is profitable up to the k th home firm provided that:

$$\pi_k^{d,f} > \pi_k^{d,x}$$

or $$\left(\frac{a(2m+2n+1)}{(m+n+1)(2m+n+k+1)}\right)^2 - f > \left(\frac{a(m+n)}{(m+n+1)(2m+n+(k-1)+1)}\right)^2$$

or $$\left(\frac{a(2m+2n+1)}{(m+n+1)(2m+n+k+1)}\right)^2 - \left(\frac{a(m+n)}{(m+n+1)(2m+n+k)}\right)^2 = f_{d,k} > f \qquad (31)$$

and $$\pi_{k+1}^{d,f} < \pi_{k+1}^{d,x}$$

or $$\left(\frac{a(2m+2n+1)}{(m+n+1)(2m+n+(k+1)+1)}\right)^2 - \left(\frac{a(m+n)}{(m+n+1)(2m+n+k+1)}\right)^2 = f_{d,k+1} < f \qquad (32)$$

where $f_{d,k+1} < f < f_{d,k}$.

Before proceeding to the discussion on the effects of different unionisation structures on the incentive for FDI, let us first determine the impact of different types of unionisation on the wage rates in the home country. This will help us to see the effects of unionisation structures on the incentive for FDI. If all the home firms export, or the same number of firms undertake FDI and exporting under different types of unionisation, their wage rates charged by the labour union is obviously higher under a centralised union than under decentralised unions. However, we can show that if the number of FDI firms under a centralised union is higher than the number of FDI firms under decentralised unions, the wage rates in the home country may be higher under decentralised unions than under a centralised union. For example, if all home firms export under decentralised unions, the wage rates in the home country are $w_i^{d,x} = \frac{a}{2m+n+1}$, whereas if k home firms undertake FDI under a centralised union, the wage rate in the home country is $w^{c,f} = \frac{a}{2(m+k+1)}$.

We find that $w_i^{d,x} > w^{c,f}$ provided $2k+1 > n$, and it is easy to see that this may hold. For

example, if $n = 2$, and $f_{d,1} < f < f_{c,1}$, FDI occurs only under a centralised union and only a single home firm undertakes FDI. Hence, we have $k = 1$, and the condition $2k + 1 > n$ is satisfied, which implies that the wage rates in the home country is higher under decentralised unions than under a centralised union.

The above discussion is summarised in the following proposition.

Proposition 1: *(i) If all home firms export or the same number of home firms undertake FDI irrespective of the unionisation structure, the wage rates in the home country is higher under centralised union than under decentralised unions.*
(ii) If the number of home firms undertaking FDI is higher under a centralised union than under decentralised unions, the wage rate in the home country may be higher under decentralised unions than under a centralised union.

Let us now consider the effects of different unionisation structures on the incentive for FDI. We find that $f_{c,k} - f_{d,k} \equiv (\pi_k^{c,f} - \pi_k^{d,f}) + (\pi_k^{d,x} - \pi_k^{c,x}) > 0$. The reason for this is as follows. Given the number of firms undertaking FDI, the wage rate in the home country is always lower under decentralised unions than under a centralised union. Therefore, if the k th firm exports, it faces a lower wage rate under decentralised unions than under a centralised union. If the k th firm exports, its competitors are as follows: m foreign firms and $(k-1)$ home firms undertaking FDI, each with wage rate 0, and $(n-k)$ domestic firms exporting, each with a lower wage rate under decentralised unions than under a centralised union. Since the effect of a lower own wage rate under decentralised unions compared to a centralised union dominates the effect of the

competitors' lower wage rate, the profit of the kth firm is higher under decentralised unions than under a centralised union, if the kth firm exports. On the other hand, if the kth firm undertakes FDI when $(k-1)$ home firms have decided to undertake FDI, the wage rate of the kth firm is 0, whereas the $(n-k)$ remaining exporting firms' marginal cost is lower under decentralised unions than under a centralised union, thus reducing the profit of the kth firm under decentralised unions compared to a centralised union when the kth firm undertakes FDI.

Hence, the following proposition follows immediately.

Proposition 2*: There are fixed costs of FDI (viz.,* $f_{d,k} < f < f_{c,k}$*) such that relatively more home firms undertake FDI under a centralised union than under decentralised unions.*

In other words, Proposition 2 implies that the incentive for FDI under a centralised union is always higher than under decentralised unions.

4.2. Union rent

Let us now determine the impacts of different unionisation structures on union rents. To start with, we consider the situation where neither home firms undertake FDI irrespective of the unionisation structure. In other words, we consider the situation where the fixed cost of FDI, f, is such that $f_{d,1} < f_{c,1} < f$, and all the home firms serve the foreign market through exports. In this situation, the comparison of the union rents under centralised and decentralised unions gives us:

$$UR^{c,x} > UR^{d,x}$$

since $$\frac{1}{4(m+1)} > \frac{m+n}{(2m+n+1)^2}. \quad (33)$$

Hence, the union is always better off under a centralised union than under decentralised unions if all home firms always export irrespective of the unionisation structure. This result is in line with the existing works such as Horn and Wolinsky (1988) and Davidson (1988), which suggest that if the workers are sufficiently substitutable, they are better off under a centralised union than under decentralised unions, since the former allows the union to internalise competition between different unions.

Let us now consider the situation where not all home firms are exporting irrespective of the unionisation structure.[10] Given the result of the previous subsection, which shows that the FDI incentive is higher under a centralised union than under decentralised unions, we now determine the situation where neither home firms undertake FDI under decentralised unions but k home firms undertake FDI under a centralised union. Therefore, the fixed cost of FDI is such that $f_{d,1} < f < f_{c,k}$. In this situation, the comparison of the union rents shows that:

$$UR^{c,f} > / < UR^{d,x}$$

provided that $$\frac{(n-k)}{4(m+k+1)} > / < \frac{n(m+n)}{(2m+n+1)^2}. \quad (34)$$

It is clear from (34) that, given $f_{d,1} < f < f_{c,k}$, as k increases, it is more likely that $UR^{c,f} < UR^{d,x}$. Hence, the workers are more likely to be better off under decentralised

[10] It is trivial to note that if all the home firms undertake FDI irrespective of the unionisation structure, union rents are always zero, and the workers in the home country are indifferent between both types of unionisation structures.

unions if the cost of FDI is not very small (so that FDI is not profitable under decentralised unions), but it is small enough to encourage a significant number of home firms to undertake FDI under a centralised union.

Given that the fixed cost of FDI is such that k home firms are undertaking FDI, we can find the condition on the market structure (i.e., the number of total firms in the industry) such that the home workers are better off under decentralised unions than under a centralised union. As an example, if we assume that $n = m$ and the fixed cost of FDI is such that $f_{d,1} < f < f_{c,1}$ (i.e., FDI occurs only under a centralised union and only one firm undertakes FDI), the home workers are better off under decentralised unions than under a centralised union, i.e., $UR^{d,x} > UR^{c,f}$ provided $n \leq 19$. Note that, for $n = m \leq 19$, the interval $(f_{d,1}, f_{c,1})$ is non-empty.

In general, the effect of centralisation on union rent depends on two opposing forces: (i) the change in the wage rate, and (ii) the change in the demand of labour. On the one hand, given the labour demand, centralisation generates a positive effect to the union rent by increasing the wage rate. On the other hand, there is a negative effect associated with a centralisation as this may cause outward FDI, and reduces labour demand in the home country. The magnitude of this negative effect depends on the number of firms undertaking FDI and the competitiveness of the industry, which is given by the total number of home and foreign firms.

Assuming the same number of home and foreign firms in the industry, the above example suggests that if the industry is very competitive (i.e., $n > 19$), the output of each firm and therefore, the labour demand by each firm is not very significant. Hence, in this situation FDI by a home firm under a centralised union is not very costly for the

union rent; rather the positive effect of a higher wage rate under a centralised union becomes important. Thus, in this situation, the worker is better off under a centralised union than under decentralised unions. But, if the market is not so competitive (i.e., $n \leq 19$), the loss of labour demand under a centralised union due to FDI dominates the higher wage rate effect under a centralised union. Thus, the worker is better off under decentralised unions than under a centralised union.

It should be noted that if the fixed cost of FDI falls below $f_{d,1}$, we observe FDI even under a decentralised wage setting. However, Proposition 2 suggests that the possibility of FDI by more firms is higher under a centralised union than under decentralised unions. This implies that labour demand in the home country due to outward FDI is likely to fall more under a centralised union than under decentralised unions. Therefore, the net effect of outward FDI on the union rents when we observe FDI under both types of unionisation structures will depend on the difference between the number of home firms undertaking FDI under different unionisation structures and the competitiveness of the industry.

The above discussion is summarised in the following proposition.

Proposition 3: *(i) If all home firms export irrespective of the unionisation structure, the union rent is higher under a centralised union than under decentralised unions.*
(ii) If outward FDI occurs only under a centralised union, the possibility of higher union rent under decentralised unions compared to a centralised union increases with the number of home firms undertaking FDI under a centralised union.

(iii) In general, if more home firms undertake FDI under a centralised union than under decentralised unions, whether the union rent is higher under the former or the latter unionisation structure depends on the difference between the number of home firms undertaking FDI under different unionisation structures and the competitiveness of the industry.

4.3. Conflict of interests between the union and the domestic industry

As mentioned in Katz (1993), though history demonstrates that the unions prefer centralised bargaining and the employers prefer decentralised bargaining, the parties' preferences are not always so clearly ordered. Furthermore, Katz (1993) argues that the unions may prefer firm-level bargaining than industry-level bargaining because the former gives them a power advantage. We will provide a different reason for the non-existence of a conflict of interest between the firms and the labour union. We will show that if the unionisation structure affects the incentive for FDI, there may not be a conflict of interest between the firms and the labour union, and both the union and the domestic *industry*[11] may prefer decentralised unions than a centralised union.

Let us first consider the situation where all home firms export irrespective of the unionisation structure. As shown in Proposition 3(i), in this situation, the workers are better off under a centralised union. In this situation, we find that the domestic industry prefers decentralised unions than a centralised union, i.e., $\pi^{d,x} > \pi^{c,x}$, as

[11] Note that we are considering the domestic industry, i.e., all the domestic firms together, rather than a particular domestic firm. It is possible that though there may not be a conflict between the domestic industry and the labour union, there may be a conflict between the labour union and a particular firm.

$$\left(\frac{(m+n)}{(2m+n+1)}\right)^2 > \left(\frac{1}{2}\right)^2, \text{ since } \; n>1. \tag{35}$$

Therefore, if all home firms export irrespective of the unionisation structure, the labour union and the domestic industry reveal conflicting interests.

Let us now consider the situation where the number of home firms undertaking FDI depends on the unionisation structure. We will show that, in this situation, there may not be a conflict of interests between the union and the domestic industry. Considering the situation where no home firms undertake FDI under decentralised unions, while k home firms undertake FDI under a centralised union, the domestic industry is better (worse) off under a centralised union than under decentralised unions provided:

$$\sum \pi_k^{c,f} \gtreqless \sum \pi^{d,x}$$

or

$$k\left(\frac{a(2m+n+k+2)}{2(m+n+1)(m+k+1)}\right)^2 - kf + (n-k)\left(\frac{a}{2(m+n+1)}\right)^2 \gtreqless n\left(\frac{a(m+n)}{(m+n+1)(2m+n+1)}\right)^2 \tag{36}$$

Similar to the example shown in subsection 4.2, if we consider the situation with $n=m$ and $k=1$ under a centralised union, while there is no FDI under decentralised unions, i.e., considering the fixed cost of FDI as $f_{d,1} < f < f_{c,1}$, we find that the left hand side of (36) is lower than the right hand side. Therefore, in this situation, the domestic industry is better off under decentralised unions than under a centralised union.

The reason for the above finding is as follows. The firm undertaking FDI faces a lower marginal cost of the production, which helps to increase its gross profit (i.e., the profit including the cost of FDI). However, FDI by a firm reduces the profits of the remaining exporting firms by exposing them to more intense competition from the firm

undertaking FDI, though FDI by a home firm may reduce the wage rate of the remaining home firms under the centralised union compared to their wage rates under decentralised unions with no FDI. Furthermore, the cost of FDI creates a negative impact on the profit of the firm undertaking FDI. On balance, the profit of the domestic industry is lower under a centralised union than under decentralised unions.

Considering the example of subsection 4.2, i.e., $n = m$ and $f_{d,1} < f < f_{c,1}$, and taking together the preferences of both the home country labour union and the domestic industry under the given parameter configurations, we can see that both the union and the home firms share a common interest toward decentralised unions if $n \leq 19$ (i.e., if the industry is not so competitive), thus creating no conflict of interests between the union and the domestic industry.

The above discussion leads to the following proposition.

Proposition 4: *(i) If all home firms export irrespective of the unionisation structure, there exists a conflict of interest between the union and the domestic industry. Labour union prefers a centralised union while the domestic industry prefers decentralised unions.*

(ii) There may not be a conflict of interest between the labour union and the domestic industry about the choice of unionisation structure if the number of firms undertaking FDI under a centralised union is higher than the number of firms undertaking FDI under decentralised unions.

5. Conclusion

It is often argued that if there are highly substitutable workers, labour is better off under a centralised union than under decentralised unions. We suggest that this may not be true in an open economy with FDI.

We find that the domestic firms have higher incentives for outward FDI under a centralised union compared to decentralised unions. Concerning the wage rates charged by the labour unions and the utility of the unions, if all home firms export irrespective of the unionisation structure, the wage rates and the union utility are higher under a centralised union. If the number of firms undertaking FDI under a centralised union is higher than that of under decentralised unions, the wage rates and the union utility may be higher under decentralised unions than under a centralised union, and the comparison may depend on the competitiveness of the industry.

We also show that if the number of firms undertaking FDI is higher under a centralised union than under decentralised unions, there may not be a conflict of interest between the labour union and the domestic industry, and both the union and the domestic industry may be better off under decentralised unions than under a centralised union.

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