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Domenico Buccella*

Abstract

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JEL-Codes: C78, F23, J51, D60.

Keywords: bargaining, Multinational Enterprises, labor unions.

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Unions' Bargaining Coordination in Multinational Enterprises

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Abstract: This paper investigates the coordination of bargaining activities among labor unions in a Multinational Enterprise (MNE) with plants in different countries. Making use of a three-stage game where the parties sequentially decide whether to coordinate negotiations, it derives the bargaining regimes arising as sub-game perfect equilibria. In presence of workers perfect substitutes in production and symmetry in the plants' efficiency, it is shown that unions' transaction costs may attenuate the conflict of interests among the parties as regards the level of coordination at which negotiations should take place.

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1. Introduction

Bargaining between Multinational Enterprises (MNE) and organized workforce is a subject of key relevance in contemporary economics. This issue has particular importance in a context like the European Union (EU), where the presence of MNE having productive units in different Member States characterizes several industries. The international dimension of MNE' activities as well as the practice of opting out from national/sector collective bargaining in favor of company-wide agreements (Eurofound, 2009) have a deep impact on labor market outcomes, attracting the EU institutions and labor unions' attention.

In 1994, the European Commission (EC) instituted the European Works Councils (EWC) (Directive 94/45/EC, recently revised in 2009 with the Directive 2009/38/EC)¹, a voluntary instrument to provide information and consultation rights for MNE' employees in relation to transnational issues.² After the implementation of the EWC Directive, the EC proposed in the Social Agenda 2006-2010 the development of a non-compulsory EU framework for transnational bargaining. From the viewpoint of the EC, this normative background would offer the prospect to arrange transnational agreements at company level.

Workers' representatives, mainly labor unions, started exploiting the EWC' potential to coordinate bargaining activities across different plants, setting the context for negotiations within MNE. The result may be an effective coordination of the bargaining agenda and outcomes among cross-borders separate negotiations (European Commission, 2009). Given the predominant unions' position in EWC, these bodies have actually a bargaining role. Latest developments in transnational labor unions' practices may change the prospect as regards the bargaining processes at company-level. For example, in the banking sector, Danish trade unions have the mandate of negotiating on behalf of all employees working at the multinational Danske Bank (EIROnline, 2009). In addition, the European Metalworking's Federation (EMF), UNI Europa Graphical (UEG), and more recently the European Public Service Union (EPSU), three cross border industry level federations, devised a procedure to receive the mandate in representing the overall workers' side throughout company-wide transnational agreements. Since the EMF formulated its internal procedure, this has been utilized with at least five MNE (Areva, Schneider, Daimler-Chrysler, John Deere and ArcelorMittal) (Eurofound, 2009; Gennard, 2009), while the EPSU used it in negotiations with Suez-Lyonnais des Eaux (Papadakis, 2010).

Transnational campaigns to support wage bargaining and wage improvements in specific industries or MNEs are additional means that labor unions use to move nearer to issues at the core of traditional collective bargaining at a transnational level. One main objective is of gaining better access to (and sharing) crucial bargaining information such as labor costs, the share of labor costs in the companies' total costs, and company profitability which may be helpful in negotiation rounds (Keune and Schmidt, 2009).

As a result, the figures related to cross border company agreements among unions are expected to increase constantly: according to the European Trade Union Confederation (ETUC, 2008), these raised from 92 in 2005 to 147 in 2007. Nonetheless, according to the EWC database of the European Trade Union Institute (ETUI, 2009), these figures relate to a subset of all MNE operating in the EU, representing only one sixth of the MNE where an EWC is active.

Why have unions this variety of attitude as regards coordination of bargaining activities in MNE? Despite the fact that several economic sectors are dominated by the presence of MNE, especially in

¹ Subsequently, in March 2002 the European Council and Parliament adopted the Directive 2002/14/EC establishing a general framework for informing and consulting employees at national level. This directive applies also to firms employing at least 50 employees. The rationale for this norm was that many MNEs production plants were not covered by the previous EWC Directive.

² According to Article 5(1) of the Directive 94/45/EC (unchanged in the 2009 revision), an EWC may be established either by: 1) a central management initiative to start negotiations for an information and consultation procedure; or 2) at the written request of at least 100 employees or their representatives in at least two undertakings or establishments in at least two different Member States.

the EU, the greatest part of the received contributions focuses on the effects of bargaining coordination in national oligopoly industries, while the transnational dimension is barely explored. This work addresses precisely on this issue.

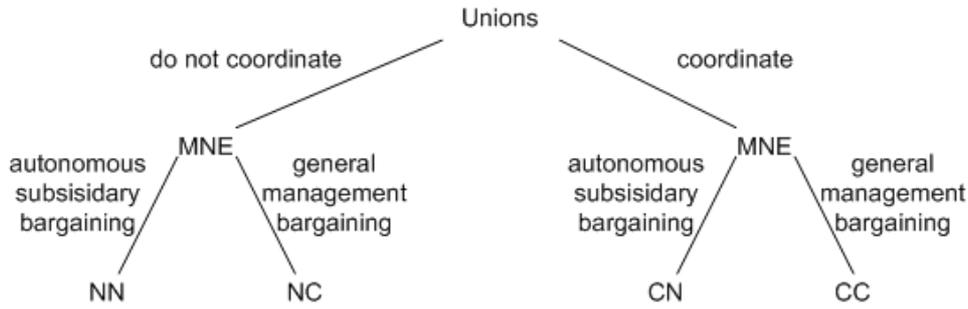
There is a consistent strand of the literature paying attention to various effects and features of collective bargaining. Authors as Davidson (1988), Horn and Wolinsky (1988), Petrakis and Vlassis (2004), and more recently Santoni (2009) investigate the outcomes of different wage bargaining structures (centralization/decentralization) in oligopoly industries. While Davidson (1988) considers simultaneous bargaining in a duopoly industry with a homogeneous final good, Horn and Wolinsky (1988) extend the analysis to the strategic implications arising from product differentiation and sequential wage bargaining.³ It turns out that, depending on the productive market structure, unions and firms have conflict of interests over the level of bargaining coordination. Petrakis and Vlassis (2004), allowing for asymmetries in firms' productive efficiency and bargaining power, investigate the endogenous formation of wage bargaining institutions in an oligopoly industry with homogeneous products. Different degrees of coordination (full decentralization, partial centralization, full centralization) arise in equilibrium. Instead, Santoni (2009) analyzes how increasing international market integration will affect the choice related to decentralized/centralized negotiations at industry level. Though, these contributions concentrate on developments about negotiation structures in national industries, without taking into account an international dimension in collective bargaining. Wage formation at company level in a context of an international productive structure is the subject of Borghijs and Du Caju (1999). Using a very simple framework (a single firm having two plants in different countries), they analyze the unions' cross borders cooperation opposed to plant specific wage settings. Under the assumption of monopoly unions (having full bargaining power), and in presence of exogenous transaction costs to cooperate, these authors show that transnational wage coordination is not always advantageous for organized labor. Starting from the basic Borghijs and Du Caju's (1999) set up, this work extends the analysis of these authors in several ways. First, by relaxing the monopoly union assumption, this paper provides a more general bargaining framework where the parties might endogenously select the negotiations' mode. Then, retaining the idea that coordination is costly for labor unions, it investigates which bargaining structure (transnational-coordinated/plant level-autonomous) arises as sub-game perfect equilibrium in negotiations among the MNE and its organized workforce. The game is a sequential one. First, unions decides whether to coordinate their bargaining activities. This is not an ad hoc assumption: in real world, it is widely observed that bargaining coordination activities are firstly taken by the employees' side (Eurofound, 1999). Then, the MNE chooses whether to negotiate by means of headquarter agents or subsidiaries' management. Finally, according to the parties' decisions, bargaining takes place simultaneously but independently at each productive site. It results that the relative parties' bargaining power and the scale of transaction costs are elements affecting the final bargaining outcomes.

Respect to the received literature, the novel result of the paper is the following. The added MNE's flexibility about the mode of negotiating as a mean of counter-reacting to the unions' prospect of cross borders coordination, and the presence of transaction costs produce different bargaining regimes (full autonomy, partial coordination, full coordination) arising as equilibrium of the game. These diversities are present despite the absence of asymmetries in the MNE plants' efficiency and perfect substitutability among workers in production. This in turn implies that, under certain circumstances, the conflict of interest among the parties as regards the level of coordination in company-wide negotiations may disappears.

The remainder of the article is organized as follows. Section 2 describes the model and derives the sub-game perfect bargaining regime arising in equilibrium. A further discussion of the results compared to the earlier literature is also provided. Finally, section 3 draws some conclusions.

³ On sequential wage bargaining in oligopoly industries see also De Fraja (1993), Dobson (1994) and Banerji (2002).

Figure 1: Timing of the game



Legenda: N stands for no coordination, C for coordination; the first letter refers to unions, the second to MNE .

2. The model

This section develops a simple three-stage bargaining game model in a multi-unit firm with plants sited in different countries of an integrated product market. For the purposes of this paper, it is relevant only the fact that the MNE has organizational power at each plant and not the technical form used to exerted control (green-field investments, transnational Mergers & Acquisitions, private equity funds, etc.).

There are two symmetric countries, denoted A and B, and in each country a MNE has a plant. The MNE produces for the entire market a non-differentiated good having no close substitutes; that is, product market competition does not occur. It is assumed that there are some exogenous fix costs G , large enough that neither the MNE will set up a new production facility, nor a potential entrant will enter into the industry. Moreover, each plant has a capacity constraint such that if the MNE shutdowns one plant, the other plant cannot produce the monopoly output for the entire market. The production of the MNE may be eventually exported across countries without extra transportation costs. The two plants have identical technology, and labor is the unique factor of production, with decreasing returns to scale. Labor supply is supposed to be sufficiently large to avoid corner solutions. The MNE hires workers at each plant from a rent-maximizing labor union that operates there, and workers are fully unionized.

As Figure 1 shows, the game follows this timing. In the first stage, unions decide whether to coordinate wage bargaining at transnational level. In the second stage, the MNE chooses whether negotiations with unions will be conducted autonomously by the management of each subsidiary or coordinated by general management. In the last stage, wage negotiations between unions and the MNE take place. These are modelled with the generalized Nash bargaining solution. The wage setting occurs before employment decisions are made. Thus, the MNE hires workers according to its necessities (right-to-manage approach). Given the bargained wages the MNE allocates production among plants. The model is solved in the usual backward fashion to get sub-game perfect equilibria.

In each plant, the production function (q_i) presents decreasing returns to scale in the single input, labor (l_i)

$$q_i = \sqrt{l_i}, \quad i = A, B \quad (1)$$

while the (inverse) linear product demand function is given by

$$p = a - Q \quad (2)$$

where p is the common price for the integrated market, and $Q = \sum_i q_i$ is total output.

The union utility is given by the following Stone-Geary utility function

$$\Omega_i = (w_i - 1)l_i, \quad i = A, B \quad (3)$$

where each union assigns equal weight to wage and employment in its preferences (neutrally oriented union), while the reservation wage is equal across countries and fixed for analytical convenience at the unity.

2.1 Last stage: optimal allocation of production among MNE's plants

The MNE maximizes profits by choosing the total quantity for the integrated market. The optimal allocation between the two plants is determined according to respective costs. From (1) it is obtained that at each plant, given wages, total and marginal costs are respectively

$$TC_i = w_i q_i^2; \quad MC_i = 2w_i q_i;$$

from which it is obtained the global marginal cost for the MNE

$$MC = \frac{2w_i w_j}{w_i + w_j} Q.$$

Total and marginal revenue are

$$TR = (a - Q)Q; \quad MR = a - 2Q.$$

Standard optimization techniques (for details see Borghijs and Du Caju, 1999) yield the following productive allocation at each plant

$$q_i(w_i, w_j) = \frac{aw_j}{2(w_i w_j + w_i + w_j)}, \quad i, j = A, B; i \neq j \quad (4)$$

Thus, the following labor demands are obtained

$$l_i(w_i, w_j) = \left[\frac{aw_j}{2(w_i w_j + w_i + w_j)} \right]^2, \quad i, j = A, B; i \neq j \quad (5)$$

with $\partial q_i / \partial w_i < 0$, $\partial l_i / \partial w_i < 0$, $\partial q_i / \partial w_j > 0$ and $\partial l_i / \partial w_j > 0$, that is, each plant's output and employment is negatively dependent on its wage level and positively related to the wage rate in the other plant. This means that workers in each plant are put in competition in the labor market against workers at the other plant. Notice also that $q_i / q_j = w_j / w_i$: the necessary condition of equalization of the marginal costs of production across plants is satisfied. Hence, given the MNE global production, total cost is minimized, and consequently MNE profits are maximized.

Finally, subsidiary i 's profits can be written as $\pi_i = pq_i - w_i l_i$. Making use of (2), (4) and (5), it can be shown that these equal

$$\pi_i = \left[\frac{a^2 w_j}{4(w_i + w_j + w_i w_j)} \right]$$

whit $\partial \pi_i / \partial w_i < 0$ and $\partial \pi_i / \partial w_j > 0$, as expected: an increase in the subsidiary i 's bargained wage decreases its profits, while an increase in the subsidiary j 's wage increases the subsidiary i 's profits.

2.2 Unions do not coordinate

At the first stage of the game, unions decide whether to coordinate bargaining. Subsequently, the MNE chooses whether negotiations will be handled autonomously by the management of each subsidiary, or coordinated by general management. First, let us consider the case that unions do not coordinate. Depending on the MNE choice about the negotiations' conduction, two cases arise.

2.2.1 Full autonomy

Suppose that the MNE chooses of conducting negotiations with subsidiaries' management (the case denoted by NN in Figure 1). Under the NN regime, the wage rate at each subsidiary is determined by maximizing the following Nash Product

$$w_i = \arg \max_{w_i} \{ NP_i = (\Omega_i)^\alpha (\pi_i)^{1-\alpha} \} \quad i = A, B \quad (6)$$

where $\alpha \in (0;1)$ is the exogenous relative bargaining power of the union, assumed to be symmetric across plants. In case of breakdown of negotiations, the inside option of both parties equals zero. Similarly to Horn and Wolinsky (1988), in this case each MNE's subsidiary is in a bilateral monopoly relation with the local labor union. Therefore, the wage rate at subsidiary j affects union i 's objective function only due to its indirect effect on l_i .

The first order condition for wage maximization is

$$\alpha \pi_i \left[l_i + \frac{\partial l_i}{\partial w_i} (w_i - 1) \right] = -(1 - \alpha) [(w_i - 1) l_i] \left(\frac{\partial \pi_i}{\partial w_i} \right) \quad i = A, B. \quad (7)$$

Given symmetry, the equilibrium wage under NN is derived

$$w_{NN} = 1 + \left[\sqrt{\alpha^2 + \alpha + 1} - (1 - \alpha) \right]. \quad (8)$$

The term in brackets represents the rent over the reservation wage. As expected, $\partial w_{NN} / \partial \alpha > 0$: higher bargaining power of the union increases the equilibrium wage because unions capture a higher share of the MNE's rents. Replacing (8) into (5), the following labor demand in equilibrium at each subsidiary is obtained

$$l_{i,NN} = \left[\frac{a}{2(2 + \alpha + \sqrt{\alpha^2 + \alpha + 1})} \right]^2 \quad (9)$$

whit $\partial l_{i,NN}/\partial\alpha < 0$. Further substitutions in to the relevant expressions allow to compute the MNE profits and global union utility

$$\pi_{NN} = \sum_i \pi_{i,NN} = \frac{a^2}{2(2+\alpha+\sqrt{\alpha^2+\alpha+1})}; \Omega_{NN} = \sum_i \Omega_{i,NN} = \frac{a^2 \left[\sqrt{\alpha^2+\alpha+1} - (1-\alpha) \right]}{2(2+\alpha+\sqrt{\alpha^2+\alpha+1})^2}.$$

2.2.2 MNE headquarter coordination in bargaining

Assume now that the MNE participates in negotiations with headquarter representatives. One may imagine of a situation where the MNE sends to each subsidiary one agent representing the total interests of the firm (Zhao, 1995). Since the cost of sending agents may be realistically supposed negligible respect to the total profit amount, it is assumed that the MNE does not sustain any costs to coordinate bargaining activities. Negotiations occur separately but simultaneously at each plant (the NC case in Figure 1). In such regime, the wage rate for the i th subsidiary is determined by maximizing the following expression

$$w_i = \arg \max_{w_i} \left\{ NP_i = (\Omega_i)^\alpha (\pi_i + \pi_j - \pi_j^*)^{1-\alpha} \right\} \quad i, j = A, B ; i \neq j \quad (10)$$

where π_j^* is the MNE's inside option in case of breakdown of negotiations. The union i 's inside option equals zero. The MNE's disagreement utility might have different specifications. In the present context, π_j^* (alternatively seen as lock-out funds) could be defined either as subsidiary j 's profits at the anticipated full autonomous bargaining equilibrium output, or as the MNE profits when subsidiary j operates as the unique plant producing for the whole market. Nevertheless, given the assumption of capacity constraint at each plant, the latter possibility is ruled out. The first order condition for wage maximization is given by

$$\alpha \pi_i \left[l_i + \frac{\partial l_i}{\partial w_i} (w_i - 1) \right] = -(1-\alpha) [(w_i - 1) l_i] \left(\frac{\partial \pi_i}{\partial w_i} + \frac{\partial \pi_j}{\partial w_i} \right) \quad i, j = A, B ; i \neq j \quad (11)$$

because in equilibrium $\pi_j = \pi_j^*$ and $\partial \pi_j^*/\partial w_i = 0$. Given the symmetry assumption, equilibrium wages are

$$w_{NC} = 1 + \left[\frac{\sqrt{25\alpha^2 + 22\alpha + 1} - (1-\alpha)}{2(1+\alpha)} \right], \quad (12)$$

where the term in brackets is the rent over the reservation wage, with $\partial w_{NC}/\partial\alpha > 0$. Nevertheless, comparing equations (8) and (12), it turns out that $w_{NC} > w_{NN} \forall \alpha \in (0;1)$. The rationale for this result may be found by inspection of the first order conditions in equations (7) and (11). In the NN regime, each subsidiary management takes into account only the negative effect of the negotiated wage during the bargaining on its subsidiary profit (the term $\partial \pi_i/\partial w_i$). Instead, in the NC bargaining regime the MNE's headquarter agents internalize also the positive effect of the wage increase at the other subsidiary (the term $\partial \pi_j/\partial w_i$). This implies that the subsidiary i 's position is weaker during negotiations while, by recognizing this internalization effect by MNE headquarter

agents, the bargaining position of each union at the respective plant improves. As a result, negotiations lead to higher wage rates. Putting the expression in (12) into (5), it is derived that the subsidiary i 's labor demand in equilibrium is given by

$$l_{i,NC} = \left[\frac{a(1+\alpha)}{5+7\alpha+\sqrt{25\alpha^2+22\alpha+1}} \right]^2 \quad (13)$$

whit $\partial l_{i,NC} / \partial \alpha < 0$. By comparison of equations (9) and (13), it results that $l_{i,NN} > l_{i,NC} \forall \alpha \in (0;1)$: higher bargained wages in the NC regime shrink the labor demand at each site for the MNE. Finally, after subsequent substitutions, it is obtained that MNE profits and global union utility are

$$\pi_{NC} = \sum_i \pi_{i,NC} = \frac{a^2(1+\alpha)}{5+7\alpha+\sqrt{25\alpha^2+22\alpha+1}}; \quad \Omega_{NC} = \sum_i \Omega_{i,NC} = \frac{a^2(\alpha+1) \left[\sqrt{25\alpha^2+22\alpha+1} - (1-\alpha) \right]}{\left(5+7\alpha+\sqrt{25\alpha^2+22\alpha+1} \right)^2}.$$

2.3 Unions coordinate

Suppose now that unions coordinate at transnational level bargaining activities. Given the MNE range of possibilities as regards the selection of the bargaining mode, two cases arise.

2.3.1 Unions' coordination only

First, assume that the MNE decides of participating in negotiations with subsidiaries' management. Bargaining takes place autonomously but simultaneously at each subsidiary (the CN case in Figure 1). To share information in coordinating activities, unions are supposed to incur an exogenous per union member (symmetric) transaction cost $\tau \geq 0$. The total amount of this cost, given by τl_i with $i = A, B$, must be deducted from the unions' rent in case of separate bargaining (Borghijis and Du Caju, 1999). A decrease in unions' transaction costs is the measure of the degree of labor market integration. In the CN bargaining regime, the wage for the i th subsidiary is determined by the maximization of the following Nash product

$$w_i = \arg \max_{w_i} \left\{ NP_i = \left[(w_i - \tau - 1)l_i + (w_j - \tau - 1)l_j - D_i \right]^\alpha (\pi_i)^{1-\alpha} \right\} \quad i, j = A, B ; i \neq j \quad (14)$$

where D_i is the union i 's inside option in case of breakdown of negotiations. The MNE subsidiary i 's inside option in absence of coordination equals zero. The disagreement utility of the union may have different specifications (Horn and Wolinsky 1988; Dobson, 1994; Santoni, 2009; Mukherjee, 2010). In the present context, D_i (alternatively seen as strike funds) might be defined either as the utility that the coordinated union obtains at subsidiary j at the anticipated separate bargaining equilibrium output, or as the union utility when subsidiary j operates as a monopolist with a unique plant producing for the entire market. However, the initial assumption of capacity constraint at each plant rules out the latter possibility.

The first order condition for wage maximization is given by

$$\alpha \pi_i \left[l_i + \frac{\partial l_i}{\partial w_i} (w_i - \tau - 1) + \frac{\partial l_j}{\partial w_i} (w_j - \tau - 1) \right] = -(1 - \alpha) \left[(w_i - \tau - 1) l_i - \tau l_j \right] \left(\frac{\partial \pi_i}{\partial w_i} \right) \quad i, j = A, B ; i \neq j \quad (15)$$

because $D_i = (w_j - 1)l_j$ in equilibrium. Comparing the first order conditions in (7) and (15), it results that the difference among non-coordinated/coordinated unions stands in the fact that in the latter case labor unions consider not only the effect of w_i on l_i , but also the effect of their own wage on the labor demand at the other plant. That is, unions internalize the cross effects of an increase in their wage rates on overall employment levels (Davidson, 1988; Horn and Wolinsky, 1988). Since in the present context workers at each plant are perfect substitutes in the production activity among them, an increase in subsidiary i 's wage rate raises the labor demand at subsidiary j (and vice versa): that is, $\partial l_j / \partial w_i > 0$. Hence, the bargaining coordination across plants for labor unions in principle should be more profitable respect to non-coordinated bargaining. Nevertheless, the presence of transaction costs may offset the unions' gains. Whether coordination is advantageous for unions crucially depend on the size of these costs.

Given the symmetry, from (15) it is obtained that equilibrium wages are

$$w_{CN} = 1 + \left[\sqrt{4\alpha^2 + (2\tau - 1)\alpha + (\tau + 1)^2} + (2\alpha + \tau - 1) \right]. \quad (16)$$

The term in brackets represents the union rent. Analytical inspection reveals that $\partial w_{CN} / \partial \alpha > 0$ as expected, and $\partial w_{CN} / \partial \tau > 0$: that is, an increase in transaction costs for coordinating activities is passed through higher wage claims by unions during negotiations at each plant. Replacing the wage rate in (16) into (5), the labor demand in equilibrium at subsidiary i 's is given by

$$l_{i,CN} = \left[\frac{a}{2 \left(\sqrt{4\alpha^2 + (2\tau - 1)\alpha + (\tau + 1)^2} + 2\alpha + \tau + 2 \right)} \right]^2 \quad (17)$$

whit $\partial l_{i,CN} / \partial \alpha < 0$ and $\partial l_{i,CN} / \partial \tau < 0$. This is so because both higher unions' relative bargaining power and transaction costs increase the bargained wage, and this in turn implies a reduction in the labor demand at each site for the MNE (the wage/employment trade-off). Subsequent substitutions leads to the following expressions for the MNE profits and global union utility

$$\pi_{CN} = \sum_i \pi_{i,CN} = \frac{a^2}{2 \left(\sqrt{4\alpha^2 + (2\tau - 1)\alpha + (\tau + 1)^2} + 2\alpha + \tau + 2 \right)};$$

$$\Omega_{CN} = \sum_i \Omega_{i,CN} = \frac{a^2 \left(\sqrt{4\alpha^2 + (2\tau - 1)\alpha + (\tau + 1)^2} + 2\alpha - 1 \right)}{2 \left(\sqrt{4\alpha^2 + (2\tau - 1)\alpha + (\tau + 1)^2} + 2\alpha + \tau + 2 \right)^2}.$$

2.3.2 Full coordination

Finally, suppose that both the MNE and the labor unions choose of conducting negotiations by coordinating their bargaining activities. Negotiations take place independently and simultaneously

at the two MNE subsidiaries (the CC case in Figure 1). As before, labor unions incur in exogenous per member coordination costs while the MNE does not. In the CC bargaining regime, the wage rate for the i th subsidiary is determined by maximizing the following Nash product

$$w_i = \arg \max_{w_i} \left\{ NP_i = \left[(w_i - \tau - 1)l_i + (w_j - \tau - 1)l_j \right]^\alpha (\pi_i + \pi_j)^{1-\alpha} \right\} \quad i, j = A, B ; i \neq j. \quad (18)$$

In case of breakdown of negotiations, the two parties' inside option now equals zero. The first order condition for wage maximization is

$$\alpha(\pi_i + \pi_j) \left[l_i + \frac{\partial l_i}{\partial w_i} (w_i - \tau - 1) + \frac{\partial l_j}{\partial w_i} (w_j - \tau - 1) \right] = -(1 - \alpha) \left[(w_i - \tau - 1)l_i + (w_j - \tau - 1)l_j \right] \left(\frac{\partial \pi_i}{\partial w_i} + \frac{\partial \pi_j}{\partial w_i} \right) \quad i, j = A, B ; i \neq j. \quad (19)$$

Given the symmetry, it is obtained that in equilibrium the wage rates are

$$w_{CC} = 1 + [(3\alpha + \tau(1 + \alpha))] \quad (20)$$

where the term in brackets is the union rent over reservation wage, whit $\partial w_{CC} / \partial \alpha > 0$ and $\partial w_{CC} / \partial \tau > 0$. Substituting back the wage rate in (20) into (5), the following labor demand at subsidiary i is obtained in equilibrium

$$l_{i,CC} = \left[\frac{a}{2[(3 + \tau)(1 + \alpha)]} \right]^2 \quad (21)$$

whit $\partial l_{i,CC} / \partial \alpha < 0$ and $\partial l_{i,CC} / \partial \tau < 0$. By comparison of equations (16) and (20), and equations (17) and (21), it results that $w_{CN} \geq w_{CC}$ and $l_{i,CC} \geq l_{i,CN}$ if and only if transaction costs are above a certain threshold level, namely $\tau \geq \tau^* = \left[\sqrt{1 + 5\alpha + 4\alpha^2} / (\alpha + 1) \right] - 1$. In such a case, the MNE recovers bargaining position by effect of coordination when it is opposed to coordinated unions because it reduces their inside option from D_i to zero. This coordination effect overcomes both the cross effects of employment and the internalization of profit externalities (see equations (19), (15) and (11)), therefore leading to lower negotiated wages and higher employment levels. On the contrary, if $\tau < \tau^*$, it follows that $w_{CC} > w_{CN}$ and $l_{i,CN} > l_{i,CC}$: despite unions' inside option falls to zero, the coordination advantages for the MNE are not sufficient to dominate the internalization of employment and profits externalities. Thus, full coordination leads to higher negotiated wages.

This finding in part reverses the MNE's position when facing non-coordinated unions. In that case, the MNE has no incentives in negotiating wages with headquarters agents, since the internalization of subsidiary profit externalities put unions in a stronger bargaining position. This is corroborated by comparison of equations (12), (16) and (20): it can be verified that for sufficiently low values of unions' bargaining power and transaction cost levels it may be either the case that $w_{NC} > w_{CC} > w_{CN}$ or $w_{CC} > w_{NC} > w_{CN}$.

Finally, further substitutions allow to evaluate the expressions for the MNE profits and global union utility, represented by

$$\pi_{CC} = \sum_i \pi_{i,CC} = \frac{a^2}{2(3+\tau)(1+\alpha)}; \Omega_{CC} = \sum_i \Omega_{i,CC} = \frac{\alpha a^2}{2(3+\tau)(1+\alpha)^2}.$$

2.5 Second stage: the MNE's choice of coordinated (headquarter agents) vs. separated (subsidiaries' management) bargaining

In the second stage of the game, the MNE selects the way of conducting its negotiations. The choice depends on the global profits that will be attained by the company under the no coordinated/coordinated bargaining decision of the unions. Profit levels are affected by the relative parties' bargaining power, α , and the unions' per member transaction cost, τ . Headquarter coordination turns out to be advantageous for the MNE if $\pi_{NC} \geq \pi_{NN}$ when unions do not coordinate bargaining, and if $\pi_{CC} \geq \pi_{CN}$ in case of unions' transnational coordination. From direct payoffs' comparison, the following proposition may be established.

Proposition 1: 1) *If unions do not coordinate bargaining activities, full autonomy always Pareto-dominates headquarter coordination for the MNE: that is, $\pi_{NN} \geq \pi_{NC} \forall \alpha \in (0;1)$;*
 2) *if unions coordinate bargaining activities, MNE headquarter coordination Pareto-dominates the subsidiaries' negotiations when transaction costs are larger than the threshold value: that is, $\pi_{CC} \geq \pi_{CN}$ iff $\tau \geq \tau^*$.*

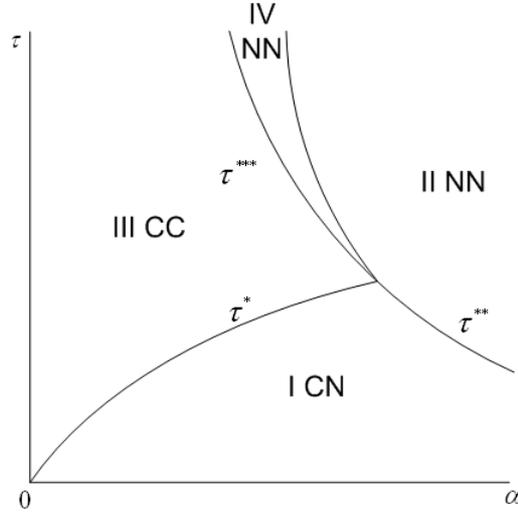
Proposition 1 states that a MNE will never find beneficial to coordinate negotiations whenever unions act separately, and the rational was find in the fact that the internalization of subsidiaries' profits by headquarter agents makes autonomous unions stronger. Instead, the MNE may find profitable coordination among subsidiaries as a mean to counterbalance bargaining positions only if unions are coordinating negotiations, and transaction costs are relatively high. In other words, under these circumstances, to negotiate with headquarter agents is a beneficial strategy to counter react unions' bargaining coordination. In particular, the threshold value τ^* depends on the parties' bargaining power, with $\partial \tau^* / \partial \alpha > 0$: an increase in unions' strength makes the threshold for coordination higher. Thus, negotiations with headquarter agents are more likely to occur when labor unions are weak and their coordination incentives higher.

2.6 First stage: the unions' decision and sub-game equilibria

In the first stage of the game, the unions choose whether to coordinate bargaining. Due to the backward induction procedure and given the timing of the game, in making such a decision unions take as given the strategic choice made by the MNE about its preferred way of conducting negotiations. As a consequence, in selecting the strategy (coordination/no coordination), unions compare their relevant payoffs subject to the MNE bargaining coordination choice. The analysis below shows how this will affect the unions' choice and derives the sub-game perfect bargaining regime arising in equilibrium. Figure 2 shows the results in the (α, τ) -space.

If unions do not coordinate bargaining, they know that the MNE will never participate in negotiations with headquarter agents. Unions get their highest utility level under the NC regime, but given the strategic choice of the MNE, this outcome will never be reached. Negotiations take place only under the NN regime. If unions coordinate their activities, the MNE bargains with headquarter agents if $\tau \geq \tau^*$, while for $\tau < \tau^*$ it negotiates by subsidiaries management. Therefore, depending on the transaction cost level, either the CN or the CC regime arise as equilibrium of the game. Thus, unions decide their strategy comparing the following payoffs: Ω_{CC} , Ω_{CN} , Ω_{NN} . This generates four different regions.

Figure 2: Bargaining regimes in equilibrium



In region I, delimited by $\tau^*(\alpha)$ and the threshold value $\tau^{**}(\alpha)$ (whose analytical expression is rather complex and it is not reported), unions' payoffs under bargaining coordination are larger than under full autonomous bargaining. However, given that for $\tau < \tau^*$ transaction cost levels are such that the MNE will not coordinate negotiations across plants, the CN regime arises in equilibrium. It can be checked that this is a *third best outcome* for both parties.

Region II is characterized by relative high values of unions' bargaining power and transaction costs $\tau \geq \tau^{**}(\alpha)$, such that unions do not find profitable to coordinate their bargaining activities. Since the MNE never negotiates with headquarter agents when unions act separately, the NN regime arises as equilibrium. Direct payoffs' comparison shows that in this region the MNE reaches its *first best*, while unions get a *second best outcome*.

In region III, restricted by $\tau^*(\alpha)$ and $\tau^{***}(\alpha) = \frac{[\alpha^3 - 2\alpha^2 - 8\alpha - 3 + (\alpha^2 + 2\alpha + 3)\sqrt{\alpha^2 + \alpha + 1}]}{(\alpha + 1)^2(1 - \alpha - \sqrt{\alpha^2 + \alpha + 1})}$, the

configuration of the parameters (α, τ) is such that for the MNE is advantageous to coordinate bargaining with headquarter agents, while for unions coordinated negotiations ensure payoffs superior than autonomous negotiations. Hence, given the choice of the MNE in the previous stage of the game, in this region the CC bargaining regime arises as equilibrium. Comparing the payoffs, it can be verified that this is a *third best outcome* for both bargaining parties.

Finally, in region IV, delimited by $\tau^{**}(\alpha)$ and $\tau^{***}(\alpha)$, if unions coordinate, their relative bargaining power and the scale of transaction costs are such that the MNE chooses to coordinate negotiations among subsidiaries. However, from payoffs' evaluation it is obtained that unions are better off if they bargain in full autonomy, that is, $\Omega_{NN} \geq \Omega_{CC}$. In other words, autonomous negotiations Pareto-dominate bargaining coordination for unions, and straightforward comparison shows that they get a *third best outcome*. Since π_{NN} is the MNE's *first best outcome*, it turns out that the NN bargaining regime arises as sub-game perfect equilibrium in this region.

2.7 Discussion of the results

These findings complement those obtained in the collective bargaining literature. The received literature has shown that the endogenous bargaining structures (decentralized/centralized) arising in equilibrium in oligopoly industries crucially depend on the nature of product markets (complement/substitute goods). If input suppliers, notably unions, are first movers it turns out that

in presence of complement goods independent negotiations with firms arise as equilibrium, while with substitute goods coordinated unions get higher payoffs. If firms also centralize bargaining, their preference order is reversed. That is, unions and firms have conflict of interests over the level of coordination (Horn and Wolinsky, 1988).

Instead, Santoni (2009) analyzes how increasing international market integration (a reduction in trade costs allowing for a higher import penetration by a foreign firm) will affect the choice related to decentralized/centralized negotiations in presence of fixed transaction costs for both parties in a national oligopoly industry. When unions and firms simultaneously choose their centralized/decentralized bargaining strategy, this author shows that if the goods are substitutes decentralization is a dominant strategy for firms, while each union, depending on the parameters of the model, will choose either centralization or decentralization. Therefore, either full decentralization or unions' partial centralization arise as sub-game perfect equilibria. On the other hand, if the goods are complements, decentralization is a dominant strategy for unions, while firms will either select centralization or decentralization. Thus, either full decentralization or firms' partial centralization arise as sub-game perfect equilibria of the game. Which of these bargaining regimes is more likely to arise as unique sub-game equilibrium depends on the characteristics of product market integration process' (one-way or two-way trade among countries). However, it is worth noting that full centralization in this model never arises as equilibrium of the game. On the other hand, abstracting from the complementary/substitutability issue, Petrakis and Vlassis (2004) show that in presence of asymmetries in firms' productive efficiency, the intervention of a national regulator intervention establishing a minimum wage floor leads to full centralization, partial centralization and full decentralization as bargaining regime arising in equilibrium. Wage formation at company level in a context of international productive structure is explored by Borghijs and Du Caju (1999). The authors' analysis is based on the assumption of monopoly unions having full bargaining power and fixing unilaterally wage rates, and it investigates the possibility of cross borders union cooperation opposed to plant specific wage settings. Depending on the scale of transaction costs, the two extreme cases of transnational wage coordination and separate wage settings arise in equilibrium.

Focussing the analysis at company level as Borghijs and Du Caju (1999), and leaving a simultaneous move game framework for a sequential one, the present work shows that in a context where workers are perfect substitutes in production (therefore, in absence of efficiency asymmetries among plants), if the MNE has an added flexibility of counter-reacting to unions' bargaining coordination decision, full centralization, partial union centralization and full decentralization arise as bargaining regime in equilibrium. Moreover, under specific circumstances, the presence of coordination costs makes advantageous for unions to negotiate wages independently, attenuating the conflict of interests with the MNE over the level of bargaining coordination at which negotiations inside the company should take place.

The proposed framework may help to shed lights on the variety of bargaining coordination activities actually observed within the MNE operating in the EU. The fact that unions' transnational bargaining activities are recently increasing may suggest that coordination costs are decreasing (labor markets turn out to be more integrated), and at least in those companies having plants located in countries with similar labor productivity these practices are more likely to occur. Further developments in the normative framework proposed by the EU institutions as regards information and consultation rights for MNE' employees to transnational issues, by affecting the scale of unions' transaction costs, may push towards more centralized bargaining regimes at company level.

3. Conclusions

This paper develops a three-stage game to investigate bargaining coordination at company level among a MNE with production facilities in different countries and plant level unionized workforce.

Unions first decide whether to coordinate their bargaining activities; then, on the basis of the unions' choice, the MNE selects whether negotiations will be conducted by subsidiaries' management or headquarter agents. Finally, wage negotiations take place, and given the bargained wages, the MNE determines the optimal allocation of production among plants. The main point of the paper is the following. With workers perfect substitutes in production, absence of asymmetries among the MNE's plants, and labor unions paying transaction costs to coordinate their activities at transnational level, different bargaining regimes arise as sub-game perfect equilibria. Depending on the scale of unions' transaction costs and the parties' relative bargaining power, full coordination, partial unions' coordination and full autonomous bargaining are given in equilibrium. Therefore, the presence of relatively high per union member transaction costs does not make always beneficial bargaining coordination for unionized workforce. This in part moderates the conflict of interests between the MNE and labor unions over the level of coordination during negotiations.

Nonetheless, the results of this work are restricted to the case of a MNE in a monopoly position in the product market. A more realistic framework should investigate an international oligopoly market structure analyzing the effects of firms' strategic interactions on the unions/MNEs coordination choice in bargaining activities. Additionally, differences in labor unions' transaction costs across companies and in labor productivity among plants may influence the final negotiations' regime; that is, the coordination activities taking place within a company will not necessarily arise in another one. These represent further extensions of the model which may help to understand the effects of the EU interventions on the company level bargaining institutions.

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