

LABOR UNIONS AND ECONOMIC INTEGRATION: A REVIEW

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RESUMEN

Este artículo presenta una revisión de la literatura microeconómica teórica y empírica que investiga los efectos de la integración de los mercados de productos y de la internacionalización de las actividades de las firmas sobre el comportamiento de los sindicatos. El trabajo relaciona estos temas a la experiencia de Europa, indicando las líneas de investigación futura en este tópico.

Clasificación JEL: F21; F23; J50

Palabras Clave: Integración económica, sindicatos.

ABSTRACT

This paper reviews the theoretical and empirical microeconomic literature on the effects of product market integration and internationalization of firms activities upon labor unions. It relates these issues to the European experience, indicating future lines of research in this field.

JEL Classification: F21; F23; J50

Keywords: Economic integration, labor unions.

LABOR UNIONS AND ECONOMIC INTEGRATION: A REVIEW**DOMENICO BUCCELLA¹****I. Introduction**

Economic integration is an ongoing process which has known in the last decades a dramatic pace of development, both at regional and global levels. Political issues like the reduction in tariff and other trade barriers have mainly driven this process, occurring either within supranational bodies like the WTO and the European Commission (EC), or through unilaterally moves by individual countries. Falling transportation and communication costs' further contributes to increase the flows of goods, services, and in some cases of people (workers). Furthermore, deregulation in international capital markets allows to move rapidly capital between different locations, leading to a process of disintegration of production, both of services and goods.

The European Union (EU) emerges as one of the major results of the ongoing process of international integration. One of the pillars of the EU economic integration process was the completion of the Single Market Program in 1992, which came into force by 1 January 1993. It resulted in the adoption of measures eliminating caveats and barriers on trade (reduction of tariffs and the removal of non-tariff barriers) to create a large integrated market for goods and services (allowing to realize and exploit economies of scale). Other measures were aimed at generating an increasing competitive environment to attain (allocative and productive) efficiency gains, reducing distortions in national product markets. The construction of the European Monetary Union (EMU), a second pillar of the EU integration process, initiated in 1990 and ended by the introduction of the Euro in 2002, has intensified economic integration between European countries by reducing trade costs and removing currency risks. The progresses in the Financial Service Action Plan and closer financial market integration further give a

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contribution to the process, making international capital mobility deal in an easier way with Foreign Direct Investment (FDI) operations.²

The deepening of economic integration has significant consequences for outcomes (wage and employment levels) and institutions of European labor markets. Product market integration, as well as increasing transparency and comparability of prices across boundaries (at least in those countries adopting the single currency), is expected to make price competition stronger and reduce the margin of profits. Financial market integration has enhanced the importance of private capital in job creation. Both these aspects of economic integration pose wages and labor costs developments as key variables to improve the countries' international competitiveness and attractiveness.

While the European economy is turning out to be progressively more integrated, labor unions operate mostly at national level. Ongoing internationalization will probably continue to exert pressures on unionized workers. This may occur through several channels. As mentioned, increasing competition is a first channel (Dreher and Gaston, 2007). The presence of international competitors increases the number of actors in imperfectly competitive product markets, shrinking the economic rents over which employers and workers negotiate. A second channel, identified both by Rodrik (1997) and Dreher and Gaston (2007), has to do with the ease with which domestic workers can be replaced by workers abroad either through trade or delocalization via FDI toward countries with lower wage levels. Technically, trade and international production flatten the labor demand at home which becomes more elastic, allowing for employers to react at changes in wages substituting workers by moving all or part of their operations abroad. It is commonly perceived that product market integration reduces the relative bargaining power of labor unions, and European integration seems to increase the labor demand sensitivity to wages, which may induce labor unions to moderate their wage claims. In economic sectors highly exposed to international competition, the demand for higher wages may trigger considerable occupational losses because of a deteriorated competitive position. European integration makes less complicated for firms,

² The realization of the Single Market Program and the completion of the Single Market for financial services has subsequently driven a growth in the figures concerning both intra-industry trade (see European Commission, 2008a) and intra-EU FDI (see European Commission, 2005, 2008b; Jovanović, 2006, chap. 3, section 3.3.6).

predominantly Multinational Enterprises (MNEs), to spread their activities between plants, located in different countries, to capture advantages in terms of reduction in production costs. Moreover, not only effective delocalization but the simple threat of delocalizing weakens unions' positions, allowing for firms to obtain favorable concessions during negotiations. The adoption of labor market policies by national Governments whose aim is to weaken union bargaining strength; and the institutional convergence towards the more decentralized, less regulated and less unionized U.S. labor market (considered the ideal model to face the challenges posed by international integration) are two additional elements (Dreher and Gaston, 2007).

Nonetheless, following more integrated product and financial markets, and fostered by processes promoted by the EU institutions, notably the adoption of the 1994 (recently revised in 2009) European Works Councils (EWC) and the 2001 European Company Directives, in recent times also European labor markets have shown signs of changes in bargaining practices. Major actors like trade unions, stimulated by the concern that would be opposed against each other in a strong competition over jobs and income, have shown increasing interest in trans-nationalize their activities. This took place typically in softer, non-binding forms, intensifying the degree of cooperation in coordinating their policies, and taking into account a broader perspective in negotiation strategies at every level (the "Europeanization" of collective bargaining). To pursue these objectives, since 1998, the sharing of common rules in collective bargaining to confederate negotiators (the "guideline for collective bargaining at the European level") by the European Trade Union Confederation (ETUC), and institutions such as multinational collective bargains has been introduced. However, similar practices emerged also in initiatives apart from the ETUC, like the "Doorn agreement", a transnational agreement endorsed by the national trade unions of Belgium, Germany, Luxembourg and the Netherlands in 1998, whose central points were wage demand coordination and the support of occupational growth.³

While the ETUC and the "Doorn agreement" provide guidelines and policy orientations in coordinating activities at cross sectoral level, unions in the European Industry Federations (EIF) mainly pursued at the industry level these initiatives, according to the sector they cover. Within the EIFs, the European

³ See European Commission (2002) for an extensive review on coordination activities about collective bargaining.

Metalworkers' Federation (EMF) is in a leading position. The EMF was the first industry level union federation which adopted a "coordination approach" to attain a European dimension in coordination activities related to national bargaining policies and minimum standards. With the purpose of preventing possible downward competition on wages and working conditions, in December 1998 the EMF, in defining its own strategy, adopted the so-called "European coordination rule". This "coordination rule" is based on two central elements: a joint commitment to European guidelines for national collective bargaining, aimed at preventing downward competition; and the political purpose of "EMF minimum standards" which all EMF associates should feel obliged to bargain for. Precisely, the EMF stated that "the wage policy of trade unions in all countries must be to offset the rate of inflation and ensure that workers' incomes retain a balanced participation in productivity gains".

The approval of the EWC Directive is modifying the level at which collective bargaining occurs in many industrial sectors in Europe. In fact, in those sectors characterized by a high incidence of Multinational Enterprises (MNE) operations, there is an increasing evidence of company level negotiations rather than industry-wide agreements. As a consequence, recently unions start to take advantage of the EWCs' potential to coordinate activities across countries during the bargaining process. For example, in the banking sector, Danish trade unions received the mandate to negotiate on behalf of all employees working at Danske Bank (EIROnline, 2009). The EMF and UNI Europa Graphical (UEG, another cross border industry union belonging to the EIFs), devised a procedure to receive the mandate in representing the workers' side all through company-wide transnational agreements (Eurofound, 2009; Gennard, 2009).

Hence, labor unions are developing trans-national cooperation strategies. In the next future, unions may seek to coordinate wage policies to improve their positions in negotiations with employers. Aim of this paper is to sum up the theoretical and empirical literature related to the effects of international integration on organized labor, considering the strategic interactions among economic actors in the product and labor markets. It focuses to the works analyzing the scope and incentives for unions' international coordination, as a means to face the impact of product and capital markets' integration. These issues relates in particular to the European experience.

The rest of the paper organizes as follows. Section 2 presents some preliminary considerations connected to the received literature: discussion of unions' objective functions; description of the features related both to the bargaining processes among unions and firms, and the structure of international markets; discussion about the concept of economic integration. Section 3 provides a review of the literature on the effects of international trade liberalization in unionized frameworks, focusing on wage and employment outcomes, and on the diverse features of union coordination. Instead, Section 4 devotes to the internationalization of productive activities and its consequences for labor unions. Section 5 presents a review of the empirical literature on the impact of economic integration on European unions' outcomes. Section 6 closes the paper.

II. Economic integration and unionized labor markets: preliminary considerations

There are some important issues to take into account when starting to analyze the effects of closer economic integration on unionized labor markets and union behavior. A first element is the union objective function. In the recent literature, unions are usually seen as optimizing agents, which maximize diverse utility functions. A general specification, encompassing several union objectives, is the following Stone-Geary utility function:

$$U = (w - \bar{w})^\theta (l - \bar{l})^{(1-\theta)}$$

where w is the wage rate, \bar{w} the reservation wage; l is the number of workers employed, and \bar{l} is the reservation employment. The parameter $\theta \in [0,1]$ represents the relative weights that the union assigns to the rent over the reservation wage and the reference level of employment. The union is wage (employment) oriented if $\theta > 1 - \theta$ ($\theta < 1 - \theta$), or neutrally oriented if $\theta = 1/2$. When $\theta = 1/2$ and $\bar{l} = 0$, the union has a rent-maximizing utility function. Additionally, if the reservation wage is $\bar{w} = 0$, the union maximizes the total wage bill. Finally, if $\theta = 1$, the union maximizes the wage premium; with $\bar{w} = 0$, the union simply maximizes the wage rate.

Other functional forms often used in representing union objectives are the utilitarian utility function,

$$U = lu(w) + (m - l)u(b)$$

and its slightly modified version, the expected utility function,

$$U = \frac{l}{m}u(w) + \frac{(m - l)}{m}u(b)$$

where $u(w)$ is the utility function of the individual employed union member, $m \geq l$ represents the number of union members, generally assumed as fixed; b is the alternative wage or the unemployment benefits. The utilitarian union utility function maximizes the sum of the utility of employed members and the utility of any unemployed member; the expected utility function maximizes the expected utility of the representative union member. If m is treated as a variable, the two utility forms differ. While the utilitarian utility is increasing in membership because is an aggregating function, the expected utility is decreasing: employment is a random draw across identical members, and growing membership lowers for each member the probability of being occupied. Finally, under the assumptions of perfect symmetry in objectives and in preferences over wages and employment, theoretical works mainly describe wage coordination among (usually two) unions as efficient union collusion, where the sum of unions' utility is maximized; but in some exceptional cases, the product of union utilities is maximized.

A second group of features that should be taken in to account are related to bargaining: the scope, the type, and level.⁴ Concerning the scope of bargaining, almost all cases consider either negotiations over wages only, or both employment levels and wage rates. The former refers to the right-to-manage model: unions and firms bargains over wages, but once the wage rate

⁴ Another feature related to bargaining (not covered in this work) is the timing at which negotiations might occur. The literature here reviewed assumes that negotiations between unions and firms occur at the same time at every level. That is, bargaining is synchronized. Only few exceptions consider the effects of sequential bargaining: negotiations take place first in a firm, industry or country which is in a "leading" position, and then the agreement reached there becomes the "pilot agreement" for all subsequent negotiations. On this topic see De Fraja (1993), Dobson (1994), Corneo (1995) and Wang et al. (2009) for theoretical models; and Traxler and al. (2008), and Traxler, F., Brandl, B. (2009) for empirical research in European countries.

is fixed, firms have the right to decide employment levels. In this case, the equilibrium solution stays on the firms' labor demand. Instead, the latter refers to the efficient bargaining model: firms and unions negotiate simultaneously over wages and employment, and the Pareto-efficient equilibrium resides somewhere on the contract curve's locus to the right of the firms' labor demand function. Rarely, a labor-hoarding model is considered: unions and firms bargain over wages and overhead labor, namely the proportion of unproductive time a worker is paid for. If workers value on-the-job leisure, overhead labor constitutes a bargaining issue for the union.

As regards the type of negotiation, the Nash Bargaining Solution is mainly adopted. This implies the maximization with respect to the bargaining scope of the Nash Product, given by:

$$NP = (U - \bar{U})^\alpha (\Pi - \bar{\Pi})^{(1-\alpha)}.$$

The parameter α captures the relative bargaining power during negotiations, Π represents firm profits, while $\bar{\Pi}$ and \bar{U} are the parties' outside options, or conflict payoffs in case of strikes. Several models assume that these are equal to zero. A special case of the Nash Product is the Monopoly Union model, where $\alpha = 1$: unions have the complete power to fix wages, and subsequently firms choose the employment level.

Bargaining between workers and employers representatives may take place at different levels. The most decentralized is the firm level. However, a distinction may be done among plant specific and company-wide agreements. Higher negotiation levels, involving an increasing degree of centralization, are industry-wide and national. In a context of increasing economic integration, especially referring to the European experience, also transnational bargaining is considered.

A third element to take in consideration is the structure of the international product market, and therefore the type of competition therein. International competition takes place in almost all works in a two-country model, but exceptionally, also a three-country model may be used. It is adopted either an oligopoly or a monopolistic competition framework; sometimes also perfectly competitive markets are assumed. As regards oligopoly markets, it is assumed that a limited number of firms, ranging from 2 to n , compete in different ways: Cournot competition is the most frequently adopted model but, even if

more rarely, Bertrand competition and conjectural variation models are also present. Markets may be fully integrated, where firms decide output levels for the entire market; alternatively, the market segmentation hypothesis is used, where firms choose production levels separately for each relevant market. For analytical convenience and tractability, linearity in demand functions is generally assumed, but some works use more general functional forms. Goods may be homogeneous or heterogeneous as well as substitutes or complements.

Finally, economic integration in itself represents a broad definition. It may refer to increasing product markets integration via international trade, due to reductions or elimination of tariff and non-tariff barriers, or because of falling general trade cost barriers such as transportation, logistic and “red-tape” costs; but also to capital markets liberalization. Consequently, economic integration can be modeled in different ways. When refers to product markets, integration is generally depicted either as a marginal reduction in trade costs or in a change from autarky to full market integration. However, in some papers, product market integration is measured by other parameters as the share of firms which start to sell their goods in the international market, or an increasing substitutability among domestic and foreign goods. The advantage of the first approach is that the economic integration is measured by the trade cost parameter. This allows to analyze the effects of marginal changes in the degree of integration. On the other hand, this method does not capture a key aspect of integration: firms in different countries may enter into foreign markets, implying increasing product market competition. The second approach captures the market access aspect, but in general it compares two extreme regimes. If international economic integration relates to capital markets liberalization, this could be viewed in increasing possibilities for firms to undertake FDI in other countries, allowing for internationalization of productive activities.

Next sections review the theoretical and empirical works on the effects of international economic integration on labor unions’ behavior and labor market outcomes, considering different dimensions and approaches towards this phenomenon.

III. Labor unions and economic integration: international trade

This section discusses the papers whose focus is the study of the labor unions’ behavior in a context of international trade. These works are classified in

accordance with the different methodologies describing international product market integration.⁵

A. Labor unions and trade liberalization: reduction in trade barriers

First theoretical contributions related to the effects of economic integration on labor markets, analyzing the related wage and employment outcomes as well as incentives for unions to cooperate internationally in face of increasing trade competition in product markets, are the models by Driffill and van der Ploeg (1993, 1995).

Driffill and van der Ploeg (1993) analyze a two-country model of international trade with barriers whose revenues are returned as lump-sum subsidies. Firms in each country produce homogeneous goods and specialize in the production of their own exportable. The domestic and the foreign goods are imperfect substitutes in consumption. There are no assets; thus equilibrium always requires balanced trade and monetary issues need not be taken in consideration. Labor factor is immobile. Households maximize the following CES utility function which depends on the consumption of domestic (x_1) and foreign (x_2) goods,

$$\begin{aligned} \tilde{U}(x_1, x_2) &= [(1 - \lambda)x_1^\theta + \lambda x_2^\theta]^{\frac{1}{\theta}} \text{ for } 0 < \theta \leq 1 \\ &= x_1^{1-\lambda} x_2^\lambda \text{ for } \theta = 0 \end{aligned} \quad (1)$$

subject to the following budget constraint

⁵ Several papers have studied the impact of trade liberalization on labor unions. These works considered a framework where unionized countries face product market competition from countries with perfectly competitive labor market. A crucial issue (not covered in this work) is that of strategic trade policy; that is, the choice of trade policy interventions by governments aiming at maximize domestic welfare. In general, these models apply in oligopoly frameworks and investigate the effects of the implementation of such strategic trade policy instruments as tariffs, subsidies and import quotas, on unionized workforce. This strand of the literature was pioneered by the works of Brander and Spencer (1988) and Mezzetti and Dinopoulos (1991), and further developed by Santoni (1996), Bandyopadhyay and Bandyopadhyay (1999, 2001), Campbell and Vousden (2000), Bandyopadhyay, Bandyopadhyay and Park (2000), Collie and Vandenbussche (2005), and Ma (2008). Another topic is the analysis of different forms of trade liberalization as unilateral reduction in tariffs, creation of free-trade agreements or free-trade areas. This is the subject of the three-country models with one non-unionized country of Fisher and Wright (1999) and Mauleon, Song, and Vanetelbosch (2006).

$$x_1 + tex_2 = m = pu, \quad (2)$$

where λ is the fraction of the foreign goods, m indicates income, p is the price index associated with the composite commodity u , e denotes the real exchange rate, namely the price of the foreign goods in terms of home products, and $t \equiv 1 + T$ with T the tariff rate charged by the home country on imports. From the maximization problem, the following expression for the CPI is derived:

$$\begin{aligned} p &= \left[(1 - \lambda)^b + \lambda^b (te)^{1-b} \right]^{\frac{1}{1-b}} \quad \text{if } b > 1 \\ &= [(1 - \lambda)^{1-\lambda} \lambda^\lambda]^{-1} (te)^\lambda \quad \text{if } b = 1 \end{aligned} \quad (3)$$

The CPI depends on the tariffs t , the real exchange rate e and the elasticity of substitution between domestic and foreign goods, $b \equiv [1/(1 - \theta)] \geq 1$. Since $\partial p / \partial t > 0$, a reduction in tariff barriers leads to a reduction in the CPI with a consequent increase in the demand for the goods produced in the foreign country. In particular, when $b > 1$, the substitution effect dominates the income effect and therefore there is a reduction in the demand for the domestic goods; instead, with the Cobb-Douglas utility function ($b = 1$), income and substitution effects are exactly offset.

Firms operate in a perfectly competitive market and demand l units of labor, the unique factor of production, to maximize profits, $f(l) - wl$, where $f(l)$ is a production function with diminishing returns to labor, and w is the product wage. The labor demand is then $l = L(w)$, $L' = 1/f'' < 0$, and the product supply is $f[L(w)] \equiv Q(w)$, $Q' = f'/f'' < 0$, both decreasing functions of the wage. Product market equilibrium requires that $Q(w) = x_1 + x_2^*$, where x_2^* represents exports (asterisks indicate foreign variables). The government distributes tariff revenues as lump-sum subsidies, so that $(t - 1)ex_2 = s$ and $m = Q(w) + s$.

Given the condition for balanced trade $x_2^* = ex_2$, the equilibrium real exchange rate's expression is $e = E(w, w^*, t, t^*)$; further substitution in the

CPI expression yields $p = P(w, w^*, t, t^*)$. An increase in the domestic product wage decreases the aggregate product supply at home, and causes a relative increase in the price of home products with respect to foreign products. This leads to an appreciation of the real exchange rate (a reduction of e), and consequently in a reduction of the CPI (from equation (3), $\partial p / \partial e > 0$): an increase in the product wage leads to an increase in the consumption wage. Similarly, an increase in the foreign product wage leads to an expansion of the aggregate supply of the domestic goods in the home market. This in turn implies depreciation of the real exchange rate, and thus an increase in the CPI. A tariff cut at home, instead, shrinks the demand for domestic products, increases the demand of foreign goods. This induces depreciation of the real exchange rate attenuating the drop in the CPI due to the tariff reduction.

Trade unions are supposed to maximize a utilitarian utility function which depends on employment and the consumption wage:

$$U\left(\frac{w}{p}, l\right) \equiv L(w)u\left(\frac{w}{p}\right) + [\bar{l} - L(w)]\bar{u}, \quad u' > 0, u'' \leq 0 \quad (4)$$

where \bar{l} is the exogenous union membership and \bar{u} is the utility of leisure time. If unions suppose that their members have wage income only, equivalent to w units of the domestic product, the utility of each member is linear in the consumption wage,

$$u\left(\frac{w}{p}\right) = \left(\frac{w}{p}\right). \quad (5)$$

Three types of unions are considered: decentralized trade unions (*D*), centralized trade unions (*C*) and international trade unions (*I*). In case of decentralized unions, from equation (5) it is obtained that the maximization problem leads to

$$\frac{\partial U}{\partial w} = L'(w)u\left(\frac{w}{p}\right) + u'\left(\frac{w}{p}\right)L(w) - L'(w)\bar{u} = 0$$

from which it is obtained that wages are set according to

$$\left[\frac{u\left(\frac{w}{p}\right) - \bar{u}}{\left(\frac{w}{p}\right)} \right] = \left[\frac{-L(w)}{wL'(w)} \right] \equiv \left(\frac{1}{d} \right)$$

which, given (5), becomes

$$w_D = p_D \frac{\bar{u}}{\left(1 - \frac{1}{d}\right)} \quad (6)$$

where $1/d$ is the inverse of the elasticity of labor demand respect to the real product wage: a low elasticity and high unemployment induce unions to set high wages. When unions are decentralized, they are so small that the effect of raising wages on the CPI and the exchange rate are ignored.

In case of centralized unions, they are sufficiently large that the effect of increasing national wages on the domestic CPI is taken into account. It follows that the maximization problem now becomes,

$$U\left(\frac{w}{p(w)}, l\right) \equiv L(w)u\left(\frac{w}{p(w)}\right) + [\bar{l} - L(w)]\bar{u}$$

from which the first order condition is:

$$\frac{dU}{dw} = L'(w)u\left(\frac{w}{p}\right) + (1 + \varepsilon)u'\left(\frac{w}{p}\right)L(w) - L'(w)\bar{u} = 0.$$

Consequently, the wage rate is set in accordance to the condition

$$\left[\frac{u\left(\frac{w}{p}\right) - \bar{u}}{\left(\frac{w}{p}\right)} \right] = \left(\frac{1 + \varepsilon}{d} \right),$$

which given (5) turns out to be

$$w_C = p_C \frac{\bar{u}}{\left(1 - \frac{1 + \varepsilon}{d}\right)}$$

where $\varepsilon \equiv -wP_w/p > 0$ is the elasticity of the CPI with respect to the domestic product wage. It is obtained that, in the symmetric equilibrium ($t = t^*$), the CPI is $p_C = p_D = \left[(1 - \lambda)^b + \lambda^b t^{1-b}\right]^{\frac{1}{1-b}}$, implying that $w_C > w_D$. This is so because decentralized unions do not take into account the positive effect that an increase in the wage rate has on union utility through a reduction in the CPI: the wage demand is lower than a centralized union, and consequently the employment level higher.

If unions are centralized and cooperate at international level, they internalize the adverse effects of a wage increase on the unions' utility abroad through the increase in the foreign CPI which causes, given the foreign product wage, a reduction in the consumption wage in that country. In equilibrium, this will cause a wage level which is lower than those fixed by centralized unions with an exclusively national viewpoint. It follows that international unions maximize

$$U\left(\frac{w}{p(w, w^*)}, l\right) \equiv L(w)u\left(\frac{w}{p(w, w^*)}\right) + [\bar{l} - L(w)]\bar{u}.$$

Differentiation leads to

$$\frac{dU}{dw} = L'(w)u\left(\frac{w}{p}\right) + (1 + \varepsilon - \varepsilon^*)u'\left(\frac{w}{p}\right)L(w) - L'(w)\bar{u} = 0.$$

Hence, trade unions fix the wage following the condition

$$\left[\frac{u\left(\frac{w}{p}\right) - \bar{u}}{\left(\frac{w}{p}\right)} \right] = \left(\frac{1 + \varepsilon - \varepsilon^*}{d} \right)$$

which becomes

$$w_I = p_I \frac{\bar{u}}{\left(1 - \frac{1 + \varepsilon - \varepsilon^*}{d}\right)}$$

where $\varepsilon^* \equiv w^* P_{w^*} / p > 0$ is the elasticity of the CPI with respect to the foreign product wage. In the symmetric equilibrium ($\varepsilon = \varepsilon^*$), it follows that $w_C > w_D = w_I$. This result corresponds to an international version of the original findings by Calmfors and Driffil (1988) of the hump-shaped relationship between wages and the degree of corporatism.

Driffil and van der Ploeg (1993, footnote 2) show that national centralized unions have a utility level lower than decentralized and international unions; it follows that national unions could find profitable to cooperate across countries (improving their welfare) because of higher employment levels. However, decentralized unions could find advantageous to move from centralization towards decentralization of the wage setting; but if wage arrangements in the foreign country are taken as given, it could be the case that decentralized unions would prefer a centralized wage setting. In other words, unions could face a classical Prisoners' Dilemma.

The effects of increasing economic integration (a reduction of $t = t^*$) are also considered. In case of Cobb-Douglas preferences, it is obtained that

$$e = \left(\frac{w}{w^*}\right)^{-c}, \quad p = [(1 - \lambda)^{1-\lambda} \lambda^\lambda]^{-1} t^\lambda \left(\frac{w}{w^*}\right)^{-\lambda c}$$

where $c \equiv -(wQ'/Q) > 0$ is the elasticity of production to product wage. With Cobb-Douglas preferences, the elasticity of the CPI with respect to home and foreign product wage is constant ($\varepsilon = \varepsilon^* = \lambda c$) and independent from tariffs. It is also derived that, in the symmetric equilibrium,

$$\frac{w_I}{p} = \frac{w_D}{p} = \frac{\bar{u}}{\left(1 - \frac{1}{d}\right)} < \frac{w_C}{p} = \frac{\bar{u}}{\left(1 - \frac{1 + \lambda c}{d}\right)} \quad (11)$$

from which it can be noted that inefficiencies from the absence of international cooperation between unions (low output and employment levels)

are larger when the share of imported goods in total consumption is large and when the aggregate supply curve is very elastic. Instead, in case of CES preferences ($b > 1$), the authors show that for $e = 1$ and $t = t^*$, $\partial\varepsilon/\partial t < 0$: centralized unions set higher wages if tariffs and ε are low, and consequently a further reduction in trade barriers deepens the wage differential between centralized setting and the other two settings. Nonetheless, the union utility as a whole decreases in case of centralized wage setting because the fall in employment level does not overcome gains from higher wage rates, and hence incentives for international cooperation between trade unions increase.

Driffill and van der Ploeg (1995) face the same issues addressed in their previous work adopting a different setting; they show that the results strongly depend on the hypothesis lying behind the models. A two-country model of intra-industry trade in differentiated goods is used where in the product market monopolistic competitive firms operate. Firms freely enter and leave until profits are bid down to zero. The production function exhibits increasing returns to scale. Moreover, in this work, the authors consider a utilitarian monopoly trade union in an industry which represents a small fraction of the country GDP, and consequently a small part of the consumers' budget. Therefore, differently from Driffill and van der Ploeg (1993), since the wage paid in the industry might have only a small effect on the CPI faced by its employees, a national union or even an international union would not be inclined to moderate its wage demands on that account. Under these conditions, the authors find that wages set at the national level positively depend upon the tariff level, explained by the fact that trade barriers protect national unions. Thus, tariff cuts oblige labor unions to set lower wages. Since the wage rates set internationally are substantially unaltered by the tariff, a fall in the tariffs themselves broadens the difference between the nationally and internationally negotiated wages, and hence to an increasing incentive for trans-national labor union cooperation. Moreover, the authors conclude that the national wage is always lower than the international wage, only approaching the latter when the tariff tends to infinity. The rationale is that with low tariffs, a small increase in the domestic wage, taking as given the wage in the other country, will cause a reduction in the number of firms in the domestic industry. Since numerous domestic firms will exit the industry while, at the same time, many firms will enter in the foreign country, the national union, taking this into account, select a very low wage. Instead, the

international union considers an overall wage rate increase and consequently perceives a less significant (total) employment effect of a wage raise. As a result, it sets a relatively high wage.

Another class of works has considered the effects of economic integration in the context of international oligopoly (duopoly) models with unionized labor markets, in which firms and unions interact strategically. Generally, these are partial equilibrium models⁶ constructed taking in consideration a two-stage game structure solved in the backward fashion where:

1) there is full unionization and monopoly unions in the first stage maximize their rents over competitive wage either competing à la Bertrand or colluding between them: in this case there is interdependency between the wage levels in different countries; otherwise, unions and firms bargain over wages: in this case wage levels are determined independently in each country;

2) in the second stage firms choose the profit maximizing quantities (and hence employment) independently for each market (market segmentation), given the quantity of the other firm (Cournot competition assumption) and the wage resulting from the first stage (“right-to-manage”).

While the bargaining approach is rarely used when economic integration is analyzed in international trade, the monopoly union model is more common given that it allows for labor markets rivalry. Normally, this approach adopts a number of simplifying assumptions regarding the demand function and production technology. In general, it is assumed linearity in demand and production functions of a homogeneous/differentiated commodity. Labor is usually the unique factor of production with constant return to scale, in such a way that each worker produces one unit of the goods: that is, production and employment are equal. The market segmentation hypothesis, combined with the constant marginal costs assumption, implies that, in each market, the price for the goods depends entirely on the quantity in that country. It is assumed that the sector is relatively small respect to the economy, such that the effects of wage negotiations on the general price level index are ignored. Moreover, only equilibria in pure strategies are considered. This kind of approach is found in Naylor (1998, 1999), Straume (2002), Piperakis et al. (2003) and Strozzi (2007, 2008).

⁶ The papers of Dube and Reddy (2006) and Bastos and Kreickmeier (2009) represent few exceptions of general equilibrium models in an international trade context.

A formal model that sums up this strand of the literature could be represented by the following framework. There are two countries (1 and 2), which have different market sizes (s_1 and s_2). In each country operates a firm. Should firms want to export, they pay a variable “per unit” cost $t \in [0, 1)$ representing a basket of costs including tariffs, transaction, transportation and logistic. Economic integration within this framework is pictured as a marginal reduction in t , and it is assumed that its value is sufficiently low so that both firms can export. The two-stage game is solved by backward induction as usual. To lighten notation, the different markets are denoted by the indices i and j ($i, j = 1, 2; i \neq j$). It follows that firm profits are given by:

$$\Pi_i = (p_{ii} - w_i)x_{ii} + (p_{ij} - w_i - t)x_{ij} \quad (12)$$

where p_{ii} is the prices of commodities in the domestic market and p_{ij} is the price for products in the foreign market, w_i is the wages paid by the firm i , x_{ii} is the firm i 's production for consumption in its domestic market while x_{ij} is the production for consumption in the foreign market. Inverse product demands are linear and take the following form

$$p_{ii} = a - \frac{b}{s_i}(x_{ii} + \gamma x_{ji}); \quad p_{ij} = a - \frac{b}{s_j}(x_{ij} + \gamma x_{ji}) \quad (13)$$

with $a, b > 0$, and where γ is the parameter which captures the degree of differentiation among goods x_i and x_j . In general, it is assumed that products are substitutes, implying that $\gamma \in (0, 1]$: if $\gamma \rightarrow 0$, the goods are substantially independent; if $\gamma = 1$, they are perfect substitutes. Thus, when international trade occurs, this is of intra-industry type: in fact, depending on the specific models' assumptions, there are threshold values of t such that autarky (defined as a situation where a firm produces only for its domestic market) arises as game equilibrium. Union utility is given by the following version of a Stone-Geary utility function

$$U_i = (w_i - \bar{w})(x_{ii} + x_{ij}) \quad (14)$$

where \bar{w} is the reservation wage. In the second stage, Cournot competition in the product market takes place. Substituting equations (13) into (12), from the firms' maximization problem (subject to the non-negative constraints), the following optimal quantities (employment levels) are obtained

$$x_{ii} = \frac{s_i(2a - a\gamma + \gamma w_i + \gamma - 2w_j)}{b(4 - \gamma^2)} \quad (15)$$

$$x_{ij} = \frac{s_j(2a - a\gamma + \gamma w_i - 2t - 2w_j)}{b(4 - \gamma^2)}. \quad (16)$$

The sum of the two labor demand schedules given by (15) and (16) represents the aggregate demand faced by union i . In the first stage, unions set their wage, taking as given the wage level in the other country. Substituting in (14) the optimal quantities, the union i maximization problem becomes

$$w_i = \arg \max_{w_i} \left\{ U_i = (w_i - \bar{w}) \left(\frac{s_i(2a - a\gamma + \gamma w_i + \gamma - 2w_j)}{b(4 - \gamma^2)} + \frac{s_j(2a - a\gamma + \gamma w_i - 2t - 2w_j)}{b(4 - \gamma^2)} \right) \right\}$$

The maximization problem leads to an expression for union i reaction function from which it is derived the equilibrium wage level in each country, given by

$$w_i = \bar{w} + \underbrace{\frac{(2 - \gamma)(a - \bar{w})}{b(4 - \gamma)}}_{\text{product differentiation effect}} - t \underbrace{\frac{[s_i(8 - \gamma^2) - 2s_j\gamma]}{b(16 - \gamma^2)(s_i + s_j)}}_{\text{market size effect}} \quad (17)$$

Equation (17) indicates that the wage in equilibrium presents a rent over the competitive level composed of two parts. The first term, the "product differentiation effect", depends exclusively on the parameter γ , and it is unequivocally positive. The second term, "the market size effects", may be either positive or negative. Economic integration (measured by the parameter t) plays a role exclusively on the second term of the rent expression. From equation (17), it is directly derived

$$\frac{\partial w_i}{\partial t} < 0 \text{ if } s_i < \frac{s_j(8-\gamma^2)}{2\gamma}; \quad \frac{\partial w_i}{\partial t} > 0 \text{ if } s_i > \frac{s_j(8-\gamma^2)}{2\gamma} \quad (18)$$

Equations (18) allow to draw some results: closer economic integration may have a positive or negative effect on wage levels, depending both on market sizes and product differentiation. If goods are perfect substitutes ($\gamma = 1$), the results of Piperakis et al. (2003) are obtained, according to whom if market size disparity is $s_i < 3.5s_j$ and if trade costs are below a certain threshold, increasing economic integration (a reduction of t) leads union i to increase wage demands. This is so because total employment in country i ($x_{ii} + x_{ij}$) increases. If market size disparities are too large ($s_i > 3.5s_j$), the reverse applies. What is the role played by product market differentiation? As long as γ approaches to zero, the right-hand sides of the inequalities increase, implying that economic integration leads unions to increase wage demands even if product markets have huge size differences. It follows that, if countries are specialized in production of relatively different goods, labor unions operating in larger countries should not be worried of increasing integration.⁷

The previous results integrate those of Naylor (1998). Assuming symmetric countries and perfect substitutes (that is, $s_i = s_j = \gamma = 1$), Naylor obtains that for levels of t allowing for intra-industry trade ($0 \leq t \leq .311$), $\partial w_i / \partial t < 0$: an increase in economic integration will induce trade unions to set unambiguously higher wages. The reason is that when trade cost level decreases, a more severe competition amongst the participants in an international oligopoly takes place. Nonetheless, the firms' output increases: gains from more sales in the foreign markets counterbalance the disadvantage of higher competition in the home market. In this framework, labor demand becomes less elastic: even if a smaller number of workers are needed to satisfy domestic demand, firms require more workers to produce goods for export.

⁷ Piperakis et al. (2003, Appendix) show that, if trade costs are above a threshold value, an increase in employment opportunities due to trade is not sufficient for the union in the larger market to equalize the utility loss due to a lower wage. Instead, the union in the smaller country finds always profitable to set a low wage assuring an employment compensation from the access in to the larger market. This a notable difference respect to symmetric models of intra-industry trade: when market sizes are asymmetric, autarky may arise in equilibrium only in one country.

Given that the latter effect is larger than the former, when intra industry trade takes place, employment grows due to the output expansion; and while firms may possibly suffer a loss in profits, unions will choose to set higher wages. Consequently, it is found that $\partial U_i / \partial t < 0$: further economic integration causes an unambiguous increase in labor unions' utilities due to a simultaneous raise in total employment and wage rates.

In a subsequent work, Naylor (1999) extends his previous analysis to a more general framework, encompassing the Brander and Spencer (1988) model which considers the case of only one labor market unionized. It characterizes a full set of possible trade regimes in a two-country duopoly model with a homogeneous product and one union active in each labor market. The author takes in consideration the outcomes of two alternative union wage strategies. Naylor (1999) defines as a low-wage strategy a union wage setting such that both domestic production and exports are strictly positive. Instead, the high-wage strategy implies that a union set a wage level precluding exports. The main results are as follows: 1) where only one market is unionized, one-way trade occurs if union chooses a high wage, which depends on the exogenous rival wage and trade cost levels; when trade costs decreases, two-way trade arises; 2) in a symmetric unionized framework, intra-industry trade arises as equilibrium if trade costs are below a certain threshold values ($0 \leq t \leq .311$); in that range increasing economic integration leads unions to set high wages, and their utility raises as trade costs fall; for sufficiently high trade costs ($t \geq .354$), the autarky equilibrium arises; in an intermediate range ($.311 < t < .354$) equilibrium in pure strategies is not existent; 3) when trade costs are sufficiently low ($0 < t < .163$), the intra-industry trade equilibrium Pareto-dominates the collusive outcome: unions jointly get a higher level of utility allowing for international trade. For higher levels of trade costs ($.163 \leq t \leq .311$), the union game presents the characteristics of a classical Prisoners' Dilemma where the collusive outcome Pareto-dominates the Nash equilibrium. Thus, there are incentives for unions to collude internationally.

Naylor (2000) extends the analysis of Naylor (1998, 1999). This model differs from the previous in that the home country is unionized, and the domestic monopoly union takes the foreign wage as given when set its own wage. It is assumed that the wage rate in the home country is higher than the

wage paid abroad. Labor is the unique factor of production with the usual assumption of constant marginal productivity. The model is a two-stage game, solved in the usual backward fashion. In the first stage, the domestic union set wages maximizing the following utility function

$$U_i = (w_i - \bar{w})^\theta l_i$$

where $l_i = x_{ii}$ in case of no trade or one-way trade, and $l_i = x_{ii} + x_{ij}$ in case of two-way trade, deciding among the high/low-wage strategies. In the second stage, differently from Naylor (1998, 1999), firms compete according to a conjectural variation model in the product market. The degree of market substitutability among goods is captured by the parameter γ in equation (13), whose range in this model is $\gamma \in [-1, 1]$: if $\gamma = -1$, the goods are complements. Depending on the trade cost level, no trade, one-way trade or two-way trade occurs in equilibrium. In the presence of high trade costs, neither the domestic nor the foreign firm undertake international trade. If trade costs decrease, one-way trade take place. This is because the foreign firm pays lower wages, and if trade costs are symmetric, exports are profitable only for the foreign firm. In a situation where trade costs are so high such that only one-way trade occurs, a decrease in trade costs leads the domestic union to reduce wage demands if goods are substitutes because of increasing international competition, while wages are increasing if goods are complements. Two-way trade takes place if trade costs further reduce. The key result is that now the domestic union increases wage demands independently from the degree of market substitutability among traded goods. However, the selection among the high/low-wage strategies does not exclusively depend on the trade regime. Although the strategic wage rate's choice depends on trade costs levels, it turns out these costs are affected by the degree of product market competition between firms, the level of product differentiation, the reservation wage and the weight assigned to the wage in the union preference.

To sum up, Naylor's works show that a marginal decrease in trade costs can increase wages even in such cases where reciprocal trade was already occurring previously to the reduction in trade barriers. Thus, in Naylor's models the market expansion effect of increasing integration dominates the market discipline effect. However, wages under autarky are always higher than with reciprocal trade. High trade costs induce unions to choose a high-wage strategy, and for certain ranges, only one-way trade occurs. If trade costs fall

below a critical threshold, unions switch their wage strategy towards a low-wage profile, and a further marginal decline in trade costs will increase wage rates.

Bastos and al. (2009), using an international duopoly model with only one country unionized, investigate the effects of the process of trade liberalization on collective bargaining outcomes when workers are represented by open shop unions. Product markets are supposed to be segmented, and union density in this model is exogenously given. The authors find that, when the union's density degree is at intermediate levels, higher wages may be negotiated in case of trade liberalization, even if no trade occurs in equilibrium. The reason for this result is that, under certain conditions, the prospects of imports from a foreign country in case of bargaining breakdown with unions will affect the firms' conflict payoff. Therefore, the "import threat" due to international competition improves the union position during negotiations and weakens the position of the domestic firm. Hence, the firm will accept higher union wage claims in the presence of strong international competition. Moreover, they are able to show that union wages might be higher with free trade than in autarky.

An extension of Naylor's (1998, 1999) analysis is represented by the work of Görtzgen (2002). The framework is different: in her international unionized duopoly model with differentiated products, market competition takes place à la Bertrand. The author studies national labor markets interdependencies and the consequences of trade liberalization for union wages. Her analysis suggests that national wages are expected to be strategic complements (substitutes) if products are ordinary substitutes (complements). The main results are as follows. Bilateral trade liberalization always leads unions to set higher wages, increasing their utilities regardless of the nature of product rivalry: this result substantially confirms Naylor's findings. As regards unilateral liberalization, whereas foreign tariff reductions always leads to higher union wages and utilities, the impact on wages and union utility of a decrease in the domestic tariff depends on the nature of product rivalry.

Scope for unions to adopt the collusive behavior within the context of a duopoly international trade game and conditions for collusive behavior to be supported as equilibrium of an infinitely repeated game framework are deeply analyzed in the works of Straume (2002) and Strozzi (2007, 2008). Both works are constructed upon the basic analytical framework of Naylor (1999) considering a two-stage game, two symmetric countries duopoly model with

reciprocal dumping. Monopoly unions are first movers and in the first stage of the game set wages, while firms determine their production taking wages as given. While Straume (2002) investigates the case of perfect substitute goods, Strozzi (2007, 2008) encompasses these works introducing into the analysis a degree of complementary/substitutability between products. Depending on the high-low union wage strategy, different trade regimes are possible. Additionally, Strozzi (2007) considers two alternative unions' strategies in case of deviation from transnational collusion: a deviation strategy where the chosen wage is such that still allows for intra-industry trade (mild deviation); and a wage strategy such that the selected wage is so low as to induce the exit of the foreign firm from the domestic market (harsh deviation). A general result is that unions select the low-wage strategy when trade costs are relatively low while they choose the high-wage strategy when these are sufficiently high.

In a repeated framework, unions are supposed to play a “trigger strategy”, namely a strategy characterized by the Nash reversion to the competitive equilibrium whenever there is a deviation from the collusive wage-setting, although this is not the optimal form of punishment. The collusive agreement between unions is sustainable if it is supported by some realistic threats, such that the one-period gain from cheating will be lower than the discounted expected value from punishment. The discounted factor is identical for both unions. The trigger strategy constitutes a sub-game perfect equilibrium in the infinitely repeated game when the following condition is satisfied

$$\frac{1}{1-\delta}U^C \geq U^D + \frac{\delta}{1-\delta}U^P$$

where U^C is the utility level from collusion, U^D is the utility level from the one-period defection and U^P the utility derived from punishment, which happens if

$$\delta \geq \frac{U^D - U^C}{U^D - U^P} \quad (19)$$

The choice of the optimal collusive wage strategy depends on trade barriers and the possibility of firm collusion: in a repeated game framework, also firms have incentives to reach a collusive agreement assuring autarky. Using (12) and (13) (with $a = b = s_i = s_j = 1$), and substituting the Cournot quantities

obtained from profit maximization into (14) (with $\bar{w} = 0$), the equilibrium wage in the union game is derived

$$w_{ITT} = \frac{4 - 2\gamma - 2t + \gamma t}{2(4 - \gamma)} \quad (20)$$

with $\partial w_{ITT} / \partial t < 0$, since $\gamma \in (0, 1]$. Further substitution of (20) into the union utility function yields

$$U_{ITT} = \frac{(2 - \gamma)(2 - t)^2}{(2 + \gamma)(4 - \gamma)^2} \quad (21)$$

when both unions adopt a low-wage strategy allowing for intra-industry trade. Instead, if unions choose a high-wage strategy inducing only domestic production, it is obtained that in equilibrium

$$w_{Au} = \frac{1}{2} \text{ and } U_{Au} = \frac{1}{8}. \quad (22)$$

If union j plays the low-wage strategy, union i may respond playing either the low-wage strategy, allowing for intra-industry trade, or the high-wage strategy, which will end with one-way trade. Union i will select the low-wage strategy as long as $U_{iL}(w_{jL}) > U_{iH}(w_{jL})$. Instead, if union j chooses a high-wage strategy, union i may select either the low-wage strategy, which leads to one-way trade, or the high-wage strategy, inducing autarky. In this case, union i plays the high-wage strategy in response to the rival union high-wage strategy as long as $U_{iH}(w_{jH}) > U_{iL}(w_{jH})$. This yields to calculate the critical thresholds values of trade costs in determining the union strategy. Each union selects the low-wage strategy if $t \leq 8(2 - \gamma)[(1 - \sqrt{2})/(\gamma^2 - 6\gamma + 4\sqrt{2}\gamma - 8\sqrt{2})]$: evaluated at $\gamma = 1$ (perfect substitutes) gives $t \leq .311$, the result obtained in Naylor (1999). Instead, a union chooses a high-wage strategy if $t > 2 - 1/4(\gamma + \gamma^2 + \sqrt{32 - 12\gamma^2 + \gamma^4})$: evaluated at $\gamma = 1$ gives $t \geq .354$, the result obtained in Naylor (1999).

In case of firms' collusion, when unions fix the collusive wage and play a low-wage strategy, the wage rate and the utility level are given by

$$w_{IT,FC}^C = \frac{4t\gamma - 8\gamma - 8t + 16 - (2 + \gamma)\sqrt{2(4 + \gamma^2 - 4\gamma - 8t^2)}}{8(2 - \gamma)} \quad (23)$$

$$U_{IT,FC}^C = \frac{\sqrt{2(4 + \gamma^2 - 4\gamma - 8t^2)}}{32} \cdot \frac{4t\gamma - 8\gamma - 8t + 16 - (2 + \gamma)\sqrt{2(4 + \gamma^2 - 4\gamma - 8t^2)}}{(2 - \gamma)^2} \quad (24)$$

in the range $0 < t \leq 1/74(4 + 3\sqrt{10})$, and

$$w_{IT}^C = \frac{1}{2} - \frac{1}{4}t \quad (25)$$

$$U_{IT}^C = \frac{(2 - t)^2}{8(2 + \gamma)} \quad (26)$$

in the range $1/74(4 + 3\sqrt{10}) < t \leq 2 - \sqrt{2 + \gamma}$. In the first range, the wage level depend on trade costs and the degree of product differentiation. Strozzi shows that a reduction in t increases the wage rate when traded goods are relatively well differentiated, while it decreases it when traded products are similar and trade costs relatively high. The reason for this result is due to the fact that a decrease in t has two effects on firm profits working in opposite directions: a negative, indirect effect due to a reduction in prices, and a positive, direct effect due to a reduction in costs. Instead, in the second range $\partial w_{IT}^C / \partial t < 0$: a reduction in t unambiguously raises the collusive wage. Conversely, for $t > 2 - \sqrt{2 + \gamma}$, unions play the high-wage strategy. Hence, firms are induced to produce only for the domestic market: the autarky regime arises. These findings are obtained for the case of perfect substitute goods also in Straume (2002). However, in the presence of intra-industry trade with firms' incentives to collude, collusion unambiguously Pareto-dominates separate wage setting from the unions' viewpoint only when traded products are intermediate or high substitutes.

A number of results arise from the analysis. First, the presence of union collusion across borders makes intra-industry trade more likely when traded goods are well differentiated. This could be seen differentiating the limit of

trade costs, which yields $d(2 - \sqrt{2 + \gamma})/d\gamma < 0$: that is, the range of trade costs assuring intra-industry trade under union collusion is wider with differentiated goods. This occurs because the lower is the degree of substitutability, the lower in each country is the responsiveness of consumer demand to the relative prices of traded goods. The intuition is that, due to the presence of trade costs, foreign market penetration is rather more difficult when traded products are similar than when they are relatively well differentiated.

Second, considering the two unions' deviations strategies from the transnational collusive agreement, Strozzi (2007) shows that in the presence of intra-industry trade between countries, a cheating union always prefers to fix a wage level which prevents exports from the foreign firm. The only exception is when traded goods are similar and international product markets not relatively well integrated: in such a case, the optimal deviation strategy is to set a wage rate allowing intra-industry trade. This is so because the sensitivity of consumer demand to relative prices is rather low when traded products are differentiated enough: the deviating union finds more advantageous to set a relatively low wage rate and completely monopolize the domestic market. At the same time, when traded goods are close substitutes and in the presence of relatively high trade costs, a cheating union prefers to set a relatively high wage, inducing intra-industry trade: trade cost levels plays an increasing role in consumer demand when this is more responsive to relative prices.

Third, making use of the union payoffs under different strategies and (19), it is shown that, in the presence of intra-industry trade, the sustainability of collusion among unions depends both on the degrees of international product market integration and substitutability between traded goods. If trade barriers are relatively low, collusion is more difficult to be sustained the more integrated are product markets and the less similar are traded products: a reduction in t makes deviation an increasingly attractive option for unions. This is because economic integration increases the short-run gains from exports while the long-run punishment is not sufficiently harsh to avoid deviation. Moreover, for lower degrees of product differentiation a deviation is comparatively more profitable from the unions' point of view: the responsiveness of consumer demand to relative prices is smaller when product differentiation degree is relatively low. This implies that only a small reduction in wages is needed to assure a monopoly position in the domestic

market. In addition, for relatively low degrees of product differentiation, the difference between union welfare under collusion and Nash reversion is comparatively smaller than in the case of perfect substitutes.

Fourth, in the presence of intra-industry trade, trade liberalization does not affect the sustainability of union collusion when traded goods are sufficiently similar and trade costs relatively high: in this case collusion is easier the less similar are traded goods. The rationale resides in the fact that product differentiation reduces unions' welfare gains by defecting the collusive agreement: since it is difficult for a single firm to gain the rivals' market share in the presence of sufficiently differentiated traded products, deviation is not beneficial from the single union's point of view.

Summarizing, the impact of international product market integration on unions' willingness to adopt collusive behavior depends both on the degree of product market integration (measured by the trade cost level) and the relative substitutability among traded products. In particular, if countries are symmetric and trade cost levels are low enough, an increase in international product market integration makes transnational collusion among unions more difficult. At the same time, collusion in wage rates is easier when traded goods are similar.

The effects of product market integration on wage bargaining institutions is the subject of Santoni (2009). The work starts with an empirical analysis where it is found a negative relation between increasing market integration (measured by reduction in trade costs) and the level of bargaining. Then, the author constructs a theoretical one-country model to investigate how import competition affects the degree of centralization (and, therefore, the degree of unions' cooperation and firms' cooperation) in wage negotiations at the industry level. This work mainly differs from those of Driffill and van der Ploeg (1993, 1995) in the fact that the degree of bargaining centralization is endogenously determined. Product market is characterized by an unionized Cournot triopoly with linear demand functions and constant marginal costs, where two unionized domestic firms compete with a non-unionized foreign firm. The structure of the model is a three-stage game. In the first stage, for a given level of trade costs, the two unions and firms decide if bargaining should be conducted at decentralized/ centralized level, coordinating their activities; in case of coordination, both unions and firms incur a fix transaction cost. In the second stage, given the bargaining institution, rent maximizing unions and

firms negotiate over wages. The asymmetric Nash bargaining solution is adopted, where the bargaining power is assumed to be symmetric across unions and firms, but different between unions and firms. In the last stage of the game, given the negotiated wages, domestic firms engage in product competition in the domestic market with the foreign firm.

The initial point of the analysis is a one-way trade for different degrees of product differentiation. In the case of substitute goods, two wage bargaining regimes arise as equilibrium: 1) full decentralization, that is, each union-firm pair bargains over wages separately; and 2) union centralization, that is, an industry-wide union negotiates the wage rate with the two firms. The bargaining regime arising in equilibrium depends on the tradeoff between unions' utility gains from centralization (which in turn is related to the relative union strength in bargaining, the degree of product substitutability and the generated domestic oligopoly rents), and the fixed costs of coordinating bargaining activities. Product market integration will make full decentralization a more likely outcome. This is so because lower domestic oligopoly rents cause to be less credible the commitment by domestic unions to higher wages deriving from the internalization of employment externalities: bargaining centralization is too costly in terms of employment losses. As regards firms, their preference is toward full decentralization. The reverse holds in case of complement goods: unions prefer a separate wage bargaining while firms prefer to centralize it. Once again, two wage bargaining regimes arise in equilibrium: 1) full centralization, that is, an industry-wide union negotiates over wages with an employers' association; and 2) firm centralization, that is, an employers' association bargains over wages with the two decentralized unions. In the presence of complement goods, increasing integration implies not only import penetration, but also increasing market rents for domestic firms. A similar situation arises in case of two-way trade in homogeneous goods: union centralization increases wages as well as market rents. In conclusion, product market integration has not a univocal effect on the degree of centralization at which negotiations will take place at the industry level: the market structure and the degree of product differentiation play an important role in determining the bargaining regime in equilibrium.

B. Labor unions and trade liberalization: integration of markets

Another way to model trade liberalization is the method used by Huizinga (1993), Sørensen (1993), and Kikuchi and Amegashie (2003). In these models, economic integration is a discrete process with countries passing from autarky to complete product market integration.

In Huizinga (1993) and Sørensen (1993), two distinct markets consisting of single union-firm bargaining units merge into a fully integrated product market for the homogeneous goods with two bargaining units. Both models assume linearity in demand and production functions, with labor the only productive factor, and the absence of transportation or trade costs to sell the goods in the market. Another common feature is the structure of the model. This is a two-stage game solved by backward induction: wages are firstly fixed, and subsequently firms, taking wage rates as given, decide their production levels. Pre-integration wages are determined according to

$$w_i = \arg \max_{w_i} \Pi_i^{1-\alpha} U_i^\alpha \quad (27)$$

with $i = 1, 2$, where $\Pi_i = (p_i - w_i)x_i$ is the firm profit function, x_i is labor, $p_i(x_i) = a - bx_i$ is the price of the goods before integration, U_i is the union utility, and α is the union's bargaining power. While Huizinga (1993) uses a union utility function as in (14) assuming monopoly unions ($x_j = 0$ because each firm produces only for its domestic market before integration), Sørensen (1993) assuming a right-to-manage model uses an expected-utility function of this form

$$U_i = \frac{x_i}{l} w_i + \frac{l - x_i}{l} - 1$$

where l is the total labor force in the country, x_i are unionized workers and 1 is the reservation wage. After integration, the two markets merge. As a consequence, the two firms start competing in a Cournot fashion in the product market. The price in the integrated market becomes $p(q) = a - bq$, with $q = (x_1 + x_2)$; firm profits now are $\Pi_i = (p(q) - w_i)x_i$. In the first stage, unions maximize their utility function subject to the new labor demand schedule.

Despite the differences between the two models, the conclusions are analogous: product market integration leads to a market size's enlargement, and in an increase in the number of the firms operating in the market, intensifying competition. This in turn implies a drop in prices and wage levels. Moreover, Huizinga (1993) gets that the wage reduction is more than offset by the increase in employment, so that net union utility increases. Thus, international integration is welfare enhancing from the unions' point of view.

Kikuchi and Amegashie (2003) focus on trade liberalization effects when the two economies are asymmetric. They assume that, in one country, there are few firms than in the other. In each country, an industry-wide union sets wages maximizing rents; firms choose employment. Product market competition is à la Cournot. The authors show that, in the absence of international trade, wages in the two countries do not depend on the number of firms, but prices in the small country are higher because market competition takes place among few firms. When trade liberalization occurs, the two markets become integrated, and all firms compete in the unique market. The effect on wages in the small country is that now their level is lower than in the large country: lower employment makes the union in the small country more responsive to competition disadvantages, reducing wages more. It follows that, depending on the market size differences among the two countries, it may be that the small country with a previous high price becomes a net exporter after the liberalization.

Nonetheless, these models do not consider any interaction between the two economies before integration occurs.⁸ The incentives for international cooperation between labor unions are only briefly sketched: in particular, Huizinga (1993) concisely discusses the effects of "wage harmonization" by unions after that the two firms begin to compete in the integrated market. Wage harmonization leads unions to set wages at a level equal to that of pre-integration. It follows that union utility increases due to higher employment levels at the higher pre-integration wage rate.

Incentives for labor union cooperation in a context of integrated product markets are deeply explored in Borghijs and Du Caju (1999). The model has a basic set up. There is a single firm with two plants located in different countries. In each country, a labor union is active. The goods are sold in the

⁸ Munch and Sørensen (2000) and Munch and Skaksen (2002) use a different approach that tries to encompass the two integration measures above described.

integrated market without any extra cost of transportation. Unions have to pay some exogenous transaction costs to coordinate wage demands (collusive behavior) at trans-national level. The model is a two-stage game. In the first stage, monopoly unions (workers are fully unionized) maximize their rents over the competitive wage. In the second stage, the firm allocates optimally production, taking as given the wages set by unions. The inverse demand function for the integrated market is linear. Total output is produced by a single firm characterized by a decreasing return to scale technology in the single input, namely labor, given by $x_i = \sqrt{l_i}$, with $i = 1, 2$ denoting the two countries. The firm's maximization problem is

$$\Pi = [a - b(x_1 + x_2)](x_1 + x_2) - w_1 x_1^2 - w_2 x_2^2,$$

from which it is obtained $\partial l_i / \partial w_i < 0$, $\partial l_i / \partial w_j > 0$, with $i, j = 1, 2$; $i \neq j$: that is, the employment level in each plant depends negatively on its own wage and positively on the wage level in the other plant. It follows that if one union demands a wage rate too high, production is shifted to the other plant and then imported without extra costs. Two different wage settings are compared in the first stage: a separate setting, where each union fixes its own wage level competing against the other plant level union; and a collusive setting, where unions choose the common wage rate that maximizes their joint utility. With these assumptions, the union rent in equation (14) becomes

$$U_i = (w_i - \bar{w})(x_i^2) \tag{28}$$

in case of separate setting, and

$$U_c = (w_c - \bar{w} - \tau)(x_1^2 + x_2^2) \tag{29}$$

in case of collusive behavior, where τ is the cost of coordinating union activities. From maximization of (28), the F.O.C. in case of separate wage setting yields

$$w_i = \bar{w} + \left(\bar{w} + \frac{bw_j}{b + w_j} \right) \tag{30}$$

while the collusive wage obtained from (29) is

$$w_c = 2(\bar{w} + b + \tau). \quad (31)$$

The main results are as follows. For coordination costs high enough, unions act as competitors on the labor market. Thus, they moderate their wage demands. Below the threshold value of transaction costs

$$\hat{\tau} = \frac{[\bar{w} + 2b - \sqrt{\bar{w}(\bar{w} + 2b)}]^2}{4\sqrt{\bar{w}(\bar{w} + 2b)}} \quad (32)$$

to cooperate turns out to be increasingly attractive for unions, which translates in a raise in wages and utilities. Further decreases in the value of τ reduce wages; but the collusive wage is higher than the competitive one. Hence, by means of coordinated wage demands, labor unions can improve their position in negotiations with employers; that is, coordination provides a countervailing power to the impact of economic integration. Intuitively, in open economies high wage claims by individual unions lead to a decrease in competitiveness related to nearest countries. This is considered only when determining their own wage claim, without considering the positive spillover effects on the competitive position of other countries. Therefore, each union tends to moderate wages. In contrast, with a coordinated action, individual trade unions will consider this positive spillover effect of high wage demands on other countries. As a result, the joint initiative by trade unions increases the wage demand compared to decentralization. Hence, staying at the results of the model, incentives for unions to coordinate their activities across boundaries seem to exist also when production activities are spread over different countries.

4. International production in unionized countries

The interaction among unionized labor markets and the activities linked to internationalization of production by firms, principally (but not exclusively) through FDI, has received in recent years an increasing attention.⁹ A consistent

⁹ Internationalization of productive activities can take forms diverse from FDI, like international outsourcing. Differently from FDI, international outsourcing does not imply that a firm invests in production capacities overseas. In fact, outsourcing is defined as a shift in control over production by means of contracts with non-affiliate firms, which develop for the contractor either part of existing productive processes or completely new activities. This kind of

body of studies in the economic literature explored the effect that unionized labor markets and their bargaining structures, as well as decreasing trade costs and competition from a non-unionized countries have in the strategic decision by MNE to enter in a market via green-field FDI,¹⁰ alternatively or concurrently to export penetration.¹¹ These works developed either one-country set up (Bughin and Vannini, 1995, 2003; Leahy and Montagna, 2000; Skaksen and Sørensen, 2001; Mukherjee and Suetrong, 2007; Mukherjee, 2008; Mukherjee and Marjit, 2009), or two-country models; these are characterized either by an international oligopoly (Zhao 1995, 1998; Lommerud et al., 2003; Naylor and Santoni, 2003; Glass and Saggi, 2005; Ishida and Matsushima 2005, 2009) or the presence of a mass of monopolistically competitive firms in the product market (Eckel and Egger, 2009). Nonetheless, these models have some common features. Because of

internationalization of production also has implications for unionized labor. On this issue, see the theoretical contributions of Zhao (2001), Skaksen (2004), Lommerud et al. (2009), Koskela and Stenbacka (2009, 2010), Zhao and Okamura (2010), König and Koskela (2011) and Rocha-Akis and Schöb (2011). See Kramarz (2004, 2008) in French manufacturing industries based on firm-level micro data, and Moreno and Rodriguez (2010) for Spain for the empirical analysis of the direct effects of outsourcing on unionized labor.

¹⁰ The OECD definition of FDI is: “FDI reflects the objective of obtaining a lasting interest by a resident entity in one economy (“direct investor”), in an entity resident in an economy other than that of the investor (“direct investor enterprise”). It can cover the transfer of ownership, but also equity capital, reinvested earnings, other capital (e.g. loans)”. Hence, FDI is a term that covers a wide range of international capital movements, including inter-company loans, mergers& acquisition (M&A), and the establishment or expansion of foreign production sites, namely green-field FDI). This review limits the analysis to the effects of green-field FDI on unionized labor. However, within the process of economic integration, the liberalization of capital markets has involved a higher degree of openness in the market for corporate control. Since the late 1980s and all over the second half of the 1990s, international M&A represented a main form of FDI, especially in advanced economies. The fraction of cross border M&A has constantly increased, reaching in recent times significant figures. According to UNCTAD (2000, 2002, 2004, 2009), the whole value of worldwide cross-border M&A in 1999 added up to more than 80% of world FDI flows, and the share of international M&A was almost 31%. In 2008, despite the international financial crisis, the share of international M&A still represented almost 73% of world FDI inflows and 64.5% of world FDI outflows. The interested readers on the consequences of cross-border M&A on unionized labor markets are referred to the contributions of Straume (2003), Lommerud et al. (2005, 2006, 2008), Mukherjee and Zhao (2007), and Mesa-Sánchez (2010).

¹¹ Aloï et al. (2009) and Boulhol (2009) analyze in two-country models the effects of capital flows on unionized labor market using a broader concept of capital market integration.

space limitations, not all of them are explored in depth, the choice of which is based solely on a decision to focus on their results. The framework is either a two or a three-stage game where:

1) at the first stage, the firm chooses whether to undertake FDI (a production facilities located in a host country), or to export their goods; or, alternatively, whether to invest in a foreign country;

2) depending on the hypothesis related to the scope of the bargaining, in the subsequent stages wages and employment are determined. In case of efficient bargaining, in the second and last stage of the game firms and unions simultaneously decide wage rates and employment; with a right-to-manage approach, in the second stage firms and unions bargain only over wages and then firms determine autonomously their production (and hence employment) levels.

Respect to models analyzing international trade, the bargaining approach in the wage determination is widely used in this literature, focusing on national wage bargaining rather than on the strategic interactions among unions in labor markets. The resulting wage derives from the relative bargaining power by national unions and their preferences over wage and employment. A direct consequence is that the cited contributions consider neither international labor market rivalry nor the possibility of transnational union cooperation. Union coordination may occur only at national level.

Bughin and Vannini (1995) and Zhao (1995) are pioneering works on the effects that unionization has on MNE decisions related to their production activities. Bughin and Vannini (1995) examine the strategic investment by a MNE in a host country in the presence of unemployment generated by union' bargaining power in wage negotiations. This is so because aggregate labor supply is exogenous and constant. Workers' mobility among firms in the relevant sector characterizes the labor market. This implies that also the competitive wage in the host country, which represents the "threat point" during the bargaining process, is endogenously determined. It is assumed that two firms, a local firm and a MNE, compete à la Cournot in the product market for homogeneous goods. The MNE chooses how to serve the relevant market: via export or building up a plant in the host country paying some fixed costs. Then, wage negotiations occur. Finally, production outcomes are realized. The model is solved in the usual backward fashion. If the MNE serves the host country market through exports, the union takes its wage rate

as exogenous during the negotiation. In case of FDI, the authors make a distinction among two sub-cases. With full unionization, the local firm and the MNE are both unionized; with partial unionization, only the local producer is unionized while the MNE pays the competitive wage. In case of partial unionization, the labor demand of the MNE influences the competitive wage in the host country and, consequently, also the union threat point during wage negotiations is affected. Given this framework, the authors show that FDI lowers the host country's welfare. Unionized workers are indifferent between a MNE producing in the foreign country and exporting the goods to the host country or producing in the host country and being unionized. With an unionized MNE, host country's unemployment is unaffected. However, if the MNE produces locally and is not unionized, the host country's labor demand increases, unemployment decreases and the competitive wages paid by the MNE will reduce. As a consequence, the threat point of the union during negotiations is lowered. While full unionization deters the MNE in undertaking FDI, partial unionization boosts the incentive for FDI since union power in the rival's firm creates unemployment, and this lowers the competitive wage for the MNE, creating a cost advantage at the expense of the local producer.

Zhao (1995) investigates how unionization of labor markets may affect the strategic choice by firms concerning the start of international business. This author constructs a partial equilibrium model of intra-industry cross-hauling (that is, reciprocal) FDI with unionized duopoly and integrated product markets. The model presents a two-stage game structure: in the first, firms choose independently whether they want to invest abroad; in the second, firms and national labor unions negotiate for wages and employment through an efficient Nash bargaining. The production function shows constant returns to scale, such that employment and production are exactly the same. In the two countries, the same technology is available. There are zero transportation costs across them. There might be trade, but this is not of intra-industry type since products are sold in one international integrated market. In the benchmark case, involving unionized labor markets without FDI, the profit for each firm equals $\Pi = (p - w)q$, with $q = x, y$ the two homogeneous goods and $p = p(x + y)$ the inverse world demand function, with $p' < 0$. Union utility is given by the following Stone-Geary function

$$U(w, q) = (w - \bar{w})^\theta q^\gamma$$

representing a more general expression of (14). \bar{w} is the reservation wage (equal across countries), $(w - \bar{w})$ is the excess wage; θ and γ are the elasticity of union utility to the rent over the reservation wage and employment, respectively. The union is wage (employment) oriented if $\theta > \gamma$ ($\theta < \gamma$), neutrally oriented when $\theta = \gamma$. Assuming that in case of disagreement both parties' fallback positions equal to zero, the generalized Nash product in each country is

$$G(w, q) = [(w - \bar{w})^\theta q^\gamma]^\alpha [(p - w)q]^{1-\alpha} \quad (33)$$

where $\alpha \geq 0$ is the relative bargaining power of the union. This game is solved by choosing w and q such that $G(\cdot)$ is maximized. It is obtained (imposing symmetry in F.O.C.)

$$w = gp + (1 - g)\bar{w} \quad (34)$$

$$w = kp + (1 - k)qp' \quad (35)$$

where $g = \alpha\theta/(\alpha\theta + 1 - \alpha) \geq 0$, $k = \alpha\gamma/(\alpha\gamma + 1 - \alpha) \leq 1$, and p is the relevant demand, namely the residual demand for each country. For example, if x is home production, then $p = p(x + \bar{y})$, where \bar{y} is the production level from bargaining in the foreign country. Total differentiation of the profit function and union utility leads to the contract curve for each country

$$\frac{\gamma}{\theta}(w - \bar{w}) = w - p - p'q \quad (36)$$

Differentiation of (36) gives the slope of the contract curve

$$\frac{dw}{dq} = \frac{2p' + p''q}{1 - \gamma/\theta} > (<) 0 \quad \text{if } \theta < (>) \gamma$$

Conditions (34) and (36) determine the equilibrium wage. If the union is employment (wage) oriented, the contract curve is positively (negatively) sloped, and the equilibrium will be with low (high) wages and high (low) employment levels. Except for the cases that the union is neither with

bargaining power ($\alpha = 0$) nor interested in wage rents ($\theta = 0$), the wage outcome lies always above the reservation wage and decreases firm profits. Thus, unionized labor increases the wage rate. It follows that firms have incentives to undertake FDI to reduce union bargaining power. However, also unions could gain because of increased employment opportunities from FDI.

In the case of reciprocal FDI, profits equal to $\Pi_i = (p - w)x_i$ for home production and $\Pi_i^* = (p - w^*)y_i$ for foreign production, with $i = 1, 2$ and $x = x_1 + x_2$, $y = y_1 + y_2$ the sum of the output of firms 1 and 2 in the two countries. The firms participate with headquarters in negotiations, which occur simultaneously in the two countries. This situation could be exemplified by the presence of an agent in each country representing the total interest of the firm during the bargaining. It is also assumed that the agents of the same firm cannot communicate between them. Hence, the Nash product in the home country is

$$G(w, x_1, x_2) = U^\alpha (\Pi_1 + \Pi_1^* - \bar{\Pi}_1^*)^\beta (\Pi_2 + \Pi_2^* - \bar{\Pi}_2^*)^{1-\alpha-\beta} \quad (37)$$

where α , β , $1 - \alpha - \beta$ are the bargaining power of the home union, home firm and foreign firm, respectively; Π_1 , Π_2 , Π_1^* and Π_2^* are the branch profits, U is the union utility, $\bar{\Pi}_1^* = [\bar{p}(y_1 + y_2) - w^*]y_1$ and $\bar{\Pi}_2^* = [\bar{p}(y_1 + y_2) - w^*]y_2$ are the foreign branch profits when the bargaining at home fails. In this case, production takes place only in the foreign country and eventually it is exported towards the home country. Therefore, the world price is $\bar{p}(y_1 + y_2)$. Similarly, the Nash product in the foreign country is

$$G(w^*, y_1, y_2) = (U^*)^\alpha (\Pi_2 + \Pi_2^* - \bar{\Pi}_2)^\beta (\Pi_1 + \Pi_1^* - \bar{\Pi}_1)^{1-\alpha-\beta}, \quad (38)$$

where $\bar{\Pi}_1 = [\bar{p}(x_1 + x_2) - w]x_1$ and $\bar{\Pi}_2 = [\bar{p}(x_1 + x_2) - w]x_2$ are the home branch profits when the bargaining in foreign fails: in this case, the MNE can produce only at home during strikes, and eventually export production towards the foreign country. The world price now is $\bar{p}(x_1 + x_2)$.

This implies that, in the bargaining process, firms increased their outside option, improving their position face unions and lowering the negotiated wage rate. In fact, taking the symmetric solution in first order conditions, maximization of (37) and (38) gives

$$w = g(2p - \bar{p}) + (1 - g)\bar{w} \quad (39)$$

$$w = k(2p - \bar{p}) + (1 - k)(p + (x + y)p') \quad (40)$$

Now, since $p < \bar{p}$ because of the reduction in world output in case of a failure in bargaining in one country), it follows that $2p - \bar{p} < p$. The contract curve for each country is

$$\frac{\gamma}{\theta}(w - \bar{w}) = w - p - p'(x + y), \quad (41)$$

and its slope is positive (negative) if $\theta < (>) \gamma$. Thus, the negotiated wage in the case of reciprocal FDI is lower with respect to the wage when firms are not MNE (since $\bar{p}' > p'$). However, reciprocal FDI decreases the wage in both countries with respect to the benchmark case, but the employment in equilibrium increases (decreases) depending whether the union is wage (employment) oriented. Analyzing the asymmetric case (only one firm invests overseas while the rival does not), the author shows that this is the preferred situation for the investing firm. Profits are even higher with respect to the case of reciprocal FDI. However, the non-FDI firm loses market shares in its own country, experiencing a decrease in profits. Thus, both firms have a dominant strategy in investing abroad. Under the symmetry assumption, the Nash equilibrium of this non-cooperative game is unique: Invest-Invest for both firms. Cross-hauling FDI arises in equilibrium. As regard welfare, in the presence of wage oriented unions, employment increases in case of reciprocal FDI, implying higher welfare levels. Instead, with employment oriented unions both employment and welfare decrease. Therefore, from a policy point of view, whether FDI is welfare enhancing depends on the union preferences. Nevertheless, wages turn out to be always lower in the presence of FDI than without investment.

Instead, Zhao (1998) constructs a general equilibrium model analyzing the impact of FDI on the determination of wages and employment in the presence of unions. Applying a Nash bargaining process to model labor-management negotiations at the industry level similar to Zhao (1995), the author shows that FDI depresses the negotiated wage in the unionized sector independently of whether or not the union is wage or employment oriented. Wages decrease because of two effects. First, there is the threat point effect: that is, in case of a strike, the investing firm can produce abroad. As a consequence, firms' position during the bargaining process is stronger and the negotiating wages reduced. Second, the two firms jointly negotiate with the industry union in one round, internalizing the external effect of changes in wages and quantities levels on each other; this reduces wages (i.e., the collusive effect). He also finds that if the union is employment oriented or if it equally cares about employment and wages, FDI reduces union employment and the competitive wage in the non unionized sector. However, if labor-management negotiations are firm specific, but the union remains industry-wide, then FDI increases the employment alternatives of the union at the same time as it benefits the MNE. The threat point for the union in case of a strike increases because now the union may extract part of the rents from the non-striking firm. The threat point effect of the firms is unaffected; nonetheless, with firms bargaining separately, the collusive effect disappears. Both effects together increase wages. Finally, if union organization is also shifted to firm-level, the consequence is that the union's threat point during the bargaining process lowers. Firms' situation remains unaltered, and this will reduce the negotiated wage rate. Finally, the author discusses the case of the international union cooperation: the intuition is that, if cooperation occurs, the unions' relative bargaining power will increase since their outside options will improve.

The issue of intra-industry FDI investigated by Zhao (1995) represents also the subject of Naylor and Santoni (2003). The authors build up a three-stage game model where in the first stage firms invest abroad only if they are willing to pay a fixed cost; otherwise they can only sell in their domestic market. Since Naylor and Santoni (2003) focuses their study on the market for services (involving production *in loco*), the possibility to serve a foreign market through exports is ruled out by assumption. Product markets are national (segmented) rather than global (integrated). Wage bargaining (like in (27)) with decentralized unions takes place under a right-to-manage model, and a degree of products' substitutability (see (13)) is present. Competition in the

product market is of the Cournot type. It is found that the main driving force for reciprocal FDI is not to weaken unions' bargaining positions but the capture of foreign market shares. Nonetheless, a higher union strength in a potential host economy makes less likely the possibility that FDI will be undertaken. In fact, the symmetric bargained wage in equilibrium within a country is

$$w_i = \bar{w} + \frac{\alpha(2 - \gamma)(a - \bar{w})}{(4 - \alpha\gamma)} \quad (42)$$

with $i = 1, 2$ denoting the two countries. From (42), it is directly derived that $\partial w_i / \partial \alpha > 0$: an increase in the union bargaining power translates in higher wages. This in turns implies that firm profits in the potential host country, given by

$$\Pi_{ij} = \frac{2(2 - \alpha)(a - \bar{w})}{(2 + \gamma)(4 - \alpha\gamma)}, \quad i, j = 1, 2; i \neq j \quad (43)$$

will be lower as long as the union bargaining power increases ($\partial \Pi_{ij} / \partial \alpha < 0$). With the additional assumption of symmetry between countries, the authors are also able to show that, as long as the product substitutability increases, the FDI game between firms may assume the characteristics of a Prisoner's Dilemma Game. With low firms' bargaining power and high product substitutability, autarky is more advantageous. Product substitutability intensifies product market competition, decreasing profits; and with lower firms' bargaining power, the negotiated wages are higher, especially in duopoly. Therefore, under these circumstances, firms are more likely to prefer autarky. However, one of the firms may still find gainful to invest abroad if the rival firm does not. The investing firm benefits from sales in the foreign product market and does not suffer competition in the domestic market; that is, each firm has a dominant strategy over FDI. However, this hurts the rival firm. Thus, the classical Prisoner's Dilemma logic applies. If the scale of fixed costs is adequately low, both firms will invest abroad, and reciprocal FDI will arise in equilibrium.

The analysis of the effects of different union organization levels as well as different negotiation levels on the incentives of a MNE in undertaking FDI in a

country and the impact on host country's welfare is also a key focus in the work of Leahy and Montagna (2000). The framework, however, is different from Zhao (1995). In Leahy and Montagna (2000), a MNE can invest in the unionized domestic country, where n symmetric local firms are already active in the product market. The demand function is linear. Labor is the unique factor of production, but the MNE is assumed more productive than local firms. In the first stage, the MNE decides if to locate a production facility in the host country or not. In the second stage, monopoly unions, with a constant bargaining power across firm, chooses the wage rate. The cases of decentralized unions (fixing firm specific wages), as well as one central union (with central or firm specific wages), are considered. In the third stage, firms decide employment (and, hence, output levels), according to the right-to-manage approach. Two sub-cases are analyzed: the MNE has no product market interaction with local firms (i.e., a platform for export FDI); the MNE and local firms compete in quantities either in the host country or in a foreign country. If no product market interaction occurs, the centralized wage is lower than the decentralized wage paid by the MNE because the labor market creates a link between the domestic firms and the MNE. It follows that unions limit the rent appropriation from the MNE to save employment levels in the less efficient domestic firms. Higher productivity levels in the MNE do not always ensure higher centralized wages: a trade off between the wage rate and the employment level is present. Thus, the MNE benefits from industry wide wages. Consequently, the "conventional" claim that a MNE always prefers decentralized wage negotiations is not supported. The welfare level in the host country is higher with the presence of the MNE than without, irrespective of the degree of centralization in negotiations. However, given that decentralized wages are higher than the industry-wide wage, divergences among the host country government and the MNE may arise concerning the bargaining level.

If there is product market interaction, the results change. The centralized wage is higher than the decentralized wage, at least for a large number of firms and low productivity levels. This result contrasts the case of non-market interaction. This is so due to the cooperative behavior by the centralized union which internalizes product market externalities. Concerning host country's welfare, the presence of a MNE lowers domestic welfare independently of the bargaining level. In case of no domestic sales, inward FDI always reduces welfare for $n > 1$. Low product market competition and productivity levels make the welfare cost of the MNE entry in the export sector higher under

decentralized bargaining, but for high MNE's productivity levels, the opposite holds true: centralized bargaining is more costly. The MNE extracts profits from the local firms and repatriates these rents to its home country. Nevertheless, the authors show that if the MNE invests, the MNE and the host Government in some cases have a common interest about centralized bargaining. In case of domestic sales, inward FDI ensures welfare gains under the decentralized bargaining, but a conflict of interest among the host country Government and the MNE may arise about centralization. Finally, in case of a centralized union fixing firm specific wages, the MNE's welfare value is positive if firms compete in the host country market while it is negative if firms compete in a foreign product market, with welfare losses lower than decentralized and standard centralized regimes. However, in case of product market interaction, the union exploits the higher MNE's productivity levels and charges a wage level higher than that of the local firms. Summarizing, the MNE prefers centralized bargaining unless in the case of centralized firm specific wages and lower productivity advantages; in case of domestic competition, host country's welfare is expected to decrease because of inward FDI, since the MNE captures rents from local producers.

Bughin and Vannini (2003) extend the study of Leahy and Montagna (2000) concerning the relation between unionization and FDI, and welfare effects in an oligopoly market structure taking into account also an efficient bargaining model in negotiations. A Cournot-Nash duopoly model for homogeneous goods, with labor unique factor of production and constant marginal costs, is analyzed. One firm is domestic, while the other is a MNE. The product demand is linear, and decentralized unions maximize rents taking as given the exogenous foreign wage level in negotiations. The MNE should decide between FDI and exports (no trade costs are considered) as market entry option in the domestic country. These authors compare the welfare effects under the right-to-manage and the efficient bargaining models. The main findings are as follows. The efficient bargaining may be a sufficient condition for inward FDI to improve domestic welfare, provided that union relative bargaining power is not too high to deter the MNE's market entry. Labor costs are not the unique key variable in the MNE choice among export and FDI; profit arbitrage matters, especially under efficient bargaining because of rent sharing with the unions. Finally, conflict of interest among the host country and the MNE may arise as regards the preference over FDI. During the negotiations, unions may support the domestic government in term of

favoring FDI; however, this effect is stronger with the right-to-manage model than with efficient bargaining, unless the union strength is too high: in this case, the MNE does not undertake FDI because the rent sharing effect overcomes the typical output expansion effect occurring under efficient bargaining.

The work of Mukherjee and Suetrong (2007) also focuses on the influence that different unionization structures has on the firms' decision to make FDI. Differently from Leahy and Montagna (2000), these authors investigate this issue in a two-country model: the "domestic" country is unionized, while the labor market in the "foreign" country is perfectly competitive. The relevant product market for the homogeneous goods is the foreign one, and firms compete à la Cournot. The unionized domestic firms decide whether to serve the foreign country through exports or to undertake FDI, paying exogenous sunk costs. The number of firms engaging in FDI is endogenously determined. Wages are set either by decentralized firm-level unions, or uniformly by one industry-wide union. The main results are as follows. If all firms export, the centralized wage is always higher than the decentralized wage. The same result holds for a given number of firms undertaking FDI. However, the authors show that incentives for outward FDI are lower with decentralized than with centralized wage negotiations. Thus, when firms actively decide over FDI, if the investing firms' number under centralization is greater than under firm-level wage settings, decentralization may lead to higher wages and union utility than the industry-wide wage setting.

Mukherjee (2008) questions why MNEs often use both export and FDI as means to penetrate foreign markets. In his model, a MNE is located in its domestic country. The factor of production is only labor. Wages in the domestic country are perfectly competitive and exogenous, while in the foreign country wages are endogenously determined by a monopoly labor union which fixes firm specific wage rates. The MNE exports the goods to serve the foreign country, which is the relevant product market; there are neither tariffs imposed by the foreign country's Government, nor transportation costs. In addition, the MNE can undertake a FDI in the foreign country, paying some fixed costs. In the foreign country, there is a local firm which also pays union wages and competes à la Cournot with the MNE. The timing of the game is as follows. In the first stage, the MNE chooses among FDI, export, or both. In the second stage, the MNE commits to its export level. This represents to a certain extent a long run decision. The author's rationale

for this structure resides in the MNE's capacity choice in its domestic plant: the MNE builds production facilities in the home country, and this is a long-term decision. On the other hand, this can be profitable for the MNE because this leads to a first-mover advantage: the MNE can credibly threaten to export a positive quantity. In the third stage, the host country union sets wages before the MNE decides the production quantity in the foreign country. Finally, both firms choose quantities and compete in the foreign product market. Given this game structure, it follows that if wage rates are too high abroad, the MNE will produce at home. Instead, with low wages, the union in the foreign country may be able to attract FDI. Mukherjee shows that the MNE chooses its market entry strategy in relation to the market size. The MNE uses only FDI and does not export in the presence of a small product market. In that case, the union selects lower wage rates than in the domestic country to attract the MNE. For an "intermediate" market size, the MNE chooses to serve the foreign market partially with FDI and exports: the MNE uses FDI and exports as complements. Using the threat of supplying the foreign market at least partly with exports, the MNE induces the foreign union to lower wages. Finally, in a large market, union wages are lower in the domestic country than in the host country. Therefore, the MNE chooses only the export option.

Mukherjee and Marjit (2009) investigate how firm productivity affects the export-FDI decision of a MNE to serve a foreign country when labor is unionized. The model is rather simple: there is only one firm and one union. Both the domestic and the foreign labor markets are unionized. In the first stage, the firm chooses between export and FDI. In the second stage, a rent-maximizing union and the firm bargain over wages. In the third stage, output is realized. The unions' bargaining power, as well as labor productivity, is symmetric among countries. The only difference is in the reservation wage, which is supposed to be higher in the foreign (host) country. The demand in the relevant market, the foreign country, is linear. If the firm chooses to export, it pays a constant per unit transportation cost; if it undertakes FDI, it incurs in sunk costs of building a production facility abroad. The main result is that, with unionized labor markets, there are situations where a firm choosing exports is more productive than foreign investors; this occurs even if the wage rate in the foreign country is higher than in the domestic country. For extremely low and high productivity levels, foreign investors are more productive than exporters, while the opposite holds for intermediate productivity levels. This is so because of the interdependence among trade

costs, sunk cost of the investment and the negotiated wage rate, and their effects on output decisions.

The choice among exports and FDI in a context of trade liberalization is the subject investigated in a class of papers pioneered by the work of Lommerud et al. (2003). As in Naylor (1998, 1999), trade liberalization is depicted by a marginal reduction in trade costs when production is exported from one country to another. In their model, there are two countries: the domestic country is unionized, while the foreign country is non-unionized and pays exogenous competitive wages. At the beginning, there is one firm in each country. In the domestic country operates a rent-maximizing monopoly union. The market segmentation's hypothesis applies. The demand for the homogeneous goods is linear. Both firms incur in tariffs when they export. While the foreign firm can only export, the firm in the domestic country may choose among three options. It can stay local, exporting its production. It may undertake a partial FDI in the non-unionized country to serve that market, producing in both countries: in this case, the domestic firm pays some sunk costs to set up a plant abroad. Finally, it can completely relocate in the foreign country, closing domestic plants and exporting production back toward the domestic country. The authors suppose that total relocation is more expensive than the partial. The model is a three-stage game. In the first stage, the domestic firm decides whether to relocate, partially or locally, in the foreign country. In the second stage, the domestic union set the wage rate. Finally, in the third stage, firms act as Cournot competitors in both markets. Like in Naylor's works, the union wage strategy differs depending on trade cost levels, and for sufficiently low values of these costs, a marginal decrease of trade barriers implies an increase in the wage level. This is so because access to the foreign market is now easier (product market expansion effect) for the domestic firm, and this implies an increase in the domestic labor demand. At the same time, competition in the domestic country becomes more severe: the foreign firm increases exports. Nonetheless, the net effect is positive, and the domestic union responds setting higher wages, capturing part of the oligopoly rents, and thus obtaining a higher utility. However, high domestic wages give a strong incentive for making FDI. This holds both for partial FDI because domestic wages still increase but there are few workers employed in the domestic country; and for complete relocation, because exporting back to the domestic unionized country turns out to be cheaper. It follows that trade liberalization, in combination with strong unions, may induce firms to

undertake FDI to success a distributional conflict. With a tariff reduction, the FDI level increases, union rents decrease and the other gains are not sufficient to offset these losses. In addition, profit shifting from domestic owners in the unionized countries to owners in the foreign non-unionized country reduces the overall domestic welfare.

Differently from Lommerud et al. (2003), Glass and Saggi (2005) determine endogenously the equilibrium FDI regime without considering the effects of trade liberalization. In their international oligopoly model, two firms producing homogeneous goods are located in two different countries. Markets are segmented and differ in sizes. The demand function is linear, and each firm may supply the foreign market via FDI or alternatively via exports. Per unit trade costs are supposed sufficiently low such that downstream firms may always export their production. Both firms require one intermediate good that a local upstream monopolist supplier provides. Local suppliers can be interpreted as labor unions. By assumption, one unit of the final good needs one unit of the intermediate. The model is a three-stage game, and the timing is as follows. First, firms in the downstream market decide as regards FDI or exports. In the second stage, the upstream suppliers (unions) fix simultaneously prices (wages); finally, Cournot competition in the downstream market takes place. If markets are of similar sizes, reciprocal FDI arises in equilibrium: to invest is a dominant strategy. This decreases global welfare because the indirect (wages affect the downstream firms' costs, and, therefore, employment levels) competition among the two monopolistic input suppliers is eliminated. This is so because the upstream prices (wages) are set after the downstream firms' decision of producing in both countries. Furthermore, one-way FDI increases the wage rate in both countries. In the FDI host country, wages increase because the demand for labor increases, and the local union may claim a higher wage. However, wages increase also in the domestic country. Falling demand for labor in the domestic country has a negative effect on wages (demand effect); but there is also a strategic effect at work: the foreign labor union's reaction function shifts outward implying an increase in the foreign wage. Domestic wage increases due to wage complementarity, and the strategic effect can dominate the demand effect; that is, in this model, outward FDI acts like a cost-raising strategy.

Ishida and Matsushima (2005) propose a slightly different version of Lommerud et al. (2003). In their duopoly model, two firms are initially located in one unionized country and can export their homogeneous goods to another

foreign country, competing à la Cournot in both product markets. Each firm has to pay a per unit transport costs for their export quantities. Two rent maximizing firm specific unions fix wages in the home country, while firms may freely choose quantities. By assumption, only one of the firms has the option to invest abroad. When this firm sets up a new production facility in the foreign country, the new plant is also unionized. Within this framework, the authors argue that, at first glance, the decision to undertake an FDI may increase the competitive position of the investing because of saving in transport costs, while the rival firm without this option may suffers. Counter intuitively, their analysis shows that the profits of the exporting firm can increase if the trade cost levels to the other market are sufficiently high. This is so because, to facilitate its firm to improve the competitive position in the foreign product market, the union operating in the exporting firm will cut its own wage rate by a sufficient amount to counterbalance the negative effect represented by the elimination of the transportation costs of the international firm. More intense competition can be beneficial for the exporting firm which experiences an increase in its profits because of the rival decision of undertaking FDI. Even more paradoxically, when some fixed costs of setting a new plant abroad are considered, in some cases the more efficient firm ends up with lower profits with respect to the exporting firm.

Instead, Ishida and Matsushima (2009) investigate the welfare and policy implications of outward FDI in an unionized oligopoly. In their duopoly model, two firms are initially located in their domestic country, which is unionized with firm specific monopoly unions. The foreign country pays exogenous perfectly competitive wages. Labor is the sole factor of production with a constant return to scale technology. Markets are segmented, and firms compete à la Cournot therein. If firms export, they incur in trade costs. Firms decide sequentially how to serve the foreign market: the first firm may set up a plant in the foreign country, relocating production; the second firm chooses whether to follow the rival. There are no fix costs to build up a production facility in the foreign country. The authors show that, in the presence of domestic competition, the second FDI always has a negative effect on domestic welfare when the markets' sizes are similar. Most of the time, the asymmetric case with one FDI is socially desirable. This is so because the second union lowers its wage when the first firm invests overseas: the competitive situation for the second firm located in the home country is weakened. The second union is induced to decrease wages to facilitate its firm

in remaining in a competitive position in the foreign market. Since wages for the second firm are lower for all workers, it will produce at low costs for the home market, improving its domestic competitive position. Consequently, the first union can not increase the wages for domestic workers as much as it would like. Even if the first firm makes high profits in the foreign country, domestic output would be reduced if home wages increase. This, in turn, lowers employment in the first firm and hence its union utility. Summing up, the first FDI will moderate domestic wages, and the price goes down; consumer surplus increases and this gain offset the unions' utility losses: overall national welfare increases. Nevertheless, if the second firm is also involved in outward FDI, wages rise in the home country. The reason is that, in this situation, both unions extract a higher share of domestic rents from their firms. This reduces output in the home market, prices increase, consumer surplus declines, and domestic welfare decreases. However, Ishida and Matsushima show that the welfare losses of two outward FDI are mainly not the consequence of lower union utility but rather from lower consumer surplus. Unions can benefit under certain conditions from the second FDI since wage rivalry tends to disappear and wage gains may offset employment reduction, increasing union utility.

In spite of the differences in the underlying assumptions and purposes of study, these models, most of the time, achieves this result: when firms may invest in a foreign country, they improve their outside option in the bargaining process. Thus, unions' position in negotiations is put under pressure inducing a moderation in wage claims.¹² Though, the subject of the international union cooperation in this context, mainly in the form of wage coordination, is lacking and not explored.

5. The impact of internationalization on labor unions: review of empirical studies

Up to date, the economic literature presents a large body of empirical works (principally focused on OECD countries) investigating the effects of increasing economic integration on labor markets outcomes in terms of wage

¹² The idea that MNE can strategically exploit the spread of productive activities across countries to improve their bargaining positions and avoid the creation of encompassing unions was originally expressed by Horn and Wolinsky (1988) and further developed by Leahy and Pavelin (2004).

and employment levels.¹³ However, the consequences of internationalization for organized labor have been mainly investigated indirectly.¹⁴ Based on micro-data, few recent papers have analyzed the direct effects on the European labor unions' outcomes.¹⁵ These are the works of Brock and Dobbalaere (2006), Dumont et al. (2006, 2010), Abraham et al. (2009), Boulhol et al. (2011), and Dobbalaere and Mairesse (2011).

Brock and Dobbalaere (2006) investigate the impact of internationalization on the unions' bargaining power in the Belgian manufacturing sectors. The authors' analysis theoretically grounds on an efficient bargaining model with risk neutral unions. They use data from an unbalanced panel of annual company accounts of all Belgian firms for the period 1987-1995, collected by the National Bank of Belgium. The methodology strategy is a two-stage estimation procedure. In the first stage, the authors proceed with the estimation of the unions' bargaining power by regressing the negotiated wage for fifteen sectors. Two approaches are used. In the first one, they get a unique estimate of the union bargaining power for all sectors over all years. In the second approach, they obtain yearly estimates of the union bargaining power for each sector. Then, in the second stage, they regress the estimated union bargaining

¹³ Radulescu and Robson (2008), and McGuinness et al. (2010), investigate the inverse causal effect (how unionization and collective bargaining systems affect the firms' internationalization choices in the form of FDI). Using cross-national time-series data from mid '70s to 1997 for 19 OECD countries (among these, 14 European economies: Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, the Netherlands, Norway, Spain, Sweden, Switzerland, and the UK), Radulescu and Robson (2008) find strong evidence that a high level of union density (used as proxy for union bargaining power) reduces the incentives for a MNE in selecting a country as a potential location for FDI. Instead, in case of close substitutes goods and MNE having productivity advantages respect to domestic firms, higher degrees of bargaining coordination moderates the negative impact that a high level of union density may have on the expected inward FDI: a country may be more attractive for FDI due to the reduction of output at the expenses of domestic firms. Making use of a linked employer-employee data set, the empirical investigation of McGuinness et al. (2010) gets similar results for Ireland.

¹⁴ For a general review see Molnar et al. (2007) and references therein. As regards European countries, recent empirical analysis on the indirect effects of internationalization on unionized workers are, i.a., Guadalupe (2007) for U.K., Biscourp and Kramarz (2007) for France, and Martins and Opramolla (2009) for Portugal based on firm-level data. Instead, based on linked employer-employee data, Schank et al. (2007) for Germany, Lundin and Yun (2009) for Sweden, and Du Caju et al. (2011) for Belgium.

¹⁵ Notable empirical contributions investigating the impact of internationalization on labor unions for countries outside the EU are Abowd and Lemieux (1993) for Canada; Bojas and Ramey (1995), and Gaston and Trefler (1995) for U.S.

power on different measures of trade, FDI, technology and a set of control variables. The main results are the following. The authors find little evidence as regards international trade and inward FDI affecting the unions' bargaining power. Instead, there is evidence that technological changes positively influence it. According to these authors, there are several reasons that could explain these findings. One possible explanation is that international economic integration may affect the unions' bargaining power of different skill groups in a different way: some workers become more essential in the production process, and labor costs might be declining because of technological improvements. A second reason may be that other, more direct, channels than the unions' bargaining power affect labor market outcomes, such as the firms and workers' outside options during negotiations.

The paper of Dumont et al. (2006) studies how international trade affected the bargaining power of labor unions in eight sectors of five EU countries (Belgium, France, Germany, Italy and U.K.). These authors also make use of a two-step estimation procedure, based on a rent-sharing theoretical framework. Using company level data, in the first stage they estimate for each country the sector level unions' bargaining power. The authors simultaneously test the bargaining regime and the unions' preferences to determine if it exists a wage-employment tradeoff due to internationalization. In the second stage, they regress the estimated union bargaining power on two groups of variables. The first group reflects the level of international competitiveness, distinguishing among import competition from OECD and Newly Industrialized Countries. The second group considers other potential determinants of the union bargaining power such as the industry concentration and capacity rate, the ratio of R&D expenses for patenting revenues, and the skill ratio. The key findings of their empirical investigation are as follows. In every country, the results show that unions have some bargaining power during negotiations; this is higher in France and Germany, intermediate in Belgium, and lower in Italy and U.K. In almost all sectors and countries, unions and firms seem to bargain according to the labor-hoarding model, with some exception in favor of the efficient bargaining (mainly in Germany). Thus, employment enters into the bargaining process. Unions are predominantly wage oriented. These results suggest that a wage-employment tradeoff due to increasing foreign competitiveness exists. The authors find evidence that import competition affects negatively the union bargaining power. The impact is equivalent if imports come from OECD and Newly Industrialized Countries. This, in turns,

lowers negotiated wages. However, the estimates suggest that increasing internationalization does not affect unions' preferences over wages.

Abraham et al. (2009) investigate the impact of European and global economic integration on labor and product markets in Belgium, focusing on manufacturing firms. Based on a production function approach with efficient bargaining model and risk-neutral unions, the authors use firm-level data for the period 1996-2004 for a simultaneous estimation of price-cost margins (index of product market power) and union bargaining power, and they investigate the effects of various aspects of globalization such as import penetration, outsourcing and direct investments on them. The analysis proceeds first with an estimate of the average measures of the mark-up and union bargaining power for the whole manufacturing sector. Then, a detailed analysis for each industry follows. The authors find that there is a strong, positive correlation between the union bargaining power and product market power. In other words, unions get higher rents in those sectors with higher mark-ups while the opposite occurs in more competitive industries (international competition diminishes firms' rents). As regards the impact of internationalization, they investigate how import competition from different origins affects the firms' market power and the unions' strength, differentiating among imports from EU-15, imports from 10 new-EU members, imports from OECD countries other than EU-25, and finally imports from countries outside OECD (low-wage countries). The results indicate that lower mark-ups and union bargaining power characterize those sectors with higher import penetration, especially from low-wage countries. However, the bargained wages increase in those industries with imports of intermediate goods from abroad. The rationale is that the firms importing intermediates have to specify their amounts, quality and characteristics in advance to their foreign contractors. Thus, when the negotiations among unions and firms occur, the formers may have hold-up opportunities, increasing their bargaining power.

Dumont et al. (2010) examine the effects of internationalization and technological change on unions' bargaining positions representing different classes of workers, low skilled and high skilled. The theoretical basis for their two-stage empirical analysis is an efficient bargaining model in which two separate unions, one for low skilled and one for high skilled workers, bargain independently with the firm. The authors make use of firm-level data for ten Belgian manufacturing sectors in the period 2000-2008. They first estimate the labor bargaining power and the relative wage preference for the two groups of

workers. Then the estimated parameters are regressed on a set of possible explanatory variables to determine both the internationalization and technological change's impacts for each skill group. The main findings are as follows. In the period under consideration, the bargaining power of low-skilled workers deteriorated while that of the high-skilled improved. Concerning the technological aspect, R&D intensity seems to have a positive impact on the bargaining power of low skilled workers. This is the only statistical relevant result. As regards the internationalization aspect, import competition decreased the mark-ups and the bargaining power in those sectors more exposed to international trade, especially from low-wage countries. In addition, offshoring and the presence of foreign subsidiaries had further negative impacts on the bargaining positions of low skilled workers. Instead, the union bargaining power of the high skilled group is unaffected by economic integration. In every sector, both unions are wage oriented, but the internationalization influences it for both types of unions. The results indicate that imports of close substitutes and offshoring of similar skill intensity activities, weaken the unions' wage orientation; the opposite mechanism applies when imports and offshoring of production activities are skill complementary. Thus, the effect of internationalization on labor unions is skill specific. In short, this work suggests that economic integration more than technological change increased skill premium (wage inequality); and the reason resides in the different impacts of international integration on the unions' bargaining position for the two groups of workers.

Boulhol et al. (2011) explore the pro-competitive effects of trade in product and labor markets in U.K. manufacturing sectors. As Abraham et al. (2009), they base the empirical investigation on a theoretical production function with an efficient bargaining approach. However, they exploit a more general framework as regards the unions' preferences toward risk. The authors use data from two firm-level surveys for 20 industries in the period 1998-2003. They proceed their empirical study with a two-stage estimation strategy. In the first stage, they simultaneously estimate price-cost margins and union bargaining power per sectors, and for three subsets of firms' size and three sub-periods. They find that both decreased along the period considered. In the second stage, they relate the estimated markups and union bargaining power of each industry to trade variables such as the share of imports in the demand for each sector (making a distinction between developed and developing countries), the ratio of exports over total sales, plus other product and labor

market variables. The results of the second step show that the imports from developed countries significantly lower the markup and the union bargaining power of those industries exposed to foreign competition. Instead, exports weakly increase the union bargaining power. These findings define that international trade has an impact working in two opposite directions on price-cost margins. However, according to the authors' estimates, the labor market discipline effect (the reduction of the union bargaining power) counterbalanced for one half the product-market discipline effect from imports (the reduction of the mark-ups to marginal costs). Additionally, they find that firms with a smaller size have lower mark-ups, and their workers are in a relatively weak position during negotiations.

Finally, also Dobbalaere and Mairesse's (2011) study grounds on a theoretical production function model with efficient bargaining. These authors estimate price-cost margins and union bargaining power in 38 French manufacturing industries over the period 1978-2001, making use of an unbalanced panel of 10646 firms. The main objective of the paper is the estimation of average price-cost mark-ups and the extent of rent sharing parameters, first for manufacturing as a whole, and then for each industry, looking for across and within industries heterogeneity. As regards the impact of internationalization, the analysis of the single sectors shows that, in those industries facing high import competition, the estimated mark-up and union bargaining power is lower than the median value of the entire manufacturing, while the opposite occurs in the protected sectors.

To sum up, exploiting different data sources and empirical methodologies, these studies seem to indicate that international integration is likely to weaken the unions' bargaining positions, confirming most of the theoretical models' predictions. Surprisingly, despite the actual evidences reported in the introduction, no empirical studies analyzed the effectiveness of cross borders unions' cooperation to counterbalance the impact of internationalization during the negotiation processes.

IV. Conclusions

Economic integration has significant consequences for labor markets in Europe. The theoretical literature stresses that product market integration usually lowers the relative bargaining power of labor unions. One reason is that high wage demands cause more substantial job losses in those industries

exposed to international competition. In other words, European integration increases the sensibility of labor demand to wages, inducing unions to wage moderation. Moreover, the integration of capital markets in Europe allows firms to locate more easily their activities among different places. Thus, firms may avoid excessive wage demands by shifting production among different plants. This threat of relocation improves the relative bargaining position of firms respect to unions, leading to lower negotiated wages.

By means of internationally coordinated wage claims, unions may improve their position during negotiations with employers. Coordination provides a countervailing power to the impact of product and capital markets integration. With some differences, this seems to be possible in those sectors characterized by intra-industry trade and the presence of large MNE having production facilities spread over different countries.

Although attractive, transnational wage coordination by European labor unions is far to be implemented. Numerous obstacles prevent it. A first one is that employers' associations oppose negotiations at the EU level, since the construction of a European platform for wage determination would reduce their relative bargaining position. Second, there are substantial differences among EU countries with respect to labor union practices: differences in union density, coverage, the degree of centralization and coordination in bargaining. Besides, there are differences related to the timing of wage bargaining and the labor unions' role in national policy discussions. Such diversities cause international coordination to be expensive because of less flexibility; and coordination implies operational costs associated with meetings, information gathering, and so on. In addition, cooperation is harder to reach as long as the number of the unions involved in the process increases. It may be complicated to sign agreements and organize activities to achieve some common results without considering collateral problems like cultural, traditional and customary diversities between countries, leadership positions, and the pursuit of national interests. Moreover, there exist other structural asymmetries representing obstacles to international wage coordination. There is a large variety of labor market regulations between EU countries, such as minimum wages, unemployment benefits, employment protection legislation, labor taxation, and labor market policy. These asymmetries increased after the 4th enlargement towards Central and Eastern European Countries. To agree upon a shared agenda among unions could become difficult; and a common policy may not be optimal for some individual members. This holds true also for blocs of

economic integration other than the EU. Asymmetries are present into the Mercado Común del Sur's (MERCOSUR) custom union, which, however, provides for a fund to realize long term projects aiming at the structural convergence among member countries (Argentina, Brazil, Paraguay and Uruguay). Structural differences can be observed in the countries associated to the ASEAN Free Trade Area (Brunei, Indonesia, Malaysia, the Philippines, Singapore, Thailand, Vietnam, Laos, Myanmar and Cambodia), whose aim is to lower gradually to zero most of their import duties among them. The 1994's North America Free Trade Agreement (NAFTA), whose objective was to remove barriers to trade (tariff and non tariff) and investment between Mexico, the U.S. and Canada, exhibits as well striking differences in the labor market regulations, unionization structures and wage levels between the signatory states.

Unions' transnational activities ensuing the economic integration process received attention only in recent times, despite its significance in the analysis of the impact of internationalization on labor markets and their institutions. This survey reported some notable contributions that have helped a better understanding of this phenomenon. Nonetheless, many aspects still have to be fully explored. As mentioned, one subject is the presence of large asymmetries among countries. Another topic is the analysis of labor unions' behavior regarding the international disintegration of productive activities, subsequent to capital market liberalization and according to perceived comparative advantages, in particular by MNE. The theoretical literature focused more on the effects of trade liberalization rather than the internationalization of production on unions' cooperation. However, workers in every regional economic bloc equally perceive the concerns related to the spread of activities across countries. Finally, the prospect of further international labor union cooperation may influence the firms' strategic decision related to international business. This, in turn, may affect both wage and employment's paths; but also the productive structures and the industrial organization of the integrated areas. To relate these issues to the peculiarities of each regional bloc of economic integration needs a focus wider than the present work. This is left for future research.

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