

## Strategic trade and FDI policies in a unionized industry with differentiated goods

Domenico Buccella<sup>1</sup>

### Abstract

This paper analyzes the differences between strategic trade and the competition policies to regulate a unionized monopoly. Both the presence of an industry-wide union and decentralized unions is investigated. The entry via the inward Foreign Direct Investment of a competitor does not reduce labor market distortions, while strategic trade policy reduces both labor and product markets distortions. The fixed cost for the foreign entrant, the wage setting institution in place in the labor market, and the degree of product differentiation determine which policy should be implemented to maximize national welfare.

**Keywords:** strategic trade policy; FDI policy; unionized markets.

**JEL Codes :** F13, J51, L12

---

<sup>1</sup>**Corresponding Author** Department of Economics, Leon Kozminski University, Warsaw, Poland.  
[buccella@kozminski.edu.pl](mailto:buccella@kozminski.edu.pl)

## 1. Introduction

Which policy should a welfare-maximizing government design and implement to regulate an industry characterized by a unionized monopoly structure? This paper precisely analyses this issue within an economy in which national labor market institutions such as unions prevail. Two policies are compared: 1) competition policy and 2) trade policy. The former guarantees market accessibility and contestability; it chiefly depends on the competence of national governments. The latter generates import competition from goods and services produced by foreign companies through their free flow within a country. The rules governing trade policy are, by and large, supranational and mirror the outcome of political issues in multilateral negotiations at the World Trade Organization (WTO). However, in line with WTO obligations, each member country can apply import tariffs on goods and services, provided that their level is lower than the level negotiated in WTO rounds.

As a final effect, both policies produce an increase in the degree of product market competition. Nonetheless, the effects on national economies differ because the channels through which those policies work are diverse. To analyze this issue, this paper proposes a basic framework. From a status in which, in a closed economy, a monopolist operates in a sector of the economy, its home government must select whether to regulate it via market contestability, i.e. allowing a foreign firm market entry in that sector via Greenfield Foreign Direct Investment (FDI) or via strategic trade policy, allowing imports from a unionized foreign country, while setting an optimal tariff. Two different unionization structures are taken into consideration when the foreign firm enters via inward Greenfield FDI: a centralized wage setting, in which the industry-wide domestic union simultaneously though independently sets two wage levels for the domestic and foreign firms, and a decentralized wage setting in which two firm-level unions fix the wages at their respective companies.

This paper relates to a vast body of literature that analyses the relation between trade and investment policies and the national economic outcomes in the presence of unionized labor market institutions. This work is close to the contributions of Naylor (1998, 1999). In those articles, two identical firms initially produce homogeneous goods for their domestic markets and, under the hypothesis of perfect symmetry in both product and labour markets, they engage in reciprocal dumping when trade costs fall below a threshold value. This leads to a drop in the labor unions' wage claims: intra-industry trade, pushing unions to compete on an international basis in the labor market, corrodes their monopoly power. As economic integration increases (a reduction in trade costs), unions set higher wages, because both firms generate higher profits, therefore capturing part of the increased firms' rent. Those papers study the impact of economic integration on wages and unions' outcomes and the interaction between the two economies, exemplified by the unions' strategic behavior in labor markets.

Dube and Reddy (2014) present a model of the impact of increased product market competition induced by trade liberalization on the income distribution between profits and wages. Those authors show that integration increases the employment cost of wage claims, thereby decreasing bargained wages and the share of oligopoly rents shouldered by workers. This effect is widened due to the existence of strategic complementarities, which leads to a race to the bottom. Trade liberalization induces a wage discipline that reduces the negative impact of fiercer competition on firm rents.

On the other hand, making use of the Hotelling model, Pagel and Way (2013) analyze how international market competition affects a union's choice of a wage setting, i.e. uniform or discriminatory. Firms are heterogeneous with regard to international competition. According to the main findings, when unions choose their wage regimes sequentially, a discriminatory regime is more likely to arise when international competition increases. Nonetheless, for intermediate levels of competition, a union may decide to opt for a uniform wage regime, even if the rival union adopts a discriminatory regime. When international competition becomes adequately intense, both unions reverse their preferences toward the discriminatory regime. Only in the latter case is a societal Pareto-improvement obtained if all unions adopt a uniform wage regime.

A second strand of the literature analyzes the interaction between unionized labor markets and firm activities related to the internationalization of production through FDI (see, i.a. Bughin and Vannini, 1995; Naylor and Santoni, 2003; Eckel and Egger, 2009; Mezzetti and Dinopoulos, 1991; Zhao, 1995; 1998) to explore the effects on wages and employment, either in a partial or a general equilibrium framework. However, of particular interest within the analysis of this paper are also the contributions of Lommerud et al. (2003), Glass and Saggi (2005), and Ishida and Matsushima (2009). Lommerud et al. (2003) use a two-country reciprocal dumping model of oligopoly in which only one country is unionized, concentrating the analysis on the impact of trade liberalization and wage setting on the firms' location choice, and, therefore, the mode that firms choose to serve their relevant markets. In a similar fashion, Ishida and Matsushima (2009) investigate the same issue when domestic competition takes place between firms located in a unionized country. Following a different approach from Lommerud et al. (2003), Glass and Saggi (2005) determine the endogenous FDI regime equilibrium without considering the effects of trade liberalization. In their international duopoly model, trade costs are sufficiently low such that firms may always export their products. The crucial assumption is that both firms require one intermediate product that a local upstream monopolist supplier provides exclusively. The authors show that, under these circumstances, outward FDI can act as a cost-raising strategy. However, these works neglect to examine the strategic interaction in the labor markets, and consequently there is no room for the study of trade union cooperation.

In a union-oligopoly context, similar to the one here proposed, Vlassis and Mamakis (2014) find the optimal equilibria that can arise from the implementation of diverse policies by a benevolent social planner in the labor market. Those policies may be in conflict or in common interest with unions' and firms' objectives, while in other cases, institutional labor market arrangements appear to be inefficient to induce or deter FDI. Therefore, the social planner must find alternative strategic devices.

Despite the different approaches, underlying hypotheses, and purposes of the analysis, these models chiefly achieve a common result: if firms can invest abroad, they will cause a moderation in wage claims. Consequently, the unions' position appears to be weakened.

This paper also relates to Vandenbussche and Konings (1998), Vandenbussche (2000), and Buccella (2012). These works investigate the differences between trade and competition policies. However, this paper takes a different route from the above-mentioned contributions regarding several aspects. First, as in Naylor (1998), the foreign wage is not exogenously given in the case of trade policy: in fact, the union in the foreign country endogenously sets its

wage, competing over jobs against the union in the home country. Moreover, the goods that the domestic and foreign firms produce are differentiated. Second, the current work explicitly models the presence of tariff barriers and, thus, the implementation of the strategic trade policy; those features are absent in the analysis of Konings and Vandebussche (1998) and Vandebussche (2000). Third, entry is costly in this model. Therefore, the size of the fixed cost the entrant faces alters the two policies' practicability.

The main results of the present paper are as follows. The choice between the two policies for the government depends on the amount of the initial fixed cost for the entrant, the wage setting, and the degree of differentiation of the goods. In the presence of an industry-wide union, firms pay wages equal to the case of the monopoly, and this increases the marginal cost of production for the foreign firm. When goods are almost independent, the oligopoly rents are sufficiently high, and the foreign company may find it profitable to enter via FDI. However, as goods are close substitutes, the oligopoly rents decrease. In the case of trade, the foreign union can moderate wage demands to allow the foreign firm to penetrate the domestic market. Consequently, for lower degrees of product differentiation, the foreign firms prefer to enter the home market via exports. On the other hand, in the presence of decentralized unions, the domestic government can enjoy the benefits from designing and incentivizing the inward FDI policy when the initial investment is adequately low. The rationale for this result is that more intense competition, due to the presence of the foreign firm in the domestic market, exerts downward pressure on prices that benefits consumers by compensating the losses in tariff revenues. Remarkably, if the fixed costs are sufficiently low, the domestic government could subsidize all of the initial investment of the foreign firm, regardless of the degree of product differentiation to encourage the entry and improve social welfare.

The remainder of the paper is organized as follows. Section 2 presents the basic ingredients of the formal model, while Section 3 investigates the national welfare implications of the competition and trade policies. Section 4 closes with an outline of future research.

## 2. The Model

This section builds a partial equilibrium model to investigate the consequences of strategic trade and FDI policy on national welfare to regulate a monopoly industry in the presence of different union wage settings.

The home country exhibits two sectors: a perfectly competitive sector and a monopoly sector. The monopolist produces goods denoted as  $q$ , using only homogeneous labor,  $l$ , as a factor of production, with constant returns to scale technology. Each worker produces one unit of output,  $l = q$ ; thus, production and employment levels are identical. The workers in the industry are organized in a monopoly union (see, e.g., Haucap and Wey 2004; Petrakis and Vlassis 2004). The supply of labor in the economy is assumed to be adequately large to avoid corner solutions. Any labor needed by, or dismissed from, the monopoly industry is supplied or absorbed by the perfectly competitive sector, which represents a buffer sector in which workers receive the competitive wage, normalized to zero. Two unionization frameworks are considered when the foreign firm enters through FDI: a centralized wage setting, in which the industry-wide domestic union, simultaneously though autonomously, sets two wage levels for

the domestic and foreign firms and a decentralized wage setting in which two firm-level unions set the wage for the respective companies.

The home government aims at introducing competition in the monopoly industry. Two policy options are suitable: 1) the *trade channel*, namely that in which the home incumbent faces import competition in the domestic market from a foreign exporter producing differentiated goods. At the beginning, imports equal zero because of a prohibitive tariff. However, the home government sets an optimal tariff, lower than the prohibitive one, to maximize domestic welfare; 2) the *competition (investment) channel*, with the entry via inward greenfield FDI of a foreign firm in the sector considered. The foreign entrant faces a fixed cost, denoted by  $F$ . It is assumed that no domestic company can disburse the cost of the initial investment.<sup>2</sup> In both cases, the industry market structure shifts from a monopoly to a duopoly. The foreign exporter also faces a monopoly union. Lower scripts 1 and 2 refer to the incumbent and entrant, while  $H$  and  $F$  denote Home and Foreign, respectively.

The model is a five-stage game solved backwards. At the pre-stage of the game, the home government designs the policy, either strategic trade or investment, to regulate the monopoly. In the first stage, the foreign firm selects the entry mode: exports vs. greenfield FDI. In the second stage, the home government implements the policy. In the third stage, unions set wages. In the fourth stage, firms compete in the relevant home product market, determining production and employment levels (right-to-manage model). The paper first considers quantity competition à la Cournot and then price competition à la Bertrand. The analysis focuses on the home country.

### 3. (Titles should be Times New Roman, 12pt, Bold, 1.15 space, with 6pt space after, Numbered consequently)

(Main text should be Times New Roman, 12, 1.15 space. First paragraph with zero indentation, following paragraphs with 0.3 inches indentation. See below )

#### 2.1 The benchmark: monopoly in autarky

First, let us consider the benchmark case of monopoly in the home setting. The representative consumer for this market maximizes the following quasi-linear utility function

$$U = \bar{U}(q_{1H}) + z = \left( q_{1H} - \frac{1}{2} q_{1H}^2 \right) + z$$

where  $\bar{U}(q_{1H})$  is the quadratic utility derived from the consumption of the goods produced in the monopoly sector, while  $z$  is the linear utility deriving from the consumption of the goods produced in the competitive sector. As a consequence, the monopolist produces goods facing the following linear, indirect demand schedule

$$p_H = 1 - q_{1H} \quad (1)$$

<sup>2</sup> Under the hypotheses of this paper, if there is a potential domestic entrant, the home government will always prefer it to an international one, because the international firm repatriates profits to the country of origin.

where  $q_{1H}$  denotes the incumbent's output, and  $p_H$  the price. The monopolist's profit maximization problem is

$$\Pi_{1H} = (1 - q_{1H} - w_H)q_{1H} \quad (2)$$

where  $w_H$  is the wage set by the home union. Taking as given the monopoly quantity, the home union maximizes the total wage bill

$$\Omega_H = w_H q_{1H}. \quad (3)$$

Simple calculations leads to  $w_H = \frac{1}{2}$ , and  $q_{1H} = \frac{1}{4}$ . Therefore, union utility and profits are  $\Omega_H = \frac{1}{8}$ ,  $\Pi_{1H} = \frac{1}{16}$ . The measure of the consumers' surplus,  $CS_H$ , is given by

$$CS_H = \bar{U}(q_{1H}) - p_H q_H = \frac{3}{32}. \quad (4)$$

Thus, the home social welfare is

$$SW_H = \Omega_H + \Pi_{1H} + CS_H = \frac{9}{32}. \quad (5)$$

## 2.2 Competition

The Home government seeks to stimulate competition in the monopoly sector. Therefore, home consumers may gain access both to goods produced by the domestic and the foreign company. Following Singh and Vives (1984) and Dobson (1997), the home representative consumer's quasi-linear utility function now becomes

$$U = \bar{U}(q_{1H}, q_{2F}) + z = (q_{1H} + q_{2F}) - \frac{1}{2}(q_{1H}^2 + q_{2F}^2 + 2cq_{1H}q_{2F}) + z \quad (6)$$

where  $\bar{U}(q_{1H}, q_{2F})$  is the quadratic utility deriving from the consumption of the good produced in the imperfectly competitive sector, while  $z$  is, as before, the linear utility deriving from the consumption of the competitive good. Consumers' utility will take similar forms in the case of production in the presence of FDI.

Maximization of (6) leads to the following linear inverse and direct demand for the goods

$$p_{1H} = 1 - q_{1H} - cq_{2F}; \quad p_{2F} = 1 - cq_{1H} - q_{2F} \quad (7)$$

$$q_{1H} = \frac{1 - p_{1H} - c(1 - p_{2F})}{1 - c^2}; \quad q_{2F} = \frac{1 - p_{2F} - c(1 - p_{1H})}{1 - c^2} \quad (8)$$

where  $q_{1H}$  and  $q_{2F}$  are the incumbent production and imports from the foreign country and  $p_{1H}$  and  $p_{2F}$  are the prices of the domestic incumbent and foreign entrant, respectively. The parameter  $c \in [0,1)$  represents the degree of product differentiation: when  $c = 0$ , the goods are independent, and as  $c \rightarrow 1$ , the goods become close substitutes.

### 2.2.1 Cournot competition with an industry-wide union

#### Trade policy

#### Stage 4, firms' quantity choices and labor demands with imports

With the trade policy, the country opens to imports. Given the inverse demand functions in (7), the profit function of the home incumbent firm is

$$\Pi_{1H} = (1 - q_{1H} - q_{2F} - w_H)q_{1H} \quad (9)$$

while the foreign exporter's profits are

$$\Pi_{2F} = (1 - q_{1H} - q_{2F} - w_F - t)q_{2F} \quad (10)$$

subject to the non-negativity constraint  $q_{2F} \geq 0$ , where  $w_F$  is the foreign union's wage rate. Notice that the foreign exporter is the "entrant" in the home product market via trade. Thus, imports have index 2. The foreign exporter faces a tariff  $t$  to sell products in the home setting. The home government sets an optimal tariff on imports to extract part of the foreign exporter's rents, getting tariff revenues, and maximizing national welfare.

Cournot competition between the two firms in the home product market leads to

$$q_{1H} = \frac{[2(1 - w_H) - c(1 - t - w_F)]}{4 - c^2}, \quad q_{2F} = \frac{[2(1 - w_F) - c(1 + 2t - w_H)]}{4 - c^2} \quad (11)$$

which also represent the labor demand functions. As expected, the standard results  $\frac{\partial q_{1H}}{\partial t} > 0$  and  $\frac{\partial q_{2F}}{\partial t} < 0$  hold: an increase in the applied tariff increases domestic production and hinders imports.

#### Stage 3, wage setting

Regarding labor markets, wages are interdependent; unions compete against each other over jobs. The utility function is (3) for the home union. Similarly, the foreign union's utility function is

$$\Omega_F = w_F q_{2F}. \quad (12)$$

Substituting the Cournot quantities into the home and foreign unions' utility functions, the maximization problems are, respectively,

$$\begin{aligned} w_H &= \arg \max_{w_H} \left\{ \Omega_H = \frac{w_H [2(1-w_H) - c(1-t-w_F)]}{4-c^2} \right\} \\ w_F &= \arg \max_{w_F} \left\{ \Omega_F = \frac{w_F [2(1-w_F) - c(1+2t-w_H)]}{4-c^2} \right\}. \end{aligned}$$

The solutions lead to the reaction functions

$$w_H = \frac{[2-c(1-t-w_F)]}{4}, \quad w_F = \frac{[2(1-t)-c(1-w_H)]}{4}. \quad (13)$$

As expected,  $\frac{\partial w_H}{\partial w_F} > 0$  and  $\frac{\partial w_F}{\partial w_H} > 0$ : an increase in wages in one firm triggers an increase in the wages of the rival; that is, wages are strategic complements. Moreover,  $\frac{\partial w_H}{\partial t} > 0$  and  $\frac{\partial w_F}{\partial t} < 0$ : an increase in the applied tariff increases protection for the domestic workers and, thus, leads to higher wage demand, while the presence of a tariff induces foreign workers to moderate wage demand to facilitate exports.

Inserting the expressions in (13) into each other, the equilibrium wages are

$$w_H = \frac{[8-c^2-2c(1-t)]}{16-c^2}, \quad w_F = \frac{[(8-c)(1-t)-2c]}{16-c^2}, \quad (14)$$

with  $\frac{\partial w_i}{\partial c} < 0, i = H, F$ : as the products become close substitutes, the duopoly rents are reduced; as a consequence, the unions can extract a lower share of those rents.

The non-negativity condition  $q_{2F} \geq 0$  and the equilibrium wages in (14) imply that trade occurs if

$$\bar{t} \leq 1 - \frac{2c}{8-c^2}, \quad (15)$$

which represents the prohibitive tariff: in fact, for  $t > \bar{t}$ , the tariff is so high that imports are prevented. Differentiation of (15) shows that  $\frac{\partial \bar{t}}{\partial c} < 0$ ; as products become close substitutes, the prohibitive tariff decreases and, therefore, a lower tariff is required to hamper imports.

Stage 2, Strategic trade policy implementation: Social welfare evaluation and the government's optimal tariff

Making use of (14), the following expressions for the foreign exporter's price, quantity, and profits are obtained

$$\begin{aligned} q_{2F} &= \frac{16(1-t) - 2c[2 + c(1-t)]}{\Upsilon}, \\ p_F &= \frac{16(3+t) - 12c - c^2(14+6t) + c^3(2+c)}{\Upsilon}, \\ \Pi_{2F} &= \frac{4[(8-c^2)(1-t) - 2c]^2}{(16-c^2)(4-c^2)\Upsilon} \end{aligned} \quad (16)$$

as well as home production, prices, union utility, profits, tariff revenues, and consumers' surplus

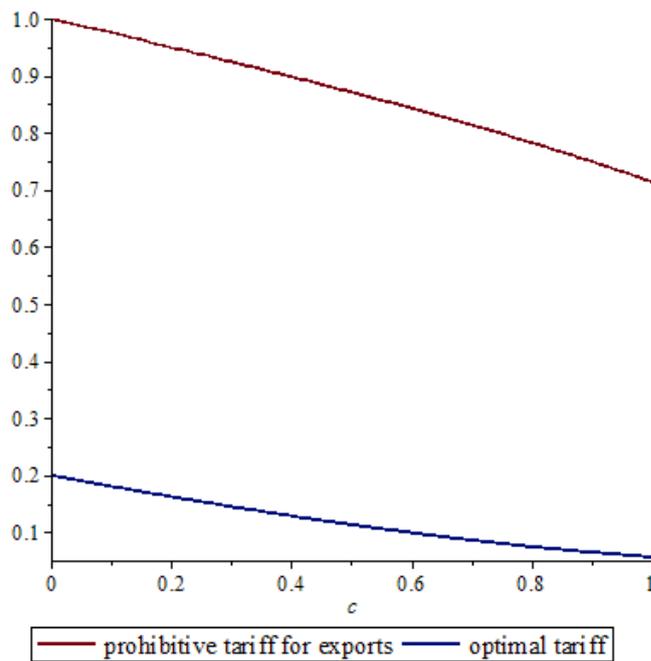
$$\begin{aligned} q_{1H} &= \frac{16 - 2c^2 - 4c(1-t)}{\Upsilon}; \\ p_H &= \frac{(6-c^2)[8-c^2-2c(1-t)]}{\Upsilon}; \\ \Omega_H &= \frac{2[8-c^2-2c(1-t)]}{(16-c^2)\Upsilon}, \\ \Pi_H &= \frac{4[(8-c^2)-2c(1-t)]^2}{(16-c^2)(4-c^2)\Upsilon} \\ CS_H &= \frac{[(12c^5 - 96c^3 + 384c + 768)(1-t) + c^4(30t^2 - 60t - 60) - c^2(528 - 528t + 264t^2) + 384t^2]}{\Upsilon} \\ TR_H &= \frac{t[16 - 2c^2 - 4c(1-t)]}{\Upsilon} \end{aligned} \quad (17)$$

where  $\Upsilon = c^4 - 20c^2 + 64$ . Hence, the home government sets the optimal tariff to maximize domestic welfare

$$SW_H = \Omega_{1H} + \Pi_{1H} + CS_H + TR_H.$$

Given the expressions in (17), the government problem is

$$t = \arg \max_t \left\{ SW_H = \frac{2[768 + 128t(1-c) - 320t^2 + c^2(116t^2 - 8t - 400) + c^3(32t + 8) + c^4(48 + 6t - 17t^2) + 2c^5(1 - 2t) - c^6(1 + t - t^2)]}{(2-c)^2(4-c)^2(2+c)^2(4+c)^2} \right\}$$

**Figure 1: Prohibitive and optimal tariff**

Source: Author's own calculation

whose solution is

$$t^* = \frac{(2-c)(4+c)(16-12c-2c^2+2c^3+c^4)}{2(320-116c^2+17c^4-c^6)} \quad (18)$$

The optimal tariff set by the home government in (18) depends on the degree of product differentiation. The differentiation of (18) shows that  $\frac{\partial t^*}{\partial c} < 0$ ; as products become close substitutes, the duopoly rents of the foreign exporter decrease, and the home government sets a lower tariff. Figure 1 reveals that  $\forall c \in [0,1)$ ,  $t^* < \bar{t}$ ; there is always an optimal tariff, lower than the prohibitive one, that the home government can apply to extract part of the foreign exporter's rents, independent of the degree of product differentiation.

Making use of (18), the social welfare under strategic trade policy is

$$SW_H = \frac{(5c^4 - 56c^2 - 8c + 244)}{2(320 - 116c^2 + 17c^4 - c^6)}. \quad (19)$$

### *Investment policy*

#### *Stage 4, firms' quantity choices and labor demands with FDI*

To regulate monopoly, the alternative policy option the government may implement is market contestability, allowing the entry of the foreign firm in the domestic market through

FDI. The industry shifts from a monopoly to a duopoly. Given the inverse demand functions in (7), the profits of the home incumbent are

$$\Pi_{1H} = (1 - q_{1H} - q_{2F} - w_{1H})q_{1H} \quad (20)$$

while the foreign firm's profits are

$$\Pi_{2F} = (1 - q_{1H} - q_{2F} - w_{2F})q_{2F} - F \quad (21)$$

where  $q_{1H}$  and  $q_{2F}$  are the incumbent and entrant production levels, respectively. The foreign firm faces a fixed cost of  $F$  to produce in the home country. The home government needs to evaluate whether it should incentivize entry by paying a subsidy to the foreign firm to improve national welfare.

Cournot competition in the home product market leads to the following output levels

$$q_{1H} = \frac{[2(1 - w_{1H}) - c(1 - w_{2F})]}{4 - c^2}, \quad q_{2F} = \frac{[2(1 - w_{2F}) - c(1 - w_{1H})]}{4 - c^2}. \quad (22)$$

with the standard results  $\frac{\partial q_{1H}}{\partial w_{2F}} > 0$ ,  $\frac{\partial q_{1H}}{\partial w_{1H}} < 0$ ,  $\frac{\partial q_{2F}}{\partial w_{1H}} > 0$ ,  $\frac{\partial q_{2F}}{\partial w_{2F}} < 0$ : an increase in the rival firm's wages increases its own production, while an increase in its own wages decreases its own production.

### Stage 3, wage setting

With regard to labor markets, let us consider the presence of an industry-wide union setting wages simultaneously, although separately, in the two firms (Haucap and Wey, 2004). The utility function, therefore, takes the following form

$$\Omega_H = w_{1H}q_{1H} + w_{2F}q_{2F} \quad (23)$$

where  $w_{1H}$  and  $w_{2F}$  are the wages charged to the home and foreign firms, respectively. Substituting the Cournot quantities into the union utility function, the maximization problem is

$$w_{1H}, w_{2F} = \arg \max_{w_{1H}, w_{2F}} \left\{ \Omega_H = \frac{w_{1H}[2(1 - w_{1H}) - c(1 - w_{2F})]}{4 - c^2} + \frac{w_{2F}[2(1 - w_{2F}) - c(1 - w_{1H})]}{4 - c^2} \right\}.$$

The solutions lead to the wage reaction functions in each firm

$$w_{1H} = \frac{[2 - c(1 - 2w_{2F})]}{4}, \quad w_{2F} = \frac{[2 - c(1 - 2w_{1H})]}{4}, \quad (24)$$

yielding the equilibrium wages

$$w_{1H} = w_{2F} = \frac{1}{2}, \quad (25)$$

independent of the degree of product differentiation.

*Stage 2, Investment policy implementation: Social welfare evaluation*

Making use of (25), the following expressions for the home as well as foreign firm price and quantities and foreign profits in the presence of an industry-wide union are

$$q_{1H} = q_{2F} = \frac{2-c}{8-2c^2}, p_{1H} = p_{2F} = \frac{6-c-c^2}{8-2c^2}, \Pi_{2F} = \frac{(2-c)^2}{4(4-c^2)^2} - F \quad (26)$$

while the home union utility, profits, and consumers' surplus are

$$\Omega_H = \frac{2-c}{8-2c^2}, \Pi_{1H} = \frac{(2-c)^2}{4(4-c^2)^2}, CS_H = \frac{3(1+c)(2-c)^2}{4(4-c^2)^2}. \quad (27)$$

Hence, the home government evaluates the social welfare, given by

$$SW_H = \Omega_H + \Pi_{1H} + CS_H = \frac{(8+5c)(2-c)^2}{4(4-c^2)^2} \quad (28)$$

to design the most suitable regulation policy in the first stage of the game. The profits of the foreign firm are not accounted in the evaluation of the national welfare because they are repatriated in the foreign country of origin.

*Stage 1, Foreign firm entry decision in the home market*

At the first stage of the game, the foreign firm must decide how to enter the home product market. To do so, the foreign firm compares the profits under the two entry strategies: export and FDI. The optimal tariff set by the government, the investment costs, and the unions' wage setting and degree of product differentiation have a direct impact on the foreign firm profits. Given (18), the foreign firm profits from exports under home country strategic trade policy are

$$\Pi_{2F}^{ST} = \frac{(c^4 - 16c^2 - 4c + 64)}{(320 - 116c^2 + 17c^4 - c^6)} \quad (29)$$

where the upper script *ST* stands for "strategic trade." Profits for the foreign firm under the FDI strategy are

$$\Pi_{2F}^{FDII} = \frac{(2-c)^2}{4(4-c^2)^2} - F, \quad (30)$$

where the upper scripts *FDII* denotes “FDI with industry union.” Straightforward payoffs’ comparison leads to the following proposition:

**Proposition 1** *The foreign firm prefers to undertake FDI than to export into the home country if the initial cost of the investment is such that*

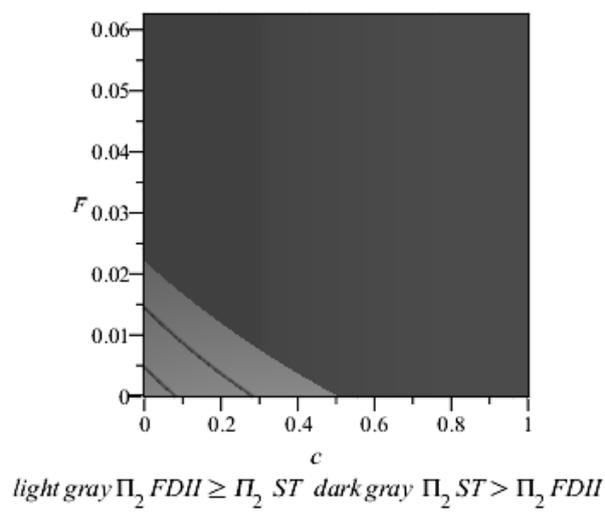
$$F(c)^{FDII} \leq \frac{(c^{12} - 38c^{10} - 16c^9 + 633c^8 + 544c^7 - 5480c^6 - 6528c^5 + 24272c^4 + 32512c^3 + 116c^2 - 57344c + 36864)}{4[(c+2)(320 - 116c^2 + 17c^4 - c^6)]^2}$$

*in the presence of an industry-wide union.*

Proof: Direct payoffs comparison.

As Figure 2 depicts, the profit outcomes generate two different regions in the  $(c, F)$ -plane. The set of points  $(c \in (F = 0) | 0 \leq c \leq .51) \cup F \in (c = 0) | 0 \leq F \leq .0225) \cup F \leq F(c)^{FDII}$  defines the first region. In this area, direct comparison of payoffs shows that  $\Pi_{2F}^{FDII} \geq \Pi_{2F}^{ST}$ . In other words, investing is the dominant strategy for the foreign firm: consequently, it undertakes FDI in the home country.

**Figure 2: Foreign firm profits: industry-wide union**



Source: Author’s own calculations.

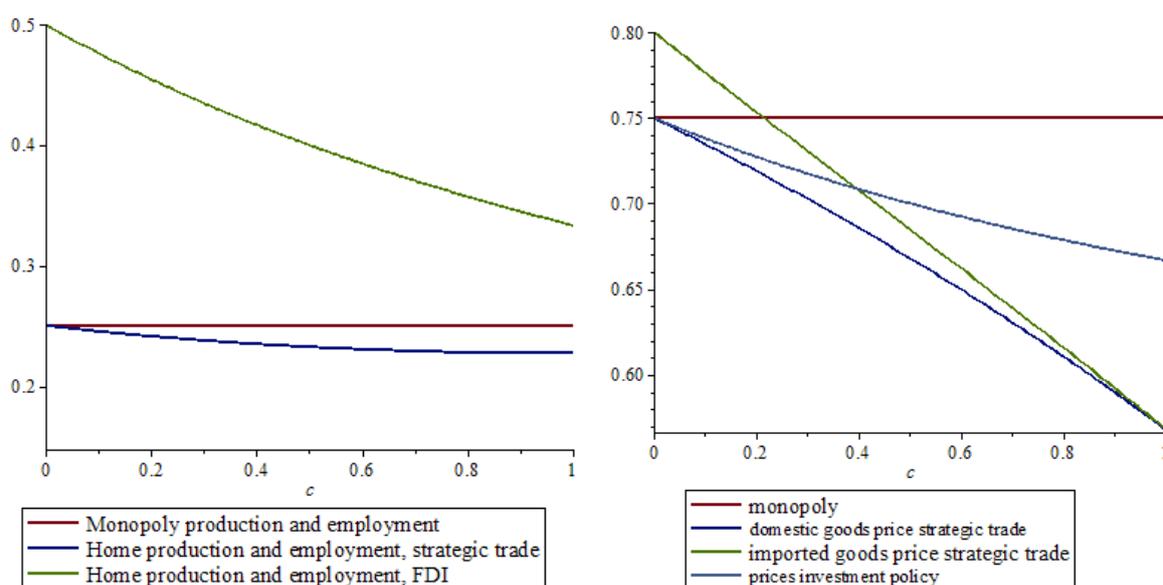
The second region is defined by the following set of points in the  $(c, F)$ -plane:  $(c \in (F = 0) | .51 < c \leq .99) \cup F \in (c = 0) | F > .0225) \cup F > F(c)^{FDI}$ . In this region,  $\Pi_{2F}^{ST} > \Pi_{2F}^{FDI}$ , that is, exporting is more profitable for the foreign firm. The rationale for this result is as follows. The investment allows the firm to “jump the tariff,” and this has the effect of reducing the marginal cost of production. On the other hand, in the presence of an industry-wide union that sets wages separately, firms pay wages equal to the case of a monopoly, and this has the opposite effect of increasing the marginal cost of production. However, as goods become close substitutes, the oligopoly rents decrease. In the case of trade, the foreign union can moderate wage demands to allow the foreign firm to export in the home country. As a consequence, for lower degrees of product differentiation, the foreign firms prefer to enter the home market via export.

### *Stage 0, Governments' policy design and implications*

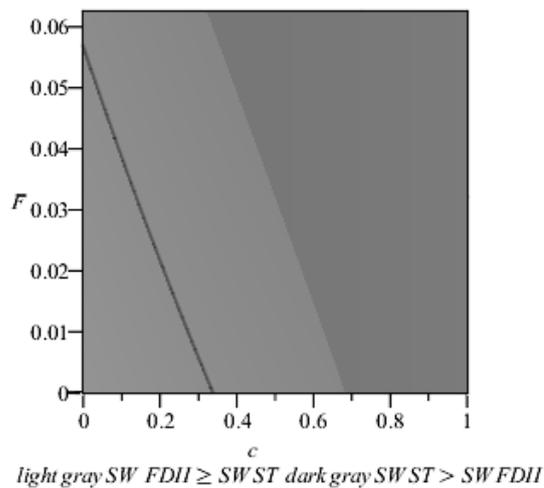
Both the investment policy (allowing the foreign firm to set up a plant in the home country) and the trade policy (allowing imports in the “former” monopoly industry) are instruments the home governments can adopt to promote competition. The consequence is a move from a monopoly industry to a duopoly market structure.

In the case of the investment policy, the foreign firm, by setting up a new plant in the home market, originates job opportunities. Nonetheless, the overall workforce in the home setting is organized in the industry-wide union and, because of coordination, the wage level remains unaltered with respect to a monopoly, unaffected by the degree of product differentiation. It follows that the union utility increases, and the price of the goods decrease because of more intensive market competition. This, in turn, implies increasing consumers'

**Figure 3: Left box: Home production and employment level; Right box: Prices in the home market**



Source: Author's own calculations

**Figure 4: Home social welfare, industry-wide union**

Source: Author's own calculations

surplus. The profits of the former monopolist shrink. However, the social welfare is higher than in the case of autarky. The key determinant for the home government, when designing the investment policy, is the likelihood of the foreign firm of undertaking the initial investment to enter into the domestic market and, therefore, the magnitude of  $F$ .

Differently, in the case of the strategic trade policy, monopoly regulation via imports exposes home workers to wage competition from abroad. Thus, the wage level in the home market lowers: import competition exerts stronger downward pressure on wages when the products are close substitutes.

The strategic trade policy induces wage moderation and, by incentivizing competition through imports, reduces the home employment with respect to monopoly in autarky. On the other hand, the investment policy leads to both higher wages and employment than the strategic trade policy. In Figure 3, the left box exemplifies these findings. With regard to prices, both policies reduce the price of the domestically produced goods with respect to monopoly; given the wage moderation effect, the price of the domestic goods under strategic trade is lower than the price under investment policy. Furthermore, the price of the imported goods is lower than the price under the investment policy if  $c \in [0, .39)$ , that is, for relatively independent goods. In that case, the demand for imports is relatively strong. However, as Figure 4 shows, it should also be noted that, for  $c \in [0, .21)$ , the price of the imported goods exceeds that of monopoly: This is so because, as goods become more differentiated, the profits of the foreign firm increases, and therefore, the home government can set a higher tariff.

Concerning the home union, the comparison of the payoffs in (17) evaluated at the optimal tariff in (18) and (27) demonstrates that the union utility under strategic trade policy is lower than under the investment policy,  $\forall c \in [0, 1)$ . The rationale for this finding is

immediate: the investment policy in the presence of an industry-wide union produces more jobs than the strategic trade policy, and workers obtain the wage rate equal to that under monopoly. The analysis carried out on domestic production and employment directly holds for the profits of the home company because  $\Pi_{1H} = (x_{1H})^2$ . In addition, consumers generally benefit from a demand higher than under a monopoly and from a price for domestic products lower than monopoly price, while imported goods, as previously discussed, can be more expensive than the monopoly price. Nevertheless, comparison of the expression for the consumers' surplus in (17) evaluated at (18) and (27) shows that the consumers' surplus is larger under the strategic trade policy than investment policy for  $c \in [0, .28)$ . This is so because, for values above this threshold, home consumers take advantage of lower prices, included for the imported goods, with respect to the case that the foreign firm invests.

The design of the regulation policy requires the home government to consider the overall national welfare, which is affected by the fixed cost of entry for the foreign firm and the degree of product differentiation. Figure 4 shows the home welfare in the  $(c, F)$  – space.

Notice that, on the vertical axis,  $F \in \left[0, \frac{1}{16}\right]$ , where the upper limit is the gross profit level of the foreign firm when investing in the home country in the presence of independent products. Direct comparison of the payoffs in (19) and (28) shows that  $SW^{FDII} - F \geq SW^{ST}$  if

$$F \leq F^T = \frac{(5c^7 + 18c^6 - 45c^5 - 208c^4 + 116c^3 + 904c^2 + 288c - 608)}{4(c+2)^2(320 - 116c^2 + 17c^4 - c^6)},$$

while  $SW^{ST} > SW^{FDII} - F$  for  $F > F^T$ . Figure 4 shows that  $dF^T/dc < 0$ ; as products are close substitutes, the duopoly rents decreases. Thus, the profitability of the industry lowers and, consequently, so does the size of the fixed cost that the foreign entrant can sustain.

Hence, the home government can find it beneficial to design and incentivize the investment policy if the cost of the initial investment is adequately low. In this case, more intensive competition generated by the foreign firm in the home market leads to a reduction in price that causes consumers' surplus to increase so as to counterbalance the losses in tariff revenues, despite the higher wage level than when the strategic trade policy is implemented. Simple algebra shows that  $F(c)^{FDII} \leq F^T$  if  $c \in [0, .72)$ . This result has remarkable consequences, summarized in the following proposition:

**Proposition 2** *For  $c \in [0, .72)$ , the home government can opt to subsidize the foreign firm to achieve a Pareto-improvement of the social welfare.*

Proof: For  $c \in [0, .72)$  and  $F < F(c)^{FDII} \leq F^T$ , the foreign firm invests because  $\Pi_{2F}^{FDII} > \Pi_{2F}^{ST}$ , and the social welfare is such that  $SW^{FDII} - F \geq SW^{ST}$ . Thus, the home government may decide whether to provide the foreign firm with subsidies to facilitate the entry. On the other hand, for  $c \in [0, .72)$ , if  $F(c)^{FDII} < F \leq F^T$ , the foreign firm does not find

it profitable to invest in the home market, because  $\Pi_{2F}^{FDI} \leq \Pi_{2F}^{ST}$ ; however, the social welfare is still such that  $SW^{FDI} - F \geq SW^{ST}$ . Therefore, the home government has room to subsidize all the fixed costs of the foreign firm and facilitate its entry to achieve higher social welfare levels.

On the other hand, when  $F > F^T$ , the home government opts for designing and implementing the strategic trade policy. Import competition leads to wage moderation, because the home union faces wage competition from abroad; thus the domestic price decreases and consumers' surplus tends to increase. However, the home government gains additional revenues from the application of the optimal tariff and, therefore, partial extraction of the foreign firm's rents. Those tariff revenues are adequately large to increase the national welfare. Then, the home government can eventually redistribute those resources to the economic agents that are negatively affected by the implementation of the strategic trade policy. The home government must then consider all of these elements in designing and implementing the appropriate policy decision to improve the national social welfare.

### 2.2.1 Cournot competition with decentralized unions

This section considers a different unionization structure in the home country in the case of the investment policy: decentralized firm-level unions. This alternative characterization reflects the practice of multinational companies of opting out of national/sector collective bargaining in favor of company-wide agreements (Eurofound, 2009). The fourth stage of the game, the competition in the product market, is unaltered.

#### Stage 3, wage setting. Case B: decentralized unions

In the presence of a decentralized wage setting structure in the home country, firm-level unions operate in the labor market. The union utility functions are

$$\Omega_{1H} = w_{1H}q_{1H}, \quad \Omega_{2H} = w_{2F}q_{2F} \quad (31)$$

where  $w_{1H}$  and  $w_{2F}$  are the wages charged by the two home unions (therefore, index  $H$  for union 2) to the home and foreign firms, respectively. Substituting the Cournot quantities into the union utility functions, the maximization problems are

$$w_{1H} = \arg \max_{w_{1H}} \left\{ \Omega_{1H} = \frac{w_{1H}[2(1-w_{1H}) - c(1-w_{2F})]}{4-c^2} \right\},$$

$$w_{2F} = \arg \max_{w_{2F}} \left\{ \Omega_{2H} = \frac{w_{2F}[2(1-w_{2F}) - c(1-w_{1H})]}{4-c^2} \right\}$$

The solutions lead to the wage reaction functions in each firm

$$w_{1H} = \frac{[2 - c(1 - w_{2F})]}{4}, w_{2F} = \frac{[2 - c(1 - w_{1H})]}{4}, \quad (32)$$

yielding the equilibrium wages

$$w_{1H} = w_{2F} = \frac{2 - c}{4 - c}, \quad (33)$$

with  $\frac{\partial w_{1H}}{\partial c} = \frac{\partial w_{2F}}{\partial c} < 0$ : as the products become close substitutes, the oligopoly rents of the firms shrink; therefore, the unions extract a lower share of the rents.

### *Stage 2 Governments' evaluation of the social welfare*

Using (30), the expressions for the home and foreign quantities and price, and the foreign firm's profits in the presence of decentralized unions are

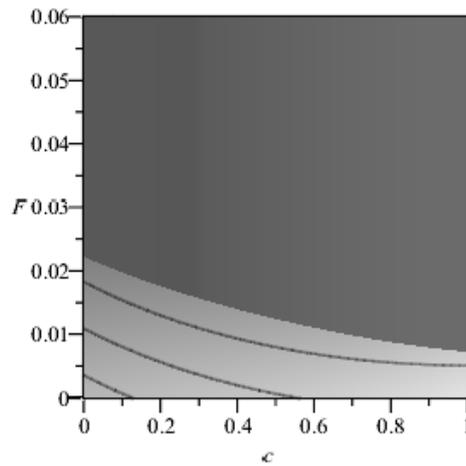
$$q_{1H} = q_{2F} = \frac{2}{(2 + c)(4 - c)}, p_{1H} = p_{2F} = \frac{6 - c^2}{(c + 2)(4 - c)}, \Pi_{2F} = \frac{4}{(2 + c)^2(4 - c)^2} - F \quad (34)$$

while the home union's utility, profits, and consumers' surplus are

$$\Omega_{1H} = \Omega_{2H} = \frac{2(2 - c)}{(2 + c)(4 - c)^2}, \Pi_{1H} = \frac{4}{(2 + c)^2(4 - c)^2}, CS_H = \frac{12(1 + c)}{(2 + c)^2(4 - c)^2}. \quad (35)$$

Thus, the home government evaluates the social welfare, given by

### **Figure 5: Foreign firm profits, Decentralized unions**



light gray  $\Pi_2^{FDID} \geq \Pi_2^{SWST}$  dark gray  $\Pi_2^{SWST} > \Pi_2^{SWFDID}$

Source: Author's own calculations

$$SW_H = \Omega_{1H} + \Omega_{2H} + \Pi_{1H} + CS_H = \frac{4(8+3c-c^2)}{(2+c)^2(4-c)^2} \quad (36)$$

to design the most suitable regulation policy in the first stage of the game. Foreign profits are repatriated.

### Stage 1, Foreign firm entry decision in the home market

The profits for the foreign firm under the FDI strategy are

$$\Pi_{2F}^{FDID} = \frac{4}{(2+c)^2(4-c)^2} - F \quad (37)$$

where the upper scripts *FDID* denotes “FDI with decentralized unions.” Straightforward payoff comparison leads to the following proposition:

**Proposition 3** *The foreign firm prefers to undertake FDI than to export into the home country if the initial cost of the investment is such that*

$$F(c)^{FDID} \leq \frac{(3c^{12} + 4c^{11} - 92c^{10} - 152c^9 + 1220c^8 + 2336c^7 - 8880c^6 - 17856c^5 + 38144c^4 + 67072c^3 + 101376c^2 - 98304c + 147456)}{[(c+2)(4-c)(320 - 116c^2 + 17c^4 - c^6)]^2}$$

*in the presence of decentralized unions.*

Proof: Direct payoffs comparison.

The first region in Figure 5 is defined by the set of points in the  $(c, F)$ -plane:  $(c \in (F = 0) | 0 \leq c \leq .99) \cup F \in (c = 0) | 0 \leq F \leq .0225) \cup F \in (c = .99) | 0 \leq F \leq .0076) \cup F \leq F(c)^{FDID}$ . It is found that, in this region,  $\Pi_{2F}^{FDID} \geq \Pi_{2F}^{ST}$ ; despite the presence of a tariff, for any given degree of product differentiation, the wages and the fixed costs in the home country are low enough that, for the foreign firm, it is profitable to opt for investing. On the other hand, the second region, the set  $(F \in (c = 0) | .0225 < F) \cup F \in (c = .99) | 0 < F \leq .0076) \cup F \leq F(c)^{FDID}$  characterizes the second region in Figure 5, where  $\Pi_{2F}^{ST} > \Pi_{2F}^{FDID}$ . The fixed costs of the initial investment are now sufficiently high to make exports in the presence of an optimal tariff more beneficial.

A simple comparison of profit outcomes under the different wage setting structures shows that, as expected, in the presence of decentralized unions, the region of the parameters of where an investment would be advantageous for the foreign firm is larger than in the presence of an industry-wide union. The rationale for this result is straightforward: in a decentralized wage setting, firm-level unions engage in a competition with each other over employment, triggering a reduction in wage levels, an element which is absent in the case of an industry-wide union.

#### *Stage 0, Governments' policy design and implications*

If the workforce in the home setting is organized in firm-level unions, the wage level decreases with respect to the monopoly, because unions compete against each other for jobs. In this case, the degree of product differentiation affects the equilibrium wage. However, despite the fact that wages decrease with respect to monopoly, the utility of workers, given by the sum of the union utilities, increases because the employment level in the home market increases. The price of the final products decreases because of the greater intensive market competition, and this implies increasing consumers' surplus. The profits of the former monopolist lessen. The social welfare is higher than in the case of autarky.

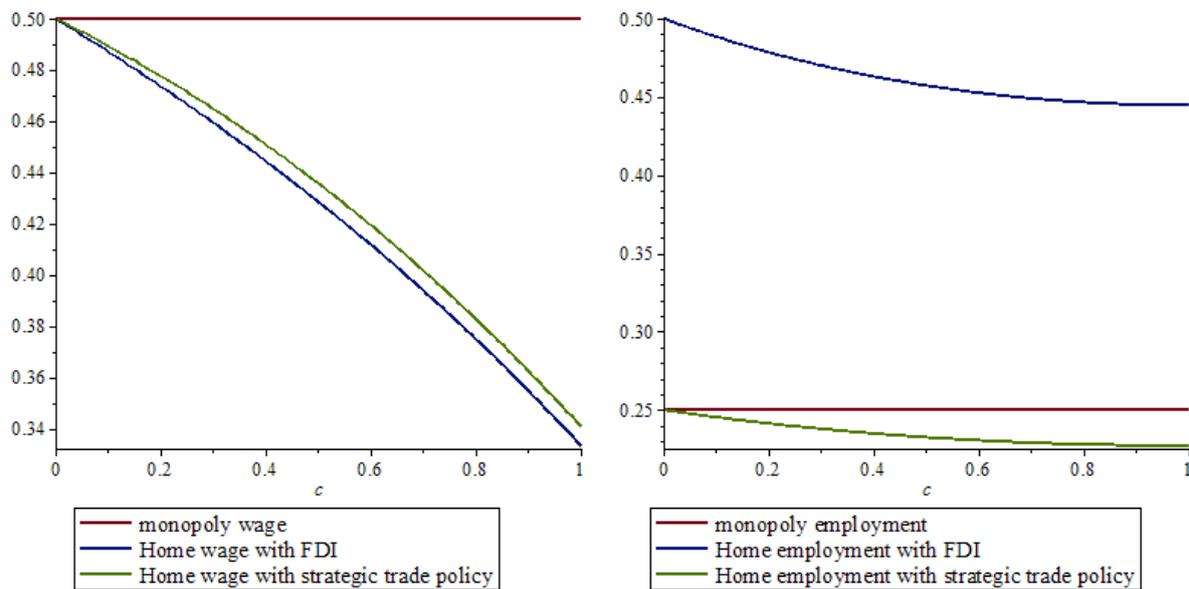
The key factor for the home government when designing the investment policy is again the willingness of the foreign firm of bearing the initial cost of the investment to enter into the domestic market and, thus, the size of  $F$ . Conversely, in the case of the strategic trade policy, monopoly regulation via imports exposes home workers to wage competition from abroad. Hence, the wage level in the home setting lowers: import competition puts home wages under pressure. It follows that the strategic trade policy also induces wage moderation; however, by stimulating competition through imports, it reduces the home employment with respect to both monopoly and investment policy. On the other hand, the investment policy with decentralized union moderates wages more than the strategic trade policy (the presence of a tariff partially protects domestic workers) but leads to a higher employment level. Figure 6 exemplifies these findings.

Both policies reduce the price of the domestically produced goods with respect to monopoly. However, the price in the home market under the investment policy is lower than under the strategic trade policy, because the wage moderation effect is more intense. Given that the foreign firm produces in the home market, the final prices of the products are equal.

With regard to home workers, the comparison of the union utility in (17) is evaluated at the optimal tariff in (18), and the sum of the union utilities in (35) shows that,  $\forall c \in [0,1]$ , their position improves more with the investment policy in the presence of decentralized unions than with the strategic trade policy. The rationale for this result is as follows. The implementation of the investment policy with decentralized unions lowers the workers' wage rate with respect to the strategic trade policy; nonetheless, it creates more jobs. The impact on the union utility of the employment effect more than overcomes the losses due to a lower wage. The final effect is an increase of the utility of unions.

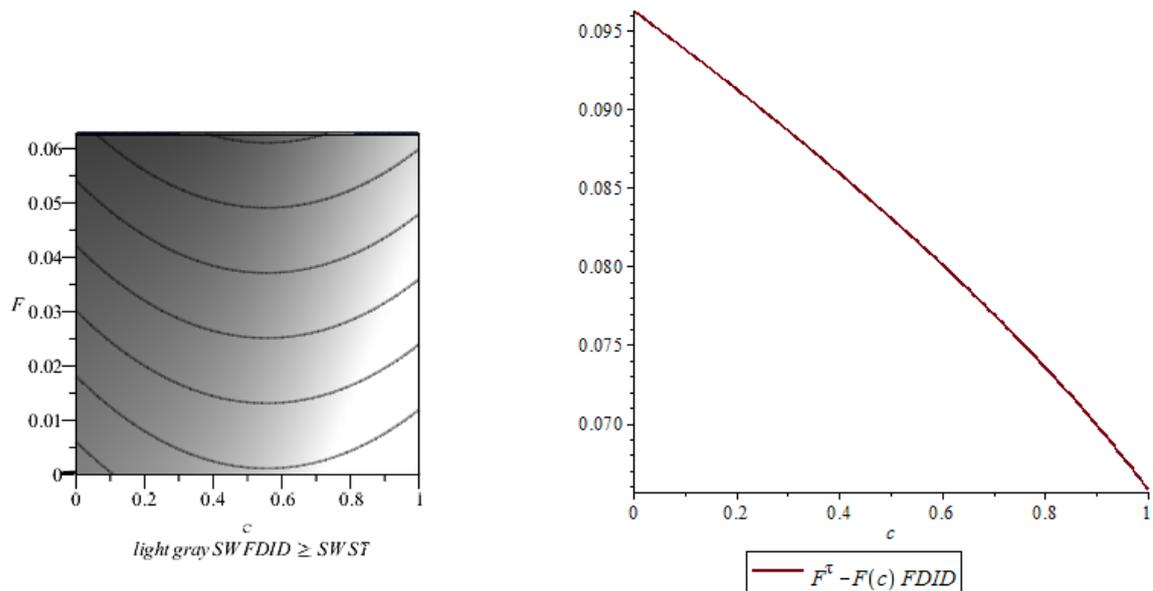
As in the previous subsection, given that  $\Pi_{1H} = (x_{1H})^2$  and  $\Pi_{2F} = (x_{2F})^2$ , the analysis conducted on production and employment holds for the profits the domestic and foreign firms generate in the home setting. Moreover, consumers unambiguously benefit from the investment policy both because of a demand higher than monopoly and the final prices being lower than monopoly and trade policy price.

**Figure 6: Left box, Home wages; Right box, Home employment**



Source: Author's own calculations

**Figure 7: Left box, Home social welfare, decentralized unions; Right box, subsidization feasibility**



Source: Author's own calculations

The home government evaluates the overall national welfare to design the most advantageous regulation policy. Again, the foreign firm's fixed cost of entry and the degree of product differentiation play a crucial role. Figure 7, left box, shows the home welfare in the  $(c, F)$ –space. The vertical axis reports the values of the fixed cost in the range  $F \in \left[0, \frac{1}{16}\right]$ , in which the upper limit is the gross profit level of the foreign firm when it invests in the home country in the presence of independent products. Notice that the value of profits equals that in the presence of the industry-union. A direct analytical inspection reveals that  $SW^{FDID} - F \geq SW^{ST}$  if

$$F \leq F^\tau = \frac{(3c^8 - 4c^7 - 84c^6 + 32c^5 + 748c^4 - 112c^3 - 3216c^2 + 384c + 4864)}{2(4-c)^2(c+2)^2(320 - 116c^2 + 17c^4 - c^6)},$$

while, in the case of  $F > F^\tau$ , it is  $SW^{ST} > SW^{FDID} - F$ , with  $dF^\tau/dc < 0$  as in the previous case: as products become close substitutes, the duopoly rents decrease. Thus, the profitability for the firms in the industry lowers and, thus, the size of the fixed cost that the foreign entrant can sustain also decreases.

Also with decentralized unions, the home government can find designing and incentivizing the investment policy to be advantageous when the initial investment is adequately low; more intense competition due to the presence of the foreign firm in the home market triggers a reduction in price that benefits consumers as to outweigh the losses in tariff revenues. Simple algebra reveals that  $F(c)^{FDID} \leq F^\tau$ ,  $\forall c \in [0, 1)$ , as Figure 7, right box, also depicts. The consequences of this result are summarized in the following proposition:

**Proposition 4** *The home government can always opt to subsidize entirely the initial cost of the investment of the foreign firm to achieve a Pareto-improvement of the social welfare.*

Proof: For  $F < F(c)^{FDII} \leq F^T$ , the foreign firm decides to invest because  $\Pi_{2F}^{FDID} > \Pi_{2F}^{ST}$   $\forall c \in [0,1)$ ; the social welfare is such that  $SW^{FDID} - F \geq SW^{ST}$ . Hence, the home government may discretionally opt to provide with subsidies the foreign firm to promote entry. On the other hand, for  $c \in [0,1)$  and  $F(c)^{FDII} \leq F \leq F^T$ , the foreign firm does not invest in the home market because  $\Pi_{2F}^{FDID} \leq \Pi_{2F}^{ST}$ . Nonetheless, the social welfare is such that  $SW^{FDID} - F \geq SW^{ST}$ . Thus, the home government may subsidize all of the fixed costs of the initial investment of the foreign firm, whatever is the degree of product differentiation to encourage the entry and improve social welfare.

On the other hand, when  $F > F^T$ , the home government prefers to design and implement the strategic trade policy: the cost of the initial investment is extremely high that, despite the positive effects of wage moderation and job creation, it is no longer beneficial to subsidize the entry of the foreign firm to improve the overall welfare.

### 3. Conclusions

This paper has analyzed the effects on domestic welfare of two different policies that a government can apply to introduce competition in a unionized monopolized industry: competition and strategic trade policies. Both policies shift the product market from monopoly to duopoly: the former through market contestability and the latter via import competition. The competition policy allows the domestic industry-wide union to maintain the same wage as in a monopoly. On the other hand, trade openness leads to wage moderation: the home union competes over jobs with the foreign one. As a result, the impact of the two policies on price, employment, and welfare differs.

The domestic government selects between the two policies depending on the magnitude of the initial fixed cost for the foreign entrant, the unionization structure, and the degree of product differentiation. In the presence of an industry-wide union which sets wages simultaneously although separately in the domestic and foreign firms, the domestic government can opt to subsidize the foreign firm if the goods are not close substitutes in order to improve social welfare. However, as goods are close substitutes, the foreign union can moderate the wage demands to allow the foreign firm to penetrate the domestic market via imports. Consequently, for lower degrees of product differentiation, the foreign firm prefers to enter the domestic market via export. On the other hand, in the presence of decentralized unions, the domestic government can find it a beneficial practice to design and incentivize the inward FDI policy when the initial investment is adequately low, regardless the degree of product differentiation to encourage the inward FDI entry and improve social welfare.

The findings of this work relate to the simplifying hypothesis that the home and foreign unions set unilateral wages. A framework in which unions and firms bargain wages is a straightforward extension to check the robustness of the model to obtain a better evaluation

of the policy effects on the national economy. Additionally, Bertrand competition in the product market may alter some of the results, thus requiring further research.

## References

- Buccella, D. (2012). Unionized monopoly regulation: strategic trade vs. domestic competition policies. *Economics Bulletin*, 32(1), 932-940.
- Bughin, J., & Vannini, S. (1995). Strategic direct investment under unionized oligopoly. *International Journal of Industrial Organization*, 13, 127-145.
- Dobson, P.W. (1997). Union-Firm Interaction and the Right to Manage. *Bulletin of Economic Research*, 49(3), 213-229.
- Dube, A., & Reddy, S. (2013). Threat Effects and Trade: Wage Discipline through Product Market Competition. *Journal of Globalization and Development*, 4(2), 213-252.
- Eckel, C., & Egger, H. (2009). Wage bargaining and multinational firms. *Journal of International Economics*, 77(2), 206-214.
- European Foundation for the Improvement of Living and Working Conditions (Eurofound) (2009). *Multinational companies and collective bargaining*. Retrieved from <http://www.eurofound.europa.eu/eiro/studies/tn0904049s/tn0904049s.htm>
- Glass, A. J., & Saggi, K. (2005). Exporting versus direct investment under local sourcing. *Review of World Economics*, 141(4), 627-647.
- Haucap, J., & Wey, C. (2004). Unionisation structure and innovation incentives. *Economic Journal*, 114, 149-165.
- Ishida, J., & Matsushima, N. (2009). Domestic Competition and Foreign Direct Investment in unionized oligopoly. The Institute of Social and Economic Research Discussion Paper n°757, Osaka University.
- Lommerud, K. E., Meland, F., & Sørgard, L. (2003). Unionised Oligopoly, Trade Liberalisation and Location Choice. *Economic Journal*, 113(490), 782-800.
- Mezzetti, C., & Dinopoulos, E. (1991). Domestic Unionization and Import Competition. *Journal of International Economics*, 31, 79-100.
- Naylor, R. (1998). International Trade and Economic Integration when Labour Markets Are Generally Unionised. *European Economic Review*, 42, 1251-1267.
- Naylor, R. (1999). Union Wage Strategies and International Trade. *Economic Journal*, 109(452), 102-115.
- Naylor, R., & Santoni, M. (2003). Foreign Direct Investment and Wage Bargaining. *Journal of International Trade and Economic Development*, 12(1), 1-18.
- Pagel, B., & Wey, C. (2013). Unionization Structures in International Oligopoly. *Labour* 27(1), 1-17.
- Petrakis, E., & Vlassis, M. (2004). Endogenous wage-bargaining institutions in oligopolistic industries. *Economic Theory*, 24, 55-73.
- Singh, N., & Vives, X. (1984). Price and Quantity Competition in a Differentiated Duopoly. *The RAND Journal of Economics*, 15(4), 546-554.
- Vandenbussche, H. (2000). Trade Policy Versus Competition Policy: Substitutes or Complements? *De Economist*, 148, 625-642.

Vandenbussche, H., & Konings, J. (1998). Globalisation and the Effects of National versus International Competition on the Labour Market: Theory and Evidence from Belgian Firm Level Data. *The World Economy*, 21, 1151-1177.

Vlassis, M., & Mamakis, S., 2014. Optimal strategies in Unionized Oligopoly and Inward FDI. University of Crete, Department of Economics Working Paper Series n. 1402.

Zhao, L. (1995). Cross-hauling Direct Foreign Investment and Unionized Oligopoly. *European Economic Review*, 39, 1237-1253.

Zhao, L. (1998). The Impact of Foreign Direct Investment on Wages and Employment. *Oxford Economic Papers*, 50, 284-301.