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FIRMS CONTROLLED BY OWNERS AND MANAGERIAL FIRMS: THE ‘STRATEGIC’ TRADE POLICY GAME REVISITED *

ABSTRACT

This paper re-examines the strategic trade policy issue by considering a bargaining process over managerial contracts and different firms’ organizational structures; that is, either family ownership or atomistic shareholders whose board of directors delegate output choice to managers keep control over the firm. We show that, in contrast to the traditional results, a plethora of Nash equilibria emerges and the implementation of trade policies in both countries may be efficient (i.e. national social welfares are higher than under free trade) in the presence of a bargaining process in a sales delegation game. Such equilibria depend on the manager’s bargaining power as well as the degree of product competition. The paper’s findings suggest that trade policy-makers should also take into account the ownership structure and the corresponding organizational form of the exporting firms.

Keywords Export Subsidy/Tax, Prisoner’s Dilemma, Managerial Delegation, Owner-Manager Bargaining, Cournot Duopoly
JEL Classification: F16, J51, L13

RIASSUNTO

Imprese controllate dai proprietari e imprese manageriali: una rivisitazione del gioco della politica commerciale strategica

Questo articolo riesamina il tema della politica commerciale strategica di due paesi esportatori in un terzo mercato in presenza di diverse strutture organizzative delle imprese, considerando, da un lato, imprese in cui il controllo è esercitato dai membri di una famiglia e, dall’altro lato, imprese con azionariato diffuso i cui consigli di amministrazione delegano la scelta dei livelli di produzione a manager, con un processo di negoziazione fra proprietari e manager sui contratti di quest’ultimi. Contrariamente ai risultati tradizionali, si dimostra che in presenza di un processo

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di negoziazione in un gioco di delega manageriale delle scelte produttive emerge una pletora di equilibri di Nash rispetto alle scelte di intervenire con politiche commerciali oppure di ‘laissez faire’ e l’attuazione delle politiche commerciali in entrambi i paesi può essere efficiente (cioè, i livelli di benessere sociale nazionali sono più alti di quelli in regime di libero commercio). Tali equilibri dipendono sia dal potere contrattuale del manager che dal grado di concorrenza tra prodotti. I risultati del lavoro suggeriscono che, in caso di intervento, i decisori delle politiche commerciali debbano prendere in considerazione sia la struttura di proprietà che la corrispondente forma organizzativa delle imprese esportatrici.

1. **Introduction**

As previously research has confirmed, the issue of the activist trade versus laissez faire policy is at the heart of the international trade literature, especially in light of the approach by Brander and Spencer (1984, 1985), who have proposed, combining traditional economic analysis and game theory, a rationale for trade policies in strategic contexts.

On the one hand, Brander and Spencer’s approach strongly suggests that, in an export-rivalry context under quantity competition, a government’s trade policy implementation is optimal for the national social welfare. On the other hand, however, once a correct game-theoretic approach is considered, the possibility of retaliation not only weakens but also totally reverses this suggestion. The well-known Prisoner’s Dilemma structure of the game, in which governments decide whether to subsidize, implies the paradox that, while firms and worldwide consumers benefit from trade policies, national social welfares are harmed by them.

In any case, also for the supporters of public intervention, a crucial question regards the appropriate selection of firms and industries policymakers must target. Above all, it is important to identify, theoretically and empirically, the types and characteristics of industries to be targeted with the trade policy instrument, because the

“identification of these characteristics is a preliminary step toward translating theory into practical policy proposals” (Spencer, 1986, 70-71).

In the words of Branson and Klevorick (1986, 250),

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1 Surveys of this literature, with a clear presentation of the activist and non-activist point of views, are, for example, in Grossman and Richardson (1986), Krugman (1986) and Brander (1995).
“a recurrent question was whether a particular product or particular industry was appropriately included on the trade policy agenda. Concerning the economic performance of a particular firm, what distinguishes, both positively and normatively, industry and sector as an appropriate target of concern by trade policymakers?”

In this paper, we attempt to provide a partial answer to this question by bringing under study the theoretical effects of the presence of some firms’ characteristics within the advanced economies of developed countries. Such firms’ characteristics are the result of a long-lasting evolution of the organizational structures as well as ownership structure, such as the diffusion of the managerial delegation on output decisions and the increasing managers’ power in the determination of their contracts. Therefore, in a game-theoretic context, we investigate the effects of trade policies when the rival firms have different ownership structures and, thus, one of them is managerial, while the other one is traditionally directly managed by owners. This market context might be represented by the phone mobile world market, for illustrative purposes, in which two giants, such as the North-American company Apple and the Korean company Samsung, compete. We show that the conventional wisdom inherited from the above-mentioned literature, according to which the game has the structure of a prisoner’s dilemma (and, thus, public intervention is the inefficient equilibrium) is modified. The non-cooperative game between governments presents a plethora of equilibria, and the implementation of trade policies in both countries may be efficient either for one or both of them, depending on the interplay between the degree of product competition and managers’ power in the managerial firm.

The remainder of the paper proceeds as follows. Section 2 presents the literature review. In Section 3, we describe a three-stage government-owner-manager game with bargaining over managerial contracts and asymmetric managerial delegation. In Section 4, we solve the game between governments and discuss the main results. Concluding remarks are summarized in Section 5.

\[2^a\text{For instance, the dominant shareholder of the Samsung group, one of the largest chaebols in Korea, controls more than 46% of the shares of the companies even though his personal shares are around 4%} \] (OECD, 2001, 167).
2. Literature Review

Recent contributions to the managerial delegation literature suggest that managers have significant power to influence their own pay (e.g. Bebchuk and Fried, 2004). This new managerial point of view is also supported by extensive empirical evidence (e.g. Bertrand and Mullainathan, 2001; Bebchuk and Fried, 2006). Following this theoretical and empirical evidence, recent papers have argued that the bonus rate could be reasonably determined via cooperative Nash bargaining between the owners (or the board of directors) and the manager and that such bargaining has relevant effects in many cases of oligopolies with strategic incentives (e.g. van Witteloostuijn et al., 2007; Nakamura, 2008; Kamaga and Nakamura, 2008; Nakamura, 2011, 2012; Fanti et al., 2017a, b). In particular, such authors show that the distribution of bargaining power between the owner and the manager affects equilibrium quantities, profits, and welfare. Nakamura (2011) shows that the bargaining over managerial delegation contracts affects the endogenous merger formation in a three-firm asymmetric Cournot industry. Furthermore, Nakamura (2012) shows that the bargaining power of the manager affects profits and welfare in an extension of the study by van Witteloostuijn et al. (2007), with product differentiation and a general number of (symmetric) quantity-setting or price-setting firms. Fanti et al. (2017a, b) examine whether and how the bargaining mechanism between owners and managers over managerial contracts modifies the results of the classical managerial delegation literature, showing that none of the previous results may hold when the owner negotiates about managerial compensation with his manager.

However, none of the above-mentioned contributions apply this new view of managerial contracts to the strategic trade policy context. Moreover, an important stylised fact is the coexistence of firms in which the separation between ownership and control is long-standing and firms are directly managed by the founders or founder’s family. In fact, the presence of managerial delegation may be asymmetric between firms, sectors, and countries, depending on whether many small shareholders share ownership (e.g. North-American public companies) or whether family ownership (very present, e.g., in Italy, Japan, Korea) prevails in the firms (see, e.g., Peng and Jiang, 2010). On the one side, we observe that, in companies with dispersed ownership – a predominant characteristic of the United States and the United Kingdom – the management was pursuing objectives other than long-term returns to shareholders,
“while, at the same time, managers were able to raise their own compensation in spite of poor company performance” (OECD, 2001, 11).

On the other side, especially in Asia (i.e. Japan and Korea3),

“major shareholders in corporate groups, very often their ‘founding fathers,’ sought to retain control and appropriate most of the returns while broadening their risk base” (OCDE, 2001, 8)4.

So far, the literature (e.g. Das, 1997; Colonques, 1997; Miller and Pazgal, 2005; Wang et al., 2009) which has introduced the managerial delegation in the Brander and Spencer’s model has suggested that owners hold all the bargaining power: the managers are delegated by the firms’ owners to choose the market variables (quantity and price) and are compensated through incentive contracts (according to the managerial delegation literature) and are offered a take-it-or-leave-it contract from the owners. Das (1997) and Colonques (1997) adopted the “sales” delegation specification (e.g. Vickers 1985; Fershtman and Judd, 1987), Miller and Pazgal (2005) adopted the “relative performance” delegation (e.g. Salas Fumás, 1992; and Miller and Pazgal, 2002), while Wang et al. (2009) adopted the “market share” delegation (i.e. Jansen et al., 2007; and Ritz, 2008). These researchers investigated how optimal trade policy may be designed in light of the changes in managerial incentive contracts, showing that, in all cases, the introduction of the managerial delegation, irrespective of whether firms compete in quantities or prices, has only the purely quantitative effect to lower the levels of trade policy instruments, because the delegation by itself qualitatively acts like the subsidy.

None of those contributions has, however, discussed the observed i) asymmetry between firms controlled by owners and firms controlled by managers5 and ii) increasing managers’ power in

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3 A high concentration of corporate ownership and control of corporations by families in Korea have led to governance structures that enable the dominant shareholding families to make key decisions on their own. Appointments of board members are almost entirely in the hands of the families controlling the firms” (OECD, 2001, 168).

4 A typical case in which owners manage their firm could be represented by the so-called chaebol, a South Korean form of business conglomerate, which, although it is a multinational owning numerous international firms, is controlled by a chairman with decisional power over all firms. There are several dozen large chaebol which are almost always owned, controlled, and managed by the same family group. Also, Japan’s keiretsu business groupings may be considered similar to the South Korea’s chaebol, but they are less family based and family oriented than their Korean counterparts. For a discussion, see inter alia, Huh and Kim (1993) and Murillo and Sung (2013).

5 In a duopoly framework in which firms offer a “take-it-or-leave-it” contract to managers, Jansen et al. (2007) investigates the firms’ endogenous choice whether to delegate and, in this case, which managerial contract to offer (sales delegation or market share). In a further extension, Jansen et al. (2009) consider a duopoly/triopoly framework in which firms may differ in terms of their managerial remuneration. Also in this paper, the managerial retribution is decided only by the owners. They study four different managerial bonus schemes: simple pure profit maximization, sales delegation, relative performance, and market share. First, those authors analyse the case in which differences in retribution policies are exogenous to reflect the fact that firms and managers are different because of motivation,
the determination of their contracts\textsuperscript{6}. Two partial exceptions are Wang \textit{et al.} (2008) and Wei (2010). Following van Witteloustjin \textit{et al.} (2007), the former authors include the managers' bargaining process in the Das (1997) model, showing that this introduction leads to a decrease in the export subsidy and optimal tariff relative to this model's results; that is, only a “scale” effect is in place without qualitative changes. However, van Witteloustjin \textit{et al.} (2007) do not consider the asymmetry in the organizational structure of rival firms. Wei (2010), revisiting the Das (1997) model, shows in general the equivalence between the government's strategic behavior in trade policy and managerial delegation under oligopolistic competition. In particular, in the case of asymmetric managerial delegation, Wei suggests that, at equilibrium, the country with a managerial firm chooses free trade, while the country without a managerial firm chooses a subsidy rate\textsuperscript{7}. However, the latter author does not consider the managers' bargaining process. Furthermore, all of the aforementioned researchers abstract from the investigation of the crucial issue of the Pareto-inefficiency of the public policy (which is the drawback of the public activism) and only consider the special case of homogeneous products.

3. THE MODEL WITH STRATEGIC TRADE POLICY

Following the approach of Brander and Spencer (1985), we consider a firm in each of two exporting countries. Both firms (1 and 2) produce heterogeneous goods, which are sold to a third

\textsuperscript{6} In a recent paper, to investigate the European gas market, Jansen \textit{et al.} (2012) make use of a modified Cournot triopoly in which a government's controlled firm has a “political objective” function, i.e. maximizing profits plus market share, to compete against two profit maximizing companies. In this respect, the paper of Jansen \textit{et al.} (2012) contributes in a similar way to our contribution, in the sense that both papers consider asymmetric ownership structures. However, while Jansen \textit{et al.} (2012) consider a typical mixed market with a state-owned firm, we consider a private duopoly market with two different organizational forms due to the different ownership structures. Moreover, our paper differs in a threefold way from Jansen \textit{et al.} (2012). First, Jansen \textit{et al.} (2012) consider the market share in the objective function of the company, while in this work we focus on sales delegation. Second, in Jansen \textit{et al.} (2012), the government unilaterally decides the (always) positive weight to attach to the market share part of the company's objective, while in our work the bonus part of the manager's compensation is negotiated between the manager and the owners to maximize their joint utility and can be either positive (sales incentive) or negative (sales penalty). Third, Jansen \textit{et al.} (2012) abstract from the issue of strategic trade policy in the sense that the government does not subsidize the company.

\textsuperscript{7} This occurs because “when only firm 1 delegates a manager, country 1's government has no incentive to subsidize, while country 2's government strengthens its subsidization incentive, playing as a Stackelberg leader to firm 1's owner in the subsidy competition. Hence, firm 1's unilateral delegation puts itself at a disadvantage as a Stackelberg follower. Since total subsidy of each firm is just the Stackelberg leader-follower subsidy, the equilibrium outputs also yield a Stackelberg solution” (Wei, 2010, 123).
country (i.e. an importing country) and compete between them regarding quantity (i.e. a duopolistic Cournot market). The two firms face the same constant marginal cost, $c$.

Countries 1 and 2 are under governments that provide specific export subsidies, $s_i$, to their producers. Therefore, the firm $i$’s cost function is linear and described by:

$$C_i(q_i) = (c - s_i)q_i, \quad i = 1, 2.$$  (1)

We assume the standard linear inverse demand for each differentiated product, given by (e.g. Singh and Vives, 1984):

$$p_i = a - \gamma q_i - q_j$$  (2)

where $p_i$ denotes price, $q_i$ and $q_j$ are the output levels of the two firms and $\gamma \in (-1, 1)$ represents the degree of substitutability between products.

Therefore, profits of firm $i$ can be written as

$$\pi_i = p_i q_i - (c - s_i)q_i.$$  (3)

As known, the presence of delegation of the firm’s control to managers depends mainly on whether the firm is a familiar business or a public company. Because the ownership structure may strongly differ among firms, sectors, and countries, then international markets can be characterized by the co-existence of both managerial firms and firms controlled by owners. For simplicity, we capture this asymmetry in the organizational structure of the firms by assuming conventionally that firm 1 is managerial, while firm 2 is traditionally profit-maximising.

The timing of our game is as follows. At the pre-play stage, governments non-cooperatively choose to be interventionists (implementing a trade policy regime) or abstain from any interventions (exhibiting a laissez-faire regime). In stage 1, governments choose the welfare-maximising levels, if any, of the trade policy instruments (export tax/subsidy) (the policy stage). In stage 2, with regard to only firm 1, owners and managers are engaged in a bargaining process to choose executive remuneration (the bargaining stage). In stage 3, managers choose the quantity in the product market (the market stage).

With sales delegation contracts (Vickers, 1985; Fershtman and Judd, 1987), the owner hires a manager and delegates the output decision to him. The manager receives a fixed salary and a
bonus related to a weighted combination of the firm’s profits and sales. The manager’s compensation, therefore, can be expressed as $\omega = A + Bu \geq 0$, where $A \geq 0$ is the fixed salary component in manager’s compensation, $B \geq 0$ is a constant, and $u$ is the manager’s utility. Without the loss of generality, we set the fixed salary component of executive compensation to zero throughout the paper. The manager’s utility takes the following form:

$$u = \pi + dq,$$  \hspace{1cm} (4)

where $d$ is the incentive parameter that the owner and manager of the firm 1 negotiate in the bargaining stage. It may be positive or negative, depending on whether the owner provides incentives or disincentives to the manager. If $d > 0$ (resp. $d < 0$) the manager becomes more (resp. less) aggressive in the market.

Given that the owners of firm 1 delegate the output decisions to their manager under sales delegation, the backward-logic argument allows us to proceed as follows. Given the decisions made in the trade policy stage and the bargaining stage, during the market stage the manager of firm 1 maximizes utility in (4) with respect to quantity. Therefore, the reaction function of managers of firm 1 and firm 2 (as a function of the rival’s quantity, his own bonus and the subsidy rate) are respectively given by:

$$\frac{\partial u_i}{\partial q_i} = 0 \iff q_i(q_2, d_1, s_1) = \frac{a - c - \gamma q_i + d_1 + s_1}{2},$$  \hspace{1cm} (5)

and

$$\frac{\partial \pi_2}{\partial q_2} = 0 \iff q_2(q_1, s_2) = \frac{a - c - \gamma q_2 + s_2}{2}.$$  \hspace{1cm} (6)

The reaction function (5) clearly shows that, if weight $d$ is positive (resp. negative), the manager of firm 1 has an incentive to increase (resp. reduce) output.

From (5) and (6), we get quantities as function of both weights and subsidy rates, that is:

$$q_1(d, s_1, s_2) = \frac{(a - c)(2 - \gamma) - \gamma s_2 + 2(d + s_1)}{4 - \gamma^2},$$  \hspace{1cm} (7)

$$q_2(d, s_1, s_2) = \frac{(a - c)(2 - \gamma) - \gamma(d + s_1) + 2s_2}{4 - \gamma^2}.$$  \hspace{1cm} (8)

Of course, the incentive scheme (4) holds only when profits are positive. If profits are negative, managers have no bonus.
Because the Cournot competition is in strategic substitutes, from (7) and (8), it is easy to see that the manager’s incentive parameter increases the production of the firm of nation 1 and reduces that of the firm of rival nation 2.

We assume that, in the second stage of the game, the weight of the bonus in the managerial contract is chosen by both the owners and manager of firm 1 through a bargaining process – in line with the previous contributions cited in the introduction – that weights the manager’s utility and owners’ profits (instead of being chosen by owners only by means of profit maximisation, as in the previous literature). Since owners and manager have a conflict of interest, “it makes sense for them to bargain over the weight $z_j$” (van Witteloostuijn, 2007, p. 899).

Then, firm 1’s bargaining unit maximises the following Nash product by choosing $d$:

$$N = u^b x^{1-b},$$

where $0 \leq b < 1$ is the relative bargaining power of the manager hired in firm 1. When $b = 0$, eq. (9) boils down to the standard case in which only the owner is involved in determining the weight of the bonus in the managerial contract. Therefore, the incentive parameter, as a function of policy parameters, is given by:

$$\frac{\partial N}{\partial d} = 0 \Leftrightarrow d(s_1, s_2) = \frac{(a - c)(2 - \gamma) - \gamma s_2 + 2s_1[b(4 - \gamma^2) + \gamma^2]}{4(2 - \gamma^2)}.$$  

(Ceteris paribus, an increase in $b$ (the relative bargaining power of the manager) increases $d$.

After standard calculations, we obtain the (asymmetric) quantities, which are given by

$$q_1(s_1, s_2) = \frac{(1 + b)[(a - c)(2 - \gamma) + 2s_1 - \gamma s_2]}{2(2 - \gamma^2)}$$

$$q_2(s_1, s_2) = \frac{4(a - c + s_2) - 2(1 + b)(a - c + s_1) - \gamma^2(1 - b)(a - c + s_2)}{4(2 - \gamma^2)}$$

The social welfare (SW) expressions of the two countries are
By exploiting (11) and (12), profits and social welfare as a function of trade policy instruments are easily calculated (omitted here for brevity). Then, we are in a position to analyse the equilibrium outcomes at the first stage of the game, first in the case of both governments’ intervention and second in the case of the intervention of only one government. They maximize their social welfares, simultaneously and independently, choosing the optimal subsidy/tax rates, and the following reaction functions in trade policy instruments are derived:

\[ s_1(s_2) = \frac{b[(a-c)(2-\gamma) + \gamma s_2]}{2(1+b)} \]  \hfill (14)

\[ s_2(s_1) = \frac{\gamma^2(1+b)[(a \gamma (\gamma-2) - \gamma^2 - 2\gamma + 4] - b \gamma [2s_1 - c(2-\gamma)] - c(\gamma^2 + 2\gamma - 4) + 2s_1]}{b^2 \gamma^3 + 2b \gamma^4 - (3\gamma^4 - 16\gamma^2 + 16)} \]  \hfill (15)

At the equilibrium, the subsidies in the two countries are

\[ s_1 = \frac{(a-c)b(\gamma^2-2)}{(1+b)((b-3)\gamma^4 + 16(\gamma^2-1))} \]  \hfill (16)

\[ s_2 = \frac{(1+b)(a-c)\gamma^2(\gamma^2 + 2\gamma - 4)}{[(b-3)\gamma^2 + 16(\gamma^2-1)]} \]  \hfill (17)

The analysis of the non-cooperative welfare-maximizing trade policy choices by governments leads to the following Lemma.

**Lemma 1.** Government 1 finds optimal to set a tax. Government 2 always sets a subsidy.

Proof: With regard to Government 1 (resp. 2), the proof follows by simple inspection of (14) (resp. 15) observing that \( s_1 < 0 \) (resp. \( s_2 > 0 \)).

It is easy to see that 1) the competition between governments is in strategic complements in terms of Government 1 (i.e. \( \frac{\partial s_1}{\partial s_2} > 0 \)), while it is in strategic substitutes for Government 2 (i.e. \( \frac{\partial s_2}{\partial s_1} < 0 \)); 2) if the manager’s power is zero, Government 1 does not intervene.
According to the traditional Brander and Spencer model, the competition between governments is, as is known, in strategic substitutes. In the present model, the unilateral managerial delegation is by itself an instrument used by the owner for aggressive behavior and, thus, it is additive to the subsidy instrument used by the government. Indeed, in the absence of a manager’s power, the best that Government 1 may do is to abstain from intervening, because the aggressiveness originated by the managerial delegation is exactly substitutive of that originated by the subsidy. Therefore, when the manager’s power is also present and works for a further increase of the aggressive output behavior, Government 1 must intervene to reduce this aggressiveness, fixing an export tax instead of a subsidy.

By exploiting (16) and (17), after the usual algebra, we obtain the equilibrium values of the incentive parameter for firm 1’s managerial contract, quantities, and social welfares (the upper script $S$ denotes the case with trade policy, the first and second lower scripts refer to the country 1 and 2, respectively) as follows:

$$d^{s,s} = \frac{(a-c)[b\gamma^3-\gamma^3-4\gamma^2-4\gamma+8][b(4-\gamma^2)+\gamma^2]}{2(1+b)(b-3)\gamma^4+16(\gamma^2-1)}$$  \hspace{1cm} (18)$$

$$q_1^{s,s} = \frac{(a-c)[b\gamma^3-\gamma^3-4\gamma^2-4\gamma+8]}{[(b-3)\gamma^4+16(\gamma^2-1)]}$$  \hspace{1cm} (19)$$

$$q_2^{s,s} = \frac{(a-c)[b\gamma^3+4-\gamma^2)(\gamma^2+2\gamma-4)]}{2[(b-3)\gamma^4+16(\gamma^2-1)]}$$  \hspace{1cm} (20)$$

$$SW_1^{s,s} = \frac{(a-c)^2(2-\gamma^2)[b\gamma^3-\gamma^3-4\gamma^2-4\gamma+8]^2}{4[(b-3)\gamma^4+16(\gamma^2-1)]^2}$$  \hspace{1cm} (21)$$

$$SW_2^{s,s} = \frac{(a-c)^2(\gamma^2+2\gamma-4)^2[(b+3)\gamma^2-4][(b-1)\gamma^2+4]}{4[(b-3)\gamma^4+16(\gamma^2-1)]^2}$$  \hspace{1cm} (22)$$

Then, the equilibrium outcomes in the case of free trade (denoted by the upper script $FT$) are straightforwardly derived:

$$d^{FT,FT} = \frac{(a-c)(2-\gamma)[b(4-\gamma^2)+\gamma^2]}{4(2-\gamma^2)}$$  \hspace{1cm} (23)$$

$$q_1^{FT,FT} = \frac{(a-c)(2-\gamma)(1+b)}{2(2-\gamma^2)}$$  \hspace{1cm} (24)$$

$$q_2^{FT,FT} = \frac{(a-c)(2-\gamma)(1+b)}{2(2-\gamma^2)}$$  \hspace{1cm} (25)$$

$$SW_1^{FT,FT} = \frac{(a-c)^2(2-\gamma^2)[b\gamma^3-\gamma^3-4\gamma^2-4\gamma+8]^2}{4[(b-3)\gamma^4+16(\gamma^2-1)]^2}$$  \hspace{1cm} (26)$$

$$SW_2^{FT,FT} = \frac{(a-c)^2(\gamma^2+2\gamma-4)^2[(b+3)\gamma^2-4][(b-1)\gamma^2+4]}{4[(b-3)\gamma^4+16(\gamma^2-1)]^2}$$  \hspace{1cm} (27)$$
To solve the governments’ game at the pre-play stage in which they non-cooperatively choose between the strategies of policy intervention and free trade, we first evaluate the payoffs in the asymmetric cases, in which, alternatively, one government subsidises while the other one allows free trade.

Standard calculations for the game in which Government 1 (resp. Government 2) intervenes, while Government 2 (resp. Government 1) does not intervene, that is \( s_2 = 0 \) (resp. \( s_1 = 0 \)), lead to the following subsidy/tax rates for firm 1 (resp. firm 2):

\[
\begin{align*}
q_2^{FT,FT} &= \frac{(a-c)[b\gamma(\gamma - 2)-(\gamma^2 + 2\gamma - 4)]}{4(2-\gamma^2)} \\
SW_1^{FT,FT} &= \frac{(a-c)^2(2-\gamma^2)^2(1-b)(1+b)}{8(2-\gamma^2)} \\
SW_2^{FT,FT} &= \frac{(a-c)^2[b\gamma^2-2b\gamma-(\gamma^2 + 2\gamma - 4)]^2}{16(2-\gamma^2)^2}
\end{align*}
\]

By substituting backwards (28) (and \( s_2 = 0 \)) (resp. (29) and \( s_1 = 0 \)), we obtain the following incentive parameter for firm 1’s managerial contract, quantities and social welfares of countries 1 and 2 in the cases of the asymmetric governments’ behaviors:

\[
\begin{align*}
s_1|s_2=0 &= -\frac{(a-c)(2-\gamma)b}{2(1+b)} \\
s_2|s_1=0 &= -\frac{\gamma^2(a-c)(1+b)[b\gamma^2-2b\gamma-(\gamma^2 + 2\gamma - 4)]}{b^2\gamma^4 + 2b\gamma^4 - (3\gamma^4 - 16\gamma^2 + 16)}.
\end{align*}
\]
Note (from (32), (33), (36), and (37)) that, when only Government 1 intervenes, the manager’s power has an effect neither on the national social welfares nor on the consumer’s welfare.

**Lemma 2.** When only one government intervenes, Government 1 (resp. 2) always sets a tax (resp. subsidy), as in the case in which both intervene (Lemma 1).

Proof: With regard to Government 1 (resp. 2), the proof follows from the simple inspection of (28) (resp. (29)).

### Table 1 - Pay-off Matrix of the Game between Governments

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<tr>
<td>FT</td>
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<td>$SW_{1}^{FT}$, $SW_{2}^{FT}$</td>
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<tr>
<td>S</td>
<td>$SW_{1}^{S,FT}$, $SW_{2}^{S,FT}$</td>
<td>$SW_{1}^{S,S}$, $SW_{2}^{S,S}$</td>
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4. The equilibrium of the game played by governments

Having applied the backward induction method from the last stage of the game, now we are in a position, first, to solve for the sub-perfect Nash equilibrium (SPNE) of the game represented in Table 1, and second, to investigate the efficiency properties of the emerged SPNE.

The countries’ benefits of the different policy regimes are summarized in the governments’ payoff matrix in Table 1. The strategies for each government are to be interventionist (S) or to adopt a non-interventionist stance (free trade, FT). As usual, the first element in each entry represents country 1’s payoff, while the second element represent country 2’s payoff. Along the top are listed the strategies of Government 2, and along the left, the strategies of Government 1 are represented.

Let us define the following six national social welfare differentials, in which the first subscript denotes the type of differential, while the second one denotes the country:

\[ \Delta_{1,1} = SW_{1}^{S/FT} - SW_{1}^{FT/FT}, \quad \Delta_{2,1} = SW_{1}^{FT/S} - SW_{1}^{S/S}, \]
\[ \Delta_{1,2} = SW_{2}^{FT/S} - SW_{2}^{FT/FT}, \quad \Delta_{2,2} = SW_{2}^{S/FT} - SW_{2}^{S/S}, \]
\[ \Delta_{3,1} = SW_{1}^{S/S} - SW_{1}^{FT/FT}, \quad \Delta_{3,2} = SW_{2}^{S/S} - SW_{2}^{FT/FT}. \]

**Result 1.** In an export-rivalry model with asymmetric organizational structure of rival firms, the analysis of the SPNE of the game identifies in the parametric \([\gamma, b])\ space the following ten regions (displayed in Figure 1), characterised by different SPNEs as follows: 1) Regions I - II - X: one asymmetric equilibrium FT/S; 2) Regions III – VIII: two asymmetric equilibria, FT/S and S/FT; 3) Regions IV – VII: one asymmetric equilibrium S/FT; and 4) Regions V – VI – IX: one common equilibrium S/S.

**Proof:** For each point of the result 1, the proof immediately follows from the following set of inequalities which are clearly depicted in Figure 1, in which are shown the areas with all possible signs of the two differentials expressing the convenience or less to deviate from the interventionist policy strategy for each government\(^9\), and two differentials expressing the payoff ranking between

\(^9\) As known, through the analysis of the first four differentials we may obtain any possible Nash equilibrium of the game, while the two last differentials express the payoff ranking between symmetric equilibria.

\(^{10}\) Note that the two differentials expressing the convenience or less to deviate from the free-trade strategy for each government are always positive; this result is in line with the findings of the established literature.
symmetric equilibria, dependant on the values of the parameters of interest here (i.e. degree of product differentiation and level of managers’ bargaining power):

1) Regions I - II - X: $\Delta_{1,1} > 0, \Delta_{2,1} > 0, \Delta_{1,2} > 0, \Delta_{2,2} < 0$;
2) Regions III – VIII: $\Delta_{1,1} > 0, \Delta_{2,1} > 0, \Delta_{1,2} > 0, \Delta_{2,2} > 0$;
3) Regions IV – VII: $\Delta_{1,1} > 0, \Delta_{2,1} < 0, \Delta_{1,2} > 0, \Delta_{2,2} > 0$;
4) Regions V – VI – IX: $\Delta_{1,1} > 0, \Delta_{2,1} < 0, \Delta_{1,2} > 0, \Delta_{2,2} < 0$.

The intuition behind the appearance of the asymmetric sub-game perfect equilibrium $FT/S$ is straightforward: since the managerial delegation gives firm 1 a leadership in quantity (reinforced by the manager’s power which raises the firm’s attitude for quantity), its government could not
further ameliorate the firm’s competitive advantage through a subsidy, while the subsidizing of Government 2 reduces the competitive advantage of the rival firm. Interestingly, the symmetric sub-game perfect equilibrium S/S emerges when products are sufficiently differentiated (that is, the competition is less fierce) and the manager’s power is sufficiently high (that is, firm 1’s manager is sufficiently aggressive in producing), such that Government 1 finds convenient the intervention through a tax because the lower the competition and the higher the output of its firm, the higher the support for price and profits of a tax-induced reduction of output (all else being equal). Therefore, a level of product differentiation (which gets lower as the manager’s power gets higher), such that not only country 2 but also country 1 are better off by their activist policies, does always exist. That is, for a large set of values of the degree of differentiation and manager’s power (i.e. Region VI), the interventions of both governments are Pareto-optimal (for their national welfares).

Finally, when the manager’s power is very high (Regions IV and VII) and thus the quantity offered by firm 1 would be very high, not only Government 1 taxes but also Government 2 finds convenient to cease the subsidization and to abstain from the intervention for stronger support for prices and profits. Therefore, Result 1 shows that the recently observed increase of the managers’ power may have rich effects on the trade policy design emerging in a world economy with asymmetric ownership and organizational structures between rival firms. This result modifies the established findings according to which managerial delegation and asymmetric organizational structure have only “scale effects” on the standard solution of the prisoner’s dilemma game and extends that of Wei (2010), according to whom only an asymmetric equilibrium exists.

Moreover, the analysis of the efficiency properties (with regard to producing countries, importing countries, and the world as a whole) of the different equilibria leads to a rich taxonomy of results. We focus on the case when products are substitute, comparing the equilibrium with an activist regime to that with the free trade regime in both countries\(^{11}\). In particular, we highlight the following results, first regarding producing countries and then all countries:

\(^{11}\) Focusing on the welfare properties of symmetric regimes makes easy and meaningful the comparison with those of the established literature (except Wei, 2010), in which only symmetric regimes are considered and the prisoner’s dilemma outcomes are the common wisdom. Other results comparing the welfare properties in the cases of product complementarity and equilibrium asymmetric regimes for the two producing countries as well as consumers and world are omitted here for brevity and are available on request.
Result 2. In an export-rivalry model, with an asymmetric organizational structure of rival firms, when at SPNE both governments intervene (i.e. Regions VI – IX), social welfare may be better off for both countries: in particular, it is always better off for Country 2, while it is better off for Country 1 only in the ample Region VI, where products are sufficiently differentiated and/or managers’ power is sufficiently high.

Proof: by inspection of Figure 1, where in Region I: \( \Delta_{3,1} > 0, \Delta_{3,2} > 0 \); Region II – III – IV – V : \( \Delta_{3,1} > 0, \Delta_{3,2} < 0 \); Region VI: \( \Delta_{3,1} > 0, \Delta_{3,2} > 0 \); Regions VII – VIII – IX – X: \( \Delta_{3,1} < 0, \Delta_{3,2} > 0 \).

Result 3. When the equilibrium prescribes activist policies which are welfare-superior for both countries (i.e. Region VI of Figure 1, as shown in Result 2), there also exists Region C – in Figure 2 – in which both exporting countries and the world’s welfare are better off\(^{12}\).

These results show that, in the case of the equilibrium with both activist governments and under the presence of product differentiation and manager’s power, the prisoner’s dilemma structure, typical of the strategic trade policy game (e.g. see the discussion in Krugman, 1986), disappears. Furthermore, public intervention may be Pareto-superior for producing countries with respect to the laissez-faire regime for most parts of the values of the parameter set (i.e. Region VI in Figure 1) and may even be preferred by the world as a whole\(^{13}\) (i.e. Region C in Figure 2).

\(^{12}\) For the sake of precision, in all other regions, as easily observed by Figure 2, there exists a conflict of interest in terms of welfare between each exporter country, consumers, and world on the preferred trade regime more ample than that in Region C. However, such a conflict is always less than that existing under Brander and Spencer’s model. Nonetheless, in Region A, as in the original model, the interests of both exporter countries are opposite to those of consumers and world as a whole (although, as discussed in the main text, with a ranking reversed with respect to that emerging in the Brander and Spencer model).

\(^{13}\) The welfare of the importing country is given by the consumer surplus (CS), while the welfare of the world as a whole (WSW) is given by the sum of the consumer surplus and the social welfare of both producing countries.
**Figure 2 -** Plot of the (consumer’s, world, exporter countries’) welfare features inside the region of the S/S equilibrium (corresponding to the Regions VI and IX of Fig. 1) for substitute products.

Legend: Region A: $\Delta WSW < 0, \Delta CS < 0, \Delta_{3,1} > 0, \Delta_{3,2} > 0$; Region B: $\Delta WSW < 0, \Delta CS < 0, \Delta_{3,1} < 0, \Delta_{3,2} > 0$; Region C: $\Delta WSW > 0, \Delta CS < 0, \Delta_{3,1} > 0, \Delta_{3,2} > 0$; Region D: $\Delta WSW > 0, \Delta CS < 0, \Delta_{3,1} < 0, \Delta_{3,2} > 0$; Region E: $\Delta WSW > 0, \Delta CS > 0, \Delta_{3,1} < 0, \Delta_{3,2} > 0$.

5. **Conclusions**

This paper has revisited the traditional issue of the strategic trade policy (in which governments set subsidies for their own exporter firms) by considering, on the one hand, the presence of a bargaining process between owners and managers over managerial contracts, which has been considered as a source of the recently observed increase of the managers’ power. On the other hand, it also considers the existence of different firms’ organizational structures, due to the prevalence either of family ownership keeping control over the firm (as in many Asian and European countries) or of atomistic shareholders doing so (as in the Anglo-Saxon public company), whose board of directors delegate the output choice to managers. We show that tax/subsidy policies may be Pareto-superior for exporting countries (i.e. national social welfares...
are higher than under free trade) in the presence of a bargaining process in a sales delegation
game, depending largely on the manager’s bargaining power as well as the degree of product
competition.
In particular, the main findings are in sharp contrast to the case of the absence of the owner-
manager bargaining over the contract, in which it is shown that a vast spectrum of (symmetric or
asymmetric) equilibria does exist. The findings are also contrary to the received literature under
quantity competition, where public intervention 1) is always under the form of a subsidy and 2)
always leads to an inefficient (resp. efficient) equilibrium when products are substitutes (resp.
complements). It is shown that, with the owner-manager bargaining, public intervention may 1)
also assume the form of a tax for the managerial firm and 2) lead to an efficient (resp. inefficient)
equilibrium, provided that products are sufficiently differentiated (resp. not too complementary).
These results suggest that, if in the context of strategic managerial delegation, the owners negotiate with their managers about executive incentive scheme, then the unilateral
public intervention may be optimal because, also in the case of the rival government’s
intervention (that is a non-cooperative equilibrium), welfares will be superior to those under
free trade within a vast parametric range. Moreover, some empirical implications are offered:
when there is high competition (i.e. low products differentiation), then with low (resp. high)
managers’ power, free trade in the managerial firm’s country and subsidization in the profit
maximising firm’s country (resp. export taxes in the managerial firm’s country and free trade in
the profit maximising firm’s country) should be more often evidenced. Conversely, with
intermediate levels of managers’ power, it should be more often found that both governments
are activist (i.e. export taxes in the managerial firm’s country and export subsidies in the profit
maximising firm’s country are undertaken). These findings suggest that also the ownership
structure and the corresponding organizational form of the exporting firms should be taken into
account by trade policy makers. Future research could extend the present analysis to the case of
other recently increasing economic characteristics, such as the socially responsible behaviour of
many firms, the expansion of network goods industries, and the diffusion of cross-participations
between rival firms.
REFERENCES


