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Discussion paper

Should Governments Help Winners or Losers?

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Abstract

One central result in the strategic trade literature is that governments should not support domestic "losers" but domestic "winners". We show that when first-mover advantages are taken into account, the reverse holds, governments have stronger incentives to support domestic "losers" that face foreign "winners". Accordingly, governments can play Stackelberg against foreign Stackelberg leaders to prevent them from playing Stackelberg against domestic Stackelberg followers.

Keywords: Export subsidies, First-Mover Advantages, Asymmetric Competitiveness.

JEL Classification: F12, F13, L13.

1 Introduction

One central result in the strategic trade literature (Brander and Spencer, 1985) is that it is preferable to subsidize domestic "winners" that face foreign "losers", than domestic "losers" that face foreign "winners" (see de Meza, 1986 and Neary, 1994). By "winners" is usually meant the firm that has higher output production in a given industry. In order to generate this type of asymmetry in output production, the standard assumption in the literature has been to make firms differ in marginal costs (de Meza, 1986 and Neary,

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1994). The outcome of this set-up is obviously to have the lower marginal cost firm produce more than the higher marginal cost firm.

In this context both de Meza (1986) and Neary (1994) show that "winners" should be preferred for government support given that "winners" cause higher international "profit-shifting" effects from foreign firms to domestic ones.

Contrary to de Meza (1986) and Neary (1994), who model asymmetries between firms only along one dimension (i.e.: marginal costs), in this paper we model "winners" and "losers" along two dimensions. The first is, like in de Meza (1986) and in Neary (1994), asymmetries in competitiveness that run through marginal costs of production. The second is asymmetries in first-mover advantages in the spirit of Stackelberg (1934). It is well known that a Stackelberg leader in outputs ends up producing more than a Stackelberg follower, i.e.: a Stackelberg leader is a "winner" and a Stackelberg follower is a "loser".

In this framework we show that first-mover advantages are sufficient to reverse the conclusions of de Meza (1986) and Neary (1994). Accordingly, when first-mover advantages are taken into account, governments have stronger incentives to support domestic "losers" that face foreign "winners".

The reason for this result is very simple. A Stackelberg leader can promote "profit-shifting" effects alone and therefore does not need government support. On the contrary, the Stackelberg follower government has incentives to play Stackelberg against the foreign Stackelberg leader so that the Stackelberg leader cannot play Stackelberg against the domestic Stackelberg follower.

2 Asymmetric Stackelberg Leader Model

The world economy consists of two producer countries, the home and the foreign country, and two firms that produce a homogeneous product, the home and the foreign firm. Foreign variables are indicated by an asterisk. It is assumed that firms sell their output only in a third market that is not involved in production.

As in Brander and Spencer (1985), we allow for national governments to subsidize exports. Where s is the export subsidy given by the home government to the home firm and s^* is the export subsidy given by the foreign government to the foreign firm.

We further assume that the foreign firm is the "winner" in the industry in question. Following the literature in the strategic trade policy (de Meza, 1986 and Neary, 1994) a "winner" is considered to be the firm that produces more in a given sector. As is also the case in de Meza (1986) and in Neary (1994), to generate "winners" and "losers" we need to model some kind of asymmetry between the home and the foreign firm.

In this paper we consider two types of asymmetries. The first is, like in de Meza (1986) and in Neary (1994), asymmetries in marginal costs; the second is asymmetries in the order of movements of players. Note that even alone, these two types of asymmetries can make one firm a "winner" and the other a "loser".

We model asymmetries in the order of movements of players by adopting a standard Stackelberg duopoly model. We consider the foreign firm to be the Stackelberg leader and the home firm to be the Stackelberg follower. This means that the foreign firm has a first-mover advantage in outputs relatively to the home firm. Furthermore, and as is known from these models, the first-mover advantage of the foreign firm will allow it to produce more than the home firm, i.e.: without government intervention the foreign firm is going to be the "winner" and the home firm is going to be the "loser".

In turn, following de Meza (1986) and Neary (1994), we model asymmetries in marginal costs by simply assuming that the foreign firm can have an advantage in marginal costs relatively to the home firm, i.e.: $c \geq c^*$. This means that if $c > c^*$, the foreign firm is more competitive than the home firm, i.e.: without government intervention the foreign firm is going to be the "winner" and the home firm is going to be the "loser". Obviously, if $c = c^*$, the foreign firm has the same competitiveness level as the home firm.

2.1 Demand and Firms

Following Brander and Spencer (1981), the home and the foreign firm face linear demands in the third country:

$$P = a - b\left(q + q^*\right) \tag{1}$$

Where q is sales by the home firm (and similarly q^* is sales by the foreign firm), a is the intercept of the demand function and b is an inverse measure of market size.

Profits by the home and the foreign firm are respectively:

$$\begin{aligned} \Pi &= (P - c - t)\, q - f + sq \\ \Pi^* &= (P - c^* - t)\, q^* - f + s^* q^* \end{aligned} \tag{2}$$

Where t is the trade cost of transporting goods to the third country, and f is the fixed cost of production.

Using the home firm FOC, we can first derive the home firm reaction function:

$$q(q^*, s) = \tfrac{D+s-bq^*}{2b} \tag{3}$$

Where $D = a - c - t > 0$ represents the home firm cost competitiveness and $D^* = a - c^* - t > 0$ represents the foreign firm cost competitiveness. Since $c \geq c^*$, we then have that $D \leq D^*$, i.e.: the foreign firm is more competitive than the home firm if $D < D^*$.

2.2 Timing of the Game

The timing of the game is the following: in stage 1 the home country picks s and the foreign country picks s^*; in stage 2 the foreign firm chooses q^*; in stage 3 the home firm chooses q.

We abstract from the entry decision of the home firm and therefore we assume that the fixed costs of production incurred by both the home and the foreign firm are sufficiently small so that they do not promote exit.

2.3 Production Equilibrium

Output production by the foreign firm can be found by substituting equation 3 in equation 2 and solving for the foreign firm first order condition (FOC). After some simple algebra we arrive at the following expression:

$$q^* = \tfrac{2D^* - D + 2s^* - s}{2b} \tag{4}$$

We can also compute output production by the home firm by substituting the previous expression into equation 3:

$$q = \tfrac{3D - 2D^* + 3s - 2s^*}{4b} \tag{5}$$

Since we are considering international competition, we want to focus our analysis on the situations where both the home and the foreign firm can export even without a subsidy[1]. Making $s = s^* = 0$ in equations 4 and 5, we can see that international trade is always possible for both the home and the foreign firm as long as:

$$D > \tfrac{2}{3}D^* \tag{6}$$

In other words, in order to have international competition the cost competitiveness difference between the home firm and the foreign firm cannot be extremely large.

It can be easily seen that if export subsidies are not considered (i.e.: $s = s^*$), then the foreign firm will always be the "winner" independently of whether it has only first-mover advantages (i.e.: $D = D^*$) or competitiveness advantages as well (i.e.: $D < D^*$).

In addition, the export subsidy is a "beggar thy neighbor" policy, given that it results in "profit-shifting" effects. This can be seen by looking at the home firm reaction function (equation 3), and the output expressions for the home and the foreign firm (equations 4 and 5). In fact, an export subsidy by the home government induces the home firm to produce more and the foreign firm to produce less.

3 Export Subsidy

We now pass on to the export subsidy stage. Note first that the foreign country welfare function equals:

$$W^* = \Pi^* \left[q\left(s, s^*\right); q^*\left(s, s^*\right), s^* \right] - s^* q^*\left(s, s^*\right) \tag{7}$$

We can differentiate the previous expression in relation to s^* to obtain:

$$\tfrac{dW^*}{ds^*} = \tfrac{\partial \Pi^*}{\partial q^*}\tfrac{dq^*}{ds^*} + \tfrac{\partial \Pi^*}{\partial q}\tfrac{dq}{ds^*} - s^*\tfrac{dq^*}{ds^*} \tag{8}$$

From the envelope theorem, we have that the first term on the right hand side of the previous equation equals zero (i.e.: $\tfrac{\partial \Pi^*}{\partial q^*} = 0$). The second term also cancels out since the home firm being a follower cannot influence the strategic choices of the foreign firm (i.e.: $\tfrac{\partial \Pi^*}{\partial q} = 0$). Finally, for the last term

[1] This is a standard assumption in the trade literature.

we have that $-s^* \frac{dq^*}{ds^*} = -s^* \frac{1}{b}$. Therefore the optimal subsidy for the leader foreign firm is zero[2]:

$$\hat{s}^* = 0 \tag{9}$$

In this sense an export subsidy to the Stackelberg leader (the foreign firm) reduces the foreign country welfare. The foreign firm does not need an export subsidy, since it has already a first mover advantage. Accordingly, a subsidy to the Stackelberg leader increases the tax burden of the society but does not generate any compensation welfare gains. This is so because output decisions made by the foreign firm already take into account the effects on the strategic choices of the home firm. In other words, the foreign firm can do "profit-shifting" effects by itself without the need of a subsidy.

To derive the home government subsidy, we start by defining the home country welfare function:

$$W = \Pi \left[q\left(s, s^*\right); q^*\left(s, s^*\right), s \right] - sq\left(s, s^*\right) \tag{10}$$

Differentiating the above expression in relation to s we obtain:

$$\frac{dW}{ds} = \frac{\partial \Pi}{\partial q}\frac{dq}{ds} + \frac{\partial \Pi}{\partial q^*}\frac{dq^*}{ds} - s\frac{dq}{ds} \tag{11}$$

From the envelope theorem we have that, the first term on the right hand side of the previous equation equals zero (i.e.: $\frac{\partial \Pi}{\partial q} = 0$). For the second and third terms we have respectively $\frac{\partial \Pi}{\partial q^*}\frac{dq^*}{ds} = \frac{1}{2}q$ and $-s\frac{dq}{ds} = -s\frac{3}{4b}$. It follows that the above equation can be simplified to:

$$\frac{dW}{ds} = \frac{1}{2}q - \frac{3s}{4b} \tag{12}$$

Solving the previous equation for s and substituting for q from equation 5 we obtain the optimal subsidy for the home firm:

$$\hat{s} = \frac{3D - 2D^*}{3} \tag{13}$$

Note, first, that the amount of subsidy given by the home government is decreasing in the competitiveness disadvantage of the home firm, i.e.: the home firm subsidy is higher when D is closer to D^*.

Second if $D = D^*$ (only first-mover advantages) then the subsidy to the home firm is always higher than that to the foreign firm (remember

[2]The symbol $\hat{}$ represents equilibrium subsidy.

that $\hat{s}^* = 0$). The same occurs for $D < D^*$ (first-mover advantages plus asymmetries in competitiveness) if equation 6 holds.

What this means is that, as long as the home firm is able to export, the export subsidy to the home firm is always higher than that to the foreign firm:

$$\hat{s} > \hat{s}^* \tag{14}$$

In other words, in the context of our model, governments should support "losers" not "winners".

We are then interested in knowing why this occurs. Start by noting that the relation between the home and the foreign firm outputs is:

$$\begin{aligned} q &= \tfrac{3D-2D^*}{2b} \\ q^* &= \tfrac{4D^*-3D}{3b} \end{aligned} \tag{15}$$

Clearly if $D = D^*$ then the Stackelberg follower (the home firm) produces more than the Stackelberg leader (the foreign firm). Then, if the foreign firm has only first-mover advantages, an export subsidy by the home government makes the home firm the "winner" and the foreign firm the "loser".

If $D < D^*$, however, the home government subsidy will only make the home firm produce more than the foreign firm if $D > \frac{14}{15}D^*$ since $q - q^* = \frac{15D-14D^*}{6b}$. This means that if the home firm competitiveness disadvantage is very large (i.e.: $\frac{2}{3}D^* < D < \frac{14}{15}D^*$), the home government subsidy cannot make the home firm the "winner". However, if the competitiveness disadvantage of the home firm is not very large ($\frac{14}{15}D^* < D < D^*$), the home government subsidy can make the Stackelberg follower (the home firm) the "winner" and the Stackelberg leader (the foreign firm) the "loser".

Summing up, the home country has incentives to support the "loser" domestic firm because by playing Stackelberg against the foreign Stackelberg leader firm it can preclude the Stackelberg leader from playing Stackelberg against the domestic Stackelberg follower. In addition, if the competitiveness disadvantage of the home firm is not too large, the home government intervention can make the initial "loser" home firm into a "winner" (and the reverse for the foreign firm).

4 Discussion

In this paper we have shown that the existence of first-mover advantages is sufficient to reverse one of the main conclusions from the strategic trade policy literature that governments shall support "winners" not "losers".

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