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Subsidy competition and the role of firm ownership

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Abstract

This paper addresses the role that foreign vs. domestic ownership of companies plays for governments in asymmetric countries' competition for a multinational's subsidiary. I argue that equilibrium subsidies as well as a foreign investor's location decision in policy competition between these countries critically depend on the ownership structure of incumbent firms. This shows that small countries with few national incumbents in an industry may be successful in attracting multinationals.

Keywords: Subsidy competition, foreign direct investment, regional location

JEL Classification: F12; F23; H25; L13

1 Introduction

There is by now a large literature on jurisdictions competing for foreign direct investment (FDI). Many examples in the European Union show that states are willing to offer considerable subsidies in order to attract potential investors' new sites. A prominent one is the aid to Bell Laboratories, establishing an R&D center in Dublin (Ireland), which was approved by the EU Commission in June 2004 and amounted to 50% of the total investment costs. Another example is the case of a Peugeot Citroën investment project necessary for the production of a new model in Ryton, West Midlands, United Kingdom, where direct aid of 9.8% of the eligible investment costs was granted.[1] Job creation is probably among the most important motives from politicians' point of view, but knowledge or

[1]Source: European Commission, Directorate General for Competition. Those are examples for cases where state aid is allowed according to Articles 87(3)(a) and 87(3)(c) of the EU Treaty, cf. European Commission (2007).

other spill-overs, local competition or proximity of business partners for existing companies may also play a role. Interregional competition for big international companies' plants or subsidiaries has thus led to 'incentive races' in a large number of cases in both Europe and North America.

The present paper aims to contribute to the literature on competition for mobile firms by focusing on the role of ownership structure in the domestic industry. This topic has received little attention so far, but it is clearly of empirical relevance. To stick with the example of Ireland, comparing 2005 World Bank data on GDP and GNI, the latter exceeds the former by 18%. This indicates that a considerable fraction of Ireland's firms is not owned by Irish nationals. In contrast, the corresponding figure for the UK, e.g., is only 3.3%. In this paper, I argue that such differences in the national ownership share of local production facilities can be crucial in determining countries' incentives to attract international firms.

In order to illustrate subsidy competition in an easily accessible way, I use a stylized two-country, three-firm model, where a third-country multinational is choosing between the two possible locations separated by transport costs. The question is addressed whether the presence of a domestically owned firm as opposed to a foreign-owned one makes a difference in bidding competition. I am able to show that not having a national company can give an otherwise losing country the edge over a bigger rival in bidding competition.

The model is related to two different strands in the literature: One focuses on the competition for mobile firms, like the monopolist model in Haufler and Wooton (1999) and the duopoly case considered in Bjorvatn and Eckel (2006). Haufler and Wooton find that in equilibrium, the monopolist will decide to go to the bigger of the two countries which may even be able to tax it. Bjorvatn and Eckel demonstrate that the market structure plays a significant role as absence of an incumbent firm can make up for a location's disadvantage of having a smaller market.[2] However, this literature does not explicitly address the role of owner-

[2]The case of two countries bidding for two mobile firms is examined in Ferrett and Wooton (2005); an extension to the generalized oligopoly case for both symmetric and asymmetric countries is discussed in Haufler and Wooton (2007). For an analysis of tax competition with full agglomeration in a New Economic Geography framework, see Baldwin and Krugman

ship. A second strand has considered this, but in different policy settings. Fuest (2005), in a model with an endogenous export vs. FDI decision, shows that in the country considered, in the absence of tariffs, falling trade costs induce profit taxes to fall as well. The existence of foreign ownership can prevent profit taxes from falling in line with trade costs. Huizinga and Nielsen (1997) argue, inter alia, that source-based investment taxes can be used to shift income away from domestic firms that are in part owned by foreigners to domestic citizens. For empirical evidence on the impact of taxes and market size on the FDI location decision, refer to Büttner and Ruf (2007) and Devereux and Griffith (1998).
The remainder of the paper is organized as follows. The following section presents the theoretical model. Section 3, the main part of the analysis, introduces policy influence and the role of different ownership structures. Section 4 concludes.

2 FDI in an oligopolistic industry: A simple model

Consider a model of a region with two countries, A and B, each of which already hosting one not necessarily locally owned firm of a specific industry, and a potential entrant. Let a and b denote the existing firms in countries A and B, respectively. The two markets are separated by unit transport costs τ. The firms in this oligopolistic industry produce a homogeneous good, x. A is the larger economy in that there is a single household in country B and $n \geq 1$ identical households in country A. There is demand for a second, numéraire good, z, produced by perfectly competitive firms where labor is the only input so that free trade in this good equalizes wages to w. Preferences in the countries are:

$$u_I = \alpha x_I - \frac{1}{2}\beta x_I^2 + z, \qquad I \in \{A, B\}. \tag{1}$$

This quadratic, quasi-linear utility function parallels that used in Horstmann and Markusen (1992) and gives rise to linear demand. A household supplies one unit of labor, earning it an income of w. Maximizing the representative utility

(2004); for a partial agglomeration case, refer to Borck and Pflüger (2006).

function subject to the implied budget constraint $w = p_I x_I + z_I$, one obtains (inverse) demand for x. This yields

$$X_A = \frac{n(\alpha - p_A)}{\beta}; \qquad X_B = \frac{\alpha - p_B}{\beta}, \tag{2}$$

(with p_I denoting the price of x in market I) as country A's and country B's aggregate demand for x, respectively. As in the z sector, wages are the only variable costs in the oligopolistic industry. In order to set up a plant, however, a fixed amount has to be spent, assumed to be sufficiently large to prevent a firm from producing in both locations.[3] Letting firms compete à la Cournot, each firm is partially protected in its domestic market by transport costs, and reciprocal dumping will occur in equilibrium, cf. Brander and Krugman (1983). The intuition for this at first glance pointless trade in homogeneous products is that eating into foreign firms' oligopoly rents makes it worthwhile to incur the real trade cost.

Now, a firm in the same industry from a third country wants to serve the regional market. I assume that trade costs between its home country and the region under consideration are too high to make exporting from there worthwhile. If the foreign company sets up a plant f in one of the region's two countries, the industry will thus be a triopoly.

In what follows, subscripts denote the countries or firms in question and superscripts indicate the foreign investor's location decision (A or B). If f goes to A, profits will amount to

$$\pi_a^A (= \pi_f^A) = \frac{n(\alpha - w + \tau)^2}{16\beta} + \frac{(\alpha - w - 2\tau)^2}{16\beta}; \tag{3}$$

$$\pi_b^A = \frac{n(\alpha - w - 3\tau)^2}{16\beta} + \frac{(\alpha - w + 2\tau)^2}{16\beta} \tag{4}$$

for firms a, f and b, respectively. The first terms in (3) and (4) represent a firm's market A profits, the second ones market B profits. Consumer surpluses will be

$$CS_A^A = \frac{n(3\alpha - 3w - \tau)^2}{32\beta}; \qquad CS_B^A = \frac{(3\alpha - 3w - 2\tau)^2}{32\beta} \tag{5}$$

[3] I do not go deeper into this point of 'exports vs. FDI' as it is has been examined extensively in the literature; see, e.g., Horstmann and Markusen (1992).

in countries A and B, respectively. These equations show how the two markets are 'made' by the transport costs.

Similarly, if f decides to locate in the smaller market B,

$$\pi_b^B (= \pi_f^B) = \frac{n(\alpha - w - 2\tau)^2}{16\beta} + \frac{(\alpha - w + \tau)^2}{16\beta}; \tag{6}$$

$$\pi_a^B = \frac{n(\alpha - w + 2\tau)^2}{16\beta} + \frac{(\alpha - w - 3\tau)^2}{16\beta}, \tag{7}$$

will be the firms' equilibrium profits and

$$CS_A^B = \frac{n(3\alpha - 3w - 2\tau)^2}{32\beta}; \qquad CS_B^B = \frac{(3\alpha - 3w - \tau)^2}{32\beta} \tag{8}$$

will be the respective countries' equilibrium consumer surpluses. Again, CS_A^B, e.g., reads 'consumer surplus in A if f goes to B'. One further assumption will be made: Transport costs are below the prohibitive level $\tau^{proh} = (\alpha - w)/3$ so that all Cournot equilibria will be interior. This ensures that 'cross-hauling', i.e., two-way trade, will occur. If any, profits of firms a and b will be of interest to the two countries' governments, as f's profits are assumed to be fully repatriated. Without government intervention and symmetric market structures, it is easily shown that the foreign investor will always choose to locate in the bigger country (and will be indifferent if $n = 1$). This is intuitive as when producing in the larger part, one has to bear transport costs only for a smaller fraction of the total market.[4]

3 Tax Policy

It is assumed that the two regions' governments do not cooperate. Due to increased local competition, attracting the multinational has the advantage of increased consumer surplus because of lower prices. Welfare in each country is determined by consumer surplus and, if the incumbent local firm is domestically owned, this firm's profit. In spite of trade between countries, due to the transport costs, competition among firms within one certain location is fiercer: The

[4]This phenomenon is called the 'home market effect' in the New Trade literature. The 'geographic advantage' Λ that A offers to f is simply the difference in profits (not taking into account taxes and fixed costs): $\Lambda \equiv \pi_f^A - \pi_f^B = (3/16)[\tau(n-1)(2\alpha - 2w - \tau)]$. This advantage is increasing and concave in τ.

marginal cost of domestic sales is lower than that of exports. However, there is the second effect that whenever the incumbent firm is domestically owned, that country's government will have to take into account that f as a new competitor will lower the incumbent's profits – by more than if it went to the other jurisdiction.

Now, if governments are free to tax or subsidize the foreign firm, it is not clear any more ex ante which country will win the 'bidding race' and whether f will have to pay taxes in equilibrium. The gain G_I a country I can make by attracting the firm is simply its welfare WF_I^I in that event minus its welfare if f went to the other country, WF_I^J, whereby those welfare levels are *before* any tax or subsidy (i.e., gains are 'gross gains'). Taking the example of country A,

$$G_A = (CS_A^A - CS_A^B) + (\pi_a^A - \pi_a^B), \tag{9}$$

whereby the last part will be dropped if firm a is in foreign hands anyway.[5] This will make G_A larger as the second part of the sum in (9) will be negative due to what one could call the 'local competition effect'. Hence, the country will then, ceteris paribus, be willing to bid for f more aggressively.[6] Three cases will be considered: (i) a and b are both owned by foreigners, (ii) a and b are both domestically owned, and (iii) a is owned domestically, whereas b is owned by (third-country) foreigners.

It is straightforward to determine country I's equilibrium policy choice B_I ('bid'):[7] Each country anticipates the maximum bid of the other potential host which it must out-bid, i.e. it has to offer f the *other* county's entire gain. In order to win the bidding race, however, a government has to offer f on top the (overall) profit it would be making had it located in the *other* country minus what it can make anyway after having decided for *this* country - i.e., the profit differential. From here on, the analysis can be carried out in two steps: By setting $B_I \geq 0$,

[5] Note that the analysis focuses on taxes or subsidies for the *initial* location decision.

[6] The policy analysis that follows assumes an ex ante symmetric market structure (in countries of different size) and concentrates on the role of firm ownership. For a discussion of the role of different industry structures within countries, refer to Bjorvatn and Eckel (2006).

[7] For a similar auction-like approach to policy competition, refer to Kessing, Konrad, and Kotsogiannis (2005).

one can see if a country will have to pay a subsidy or be able to raise a tax.[8] By comparing B_I, the minimum (and hence equilibrium) bid needed to win, and G_I, one can see if country I actually wants to attract the investment at that cost or if it is better off letting f go to jurisdiction J. It can be easily shown that one region wanting to attract f implies that the other region does not do so, and vice versa: The difference in f's profits $(\pi_f^I - \pi_f^J)$, by definition, exactly equals $G_J - B_I = B_J - G_I$. The results in the aforementioned cases are as follows:

(i) If both incumbent firms are owned by foreigners, B_B will always be positive, i.e., country B will in any event have to pay a subsidy. The condition is that τ be smaller than $2(\alpha - w)$. B_A will be greater than 0 if $n < 1.5$, implying a subsidy in those cases and taxes in all others.[9] G_A will always be greater than B_A[10], i.e., in equilibrium, the bigger country will *always* attract the investment. This case exactly mirrors the monopoly case (Haufler and Wooton (1999)): Countries are ex ante symmetric in all respects but size. The difference is that consumer surplus will be higher and profits will be lower here due to intensified competition.

(ii) If both countries take into account their respective incumbents' profits, nothing changes with respect to the symmetric incentives to attract f. Hence, it will again always be the case that $G_A > B_A$. However, the equilibrium tax/subsidy thresholds change. Setting

$$B_A > 0 \Leftrightarrow \pi_f^B - \pi_f^A + CS_B^B - CS_B^A + \pi_b^B - \pi_b^A > 0, \tag{10}$$

one obtains the critical level[11] below which country A has to pay a subsidy:

$$\tau_A^{(ii)} = \frac{(14 - 8n)(\alpha - w)}{15 + 4n}. \tag{11}$$

The analogous value for country B is $\tau_B^{(ii)} = \frac{14n-8}{15n+4}(\alpha - w)$, but it remains without significance since country A always attracts f. These results are summarized in

Proposition 1 *With symmetric ownership structures, in a bidding equilibrium for a multinational's affiliate f, the bigger country will always attract the invest-*

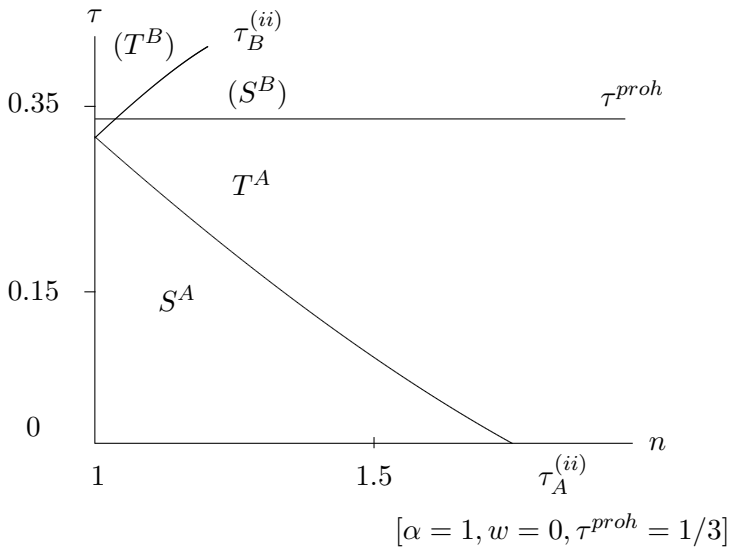
[8] The seemingly simplistic lump-sum taxes are not restrictive as they can be easily transformed into ad valorem profit taxes by dividing them by company profits.

[9] In case $n = 1.5$, zero taxes will prevail.

[10] The calculation reduces to $n > 1$.

[11] Observe in (10) that the bid consists of f's profit differential and the other country's gain.

Figure 1: Equilibrium outcomes with two locally owned firms – regime (ii)



ment. Its ability to tax is higher under the 'both nationals' regime (ii) for high trade costs and lower for low trade costs.

Proof. The first result follows immediately from setting $G_A > B_A$ (or, equivalently, setting $G_B < B_B$), which yields $n > 1$. □

To understand the second part of the proposition, the changed taxing power, observe that there are parameter constellations in n-τ-space where A has to pay a subsidy under regime (i) and can already tax under (ii). This is above the $\tau_A^{(ii)}$-threshold and to the left of $n = 1.5$. Intuitively, here, (always *in equilibrium* winning) country A will find it harder to out-bid B under (i) where the latter does not take b's profits into account. On the other hand, there is a small area to the right of $n = 1.5$ and at low trade costs where A has to pay subsidies under (ii) where it could already raise taxes under (i). There, the intuition is that it is harder for A to out-bid B under (ii) as firm b's profit will be *higher* if f decides to co-locate with it. This at first sight counter-intuitive effect appears as at low levels of trade costs, market B is hardly shielded from competition and it is better for b if its rival does not settle in the larger A market (and, thus, has to incur the same cost disadvantage vis-à-vis firm a when serving it). To get the argument graphically, refer to Figure 1[12] (where the big letters

[12]For these comparisons of cases, as in the figures, I set the marginal cost $w = 0$ and $\alpha = 1$ in order to concentrate on trade cost and country size effects. Then, the factor $(\alpha - w)$

denote the equilibrium policy (i.e., subsidy 'S' or tax 'T') and the superscripts again show the winning location) and compare the $\tau_A^{(ii)}$-line with a vertical line through $n = 1.5$, which could be thought of as the $\tau_A^{(i)}$-line (to the left of which subsidies have to be paid by A under regime (i)). The formal condition for π_b^B being greater than π_b^A, which drives this result, reads

$$\tau < \tilde{\tau} = \frac{2(\alpha - w)(n-1)}{5n+3}. \tag{12}$$

Notice that $\tilde{\tau} = \tau_A^{(ii)}$ if $n = 1.5$. The corresponding expression for firm a can never be positive as being joined in the bigger market is always a disadvantage.

(iii) The most interesting case is the asymmetric one. Now, I assume that only a is a domestic firm. One could think of a traditional company in a big country. In another, smaller country, one finds a firm of the same industry, but owned by people from a different (third) country.[13] That is, A will now consider a's profits, but B will not take into account b's. Note first that this instantaneously yields $\tau_B^{(ii)} = \tau_B^{(iii)}$ as in order to out-bid A, nothing determining the 'frontier' between B raising taxes or paying subsidies changed from (ii) to (iii). As to country A, the condition that $B_A > 0$ reads $n < 1.5$ again, just as in (i): it suffices that $\pi_f^B - \pi_f^A + CS_B^B - CS_B^A > 0$, which implies $n < 1.5$ for a subsidy by A. That is, $\tau_A^{(i)} = \tau_A^{(iii)}$. More importantly, B can now win the investment, namely if [14]

$$\tau \geq \tau_d = \frac{(14n-14)(\alpha - w)}{15n+1}. \tag{13}$$

Proposition 2 *If only the large region 's incumbent firm, a, is home-owned, it is possible for the small region to win the bidding race as the large one's offer is moderated by concern for firm a's profits. This occurs above a level of trade costs τ_d, whereby this critical level is increasing in n.*

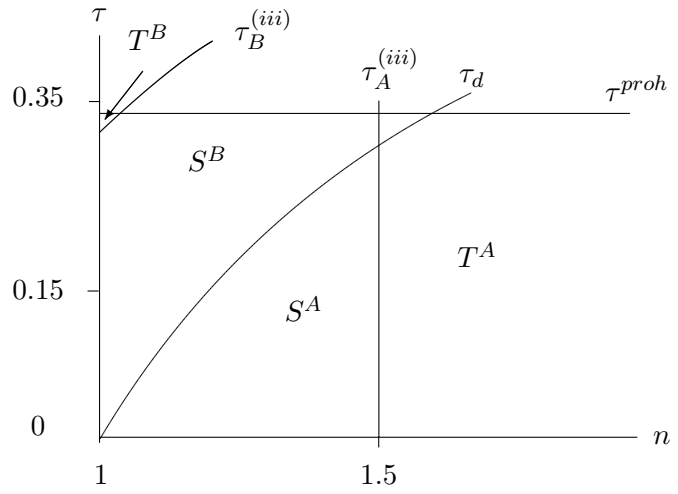
Proof. By setting $G_A > B_A \Leftrightarrow CS_A^A - CS_A^B + \pi_a^A - \pi_a^B > \pi_f^B - \pi_f^A + CS_B^B - CS_B^A$, one obtains that A will win the investment if $\tau < \tau_d = \frac{14n-14}{15n+1}(\alpha - w)$. The first derivative thereof with respect to n is strictly positive. □

disappears in the numerators of the critical levels. As those parameters are identical across countries anyway, nothing is lost by this.

[13] The case where a home-owned firm resides in the small country yields no additional insight – that the big region, not having to worry about producer surplus, will win, is confirmed in the affirmative.

[14] The straightforward, but a bit tedious derivations are delivered upon request.

Figure 2: Equilibrium outcomes with only a locally owned – regime (iii)



$[\alpha = 1, w = 0, \tau^{proh} = 1/3]$

This suggests that close to the 'τ_d-line', competition for f will be most intense – i.e., subsidies will be paid in equilibrium, cf. Fig. 2. A will only be able to tax the multinational if it is more than 1.5 times as large as B (and trade costs are not close to the prohibitive level)., cf. Figure 2. The intuition for A having an easier game the larger is n, for any given τ, is the market size effect, as above. The dependency on τ is less clear, but it is understood by taking a closer look at the condition that $G_A < B_A \Leftrightarrow G_B > B_B \Leftrightarrow CS_B^B - CS_B^A > \pi_f^A - \pi_f^B + CS_A^A - CS_A^B + \pi_a^A - \pi_a^B$: When considering whether to attract f, B weighs increasing own consumer surplus against the costs of outbidding A, which consist of three elements: Firstly, A's change in consumer surplus; secondly, the direct costs of attracting f, earning the latter the profit differential. And thirdly, firm a's profit differential. This last effect drives the result, as with high trade costs, a acts as a quasi-monopolist in the large market, making it unattractive for A to reduce its home firm's profits by getting f into the country – and hence, making it easy for B to outbid A's low offer. For n close to 1, f's profit differential $(\pi_f^A - \pi_f^B)$ and the difference in change of consumer surplus across countries are minor, whereas it makes a big difference for a (namely, $\pi_a^A - \pi_a^B \leq 0$) if it acts as a quasi-duopolist or a quasi-monopolist in the A market. With n increasing, the first two differences become significant, making it harder for B to profitably win the investment.

As indicated in Figure 2, there is a small range of parameter values where the two countries are almost of equal size and trade costs are almost prohibitively high. Following the arguments from above, there, B is even able to attract and tax f as it will find it very easy to out-bid A. To summarize those findings: If the ownership structure gets more international in the sense that the incumbent in the small country is not domestic, the large country is at risk of losing FDI to the small one which is less reluctant to subsidize multinationals as it lacks a 'national champion' it could harm through local competition. Stated differently, the mere fact that B does not own 'its' company may induce it to attract a multinational. Finally, note that this result was derived on a pure consumer and producer surplus basis, with no other positive or negative impacts of FDI considered.

4 Conclusion

This paper has shown that in a simple Cournot oligopoly framework, in competition for FDI, the location pattern and equilibrium taxes/subsidies are highly sensitive to ownership structures. Under the assumption that national governments as tax-setting authorities only care about firm-level profits that will not be repatriated to some other jurisdiction, their willingness to bid for multinationals' new plants or subsidiaries will be very high if there are no domestically owned incumbents, even though those subsidies do not apply to existing firms. This can help explain recently observed high amounts paid to companies in the European Union for settling in a particular region. As with otherwise symmetric countries, the bigger one will always have the edge over smaller jurisdictions in bidding races, evidence about FDI in the European periphery suggests that a force like the one modelled may be at work. Contrarily to conventional wisdom, my analysis suggests that having national champions may actually be a disadvantage in international location competition.

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