Fiscal Competition for FDI when Bidding is Costly

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Abstract

We introduce bidding costs into a standard model of tax/subsidy competition between two potential host countries to attract a monopoly firm's plant. Such a bidding cost, even if it is infinitesimal, qualitatively alters the resulting equilibrium. At most one country offers fiscal inducements to the firm, and this attenuates the familiar "race to the bottom" in corporate taxes. In general, the successful host country benefits from the resulting absence of active tax/subsidy competition, at the expense of the firm's owners in the rest of the world.

Keywords: tax/subsidy competition; foreign direct investment; bidding cost; race to the bottom.

JEL codes: F23; H25; H73.

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1. Introduction

Policy activism by governments is a costly, resource-consuming business. Teams of public servants are needed to help governments formulate, and later implement, their decisions. Despite this fact, theoretical analyses of the international fiscal competition for inward foreign direct investment (FDI) generally assume that governmental participation in such contests is costless.

We introduce a bidding cost into an otherwise-standard model of tax competition for a firm's FDI. We show that even an infinitesimal cost qualitatively alters the outcome of the contest. In equilibrium, (at most) one country offers inducements to the firm, whereas both were willing to bid for the FDI in the absence of the cost. This attenuates the familiar "race to the bottom" in corporate taxes. In general, the successful host country benefits from the absence of active tax/subsidy competition, at the expense of the firm's owners in the rest of the world. Finally, we show that when the bidding cost is non-infinitesimal and one of the countries bids for the firm in equilibrium, this may be the "wrong" country from a welfare perspective.

2. Model

Our basic set-up follows Haufler and Wooton (1999). A single firm, entirely owned in the rest of the world, plans to establish a single plant in a host region composed of two countries, A and B. Both countries prefer local production to imports, where $V_i > 0$ is the value that country i places on hosting the FDI.[1] $\Pi_i > 0$ denotes the pre-tax profit that the firm earns from locating in country i. We define $\Gamma \equiv \Pi_A - \Pi_B$ to be country A's "geographic advantage".[2] We assume that the valuations and operating-profits are common knowledge.

Our game has three stages. In stage one, the countries simultaneously decide whether to bid for the firm's FDI. Under strategy N_i, country i incurs no costs by choosing not to make a bid, while bidding under strategy Y_i incurs an administrative cost of $c > 0$. Any bids are announced in stage two,

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[1] FDI can be valued for many reasons, such as the payment of wage premia by the foreign firm, the relief of involuntary unemployment, access to training for domestic workers, technological spillovers to domestic firms, etc.

[2] The higher profit offered by country A would arise, for example, if both countries had the same production costs but shipping goods between them was costly and A had the larger domestic market.

where offers can be positive (a subsidy) or negative (a tax). In stage three, the firm chooses to locate its plant in the country that offers it the higher post-tax profit. As is conventional in models of this type, we solve the game backwards and focus on subgame perfect Nash equilibria in pure strategies.

We assume throughout that $V_B > \Gamma > 0$. $\Gamma > 0$ implies both that the firm will choose to locate in country A in the absence of any fiscal inducements and that A will win the firm if it is the only bidder. $V_B > \Gamma$ means that B's valuation of the FDI is sufficiently strong to enable it to offset its geographic disadvantage (otherwise, the firm would locate in A even if B were to offer it a subsidy equal to its valuation of the FDI). Thus, either country bidding alone for the firm will win the FDI.

3. Analysis

The payoff matrix for the two countries is given in Table 1. If a country does not bid for the firm, it gets nothing if the firm decides to locate in the other country, while it gains its valuation of the FDI if it is chosen to be the production location. The payoffs in (N_A, N_B) thus follow from our assumption that A has the geographic advantage ($\Gamma > 0$), so the firm locates in A in the absence of bids from either country. Should a country choose to bid for the firm, it will have to pay the cost, $c > 0$, regardless of its success in attracting the firm. A successful bid will result in the winning country getting its valuation of the FDI less the total cost of its bid (the sum of c and the offer made to the firm).[3]

<table>
<tr><td colspan="2"></td><td colspan="3">Country B</td></tr>
<tr><td colspan="2"></td><td>$\boldsymbol{N_B}$</td><td colspan="2">$\boldsymbol{Y_B}$</td></tr>
<tr><td rowspan="4">Country A</td><td>$\boldsymbol{N_A}$</td><td>0
V_A</td><td colspan="2">$V_B - \Gamma - c$
0</td></tr>
<tr><td rowspan="3">$\boldsymbol{Y_A}$</td><td rowspan="3">0
$V_A + \Gamma - c$</td><td>$-c$</td><td>$V_B - V_A - \Gamma - c$</td></tr>
<tr><td>($V_A + \Gamma > V_B$)</td><td>($V_B > V_A + \Gamma$)</td></tr>
<tr><td>$V_A - V_B + \Gamma - c$</td><td>$-c$</td></tr>
</table>

Table 1. Payoff matrix ($V_B > \Gamma > 0$)

[3] This formulation for social welfare is consistent with quasi-linear preferences. See Ferrett and Wooton (2010, Appendix).

In (Y_A, N_B), where A bids for the firm but B does not, A will win the firm with any bid that falls just short of a tax equal to its geographic advantage of Γ. Consequently, its best bid will equal this tax. In (N_A, Y_B), B must offer a subsidy of (just above) Γ in order to offset its geographic disadvantage and win the firm. In (Y_A, Y_B), both countries compete for the firm's plant. Who wins the auction depends upon national valuations of the FDI and A's geographic advantage. Given its geographic advantage, A wins the competition as long as $V_A + \Gamma > V_B$. It would then attract the firm with a bid of (just above) $V_B - \Gamma$, while B would unsuccessfully bid its valuation of V_B. If, however, B's valuation of the FDI is sufficiently strong to overcome both its geographic disadvantage and A's valuation, then its bid of (just above) $V_A + \Gamma$ will succeed while A's bid of V_A will fail.

The three panels of Figure 1 illustrate the bidding outcomes that can arise in equilibrium. The panels are distinguished by the countries' valuations of the FDI: $V_A > V_B$ in 1(a); $V_A = V_B$ in 1(b); and $V_A < V_B$ in 1(c).

[INSERT FIGURE 1 HERE]

In all three cases, (N_A, N_B) is an equilibrium if and only if both $c > \Gamma$ (A's best response) and $c > V_B - \Gamma$ (B's best response). Given its geographic advantage, A will attract the firm if neither country bids. By making a bid, A can extract a tax of Γ but this is not worthwhile if $c > \Gamma$. In contrast, B will only attract the FDI if it actually bids and offsets its geographic disadvantage, receiving a net surplus of $V_B - \Gamma$. Consequently, it is not worthwhile for B to bid if $c > V_B - \Gamma$.

(Y_A, N_B) is an equilibrium if and only if $\Gamma > c$ and $\Gamma > V_B - V_A - c$. The first condition ensures that the tax that A can raise from its unopposed bid for the firm exceeds the bidding cost. The second condition ensures that the surplus B would make in a subsidy competition is less than the bidding cost, making it unwilling to enter such a competition. This second condition is guaranteed to hold if $V_A \geq V_B$ and, consequently, the entire region above the 45° line in panels 1(a) and 1(b) has (Y_A, N_B) as the equilibrium. This region is reduced when $V_A < V_B$, as illustrated in 1(c).[4]

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[4] If $\Gamma < V_B - V_A - c$, then B's valuation premium, $V_B - V_A$, is sufficiently large to make it worthwhile for B to enter (and win) a subsidy competition with A. Thus, in panel 1(c), (Y_A, N_B) is not an equilibrium in the triangle above the 45° line with its apex at $V_B - V_A$ on the Γ axis.

For (N_A, Y_B) to be an equilibrium, we require $\Gamma + c < V_B$, otherwise B would gain nothing from the FDI after paying for a bid to offset its geographic disadvantage. In addition, A has to be deterred from bidding. This requires a sufficiently high bidding cost to overcome A's surplus in subsidy competition, such that $c > V_A - V_B + \Gamma$. Where the implied frontier appears in Figure 1 depends upon which country has the larger valuation of FDI. In 1(b), $V_A = V_B$ and the boundary is the 45° line. The boundary shifts to the right when A has the higher valuation and to the left when B benefits more.

In all three panels of Figure 1 we see that whenever (N_A, N_B) is an equilibrium, this equilibrium is unique. As $\Gamma > 0$, A will attract the FDI. Moreover, from 1(b), we see that if $V_A = V_B$ then there exists a unique pure-strategy Nash equilibrium (PSNE) for every $c, \Gamma > 0$ (barring knife-edge cases on the inter-regional boundaries). If $V_A < V_B$, as in 1(c), then a PSNE always exists, but it may not be unique. In particular, there exists a region where both (Y_A, N_B) and (N_A, Y_B) are equilibria. In that region, the bidding competition resembles a game of chicken. By contrast, if $V_A > V_B$, as in 1(a), then it is possible that no PSNE exists.

Our central result in Proposition 1 arises because a country that loses a bidding war for the firm does not have to pay the subsidy that it offered but *does* have to pay the bidding cost. Thus, such a losing country will exit the subsidy competition.

Proposition 1 Costly bidding qualitatively changes the outcome of the contest. When there is no cost to making a bid, it is a dominant strategy for both countries to bid for the firm and hence (Y_A, Y_B) is the unique equilibrium. In contrast, when $c > 0$, (Y_A, Y_B) never arises in equilibrium and the firm receives at most one bid for its FDI. If the bidding cost is sufficiently large, neither country will make a bid.

Proof To check that (Y_A, Y_B) is the dominant strategy equilibrium when bidding is costless, substitute $c = 0$ into the cells of Table 1. A country then is not any worse off from placing a losing bid and always gains if its bid is successful. Thus countries will always be prepared to bid in equilibrium. This is not the case when $c > 0$ where it is straightforward to verify that the country that would lose the subsidy competition in (Y_A, Y_B) would prefer to deviate and make no bid. ■

4. Welfare Issues

We focus first on the case where the bidding cost, c, is infinitesimal. In practice, the administrative cost of making a bid for inward FDI is likely to be small relative to the countries' gross benefits (V_A, V_B) and tax/subsidy payments. However, a bidding cost of any magnitude is sufficient to deter one of the countries from bidding. As a result, the familiar "race to the bottom" in taxes is attenuated with consequent impacts on the welfare of the bidding nation and the firm's after-tax profits.

Proposition 2 The introduction of an infinitesimal, positive bidding cost does not change the equilibrium location of the firm, which remains efficient. However, it causes discrete changes to the national payoffs such that the winning country gains at the expense of the firm's owners, while the losing country is unaffected.

Proof With infinitesimal c, the efficiency claim is clear from Figure 1. A is the efficient location in panels 1(a) and 1(b), while A is efficient in 1(c) if and only if $\Gamma > V_B - V_A$. However, the players' payoffs in the efficient equilibrium differ markedly from the case of costless bidding, where (Y_A, Y_B) is the dominant strategy equilibrium. As we showed in Proposition 1, at most one country will bid for the firm when $c > 0$. With infinitesimal c, this sole bidder is the country that would win a subsidy competition for the firm. Secure in the knowledge that it faces no competition for the firm, this country can reduce its bid relative to the subsidy-competition case, while still retaining the investment. This results in a reduction in the firm's after-tax profits. ■

We turn next to the case where c is non-infinitesimal. For simplicity and brevity, we restrict ourselves here to the case where $V_A = V_B$, although our results generalise to $V_A \neq V_B$.

Proposition 3 If the bidding cost is non-infinitesimal and a single country bids for and wins the firm in equilibrium, then this might be the "wrong" country from a welfare perspective. Nevertheless, the host region can benefit from the presence of bidding costs in such an equilibrium.

Proof In Figure 1(b), world welfare is higher in (Y_A, N_B) than in (N_A, Y_B). However, the "wrong" outcome (N_A, Y_B) exists as an equilibrium. Given $V_A = V_B$, the joint welfare of A and B in the absence of bidding costs is Γ, where A's winning bid is $V_B - \Gamma$. Thus, the host region always benefits from the presence of bidding costs if the resulting equilibrium is (Y_A, N_B). This result requires $c < V_B$, which holds whenever one of the countries bids for the firm in equilibrium. Moreover, the host region *might* benefit from bidding costs even if the resulting equilibrium is (N_A, Y_B), which requires $\Gamma < (V_B - c)/2$ and holds towards the bottom of the (N_A, Y_B) region in Figure 1(b). ■

The first result in Proposition 3 is intriguing. It raises the question as to why A does not always make the only bid for the firm in equilibrium in Figure 1(b). It is clear that B's best response to Y_A is always N_B, given that B would lose a subsidy competition for the firm. However, A's best response to N_B is Y_A only if $\Gamma > c$. That is, A will host the firm whether or not it bids, so the tax revenue it collects from bidding must exceed the bidding cost.

The reason why the countries might prefer the equilibrium with bidding costs to that where $c = 0$ is that the presence of such costs prevents subsidy competition from arising in equilibrium. Moreover, as Proposition 3 shows, this gain to the host region, which comes at the expense of the firm's owners in the rest of the world, might be large enough to outweigh the welfare costs associated with the "wrong" location.

5. Conclusion

We have shown that the introduction of a bidding cost into a familiar model of tax competition for FDI results in a profound change in the outcome of the game. Our central result turns on the fact that, irrespective of their success in attracting the FDI, bidding countries face real costs from taking part in the contest. Thus a country that expects to lose the competition has a disincentive to make a bid.

Our analysis has both parallels and contrasts with that in Stiglitz (1987). He studies a market-entry game, where two identical firms simultaneously choose whether to pay a sunk cost to enter the Bertrand market for a homogeneous good. This is a "game of chicken" where only one firm will enter in equilibrium, even if the sunk entry cost is infinitesimal. If both firms were to enter, then the price would be driven down to marginal cost and losses would result. In common with Stiglitz, we have shown that an infinitesimal bidding cost is sufficient to eliminate rivalry. In our case, the losing country will choose to avoid the competition.

There are contrasts between our welfare results and those in Stiglitz, where an infinitesimal sunk entry cost replaces a Bertrand duopoly with a monopoly. We find that efficiency survives the presence of infinitesimal bidding costs. However, the distribution of world welfare is sharply altered by the presence of a bidding cost. Specifically, the successful host country gains at the expense of the foreign firm's owners.

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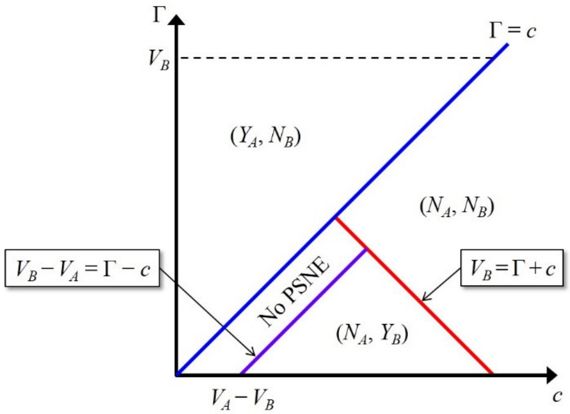

Figure 1(a) Bidding equilibria when $V_A > V_B$

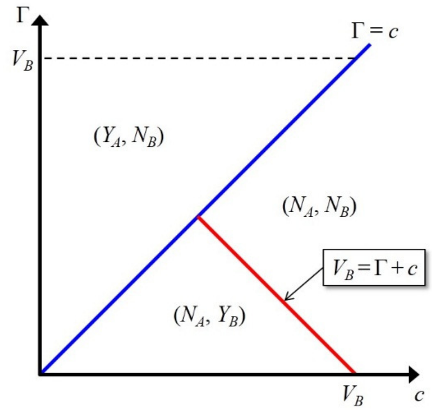

Figure 1(b) Bidding equilibria when $V_A = V_B$

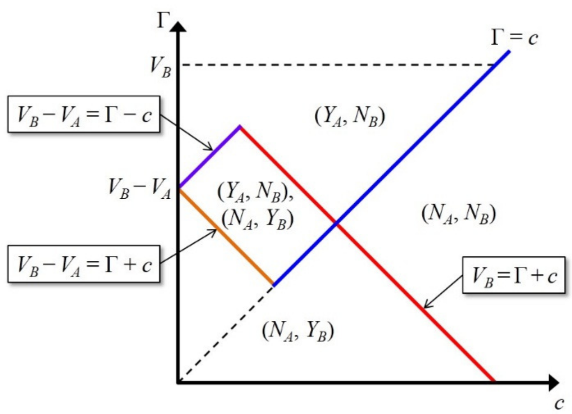

Figure 1(c) Bidding equilibria when $V_A < V_B$

Figure 1 Equilibria when bidding is costly