



## Competing for FDI

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In this note, we study how competition among countries shapes the division of the gains from FDI between the host country and the multinational.

### The one-country model

We begin by studying the problem of a single country competing for a project and extend our analysis to multiple countries in the next section. We index a country by  $i$ . We assume that a multinational firm has a project that has a value of  $v_i$  if undertaken in country  $i$  after paying a fixed cost  $f_i^p$ . The firm's profit from operating in  $i$  is

$$\pi_i = v_i - f_i^p. \quad (1)$$

If the firm locates the project in country  $i$ , the country receives a benefit of  $b_i$ . This benefit represents the spillovers through backward and forward linkages that we discussed previously. We assume that this benefit is spread out over many small households and firms in the economy.

Assume that the project is not profitable for the firm,

$$\pi_i = v_i - f_i^p < 0 \quad (2)$$

but the project is jointly beneficial,

$$\pi_i + b_i = v_i - f_i^p + b_i > 0. \quad (3)$$

We refer to  $\pi_i + b_i$  as the joint surplus of the project. Clearly, the firm will not locate its project in  $i$  unless it is incentivized to do so. Since the benefit is spread out over many small households and firms, it is impossible for each person receiving a benefit to organize and privately provide an incentive. This generates a role for the government: It overcomes the free-rider problem by offering a subsidy  $s_i$  on behalf of the households and firms in the country. How big should the subsidy be?

Assume that the government makes a take-it-or-leave-it offer. Then the best subsidy solves

$$\max_{s_i} \beta_i = b_i - s_i \quad (4)$$

$$\text{subject to } v_i - f_i^p + s_i \geq 0. \quad (5)$$

The country chooses a subsidy such that it maximizes the benefit it receives after paying the subsidy ( $\beta_i$ ), but the government must choose a subsidy that makes the firm want to locate its project in  $i$ . The solution to this problem is to offer the multinational just enough to make the project profitable,

$$s_i = f_i^p - v_i + \eta. \quad (6)$$

where  $\eta$  is a very (very, very) small, positive number. The multinational's profit will be  $\pi_i + s_i = v_i - f_i^p + f_i^p - v_i + \eta = \eta$  and the country's after-subsidy benefit is

$$\beta_i = b_i - f_i^p + v_i - \eta = b_i + \pi_i - \eta, \quad (7)$$

where the last equality follows from (2). Notice that the country has captured all of the joint surplus except for  $\eta$ . This is due to the take-it-or-leave-it nature of the country's offer. We have assumed the country has all of the bargaining power, so it extracts almost all of the joint surplus. Providing a subsidy worked out pretty well for the country!

## A two-country model

In this section we extend our previous model to include a second country and label the two countries  $i = 1, 2$ . The rest of the model is the same as in the previous section: a multinational firm has a project that is not profitable without a subsidy and each country can offer the multinational a take-it-or-leave-it subsidy offer.

The model is made up of two periods. In the first period, the countries submit subsidy offers. Each country cannot observe the other country's offer — imagine a representative from each country hands the CEO of the multinational a sealed envelope with the subsidy offer. In the second period, the multinational locates the project in the country that provides the greatest profit. If the two countries submit subsidies that result in the same (positive) profit for the multinational, the firm will “flip a coin” and randomly choose in which country to locate the project.

To simplify our lives, let's make the two countries symmetric (they do not have to be). This means  $v_1 = v_2 = v$ ,  $f_1^p = f_2^p = f^p$ , and  $b_1 = b_2 = b$ . What subsidy should the country choose? Consider the problem of country 1, the problem for country 2 is analogous.

1. If country 2 does not subsidize and country 1 does not subsidize, then the multinational will not locate the project in either country because  $\pi_i = v_i - f_i^p < 0$ . Country 1 earns an after-subsidy benefit of zero,  $\beta_1 = 0$ .
2. If country 2 does not subsidize and country 1 does subsidize, country 1's choice problem is the same as in the one-country model. Country 1 will choose a subsidy of  $s_1 = f^p - v + \eta$ , the multinational will locate in country 1, and the country will earn an after-subsidy benefit of  $\beta_1 = b + \pi - \eta$ .
3. If country 2 subsidizes and country 1 does not subsidize, then country 2 will solve the choice problem from the one-country model and offer the subsidy that attracts the multinational's project.  $\beta_1 = 0$ .
4. If country 2 subsidizes and country 1 subsidizes, then both countries will offer a subsidy of  $s_1 = s_2 = b$ . Why does each country choose to give away its entire surplus?

This is the result of the head-to-head competition. Suppose country 2 offered the one-country optimal subsidy of  $f^p - v + \eta$ . Then country 1 should offer  $f^p - v + 2\eta$ , giving up  $\eta$  of its benefit, but luring the project to country 1. Country 2, knowing that country 1 would behave this way, could instead offer  $f^p - v + 3\eta$ , giving up a bit more benefit, but luring the project to country 2. Following this reasoning to its conclusion, both countries will make the largest subsidy offer that it can without driving its after-subsidy benefit negative,  $s_i = b$ . The two countries will make identical subsidy offers and the firm will randomly choose in which country to locate its project. If the project is located in country 2, then  $\beta_1 = 0$  and if the project is located in country 1,  $\beta_1 = b - b = 0$ .

We can collect these results into a payoff matrix.

		Country 2	
		subsidize	do not subsidize
Country 1	subsidize	(0, 0)	( $\beta_1$ , 0)
	do not subsidize	(0, $\beta_2$ )	(0, 0)

The Nash equilibrium of this game is that each country will choose to offer a subsidy of  $s = b$  and the multinational will randomly choose in which country to locate the project. Each country — even if it lands the project — earns an after-subsidy benefit of zero and the multinational captures the entire joint surplus.

Adding a second country has dramatically changed the distribution of the joint surplus. When only one country is competing for the project, it captured the entire surplus. When a second, identical country also competes for the project, the entire surplus is captured by the multinational. Our assumption that countries are identical generated the extreme result that all of the surplus accrued to the multinational. If countries have different benefit levels, then generally the country with the greatest benefit will win the project, but it will have to offer a subsidy equal to the second largest benefit.

When countries (or states, cities, . . .) compete for FDI the multinational is often the winner.