Fiscal competition for FDI when governments must choose which firm to target

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Motivation

Claim: As production becomes increasingly mobile (leading to more MNEs), countries increasingly have to choose which firms to target with fiscal incentives

Plausible assumption: Governments are constrained in the number of potential inward investors they can target using incentive packages

Our contribution: In contrast to our characterisation, existing analyses of tax/subsidy competition for FDI typically assume that all mobile firms receive offers from all (both) countries

Targeting constraints in fiscal competition

We assume that the targeting constraint on government behaviour is **binding**:

It is infeasible for a national government to develop a project-specific incentive package for every potential inward investor

Such constraints might arise for budgetary reasons. For example, there might be politically determined ceilings on government spending to

- subsidise inward FDI and

- employ public servants to research and negotiate incentive packages

In this "constrained targeting" environment, the following questions arise:

- Which firm/s will governments choose to target with FDI subsidies, and when will subsidy competition for a given firm arise?

- What are the implications of governmental targeting constraints for global efficiency and the welfare of host countries?

Model

Modelling set-up is related to that used in our previous joint work: Ferrett and Wooton (2010a in *CJE*, 2010b in *IT&PF*)

Two firms (1 and 2), and two host countries (*A* and *B*)

Each firm is entirely owned outside the host region (in RoW) and will establish one plant in either *A* or *B*

There is no product market interaction between the two firms

Each country must choose which firm to target with fiscal incentives. If both countries target the same firm then "subsidy competition" occurs

The countries' valuations of inward FDI:

We don't specify the precise source of benefits from inward FDI

Countries' valuations of firm 1's plant: V_A and V_B, where $V_B \geq V_A > 0$

Countries' valuations of firm 2's plant: kV_A and kV_B, where $k \geq 1$

Set-up allows for differences in valuations both across countries ($V_B \neq V_A$) and across firms ($k \neq 1$)

[An example of the general case: Country *B* has a worse involuntary unemployment problem than *A*, but firm 2 offers a bigger plant to both countries]

The firms' profits:

Π_{ij} = pre-tax profits of firm *i* in country *j*

$\Gamma_i \equiv \Pi_{iA} - \Pi_{iB} \gtrless 0$
denotes country *A*'s **geographic advantage** in sector *i*

Sequence of moves

Countries' targeting choices, then auctions for plants:

Stage 1: Countries choose which firm to bid for ("target")

Stage 2: Each country announces a bid for its target firm

Stage 3: Firms choose plant locations

Decisions taken simultaneously at each stage

Solution concept is subgame perfect Nash equilibrium in pure strategies (our concept of "subsidy competition" is defined in terms of pure strategies)

The countries' bids

Bids act like location-specific fixed costs and can be positive (subsidies) or negative (taxes)

A bid could be any policy measure that increases the firm's profits and imposes a cost on the host country

For example:
- Cash transfers
- Provision of public infrastructure (or investment grants)
- Provision of skilled workers (or training grants)

A negative bid ("tax") corresponds to a cut in firm-specific benefits below the baseline (itself normalised to zero)

Equilibrium fiscal incentives and plant locations

Stages 2 and 3 of our game

Without loss of generality, we focus on firm 1

4 cases to consider:

Neither country targets firm 1 (laissez-faire)

Firm 1 locates in country *A* iff

$$\Pi_{1A} \geq \Pi_{1B}$$

$$\Leftrightarrow \Gamma_1 \equiv \Pi_{1A} - \Pi_{1B} \geq 0$$

Both countries target firm 1 (subsidy competition)

Subsidy competition is a private-value, first-price, sealed-bid auction with a twist – augmented with geographic advantage

Geographic advantage typically means that the firm is **not** indifferent between locations when the countries' bids are equal

As expected, subsidy competition leads to an efficient location choice

Country A wins the subsidy competition for firm 1 iff

$$V_A + \Pi_{1A} \geq V_B + \Pi_{1B}$$

Rearranging, *A* wins the subsidy competition for firm 1 iff

$$V_A - V_B + \Gamma_1 \geq 0$$

Normalise social welfare under importing to zero. Then, the LHS is also the welfare that *A* derives from the contest if it wins (*A*'s winning bid is $V_B - \Gamma_1$)

Therefore, the payoff of country $\begin{matrix} A \\ B \end{matrix}$ from the subsidy competition for firm

1 is $\begin{matrix} \max\{V_A - V_B + \Gamma_1, 0\} \\ \max\{V_B - V_A - \Gamma_1, 0\} \end{matrix}$

Only country _A_ targets firm 1

Country _A_ wins firm 1's FDI iff $V_A + \Pi_{1A} \geq \Pi_{1B}$

$$\Leftrightarrow V_A + \Gamma_1 \geq 0$$

_A_ imposes a tax equal to Γ_1

Only country _B_ targets firm 1

Country _B_ wins firm 1's FDI iff $V_B + \Pi_{1B} \geq \Pi_{1A}$

$$\Leftrightarrow V_B - \Gamma_1 \geq 0$$

_B_ pays a subsidy equal to Γ_1

Parameter restrictions

To limit taxonomy, we assume:

$$\Gamma_1 \in [0, V_B] \text{ and } \Gamma_2 \in [-kV_A, kV_B]$$

These restrictions imply that a country always wins a firm that it targets alone

In an extension (to uncertainty), we will also assume:

$$V_B \in [V_A, 2V_A]$$

Impossibility of subsidy competition in equilibrium

Result: Subsidy competition, where both countries target the same firm (with probability one), will never arise in equilibrium

Reason: The losing country would do better by deviating away from subsidy competition and targeting the other firm – and either taxing it (if it would have attracted that other firm under laissez-faire) or subsidising it to locate locally

Result is a consequence of complete information: both countries know with certainty what the outcome of a given subsidy competition will be. Therefore, why would the loser bother to participate?

Without loss of generality, assume that county A targets firm 1 and will win a subsidy competition for it (i.e. $\Gamma_1 \geq V_B - V_A$)

Should country B target firm 1 or 2?

Table shows country B's social welfare is higher if it targets firm 2

	B targets	
	firm 1	firm 2
$\Gamma_2 > 0$	0	$kV_B - \Gamma_2 > 0$ (subsidy)
$\Gamma_2 < 0$	kV_B	$kV_B - \Gamma_2 > kV_B$ (tax)

Therefore, the only possible pure-strategy equilibria are (1,2) and (2,1)

Equilibrium targeting decisions and locations

(1,2) is a NE (for both targeting decisions and firm locations) iff

Country *A* targets firm 1 in response to 2:

$$\underbrace{V_A + \Gamma_1}_{A\text{'s welfare in (1,2)}} \geq \underbrace{\max\{kV_A - kV_B + \Gamma_2, 0\} + V_A}_{A\text{'s welfare in (2,2): } A \text{ wins } 1}$$

Country *B* targets firm 2 in response to 1:

$$\overbrace{kV_B - \Gamma_2}^{B\text{'s welfare in (1,2)}} \geq \overbrace{\max\{V_B - V_A - \Gamma_1, 0\}}^{B\text{'s welfare in (1,1)}} \text{ if } \Gamma_2 > 0$$

$$kV_B - \Gamma_2 \geq \max\{V_B - V_A - \Gamma_1, 0\} + kV_B \text{ if } \Gamma_2 < 0$$

(2,1) is a NE (for both targeting decisions and firm locations) iff

Country A targets firm 2 in response to 1:

$$\overbrace{kV_A + \Gamma_2}^{A\text{'s welfare in (2,1)}} \geq \overbrace{\max\{V_A - V_B + \Gamma_1, 0\} + kV_A}^{A\text{'s welfare in (1,1)}} \text{ if } \Gamma_2 > 0$$

$$kV_A + \Gamma_2 \geq \max\{V_A - V_B + \Gamma_1, 0\} \text{ if } \Gamma_2 < 0$$

Country B targets firm 1 in response to 2:

$$\underbrace{V_B - \Gamma_1}_{B\text{'s welfare in (2,1)}} \geq \underbrace{\max\{kV_B - kV_A - \Gamma_2, 0\}}_{B\text{'s welfare in (2,2): } A \text{ wins 1}}$$

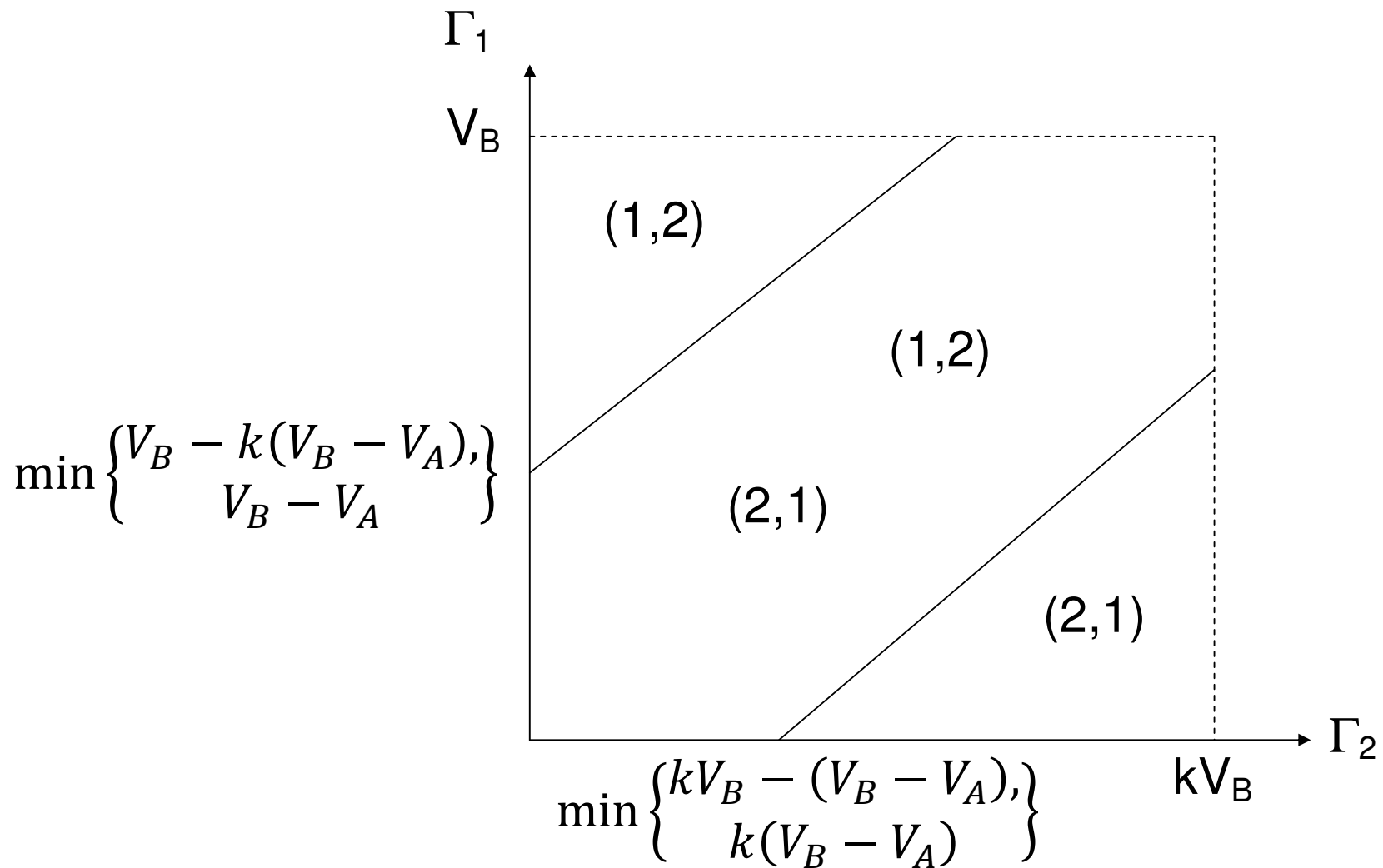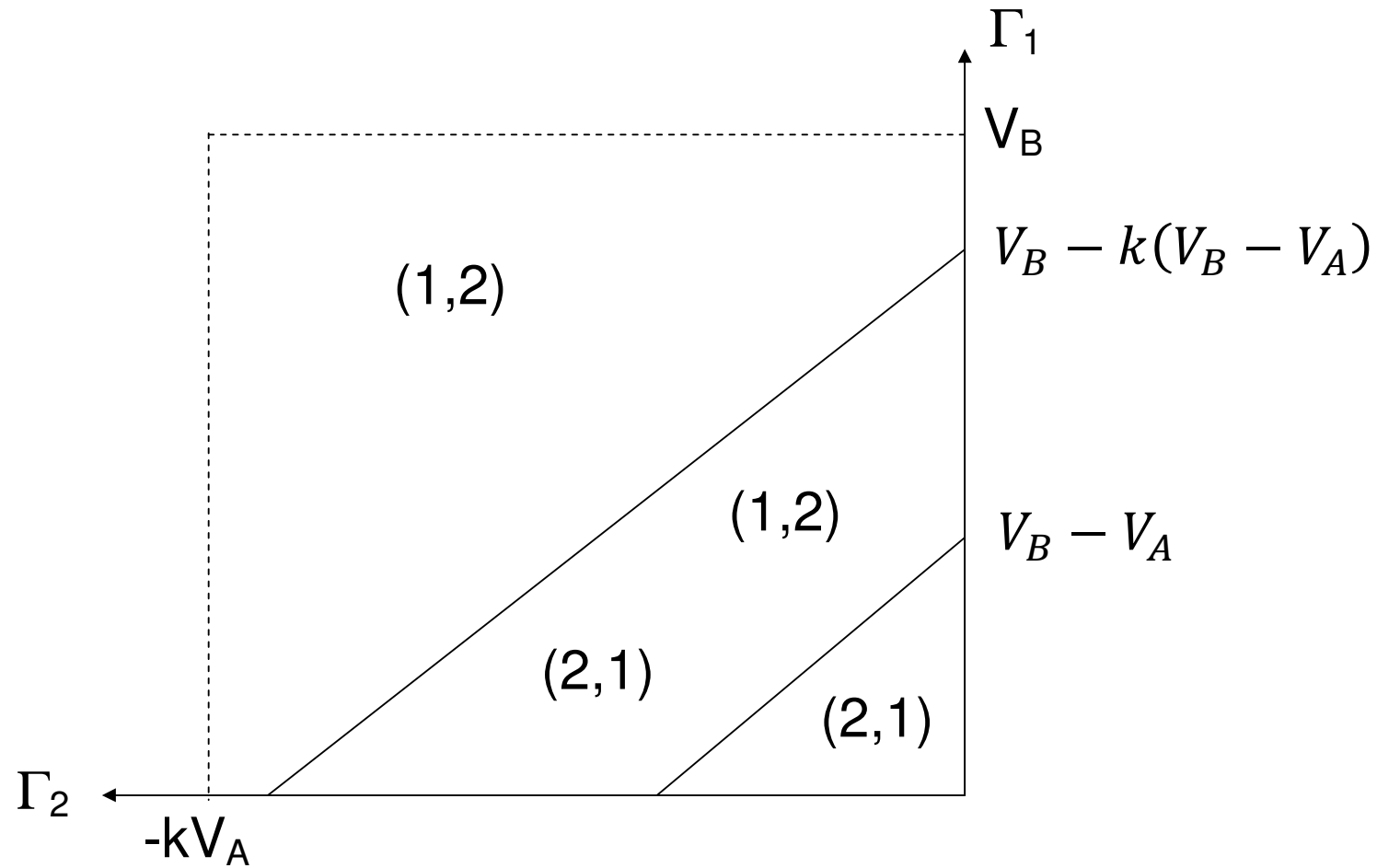# Figure 1: Equilibrium targeting choices & locations for $\Gamma_1, \Gamma_2 \geq 0$

Figure 2: Equilibrium targeting choices & locations for $\Gamma_1 \geq 0 \geq \Gamma_2$

Efficiency considerations

Efficient for firm $\frac{1}{2}$ to locate in *A* iff $\quad \Gamma_1 \geq V_B - V_A$
$$\Gamma_2 \geq k(V_B - V_A)$$

Therefore, without targeting constraints, when there is subsidy competition for both firms, equilibrium locations are always efficient

With targeting constraints (our model), equilibrium locations might be inefficient: see Figure 3

[Can show that the point $(k(V_B - V_A), V_B - V_A)$ lies in the 2-equilibrium region by substituting into the countries' BR conditions for Γ_1, Γ_2]

Figure 3: Efficient locations for $\Gamma_1, \Gamma_2 \geq 0$
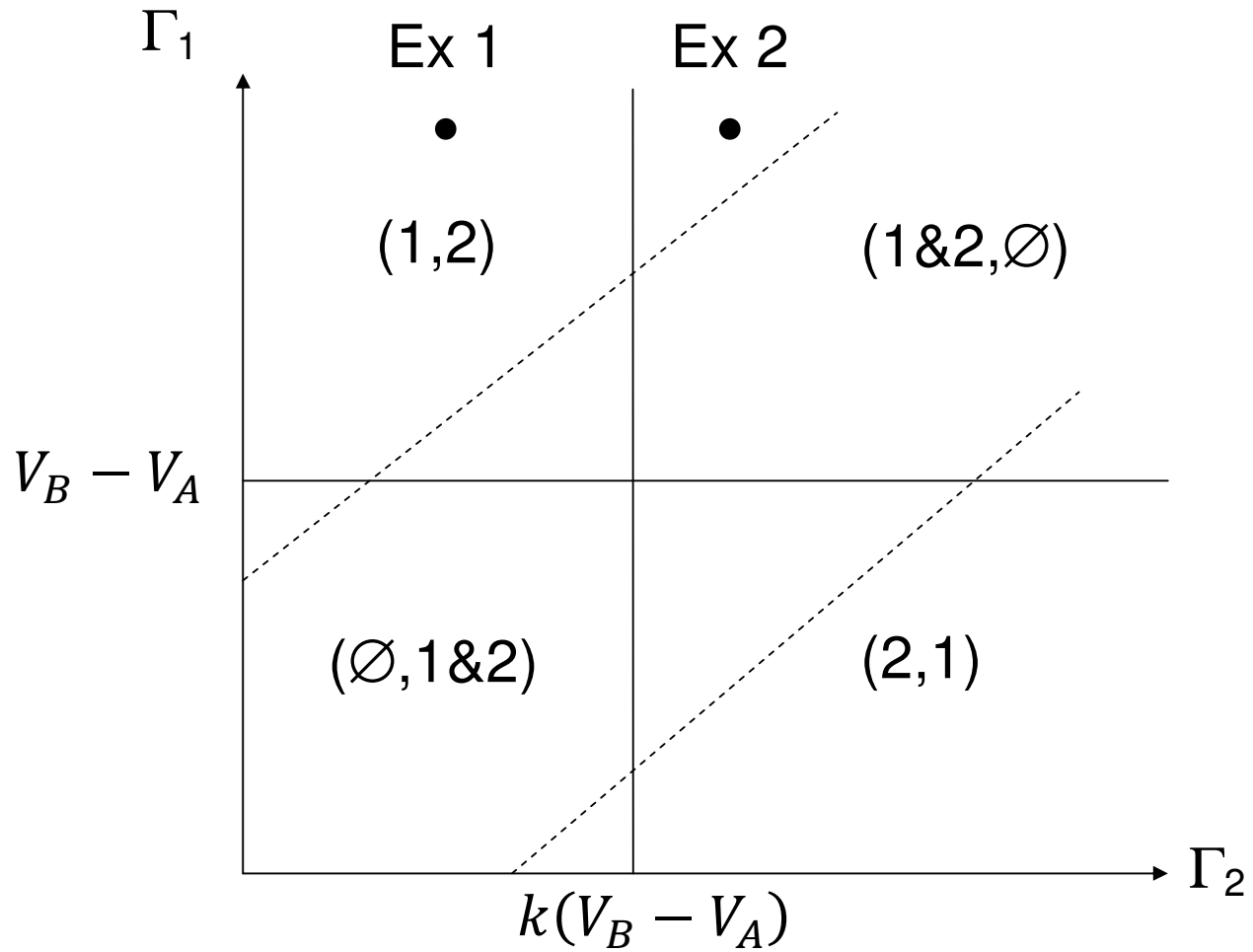
Welfare result

Relative to the unconstrained case, the host region tends to benefit from targeting constraints – even if they lead to an inefficient equilibrium (e.g. if efficiency requires co-location, which can't occur in equilibrium)

Corollary: the owners of firms 1 and 2 (in RoW) tend to be harmed by targeting constraints

Intuition: Targeting constraints act like a commitment device (exogenously imposed, not endogenously chosen) to avoid subsidy competition and incentive inflation

Some preliminary results

Subsidy competition never arises in equilibrium: the losing country would do better by opting out of an FDI contest and targeting another firm

Therefore, in equilibrium, the countries target and win different firms, and the firms never co-locate

Broadly speaking, equilibrium plant locations follow the pattern of geographic advantage: country *A* is more likely to win firm 1 in equilibrium, the larger is Γ_1

Welfare implications:

- Inefficiency seems likely to arise when one country offers geographic advantages across a range of sectors ($\Leftrightarrow$ co-location is efficient)

- Under unconstrained targeting (subsidy competition for both firms), the equilibrium would always be efficient

- However, the host region might prefer our "constrained targeting" equilibrium because it avoids subsidy inflation: targeting constraints are a commitment device

- This is a welfare gain for the host region at the expense of firm owners in RoW

Explaining subsidy competition: old and new firms

We introduce some ex ante uncertainty into the pattern of geographic advantage:

- Firm 1 is "old" (traditional): Γ_1 is known with certainty ex ante, and $\Gamma_1 \in (0, V_B)$

- Firm 2 is "new" (modern): Γ_2 is risky and is revealed only after the countries have made their targeting choices:

$$\Gamma_2 = \begin{cases} \Delta \geq 0 \text{ with probability } p \\ -\Delta \text{ with probability } 1 - p \end{cases}$$

Therefore, $\mathrm{E}(\Gamma_2) = (2p - 1)\Delta$

To limit the taxonomy, we assume:

$$\Delta \in (k(V_B - V_A), kV_A), \text{ where non-emptiness requires } V_B < 2V_A$$

This assumption implies:

- If just one country targets firm 2, that country always wins firm 2:

  This requires $kV_A \pm \Delta > 0 \Rightarrow \Delta < kV_A$, and likewise for country B

- If both countries target firm 2, the country with the favourable Γ_2 realisation wins firm 2:

  This requires $\underbrace{k(V_A - V_B) + \Delta >}_{A \text{ wins if } \Gamma_2 = \Delta} 0 \underbrace{> k(V_A - V_B) - \Delta}_{B \text{ wins if } \Gamma_2 = -\Delta} \Rightarrow \Delta > k(V_B - V_A)$

Conditions for subsidy competition for firm 2

By earlier arguments, subsidy competition never arises for firm 1
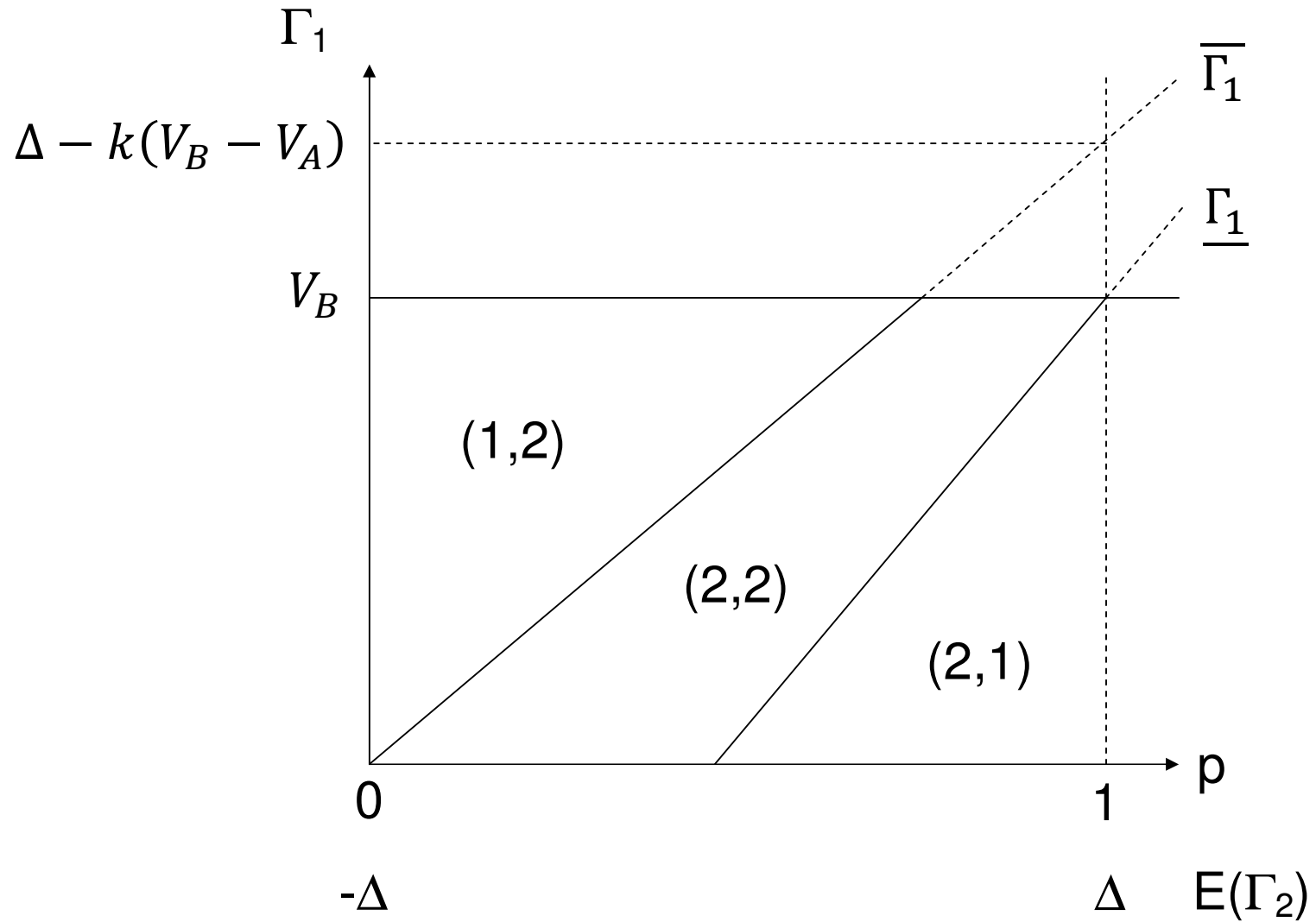
Conditions for (2,2) to be a NE:

A's BR to 2 is 2 iff:

$$\overbrace{V_A + p(kV_A - kV_B + \Delta)}^{A\text{'s payoff in (2,2): } A \text{ wins } 1} > \overbrace{V_A + \Gamma_1}^{A\text{'s payoff in (1,2)}}$$

$$\Gamma_1 < p(kV_A - kV_B + \Delta) \equiv \overline{\Gamma_1}$$

B's BR to 2 is 2 iff:

$$\overbrace{(1-p)(kV_B - kV_A + \Delta)}^{B\text{'s payoff in (2,2)}} > \overbrace{V_B - \Gamma_1}^{B\text{'s payoff in (2,1)}}$$

$$\Gamma_1 > V_B - (1-p)(kV_B - kV_A + \Delta) \equiv \underline{\Gamma_1}$$

Figure 4: Equilibrium targeting choices under uncertainty

Discussion of results from the uncertainty case

Imagine Figure 4 split into four quadrants by horizontal and vertical lines around $\Gamma_1 = V_B/2$ and $p = 0.5$ respectively

Subsidy competition for the new firm (2) tends to arise when country A is "similarly situated" in terms of geographic advantage in both industries – that is, in the NE or SW quadrants, where Γ_1 and p are either both high or both low (or both "middling")

Countries tend to target different firms (the SE and NW quadrants) when the pattern of geographic advantage differs substantially across industries

Summary and Conclusions

Contribution: To incorporate governments' targeting choices into the analysis of fiscal competition for FDI

Subsidy competition arises only if there is sufficient ex ante uncertainty about the relative profitability of rival plant locations

Welfare implications of governmental targeting constraints (under certainty):

- World harmed because inefficient equilibria arise

- Perhaps paradoxically, the host region may gain: targeting constraints act as a commitment device to limit the spread of subsidy competition