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Leadership in internationalization strategies

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Abstract

This paper examines leadership in internationalization strategies for an asymmetric cost duopoly where firms choose between exports and foreign direct investment (FDI) in a sequential setting. The incentive to lead and to engage in FDI is stronger for the more efficient firm. With sequential choices and the efficient firm playing in advance, it is less likely that firms pick identical internationalization strategies in equilibrium, as compared with simultaneous choices; this is more so for greater cost asymmetry. It also happens for large enough oligopoly profitability when the inefficient firm plays in advance. Follow-the-leader behaviour in FDI arises for low values of the setup cost. Although entry in FDI by both firms is best for consumers, total welfare can be higher with opposite internationalization strategies. Were firms given the opportunity to lead or wait and enter later, the efficient firm would emerge as the leader in exports/FDI depending on the well-known proximity-concentration trade-off. Interestingly, the less efficient firm might prefer to wait for strategic reasons.

KEYWORDS

asymmetric oligopoly, exports, FDI, leadership

JEL CLASSIFICATION

D43; F12; F23

1 | INTRODUCTION

In many instances, a firm's market entry decision regarding the type and the timing of entry becomes complex. The formulation of entry strategies, which entail various types of fixed and

variable costs, is particularly difficult when competing firms contend for the same market. When a firm is not alone its decision to become a pioneer does not solely depend on its own action and a simple cost-benefit analysis is not adequate for an optimal entry strategy.

Scholars have devoted attention to study the timing of market entry. Empirical contributions have identified the existence of advantages and disadvantages of early entry as well as the determinants of such (dis)advantages, as in Lieberman and Montgomery (1988), Shamsie et al. (2004) and Boulding and Christen (2008)—see Zachary et al. (2015) and Schellenberg et al. (2018) for reviews. Evidence of bunching behaviour regarding foreign market entry as a consequence of interfirm rivalry has been found by Makino and Delios (2000) and Lu (2002). Firms' decisions towards foreign direct investment (FDI) are certainly influenced by rivals' actions. Thus, although an early entrant faces less competition, anticipating that others may mimic their actions, including the entry mode, will diminish the pioneering advantages possibly making a wait-and-see strategy advisable. For the U.S. telecommunications industry, mimicry in international entry occurs in response to competitors' prior moves, as shown by Gimeno et al. (2005). Pacheco-de-Almeida et al. (2008) analyze the worldwide petrochemical industry regarding the decision to invest controlling for rivals' expansion. Rose and Ito (2008) study international investments by Japanese automobile manufacturers, noting that firm-specific factors guide their international strategies carefully looking at the intensity of market competition. These analyses, that account for competitive interactions, provide evidence of imitation of FDI strategies as well as a tendency to defer investments in markets with many competitors.

Therefore, firms' expansion in international markets deserves further analysis to increase our understanding of the strategic issues at play, which depend, among other things, on firms' capabilities. Given firm heterogeneity, which firm has more to gain by leading entry in a foreign market? Is the incentive to undertake FDI stronger if entry decisions occur sequentially rather than simultaneously? If one of the firms is given the chance to lead, will she do so? Will the rival react by imitating the entry mode? Which are the welfare implications of firms' equilibrium decisions regarding internationalization?

Oligopolistic competition is an independent source of trade—see Leahy and Neary (2011) for a selective survey of the main results of trade under oligopoly. The conditions of market rivalry indeed determine firms' internationalization strategies. Traditional theories of multinational corporations, as structured by Dunning (1981), suggest that they do so to exploit some advantages, but typically ignore strategic interactions in the explanation of international direct investment flows. Relevant game-theoretic research in the context of the well-known proximity-concentration tradeoff include Smith (1987), Horstmann and Markusen (1987, 1992), Motta (1992, 1994), Rowthorn (1992), Campa et al. (1998), Markusen (2002), Dixon (2006). A firm's decision to enter a foreign market, either through exports or through FDI, is governed by the tension between the additional variable costs of exports against the fixed setup costs of investment. In principle, the incentive to FDI would be heightened when tariffs rise. However, FDI flows have increased despite much lower tariffs and transport costs due to trading agreements. It is possible to explain unconventional FDI decisions by alluding to strategic interactions among foreign firms (as in Motta, 1994, Petit & Sanna-Randaccio, 2000, and Alcácer et al., 2015) or to sequential play between the foreign and the host firms (as in Markusen, 2002, and Dixon, 2006).[1]

[1]The literature has studied the rationales for FDI grounded on consumer-based arguments (Moner-Colonques et al., 2007; Rob & Vettas, 2003; Saggi, 1998), technology-based arguments (Ethier & Markusen, 1996; Fosfuri & Motta, 1999), as well as the link between R&D decisions and multinational expansion (Belderbos et al., 2008; Sanna-Randaccio, 2002), and the role of environmental policy in firms' location decisions (Bárcena-Ruiz & Garzón, 2017; Sanna-Randaccio & Sestini, 2012). The reader may visit Saggi (2002) and Helpman (2006) for excellent surveys on the reorganization of production across national borders.

Few studies have modelled oligopolistic competition among multinationals that are asymmetric in terms of costs regarding how to serve a foreign market. Qiu and Tao (2001) develop a heterogenous duopoly model, as we do here, to emphasize the role of a local content requirement policy taken on by the host government towards FDI; they explain why firms in the same industry adopt different entry modes and show that the cost-inefficient firm will more likely engage in FDI. Fumagalli (2003) considers a multinational firm's location that conveys a technological spillover to the firm in a particular region. The technological gap between regions determines why the firm locates in the more technologically advanced region. In Javorcik and Saggi (2010), differences in costs are related to the mode choice, whether direct entry or joint venture. In a two-country, duopoly model, Ishikawa and Komoriya (2010) analyze location choices in the case of reverse imports. Cost asymmetries can be justified by alluding to productivity differences, as done by Guariglia et al. (2013). Their paper contributes to the export-platform literature suggesting the relevance of the efficiency of host-country competitors for a firm's plant location decision. Kabiraj and Sinha (2015) consider merger as an entry option to an asymmetric cost host duopoly and show that, when technology transfer is costless, the multinational prefers to acquire the inefficient firm. Firm asymmetries that affect the internationalization decision can be grounded on product quality differences, as in Koska (2020). Finally, an early move by one of the firms can be explained by alluding to different objective functions in a mixed duopoly (Amir & De Feo, 2014; Haraguchi & Matsumura, 2020). We wish to contribute to this literature by providing a formal model that studies strategic interactions among cost asymmetric foreign firms while endogenizing leadership in the internationalization process of firms.

At an empirical level, heterogeneity in firms' productivity determines which type of firms chooses which entry type, as shown by the remarkably influential paper by Helpman et al. (2004)—see Mrázová and Neary (2019) for a review of recent contributions on heterogeneous firms and trade. On the other hand, researchers have studied follow-the-leader behaviour or oligopolistic reaction in FDI—the fact that imitation of a leader firm's decision to invest overseas allows competing firms to maintain their competitive balance. In addition to the papers above mentioned, contributions that provide empirical support to the relevance of strategic factors in FDI decisions include Yu and Ito (1988), Hennart and Park (1994), and Ito and Rose (2002), to mention a few. Follow-the-leader behaviour can be rationalized by alluding to cost uncertainty and risk-aversion, and Bayesian learning as done by Head et al. (2002) and Altomonte and Pennings (2008), respectively.[2]

We address the above mentioned research questions by developing a simple game-theoretical model to examine how cost asymmetries and the order of entry influence the form of foreign expansion chosen by oligopolistic firms. How firms compete at home and away can

[2]Industry characteristics such as foreign demand growth opportunities and uncertainty, are among the determinants of entry decisions. The literature has examined the FDI decision in an uncertainty environment and dynamic settings. The contributions by Saggi (1998), Rob and Vettas (2003) and Conconi et al. (2016) merit to be cited. In Saggi (1998), initial exporting serves as a learning tool about market demand in a two-period model. Rob and Vettas (2003) study a firm's decision via exports or FDI or a combination of the two in an infinite horizon model with uncertain demand growth. Finally, in the presence of uncertainty about profitability in foreign markets, Conconi et al. (2016) develop a two-period model to show that the probability that a firm starts investing in a foreign country increases with its export experience. This strand of the literature therefore sheds light on the dynamic evolution of a firm's business strategies while drawing attention to elements that affect the variability in profits for either entry strategy. In contrast, our analysis focuses on strategic market uncertainty regarding the effects brought about by a rival's entry decision in a sequential static setting. Some discussion on the consideration of demand uncertainty in the current setting is given in subsection 3.1.

conveniently be examined in an international oligopoly where trade costs, reflecting trade barriers and/or transportation costs, are assumed. Besides, potential multinationals possess firm-specific advantages over host firms that allow them to incur foreign investments. Here we consider the "third-market" model (Spencer & Brander, 1983) to focus on strategic issues. Our analysis complements the received literature by pointing out the relevance of picking not only the right timing of entry but also the entry mode; besides, it provides a simple framework to endogenize follow-the-leader behaviour in internationalization strategies. Thus, we may check whether the more efficient firm typically chooses FDI whereas the less efficient one exports. Our modelling assumptions also allow us to study the complementarity or substitutability between internationalization strategies, in the sense that firms select the same or opposite strategies, respectively. Most importantly, the analysis identifies conditions under which leadership in internationalization strategies arises in equilibrium and so the follower matches the leader's move; follow-the-leader behaviour is endogenized and is an equilibrium decision that results from firm interaction. Opposite equilibrium choices in the assumed homogeneous products industry, in which the less efficient firm enters as an exporter and the more efficient firm comes after with direct investment, would provide a loose interpretation of the gradual internationalization process of firms, where exports imply a more flexible position than building a production plant abroad.

As there are quite a number of effects at play, the presentation will proceed in steps. We will begin, in Section 2, by examining how sequential entry strategies affect the incentives of firms to engage in FDI. It is shown that the efficient firm has more to gain from leading and that the premium for doing so increases with cost advantages. Similarly, the incentive to FDI by the efficient firm is stronger than that for the less efficient firm. Then, to establish when identical internationalization strategies are adopted in equilibrium, we present the model under which firms take their exports versus FDI decisions along with the corresponding output simultaneously and set it against the case of sequential decisions. The characterization of the equilibrium entry modes is found to depend on the well-known trade-off between a technology with lower marginal costs (FDI) and a technology with lower fixed costs (exports). Both firms decide to export when the fixed setup costs are sufficiently large; otherwise FDI by at least one firm is chosen. However, the critical values on the setup costs are different whether the order of play is simultaneous or sequential. It is shown that, with sequential choices and the efficient firm playing in advance, it is less likely that firms pick identical internationalization strategies in equilibrium. This is even more so as firms become more cost asymmetric. This is not necessarily true when the less efficient firm leads entry unless oligopoly profitability is sufficiently large. Only then can the cost disadvantage be lessened by the inefficient firm and imitation in exports will appear less often under sequential play.

Then, in Section 3, we allow one of the firms to commit its internationalization strategy and take a Stackelberg leading role or give up that possibility and be a Cournot simultaneous player. The efficient firm opts for leading; in that manner, she enjoys both the cost advantage plus the first-mover advantage on output. She would not want to be flexible and refuse such benefits. The firm will commit to FDI when the setup cost is sufficiently low. The follower less efficient firm will imitate the leader's strategy for fairly low enough values of the setup cost—rather naturally, the critical values are lower for the follower than for the leader firm. There are some other equilibria when the less efficient firm is given the chance to lead or wait. She might choose to export whereas the follower more efficient firm would select FDI. Interestingly, the inefficient firm may find it advantageous to wait, under certain conditions, and an equilibrium with simultaneous exports decisions can occur. Finally, if both firms were given the choice of picking the timing of market entry, numerical analysis allow us to conclude that the equilibrium outcomes are those

in which the efficient firm emerges as the leader thereby committing its internationalization strategy. We also argue that many of our findings are robust to the consideration of non-linear demand and costs. Some concluding remarks close the paper.

2 | THE MODEL: SEQUENCING FIRMS' EXPORTS AND FDI CHOICES

Consider two foreign firms willing to serve a market with no pre-existing firms in that market. Inverse demand is linear and equal to

$$p = a - (q_1 + q_2) \tag{1}$$

where q_i represents the output produced by firm $i = 1, 2$ and p is the price. One of the firms, firm 1, has constant marginal cost c whereas the rival, firm 2, has constant marginal cost $c + \delta$, with $\delta > 0$ representing the cost gap between firms. So firm 1 is the more efficient firm, it is more productive than foreign firm 2.

These two firms decide their entry mode, either exports, E, or foreign direct investment, FDI, together with the corresponding output. Both entry modes involve different marginal and fixed costs.[3] Entry via exports entails an increase in marginal cost by t, due to natural (e.g., transportation costs) or artificial (e.g., tariffs) barriers to trade. We will refer to t as trade costs. In contrast, entry via FDI entails a fixed setup cost G. The internationalization strategy endogenizes technology choice and allows us to study heterogeneity in several respects. On the one hand, when firms decide their entry mode they are choosing between exporting, with greater variable cost without any fixed costs, and foreign investment, preserving their variable cost level while incurring a fixed cost. On the other hand, there is an initial technological gap between firms, such that heterogeneities in variable costs remain, even if they choose symmetric internationalization strategies.

Our modelling approach assumes that the internationalization mode and the quantity choice are bundled. What is relevant is that the choice is visible and irreversible. The analysis of (possibly) imitation as a firm's reaction strategy demands a sequential setting as opposed to a simultaneous one.

To be more specific, we shall analyse two games. In one of them, the simultaneous move game, the two foreign firms simultaneously and independently choose whether to export or engage in FDI and the corresponding output. In the other game, the sequential move game, one of the firms chooses whether to export or engage in FDI and the corresponding output in stage one and then, in stage two, after observing the rival's choice, the other firm selects her internationalization strategy and the associated output.

The sequential game implies that the mode of entry and the attached output is observed, while this is not so in the simultaneous play. One may take the usual interpretation of capacities so that the leader firm builds the plant to produce a particular output level in case of FDI or hire a given export capacity with a domestic agent to export. Such mode-wise commitment implied by capacity choices can be alternatively justified by either technology reasons, or advance

[3]These cost assumptions are standard in the literature. Buckley and Casson (1981) use cost minimization as the criterion for a firm to decide its optimal mode of entry. Different output thresholds determine whether it is less costly whether to export or switch to FDI. Under exporting, the firm's fixed production cost is minor since output exported is produced by increasing the utilization of existing plant in the source country. Variable costs are higher than under FDI since they also include international transport costs and tariff payments. With FDI, fixed costs will be higher as it requires new production equipment and establishing an independent distribution system.

production and inventory investment, or binding contracts, as the notion of quantity sticky production mode in Hirokawa and Sasaki (2001).[4]

To see the role of leadership, suppose that the two firms export to the target market. We may characterize equilibrium profits under simultaneous play and under sequential play, for both firms. Let $\pi_i^k(X,Z)$ denote the profit of firm i when she plays the role k, $k = C$ (simultaneous), L (leader), F (follower), and firm 1 chooses entry X while firm 2 chooses entry Z, where X, Z are exports (E) and foreign direct investment (FDI). It is straightforward to obtain $\pi_1^C(E,E) = \frac{(a-c-t+\delta)^2}{9}$. In case firm 1 leads, her profits are given by $\pi_1^L(E,E) = \frac{(a-c-t+\delta)^2}{8}$. The profit difference $\pi_1^L(E,E) - \pi_1^C(E,E)$ can be expressed as follows:

$$\underbrace{\frac{(a-c)^2}{72}}_{\substack{\text{pure first}\\ \text{mover advantage}}} + \underbrace{\frac{\delta(2a-2c+\delta)}{72}}_{\substack{\text{cost efficiency}\\ \text{effect}}} - \underbrace{\frac{t(2a-2c-t+2\delta)}{72}}_{\substack{\text{trade cost}\\ \text{effect}}} \tag{2}$$

The first term is the standard first-mover advantage gain that is obtained in a symmetric cost duopoly; the second term, associated with the cost difference, is also positive and reinforces the former; the third term is negative as it is related with export activity.[5] What are the gains from leading for the less efficient firm? We can work out the profit difference $\pi_2^L(E,E) - \pi_2^C(E,E) = \frac{(a-c-t-2\delta)^2}{8} - \frac{(a-c-t-2\delta)^2}{9}$ to write:

$$\underbrace{\frac{(a-c)^2}{72}}_{\substack{\text{pure first}\\ \text{mover advantage}}} - \underbrace{\frac{4\delta(a-c-\delta)}{72}}_{\substack{\text{cost inefficiency}\\ \text{effect}}} - \underbrace{\frac{t(2a-2c-t-4\delta)}{72}}_{\substack{\text{trade cost}\\ \text{effect}}} \tag{3}$$

so that the first-mover advantage is now smaller due to a cost inefficiency effect. We can conclude that *the efficient firm has more to gain from leading; the premium for leading increases with cost advantages.*

All the equilibrium profits expressions, for simultaneous and for sequential play, under the other internationalization outcomes are displayed in Table 1.

The next question we analyse is when will a firm choose FDI rather than exports. Given that firm 2 chooses to export, firm 1 will switch to FDI when $\pi_1^C(FDI,E) > \pi_1^C(E,E)$ and

[4]Shaver et al. (1997) describe the strategic decisions between Honda and Volkswagen regarding their investments in sequence in their automobile plants in the US market. Similarly, Hawk et al. (2013) describe the Atlantic Basin liquefied natural gas industry. Entry requires substantial irreversible and costly investments; the authors draw attention to firms' intrinsic capabilities in explaining the timing of investments in gasification facilities which represent a very usage-specific commitment in this industry.

[5]Cost differences could also be attributed to differences in trade costs. Trade cost for firm i would be t_i, $i = 1, 2$. Then, the profit difference would read as follows:

$$\underbrace{\frac{(a-c)^2}{72}}_{\substack{\text{pure first}\\ \text{mover advantage}}} + \underbrace{\frac{\delta(2a-2c+\delta)}{72}}_{\substack{\text{cost efficiency}\\ \text{effect}}} - \underbrace{\frac{(2t_1-t_2)(2a-2c-2t_1+t_2+2\delta)}{72}}_{\substack{\text{trade cost}\\ \text{effect}}}$$

So, if 2t1 < t2 then differences in trade costs would add to the other two effects. Otherwise, the first-mover advantage would be lessened by the trade cost effect. In fact, any cost differences favourable to the leader firm make the gains from leading larger.

TABLE 1 Equilibrium profits

Outcome	π_1^C	π_2^C	π_1^L	π_2^F	π_1^F	π_2^L
(E,E)	$\frac{(a-c-t+\delta)^2}{9}$	$\frac{(a-c-t-2\delta)^2}{9}$	$\frac{(a-c-t+\delta)^2}{8}$	$\frac{(a-c-t-3\delta)^2}{16}$	$\frac{(a-c-t+2\delta)^2}{16}$	$\frac{(a-c-t-2\delta)^2}{8}$
(FDI,E)	$\frac{(a-c+t+\delta)^2}{9}-G$	$\frac{(a-c-2t-2\delta)^2}{9}$	$\frac{(a-c+t+\delta)^2}{8}-G$	$\frac{(a-c-3t-3\delta)^2}{16}$	$\frac{(a-c+2t+2\delta)^2}{16}-G$	$\frac{(a-c-2t-2\delta)^2}{8}$
(FDI,FDI)	$\frac{(a-c+\delta)^2}{9}-G$	$\frac{(a-c-2\delta)^2}{9}-G$	$\frac{(a-c+\delta)^2}{8}-G$	$\frac{(a-c-3\delta)^2}{16}-G$	$\frac{(a-c+2\delta)^2}{16}-G$	$\frac{(a-c-2\delta)^2}{8}-G$
(E,FDI)	$\frac{(a-c-2t+\delta)^2}{9}$	$\frac{(a-c+t-2\delta)^2}{9}-G$	$\frac{(a-c-2t+\delta)^2}{8}$	$\frac{(a-c+2t-3\delta)^2}{16}-G$	$\frac{(a-c-3t+2\delta)^2}{16}$	$\frac{(a-c+t-2\delta)^2}{8}-G$

$\pi_1^L(FDI,E) > \pi_1^L(E,E)$ under simultaneous and sequential play, respectively. Firm 1 saves on trade costs and incurs a fixed cost, with the former having a *direct effect* on its variable profit and a *strategic effect* on the rival's profit, because a fall in firm 1's marginal cost implies a fall in firm 2's profits. Whether the firm chooses FDI rather than E reduces to verifying that the increase in variable profits offsets G; the cost gap δ favours the incentive to engage in foreign direct investment. It can be checked that $\pi_1^L(FDI,E) - \pi_1^L(E,E) > \pi_1^C(FDI,E) - \pi_1^C(E,E)$, which means that the incentive to FDI is stronger when internationalization strategies are chosen in sequence. This statement is also true were the inefficient firm leading; the difference is that now the cost gap δ enters negatively. It is precisely cost heterogeneity that explains that *the incentive to lead in* FDI *by the efficient firm is stronger than that for the inefficient firm*.

To complete the analysis and provide an answer to the question of when should we expect firms to select identical or different internationalization strategies we proceed in steps and first present the simultaneous choice of internationalization strategies and corresponding output. The characterization of the equilibrium amounts to studying various critical values against the size of the setup cost G, which define the firms' best responses.[6] Those comparisons illustrate the trade-off between proximity and concentration, as they reflect the incentive to invest abroad and collect the oligopolistic profits. Intuitively, too high setup costs relative to trade costs mean that variable profits would not suffice to cover G in case both firms chose FDI and hence they would rather export—this is the critical value $\overline{B^c}$ in Figure 1. A greater cost difference, δ, relaxes the condition on the size of G and therefore exports by both firms is observed less often since $\overline{B^c}$ would shift to the right. In fact, the critical value $\overline{B^c}$ follows from $\pi_1^C(E,E) > \pi_1^C(FDI,E)$, the decision of the efficient firm to switch to foreign direct investment, given that the rival exports. Intermediate values of G make FDI to be selected in equilibrium by the more efficient firm. Finally, low enough values of G—below the critical value $\underline{B^c}$ in Figure 1—induce FDI by both firms; $\underline{B^c}$ follows from $\pi_2^C(FDI,FDI) > \pi_2^C(FDI,E)$, i.e., $\frac{4t}{9}(a-c-t) - \frac{8}{9}t\delta > G$, so that the less efficient firm finds it profitable to invest, provided the rival invests. The threshold $\underline{B^c}$ moves to the left when δ increases; cost heterogeneity makes it more likely to observe FDI by at least one of the firms.[7,8]

[6]As suggested in footnote 5 above, different trade costs could be considered in the analysis. Nothing changes if trade costs are such that cost differences favour firm 1 over firm 2. Otherwise, the characterization of the equilibrium would require the comparison of more critical values, without adding any further insights.

[7]For intermediate values of G, if trade costs are small relative to the cost gap, then the efficient firm will opt for *FDI* and the less efficient one for *E*; a finding consistent with the self-selection hypothesis. However, when trade costs are relatively larger, the two outcomes where firms choose opposite strategies are equilibria of the game. See Appendix, Tables A1 and A2.

[8]With cost symmetry, there is multiplicity of equilibria in which firms choose opposite strategies, that is, both (*FDI*,*E*) and (*E*,*FDI*) for intermediate values of the setup cost. Such multiplicity would disappear if trade costs t were zero since we would be left with just one threshold on G so that either both firms would export or they would invest.

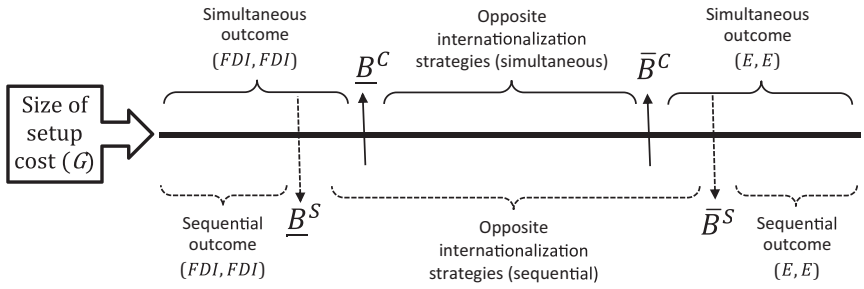

FIGURE 1 Critical values for follow the leader outcomes in internationalization strategies

As already argued, our analysis in understanding strategic FDI responses to previous FDI decisions calls for the consideration of sequential play. Suppose now that the efficient firm can select its entry mode before the rival less efficient competitor. That is, there is sequential play in internationalization strategies. Then the game has two stages as follows. In the first stage, firm 1 chooses between FDI and E, and the corresponding output, that is, commitment occurs via an output level given the market entry mode—an assumption that is common in pre-commitment versus flexibility games, as in Spencer and Brander (1992). In stage two, firm 2, once observing the rival's choice, selects the output associated either with FDI or with E.

Again, both firms will export when the setup cost is large enough. The critical value is given by the incentive of the efficient firm to prefer leading in FDI rather than exports. This is shown by $\overline{B^s}$ in Figure 1. We noted above that the incentive to switch is stronger under sequential play and hence $\overline{B^s}$ lies to the right of $\overline{B^c}$; however, it is unclear whether this is so when the inefficient firm leads entry. Intermediate values of G have the efficient firm leading in FDI and the less efficient firm following in E. For the latter firm to also engage in FDI the setup cost must be lower than the critical value obtained from $\pi_2^F(FDI, FDI) > \pi_2^F(FDI, E)$, which is equal to $\frac{3t}{16}(2a - 2c - 3t) - \frac{8}{9}t\delta > G$ the value $\underline{B^s}$ in Figure 1. When firm 2 evaluates switching to FDI, the increase in the variable profit in case she is a follower is smaller than the increase under simultaneous play. Additionally, that increase is lowered by the cost gap and that negative effect is larger under sequential. All in all, this explains why $\underline{B^s}$ lies to the left of $\underline{B^c}$: identical entry strategies will be observed less often under sequential play, and this will be more so the greater the cost gap—see Appendix and Tables A3 and A4. The ordering of these values remains unclear in case the inefficient firm leads entry.

In fact, when the less efficient firm chooses its entry mode in advance, opposite internationalization strategies will show up more often under sequential entry only under certain conditions on the size of oligopoly profitability $a - c$ and the cost gap δ. For intermediate values of the setup cost we may find two equilibria—see Appendix for the details and Tables A5 and A6. In one of them, firm 2 leads in FDI and firm 1 follows in E; in another, strategies are reversed. The possibility for the latter equilibrium to arise, which cannot happen when the efficient firm plays first, would conform with a loose reading—since we assume a homogeneous products industry—of the gradual internationalization process of the firm (Johanson & Vahlne, 1977); firms strengthen their position in foreign markets with successive actions that imply an increasing level of inflexibility, where exports represent a less rigid choice than establishment of a production plant. Such decisions in stages may be explained, among other factors, by cost asymmetries and the opportunity to lead.

For a null cost gap, there are not any qualitative differences regarding the case when the more efficient firm is the leader. However, an equilibrium under opposite strategies is less likely to be observed.

The effect of the sequential play assumption in strategic internationalization decisions can be summarized as follows.

Proposition 1 Relative to simultaneous choice of internationalization strategies, the incentive to *FDI* under sequential play is stronger for the efficient firm; identical export strategies will be observed less often. Imitation strategies are observed less often when the efficient firm leads entry. This is not necessarily so when the less efficient firm leads entry unless oligopoly profitability is sufficiently large.

The received literature has enquired into the substitution/complementarity relationship between exports and foreign production. That is, it has examined to what extent increases in overseas investments replace or help increase subsequent exports to the same market. Although a proper modelling should consider the time dimension, our analysis suggests that sequential play in internationalization strategies favours the "substitutability" prediction, as firms choosing opposite strategies is observed more often (Blonigen, 2001). Departing from a setting where both firms export in a homogenous products industry, the fact that one firm chooses direct investment results in the rival exporting a lower amount.

The preceding analysis can be generalized to the consideration of an n-firm asymmetric oligopoly. It can be checked that the incentive to lead, whether in exports or in FDI, is stronger for more efficient firms, once comparing with the simultaneous play game. Therefore, for a given oligopoly of size n, identical export strategies will be observed less often under sequential play. In fact, when firms simultaneously decide their internationalization strategy, we shall find that, as the value of the setup cost G varies, the most efficient firms will choose FDI while the remaining less efficient firms up to n will choose to export. The sequential game with several leader firms and several follower firms requires more elaboration; note that there are two partial simultaneous move games embedded in a two-stage game (Julien, 2017). As the value of G varies, one intuitively expects outcomes with, e.g., several leader more efficient firms to select FDI and several less efficient firms that later may imitate or not the leaders' strategies.[9]

2.1 | Welfare analysis

Once we have defined the equilibrium outcomes, it is also important to explore the welfare implications of sequentiality in internationalization for heterogeneous firms, considering the total welfare as the sum of consumer surplus and both firms' profits. Since the welfare orderings among settings are not unique, conclusions are not straightforward.[10] Let us consider initially the simultaneous outcomes. Welfare levels when firms adopt opposite internationalization strategies, with the most efficient firm exporting and the rival choosing FDI, typically rank first or second. However, the reverse outcome (FDI, E) which is the most plausible to arise in

[9]Computations available on request.

[10]Computations available on request.

equilibrium for intermediate levels of setup cost, never represents the maximum welfare. This means that there is a market failure when firms choose opposite strategies unless (E, FDI) is the outcome chosen. For the levels of setup costs when firms opt for imitation strategies at equilibrium, these can indeed be the ones that yield the maximum welfare, but they can also be dominated, under some conditions, by welfare achieved for (E, FDI), thus reflecting a potential conflict.

Such a market failure seems to be attenuated under sequentiality when leadership is taken by the most efficient firm, but it is not so when the leader is the less efficient duopolist. On the one hand, with an efficient leader the outcome with opposite strategies (FDI, E) reaches the highest welfare level under the conditions on the setup cost that ensure this outcome being the equilibrium of the game. For extreme sizes of setup costs, either when (E, E) or (FDI, FDI) arise at equilibrium, we find that firms' choices are compatible with the highest welfare levels (under some conditions); however, the equilibrium with opposite strategies (FDI, E) can overcome the welfare level under imitation strategies. On the other hand, in a sequential equilibrium with an inefficient leader the maximum attainable welfare level can be compatible with various equilibrium outcomes (sometimes even with all of them) including the one that will arise in equilibrium, so that we cannot unambiguously conclude whether there is a market failure. In trying to define a pattern we observe that an equilibrium with opposite strategies results at least in the second preferable outcome in welfare terms, but it is not clear which firm should be the exporter and which internationalize via FDI.

3 | ENDOGENOUS LEADERSHIP IN THE INTERNATIONALIZATION PROCESS OF FIRMS

As noticed above, earlier papers by Motta (1994) and Markusen (2002), consider sequential decisions but quantity choices are taken simultaneously. Motta (1994) acknowledges, however, that a fully dynamic setting is required to show that follower investment is in response to the FDI of the leader. In this section, we take a step in this direction and give one of the firms the opportunity to either move first or wait and enter a simultaneous output game with its rival. Specifically, in the first stage firm 1 decides its internationalization strategy between exports (E) and foreign direct investment (FDI) and commit the corresponding output. It may alternatively opt for entering later. If so, in stage two, both firms choose the Cournot quantities corresponding to the various internationalization combinations. In case, firm 1 committed in stage one, firm 2 will choose the follower output that corresponds to either FDI or E. The game tree in Figure 2 illustrates the eight different equilibrium outcomes regarding the entry mode and the timing decision of the more efficient firm.[11]

The profits expressions to consider in solving the game are the ones reported in the previous section. Thus, the characterization of the equilibrium involves working with the critical values from the simultaneous play game, when firm 1 decides to wait and enter later, and with the values from the sequential play move game. The next Proposition describes the equilibrium in entry strategies.

[11]To be sure, the pre-commitment versus flexibility choice has been explored in many contexts. Regarding trade policy, it is worth mentioning the papers by Neary and Leahy (2000) who study trade and industrial policies in dynamic oligopoly when governments cannot commit far into the future; by Dewit and Leahy (2004) on how an export subsidy affects the firms' strategic investment decisions for an export market where demand is uncertain; and by Li and Rajan (2009) on a foreign investor's decision under policy uncertainty in a less developed economy.

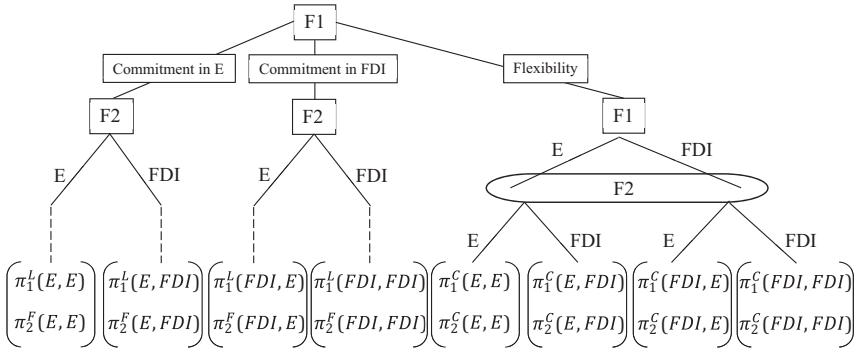

FIGURE 2 Endogenous leadership game tree

Proposition 2 Consider the game where firms choose their internationalization strategies between exports and foreign direct investment, and the more efficient firm can either commit or enter later. The leading strategy always dominates waiting. Follow-the-leader behaviour in FDI arises only for extreme setup cost values, when setup costs are sufficiently low. For intermediate levels of setup costs firms will opt for opposite internationalization strategies, with the efficient firm committing in *FDI*.

The proof is relegated to the Appendix.

Consider the left hand side part of the game tree referred to the sequential choice of internationalization strategies. The first thing to note is that the outcome (E, FDI) with the efficient firm leading in exports cannot be an equilibrium. That outcome requires a low enough setup cost G such that the follower less efficient firm prefers investment to export. However, such critical value would make the leader more efficient firm to switch from leading exports to leading in FDI. Her profits rank as follows: $\pi_1^L(FDI, E) > \pi_1^L(FDI, FDI) > \pi_1^L(E, FDI)$, and so the latter outcome would be dominated. In other words, given that firm 1 leads entry and has a cost advantage, she is not willing to mitigate the cost efficiency effect that she enjoys and would give up if led entry with exports followed by rival's investment.

Next, we wish to argue that firm 1 prefers leading to waiting. Suppose that the setup cost G is very high. We know from the analysis in the previous section that the critical value that governs identical choice of exports is given by the decision of the more efficient firm to switch between E and FDI. Because of the cost disadvantage of firm 2, the critical values that determine their decision between E and FDI are less demanding than for firm 1, whether firm 2 is a Cournot player or a Stackelberg follower; so firm 2 selects E. Then, by (2), firm 1 prefers committing to waiting and we find follow-the-leader behaviour in exports for large enough values of the setup cost. What happens for intermediate values of G? As the setup cost decreases firm 1 will prefer leading in FDI to leading in E; we noted above that the incentive to FDI is stronger when internationalization strategies are chosen in sequence—the strategic effect on the follower's variable profit does not allow her to cover the fixed setup costs. Further decreases in G might allow the less efficient firm to opt for foreign direct investment, were internationalization strategies chosen at the same time. It can be checked that $\pi_1^L(FDI, E) > \pi_1^C(FDI, FDI)$. Then we shall find the efficient firm leading entry via FDI and the less efficient firm following in E.

At the other extreme, consider low values of G. The critical values $\underline{B}^s$ and $\underline{B}^c$ in Figure 1 come from the decision to switch from exports to FDI by the less efficient firm. Once again, provided that the cost gap is favourable to firm 1 and the ordering of the critical values, we shall find that

the efficient firm will also invest. Since $\pi_1^L(FDI, FDI) > \pi_1^C(FDI, FDI)$ firm 1 will not wait and we observe follow-the-leader behaviour in foreign direct investment for low enough values of the setup cost. This argument explains why the efficient firm will always lead entry and how the equilibrium that we obtain is shaped by the size of the setup cost.

When the more efficient firm may choose to lead she has a double advantage. One stemming from the fact that she is more productive (in line with the Helpman et al. (2004) prediction) and another from the fact of leading: both effects reinforce each other. One wonders what happens if firm 2 is given the chance to either commit its internationalization strategy or wait. Note that for the less efficient firm those effects run contrary to one another. The next proposition unveils that there are relevant differences with the equilibrium when the inefficient firm leads.

Proposition 3 If the less efficient firm is given the opportunity to lead or wait regarding its entry mode, any combination of internationalization strategies can arise in equilibrium with the firm becoming a leader. Interestingly, waiting and entering via exports to compete with rival's exports can arise in equilibrium.

The proof is relegated to the Appendix.

The less efficient firm has the possibility to gain market share and attenuate her cost disadvantage in case she leads entry. Very low values of G that can be covered by the variable profits of the less efficient leader and of the more efficient follower will result in follow-the-leader behaviour in FDI—indeed $\pi_2^L(FDI, FDI) > \pi_2^C(FDI, FDI)$. If instead G is very large then we shall observe follow-the-leader behaviour in E, and firm 2 is certainly better off leading than waiting. It may happen that she is still happier leading in exports although the follower enters with a lower variable cost as she chooses to invest. This equilibrium, which does not arise when the efficient firm plays first, is fundamentally driven by the size of oligopoly profitability and the cost disadvantage of the less efficient firm: her variable profits do not suffice to cover the fixed setup cost. However, the strategic effect on the follower's profit—which is now positive since firm 2 incurs t—in addition to the cost gap allow firm 1 to capture enough market share and undertake FDI. To sum up, the cost disadvantage is so important that neutralizes the leadership advantage thus making the less efficient firm to lead entry as an exporter.

Interestingly, if oligopoly size and the cost disadvantage are not too important then the strategic effect of leading entry via FDI pushes down the follower's variable profits making her opt for exports. We should note that this equilibrium, leading in FDI followed by E, runs contrary to the well-known result by Helpman et al. (2004) who find that, on average, the least productive firms serve only the domestic market, the relatively more productive firms export, and the most productive firms engage in FDI—which is in concordance with the predictions of their model. An oligopolistic environment rather than one with monopolistic competition can certainly explain this alternative pattern of internationalization. In this case, the first-mover advantage is stronger than the cost disadvantage, which allows the less efficient firm to afford a wider range of G values then opting for leading entry via FDI—see Appendix and Table A7.

Possibly the most notable result is that the less efficient firm might forego the chance to lead and enter later; an equilibrium with similar strategies and simultaneous play in exports can be characterized without resorting to neither uncertainty nor informational assumptions. In such an equilibrium the setup cost G is low enough so that the follower firm can afford internationalization via FDI provided that the less efficient firm commits in exports. Given this, firm 2 considers changing her choice. Why? Because her variable profits are lower whenever she does not lead entry via FDI. If she opted for leading in FDI then the strategic effect

of saving on trade costs would imply the follower selecting exports. If she decided to wait, then she must prefer exports to investment; this entails some lower bound on the size of G. Simultaneous choice of exports requires equilibrium profits of firm 2 to exceed those in the other two paths: early exports followed by investment, and early investment followed by exports.[12]

To sum up, under quantity competition, leadership with either entry mode is advantageous. A firm that enjoys a cost advantage over the rival will certainly be willing to maintain the leader role. However, a less efficient firm might be inclined to refrain from the strategic advantage of leadership. She would do so if, anticipating the rival's response, she can induce an entry mode that is more beneficial for her, despite it becoming a weaker competitor with higher variable costs.

It is also worth noting that, from the point of view of the host country and given the type of competition among firms—whether simultaneous or sequential—, an outcome where both firms export results in the lowest possible aggregate output and, consequently, it would be the least preferred scenario for consumers. From a policy perspective, the host government would prefer entry in FDI by both foreign firms since total output is highest under such an equilibrium.[13] Otherwise, assuming internationalization strategies as given—whether $(E,E),(E,FDI),(FDI,E)$ or (FDI,FDI)—consumers will prefer the sequential entry rather than simultaneous and, among them, leadership by the most efficient firm is best. Suppose then that the government in the third market considered the timing of approving entry of foreign firms. It should first accept FDI entry by the low-cost firm. Then, given that imitation by the high-cost firm is more difficult under sequential play, it could consider policies that encourage FDI relative to exports, such as subsidizing G to facilitate FDI by the less efficient competitor. This policy implication from our analysis can be particularly suitable for emerging economic regions, where successful entry has become a central issue for many multinational enterprises. Policies to attract foreign investors should be crafted to improve the wealth and welfare in these economies.

We have learnt that if a firm is given the chance to lead she will typically do so. Intermediate values of G make firms choose opposite internationalization strategies. Our findings emphasize the relevance of sequential moves and cost differences in identifying substitution effects between exports and foreign production. The assignment of the potential leader role has been exogenous yet the sequence of decisions allows for a partial endogenization of the market structure. The next subsection explores the issue of which firm would lead as well as discusses why an efficient firm might wish to wait.

3.1 | Further extensions and robustness

A natural extension is to allow both firms whether to play early or late in internationalization strategies. Would the results change if both firms were given the option of choosing the timing of market entry? In an insightful paper, Hamilton and Slutsky (1990) provided a formal model to study the tradeoff between commitment and flexibility by adding a pre-play stage (to the basic

[12]Note that the interval for G for flexible outcome in exporting strategies exists for certain values of oligopoly profitability and the cost gap, as detailed in the Appendix.

[13]Porter (2012) explores the scope for a host-country corporate tax in inducing FDI by the cost-efficient firm.

game) at which duopolists simultaneously decide whether to move early or late in the basic game, independently of each other. The basic game is then played according to these timing decisions: with simultaneous play if both players decide to move at the same time (whether early or late), and with sequential play under perfect information otherwise (with the order of moves as announced by the players).[14] We follow Hamilton and Slutsky's (1990) extended game with observable delay and apply it to early-late decision when firms can choose between FDI and E. More precisely, there are two periods and each firm has to choose a quantity (attached to either entry mode) in exactly one of these periods. Within a period, choices are simultaneous, but if a firm does not decide to produce in period one, then in period two this firm is informed about which action his rival chose in period one.

Performing analytical comparisons is fairly complex, we resort to numerical analysis to fully endogenize market structure and have a clearer understanding on the firms' intrinsic incentives to entry mode and timing structure. We take values for all the parameters, and let the value of G differ, as we have seen that the equilibrium outcomes depend on the size of the setup cost. Tables A8–A10 with payoffs appear in the Appendix.

The prediction from the numerical analysis is that, for large enough values of the setup cost, there are two equilibria, one in which the efficient firm enters first as an exporter and is followed by rivals' exports, and another one in which both firms export with the less efficient firm as the leader. By applying risk dominance we select the Stackelberg equilibrium in exports where the efficient firm leads.[15] Similarly, two equilibria appear for low enough values of the setup cost that involve follow-the-leader behaviour in FDI where either firm can lead entry; the risk dominant equilibrium is the one in which the efficient firm is the leader. Finally, an equilibrium with opposite internationalization strategies is obtained by combining low values of G and a sufficiently high cost gap: the risk dominant equilibrium has the efficient firm leading entry via FDI followed by exports by the rival less efficient firm.

If the move order were endogenous, then we end up with the equilibrium outcomes where the efficient firm leads. That is, the simpler setting in which firm 1 is exogenously given the chance to lead or wait is reproduced.

The limitations of our analysis lie on can be limited by the assumptions of linearity in demand and costs. However, first-mover advantages survive as long as, for a given pair of internationalization strategies, (i) the leader profits exceed those under simultaneous play and, (ii) the simultaneous play profits are larger than the follower profits both. As shown by Amir and Grilo (1999) and Julien (2011), what is relevant for (i) and (ii) to be satisfied is whether the different demand and costs properties imply reaction functions that are monotone decreasing everywhere under quantity competition. Convexities in demand may result in reaction functions that are not monotone decreasing everywhere. Consequently, we have developed a series of numerical examples to check the robustness of our findings.

Thus, with an isoelastic demand and linear asymmetric costs, (i) continues to hold although (ii) may fail in some pair of internationalization strategies. Our result that imitation strategies are less observed under sequential play remains true. However, there are changes regarding

[14]Other relevant contributions regarding the endogenous timing of moves and hence the allocation of roles in oligopoly include Mailath (1993), van Damme and Hurkens (1999, 2004).

[15]The concept of risk dominance captures the intuitive idea that, when players do not know which of two equilibria should be played, they will measure the risk involved in playing each of these equilibria and they will coordinate expectations on the less risky one, i.e., on the risk dominant equilibrium of the pair. See Van Damme and Hurkens (1999) whose model features an asymmetric cost duopoly with quantity competition.

Proposition 2; for intermediate values, the efficient firm might prefer waiting than leading for strategic reasons (firm 2 exports and firm 1 plays either exports or FDI). Some modifications also show up when the inefficient firm is given the opportunity to lead (Proposition 3) since not all combinations of internationalization strategies are possible. For example, for intermediate values of the setup costs, the inefficient firm prefers waiting to end up in an equilibrium where both firms export. Finally, if the move order were endogenous (as argued at the beginning of this subsection), we would find that the Stackelberg equilibrium in exports where the efficient firm leads appears for sufficiently large setup costs. However, for intermediate values, the risk dominant equilibrium is the one where the inefficient firm leads either in exports or FDI, followed by FDI by the efficient firm. These unexpected results occur because convex demands give a second-mover advantage and quantities behave as strategic complements, as shown by the above papers.

With a convex demand and quadratic cost functions, although our findings in Proposition 2 qualitatively hold, some new results appear when the inefficient firm is given the chance to lead or wait; we now observe that leading is always preferred to waiting. Endogenizing the order of moves also throws some changes since, for low values of the setup cost, we have the inefficient firm leading FDI followed by FDI by the efficient firm as the risk dominant equilibrium. Altogether we may conclude that our results may well follow when departing from the linear case presented although new outcomes may occur under convexities.

Coming back to the linear case one may wonder why would the efficient firm give up the chance of committing to an entry mode. She might do so if there is something to gain by retaining flexibility. Spencer and Brander (1992) present a duopoly model with uncertainty in demand where one firm has exogenously been given the possibility to commit the quantity before the realization of the uncertainty, taking advantage of moving first and acting as a Stackelberg leader; or defer its decision till the uncertainty is resolved, thereby losing its leading role but allowing her to adjust output. Their paper can be extended to apply the dichotomy pre-commitment versus flexibility to the internationalization strategies of heterogeneous firms (Barac & Moner-Colonques, 2019). It can be shown that follow-the-leader behaviour in FDI happens when setup costs are small and demand uncertainty is low enough. If the realization of demand does not differ much from its expected value, then being uninformed is not that bad and commitment is preferred. However, large enough values of setup costs will make firms opt for exports; if coupled with a large enough variance of demand we will find the more efficient firm choosing flexibility in exports thus giving up the opportunity to lead. A combination of sufficient demand uncertainty and intermediate values of setup costs is required for both firms to engage in simultaneous foreign direct investment.

4 | CONCLUSIONS

This paper has studied the timing of foreign market entry and the optimal entry, exports or FDI, in a quantity competition duopoly with heterogeneous firms in terms of their production costs. We have investigated foreign firm interaction to establish conditions for follow-the-leader strategies in mode of entry. It has been shown that that the incentive to lead and to engage in FDI is stronger for the more efficient firm than for the less efficient firm. Likewise, letting one of the firms enter in advance makes it less likely that identical internationalization strategies are chosen in equilibrium. Cost asymmetry plays favourably to this observation when the efficient firm is the leader, yet it works in the opposite direction when instead it is the inefficient firm that leads. Although entry in FDI by both firms is best for consumers, total welfare can be higher with

opposite internationalization strategies. We further show that if the assignment of leader and follower roles is not arbitrary, then the firm that is given the chance to lead finds it advantageous to do so and not refuse the benefits of leadership. Whether internationalization occurs either with exports or with FDI depends on the well-known tension between the fixed setup costs of investment against the additional variable costs of exporting. Thus, follow-the-leader behaviour in FDI will arise for low values of the setup cost; it will be in exports for sufficiently large values. Interestingly, the less efficient firm might prefer to wait for strategic reasons. If the move order were endogenous then leadership by the efficient firm arises in equilibrium. Our results are limited by the linearity assumptions. Some of our findings have to be qualified under convexities in demand and costs since these may give rise to second-mover advantages.

The received literature has devoted attention to empirically investigate export/FDI dynamics. Our model draws attention to variables related to oligopoly profitability and productivity differences which, on top of the costs of setting up a subsidiary and trade costs, may improve our understanding of strategic internationalization decisions that may happen in sequence. The consideration of strategic interactions regarding the geographic expansion of firms unveils two effects at play. On the one hand, the opportunity costs of serving a market with exports or FDI and, on the other, the benefits of entering earlier than rivals. Our formal model suggests several testable predictions. First, opposite internationalization strategies should be observed more often under sequential entry decisions; differently, firms will avoid locating subsidiaries as a response to earlier similar decisions by competitors in the same market unless setup costs are fairly low and oligopoly profitability sufficiently large. Second, past entry decisions of rivals help explain a current firm's decision to imitate their entry mode; follow-the-leader behaviour in FDI in which the more efficient firms enter in advance should be seen more frequently than early entry by less efficient firms. Third, leadership in exports may be profitable for not too efficient firms; in homogeneous products industries, exports may precede FDI, which is indirect evidence of the gradual internationalization process of firms. Fourth, because evidence on timing-performance is mixed, our analysis points at strategic mistakes/reasons that explain the misalignment between time and mode of entry with firm performance. Fifth, it is more likely that imitation strategies yield maximum welfare levels. By predicting the high probability of the leadership in FDI by more efficient firms the host country should consider measures that facilitate entry of less efficient competitors via direct investment. Including all of these elements in future empirical research will certainly improve our understanding about actual internationalization patterns.

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REFERENCES

Alcácer, J., Dezsö, C., & Zhao, M. (2015). Location choices under strategic interactions. *Strategic Management Journal*, *36*, 197–215. https://doi.org/10.1002/smj.2214

Altomonte, C., & Pennings, E. (2008). Learning from foreign investment by rival firms: Theory and evidence. *International Journal of Industrial Organization*, *26*, 1203–1217. https://doi.org/10.1016/j.ijindorg.2007.12.002

Amir, R., & De Feo, G. (2014). Endogenous timing in a mixed duopoly. *International Journal of Game Theory*, *43*(3), 629–658.

Amir, R., & Grilo, I. (1999). Stackelberg versus Cournot equilibrium. *Games and Economic Behavior*, *26*, 1–21. https://doi.org/10.1006/game.1998.0650

Barac, M., & Moner-Colonques, R. (2019). To lead or to wait? An application to internationalization strategies under demand uncertainty. *Managerial and Decision Economics*, *40*(5), 559–568. https://doi.org/10.1002/mde.3026

Bárcena-Ruiz, J. C., & Garzón, M. B. (2017). Environmental policy, north-south trade and FDI. *Journal of Industry, Competition and Trade*, *17*, 371–386. https://doi.org/10.1007/s10842-016-0241-0

Belderbos, R., Lykogianni, E., & Veugelers, R. (2008). Strategic R&D location in European manufacturing industries. *Review of World Economics*, *144*(2), 183–206.

Blonigen, B. A. (2001). In search of substitution between foreign production and exports. *Journal of International Economics*, *53*(1), 81–104. https://doi.org/10.1016/S0022-1996(00)00066-0

Boulding, W., & Christen, M. (2008). Disentangling pioneering cost advantages and disadvantages. *Marketing Science*, *27*, 699–716. https://doi.org/10.1287/mksc.1070.0324

Buckley, P., & Casson, M. (1981). The optimal timing of a foreign direct investment. *The Economic Journal*, *91*(361), 75–87. https://doi.org/10.2307/2231697

Campa, J., Donnenfeld, S., & Weber, S. (1998). Market structure and foreign direct investment. *Review of International Economics*, *63*, 361–380. https://doi.org/10.1111/1467-9396.00109

Conconi, P., Sapir, A., & Zanardi, M. (2016). The internationalization process of firms: From exports to FDI. *Journal of International Economics*, *99*, 16–30. https://doi.org/10.1016/j.jinteco.2015.12.004

Dewit, G., & Leahy, D. (2004). Rivalry in uncertain export markets: Commitment versus flexibility. *Journal of International Economics*, *64*, 195–209. https://doi.org/10.1016/S0022-1996(03)00082-5

Dixon, S. (2006). Multinational corporations, Stackelberg leadership, and tariff-jumping. *Review of International Economics*, *14*(3), 414–426. https://doi.org/10.1111/j.1467-9396.2006.00652.x

Dunning, J. H. (1981). *International production and the multinational enterprise*. Allen & Unwin.

Ethier, W., & Markusen, J. R. (1996). Multinational firms, technology diffusion and trade. *Journal of International Economics*, *41*, 1–28. https://doi.org/10.1016/0022-1996(95)01411-X

Fosfuri, A., & Motta, M. (1999). Multinationals without advantages. *Scandinavian Journal of Economics*, *101*(4), 617–630. https://doi.org/10.1111/1467-9442.00176

Fumagalli, C. (2003). On the welfare effects of competition for foreign direct investments. *European Economic Review*, *47*, 963–983. https://doi.org/10.1016/S0014-2921(02)00228-3

Gimeno, J., Hoskisson, R. E., Beal, B. D., & Wan, W. P. (2005). Explaining the clustering of international expansion moves: A critical test in the U.S. telecommunications industry. *The Academy of Management Journal*, *48*(2), 297–319.

Guariglia, A., Mukherjee, A., & Suetrong, K. (2013). Productivity differences and strategic plant location. *The Manchester School*, *81*(5), 712–729. https://doi.org/10.1111/j.1467-9957.2012.02332.x

Hamilton, J. H., & Slutsky, S. M. (1990). Endogenous timing in duopoly games: Stackelberg or Cournot equilibria. *Games and Economic Behavior*, *2*(1), 29–46. https://doi.org/10.1016/0899-8256(90)90012-J

Haraguchi, J., & Matsumura, T. (2020). Endogenous public and private leadership with diverging social and private marginal costs. *The Manchester School*, *88*(5), 699–730. https://doi.org/10.1111/manc.12320

Hawk, A., Pacheco-de-Almeida, G., & Yeung, B. (2013). Fast-mover advantages: Speed capabilities and entry into the emerging submarket of Atlantic Basin LNG. *Strategic Management Journal*, *34*, 1531–1550. https://doi.org/10.1002/smj.2085

Head, K., Mayer, T., & Ries, J. (2002). Revisiting oligopolistic reaction: Are decisions on foreign direct investment strategic complements? *Journal of Economics and Management Strategy*, *11*(3), 453–472. https://doi.org/10.1111/j.1430-9134.2002.00453.x

Helpman, E. (2006). Trade, FDI, and the organization of firms. *Journal of Economic Literature*, *44*(3), 589–630. https://doi.org/10.1257/jel.44.3.589

Helpman, E., Melitz, M. J., & Yeaple, S. R. (2004). Export versus FDI with heterogeneous firms. *The American Economic Review*, *94*(1), 300–316. https://doi.org/10.1257/000282804322970814

Hennart, J.-F., & Park, Y.-R. (1994). Location, governance, and strategic determinants of Japanese manufacturing investments in the United States. *Strategic Management Journal*, *15*, 419–436.

Hirokawa, M., & Sasaki, D. (2001). Strategic choice of quantity stickiness and Stackelberg leadership. *Bulletin of Economic Research*, *53*(1), 19–34. https://doi.org/10.1111/1467-8586.00115

Horstmann, I. J., & Markusen, J. R. (1987). Strategic investments and the development of multinationals. *International Economic Review*, *28*, 109–129. https://doi.org/10.2307/2526862

Horstmann, I. J., & Markusen, J. R. (1992). Endogenous market structures in international trade. *Journal of International Economics*, *32*(1/2), 109–129.

Ishikawa, J., & Komoriya, Y. (2010). Stay or leave? Choice of plant location with cost heterogeneity. *Japanese Economic Review*, *61*(1), 97–115. https://doi.org/10.1111/j.1468-5876.2009.00473.x

Ito, K., & Rose, E. (2002). Foreign direct investment location strategies in the tire industry. *Journal of International Business Studies*, *33*, 593–602. https://doi.org/10.1057/palgrave.jibs.8491034

Javorcik, B. S., & Saggi, K. (2010). Technological asymmetry among foreign investors and mode of entry. *Economic Inquiry*, *48*, 415–433. https://doi.org/10.1111/j.1465-7295.2009.00250.x

Johanson, J., & Vahlne, J. E. (1977). The internationalization process of the firm—A model of knowledge development and increasing foreign market commitments. *Journal of International Business Studies*, *8*(1), 23–32. https://doi.org/10.1057/palgrave.jibs.8490676

Julien, L. A. (2011). A note on Stackelberg competition. *Journal of Economics*, *103*, 171–187. https://doi.org/10.1007/s00712-010-0187-3

Julien, L. A. (2017). On noncooperative oligopoly equilibrium in the multiple leader-follower game. *European Journal of Operational Research*, *256*, 650–662. https://doi.org/10.1016/j.ejor.2016.06.070

Kabiraj, T., & Sinha, U. B. (2015). Foreign entry, acquisition target and host country welfare. *The Manchester School*, *83*(6), 725–748. https://doi.org/10.1111/manc.12084

Koska, O. A. (2020). Sourcing product quality for foreign market entry. *Review of World Economics*, *156*(3), 669–702. https://doi.org/10.1007/s10290-020-00375-1

Leahy, D., & Neary, P. (2011). Oligopoly and trade. In D. Bernhofen, R. Falvay, D. Greenaway, & U. Kreickemeier (Eds.), *Palgrave handbook of international trade* (pp. 197–235). Palgrave Macmillan.

Li, J., & Rajan, R. S. (2009). Foreign direct investment and technology transfer under uncertainty in a liberalizing host economy. *International Economic Journal*, *23*(1), 23–41. https://doi.org/10.1080/10168730802696483

Lieberman, M. B., & Montgomery, D. B. (1988). Fist-mover advantages. *Strategic Management Journal*, *9*, 41–58.

Lu, J. W. (2002). Intra-and inter-organizational imitative behavior: Institutional influences on Japanese firms' entry mode choice. *Journal of International Business Studies*, *33*(1), 19–37. https://doi.org/10.1057/palgrave.jibs.8491003

Mailath, G. J. (1993). Endogenous sequencing of firm decisions. *Journal of Economic Theory*, *59*(1), 169–182. https://doi.org/10.1006/jeth.1993.1010

Makino, S., & Delios, A. (2000). Competitive reaction, imitation and bunching in foreign entry decisions. *Academy of Management Proceedings*, *2000*(1), C1–C6. https://doi.org/10.5465/apbpp.2000.5535054

Markusen, J. R. (2002). Incumbency, preemption, and persistence. In J. R. Markusen (Ed.), *Multinational firms and the theory of international trade* (pp. 61–75). MIT Press.

Moner-Colonques, R., Orts, V., & Sempere-Monerris, J. J. (2007). Asymmetric demand information and foreign direct investment. *Scandinavian Journal of Economics*, *109*(1), 93–106. https://doi.org/10.1111/j.1467-9442.2007.00482.x

Motta, M. (1992). Multinational firms and the tariff-jumping argument: A game-theoretic analysis with some unconventional conclusions. *European Economic Review*, *36*, 1557–1571. https://doi.org/10.1016/0014-2921(92)90006-I

Motta, M. (1994). International trade and investments in a vertically differentiated industry. *International Journal of Industrial Organization*, *12*, 179–196. https://doi.org/10.1016/0167-7187(94)90012-4

Mrázová, M., & Neary, P. (2019). Selection effects with heterogeneous firms. *Journal of the European Economic Association*, *17*(4), 1294–1334. https://doi.org/10.1093/jeea/jvy024

Neary, P., & Leahy, D. (2000). Strategic trade and industrial policy towards dynamic oligopolies. *The Economic Journal*, *110*(463), 484–508. https://doi.org/10.1111/1468-0297.00534

Pacheco-De-Almeida, G., Henderson, J. E., & Cool, K. O. (2008). Resolving the commitment versus flexibility trade-off: The role of resource accumulation lags. *Academy of Management Journal*, *51*(3), 517–536. https://doi.org/10.5465/amj.2008.32626001

Petit, M. L., & Sanna-Randaccio, F. (2000). Endogenous R&D and foreign direct investment in international oligopolies. *International Journal of Industrial Organization*, *18*, 339–367.

Porter, L. A. (2012). Asymmetric oligopoly and foreign direct investment: Implications for host-country tax-setting. *International Economic Journal*, *26*(2), 229–246. https://doi.org/10.1080/10168737.2011.552515

Qiu, L. D., & Tao, Z. (2001). Export, foreign direct investment, and local content requirement. *Journal of Development Economics*, *66*(1), 101–125. https://doi.org/10.1016/S0304-3878(01)00157-2

Rob, R., & Vettas, N. (2003). Foreign direct investment and exports with growing demand. *Review of Economic Studies*, *70*(3), 629–648. https://doi.org/10.1111/1467-937X.00259

Rose, E., & Ito, K. (2008). The international investment patterns of Japanese automobile manufacturers. *Journal of International Business Studies*, *39*(5), 864–879.

Rowthorn, R. E. (1992). Intra-industry trade and investment under oligopoly: The role of market size. *Economic Journal*, *102*, 402–414. https://doi.org/10.2307/2234524

Saggi, K. (1998). Optimal timing of FDI under demand uncertainty. In J. L. Mucchielli, P. J. Buckley, & V. V. Cordell (Eds.), *Globalization and regionalization: Strategies, policies and economic environments* (pp. 73–87). The Haworth Press.

Saggi, K. (2002). Trade, foreign direct investment and international technology transfer: A survey. *The World Bank Research Observer*, *17*(2), 191–235. https://doi.org/10.1093/wbro/17.2.191

Sanna-Randaccio, F. (2002). The impact of foreign direct investment on home and host countries with endogenous R&D. *Review of International Economics*, *10*(2), 278–298.

Sanna-Randaccio, F., & Sestini, R. (2012). The impact of unilateral climate policy with endogenous plant location and market size asymmetry. *Review of International Economics*, *20*(3), 580–599. https://doi.org/10.1111/j.1467-9396.2012.01040.x

Schellenberg, M., Harker, M. J., & Jafari, A. (2018). International market entry mode—A systematic literature review. *Journal of Strategic Marketing*, *26*(7), 601–627. https://doi.org/10.1080/0965254X.2017.1339114

Shamsie, J., Phelps, C., & Kuperman, J. (2004). Better late than never: A study of late entrants in household electrical equipment. *Strategic Management Journal*, *25*(1), 69–84. https://doi.org/10.1002/smj.364

Shaver, J. M., Mitchell, W., & Yeung, B. (1997). The effect of own-firm and other-firm experience on foreign direct investment survival in the United States, 1987–97. *Strategic Management Journal*, *18*, 811–824.

Smith, A. (1987). Strategic investment, multinational corporations and trade policy. *European Economic Review*, *31*, 89–96. https://doi.org/10.1016/0014-2921(87)90018-3

Spencer, B., & Brander, J. (1983). International R & D rivalry and industrial strategy. *Review of Economic Studies*, *50*(4), 707–722.

Spencer, B., & Brander, J. (1992). Pre-commitment and flexibility: Applications to oligopoly theory. *European Economic Review*, *36*, 1601–1626. https://doi.org/10.1016/0014-2921(92)90008-K

van Damme, E., & Hurkens, S. (1999). Endogenous stackelberg leadership. *Games and Economic Behavior*, *28*, 105–129. https://doi.org/10.1006/game.1998.0687

van Damme, E., & Hurkens, S. (2004). Endogenous price leadership. *Games and Economic Behavior*, *47*, 404–420. https://doi.org/10.1016/j.geb.2004.01.003

Yu, C. M., & Ito, K. (1988). Oligopolistic reaction and foreign direct investment: The case of the U.S. tire and textiles industries. *Journal of International Business Studies*, *19*(3), 449–460. https://doi.org/10.1057/palgrave.jibs.8490391

Zachary, M. A., Gianiodis, P. T., Payne, G. T., & Markman, G. D. (2015). Entry timing: Enduring lessons and future directions. *Journal of Management*, *41*(5), 1388–1415. https://doi.org/10.1177/0149206314563982

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APPENDIX

NASH EQUILIBRIUM IN THE SIMULTANEOUS GAME

Let us explain in detail the resolution of the Nash equilibrium in the simultaneous choice between exports and *FDI* presented in Section 2. With linear demand and constant marginal costs we know that the second order conditions and the stability conditions ensure a maximum. Once we have obtained all the expressions of profits at the equilibrium, we establish the following conditions to ensure positive quantities (*CPQ*) and profits (*CPP*),

$$CPC^C \rightarrow a - c > 2t + 2\delta \tag{A1}$$

$$CPP^C \rightarrow G > \frac{(a-c-2\delta)^2}{9} \tag{A2}$$

Best responses (*BR*) by firm 2 are obtained by comparing all pairs of profits in exports versus FDI for firm 2. Given that firm 1 decides to export, firm 2 will choose the same internationalization strategy, as long as $\pi_2^C(E,E) > \pi_2^C(E,FDI)$ that is, when:

$$G > \frac{4t}{9}(a - c - 2\delta) \equiv g_{21}^C \tag{A3}$$

Otherwise, firm 2's *BR* will be to invest if G is smaller than g_{21}^C. The notation of the critical values in the appendix will be g_{ij}^C, where small g, denotes that all the values are critical thresholds for the setup cost G. As in the paper, superscript C refers to the Cournot setting, and the subscript $i = 1, 2$ stands for firm 1 and for firm 2, and $j = 1, 2$ denotes the number of the critical value when there exists more than one critical bound for a firm. We proceed in the same manner to construct the other critical values for firm 2 and the two that follow for firm 1, which are to be compared with the level of the setup cost. The critical values are the following:

$$\pi_2^C(FDI,E) > \pi_2^C(FDI,FDI) \rightarrow G > \frac{4t}{9}(a - c - t - 2\delta) \equiv g_{22}^C \tag{A4}$$

$$\pi_1^C(E,E) > \pi_1^C(FDI,E) \rightarrow G > \frac{4t}{9}(a - c + \delta) \equiv g_{11}^C \tag{A5}$$

$$\pi_1^C(E,FDI) > \pi_1^C(FDI,FDI) \rightarrow G > \frac{4t}{9}(a - c - t + \delta) \equiv g_{12}^C \tag{A6}$$

It can be checked that, considering the *CPQ* all the values g_{ij}^C increase with trade costs, making export obviously less attractive as it increases. However, the values of firm 2 decrease with the cost gap δ, discouraging entry via *FDI* for the less productive firm. The opposite is true for the more efficient firm. These values reflect the familiar trade-off between costs (proximity and concentration) and account for cost heterogeneity. By using the condition for positive quantities, we can order the four critical values. Specifically, the lower value is g_{22}^C and the upper one is g_{11}^C. The two intermediate values can be ordered in two ways, $g_{21}^C < g_{12}^C$ when $3\delta > t$ and $g_{21}^C > g_{12}^C$ otherwise.

TABLE A1 Cournot Nash equilibrium when $g_{21}^C < g_{12}^C$

CASE I bounds ordering	Cournot Nash equilibrium
$G < g_{22}^C < g_{21}^C < g_{12}^C < g_{11}^C$	(*FDI*,*FDI*)
$g_{22}^C < G < g_{21}^C < g_{12}^C < g_{11}^C$	(*FDI*,*E*)
$g_{22}^C < g_{21}^C < G < g_{12}^C < g_{11}^C$	(*FDI*,*E*)
$g_{22}^C < g_{21}^C < g_{12}^C < G < g_{11}^C$	(*FDI*,*E*)
$g_{22}^C < g_{21}^C < g_{12}^C < g_{11}^C < G$	(*E*,*E*)

TABLE A2 Cournot Nash equilibrium when $g_{21}^C > g_{12}^C$

CASE II bounds ordering	Cournot Nash equilibrium
$G < g_{22}^C < g_{12}^C < g_{21}^C < g_{11}^C$	(*FDI*,*FDI*)
$g_{22}^C < G < g_{12}^C < g_{21}^C < g_{11}^C$	(*FDI*,*E*)
$g_{22}^C < g_{12}^C < G < g_{21}^C < g_{11}^C$	(*FDI*,*E*) and (*E*,*FDI*)
$g_{22}^C < g_{12}^C < g_{21}^C < G < g_{11}^C$	(*FDI*,*E*)
$g_{22}^C < g_{12}^C < g_{21}^C < g_{11}^C < G$	(*E*,*E*)

TABLE A3 Stackelberg Nash equilibrium when $g_{21}^F < g_{11}^L$

CASE I bounds ordering	Stackelberg Nash equilibrium
$G < g_{22}^F < g_{21}^F < g_{11}^L < g_{12}^L < g_{13}^L$	(*FDI*,*FDI*)
$g_{22}^F < G < g_{21}^F < g_{11}^L < g_{12}^L < g_{13}^L$	(*FDI*,*E*)
$g_{22}^F < g_{21}^F < G < g_{11}^L < g_{12}^L < g_{13}^L$	(*FDI*,*E*)
$g_{22}^F < g_{21}^F < g_{11}^L < G < g_{12}^L < g_{13}^L$	(*FDI*,*E*)
$g_{22}^F < g_{21}^F < g_{11}^L < g_{12}^L < G < g_{13}^L$	(*E*,*E*)
$g_{22}^F < g_{21}^F < g_{11}^L < g_{12}^L < g_{13}^L < G$	(*E*,*E*)

TABLE A4 Stackelberg Nash equilibrium when $g_{21}^F > g_{11}^L$

CASE II bounds ordering	Stackelberg Nash equilibrium
$G < g_{22}^F < g_{11}^L < g_{21}^F < g_{12}^L < g_{13}^L$	(*FDI*,*FDI*)
$g_{22}^F < G < g_{11}^L < g_{21}^F < g_{12}^L < g_{13}^L$	(*FDI*,*E*)
$g_{22}^F < g_{11}^L < G < g_{21}^F < g_{12}^L < g_{13}^L$	(*FDI*,*E*)
$g_{22}^F < g_{11}^L < g_{21}^F < G < g_{12}^L < g_{13}^L$	(*FDI*,*E*)
$g_{22}^F < g_{11}^L < g_{21}^F < g_{12}^L < G < g_{13}^L$	(*E*,*E*)
$g_{22}^F < g_{11}^L < g_{21}^F < g_{12}^L < g_{13}^L < G$	(*E*,*E*)

Considering the relationships between bounds we can obtain the following two different cases detailed in Tables A1 and A2. Therefore, depending on the size of the setup cost we can obtain different Nash equilibrium.

Summarizing, we can observe from the tables above that as long as the setup cost is under the lower bound $\underline{B}^c$ that corresponds with g_{22}^C, then both firms will choose the same internationalization strategy and will decide to invest, but if G is above the upper bound $\overline{B^c}$, that is g_{11}^C both firms

TABLE A5 Cases that arise when the leader is the less efficient firm

	Ordering of critical values
CASE I	$g_{12}^F < g_{21}^L < g_{11}^F < g_{22}^L < g_{23}^L$
CASE II	$g_{12}^F < g_{21}^L < g_{22}^L < g_{11}^F < g_{23}^L$
CASE III	$g_{12}^F < g_{21}^L < g_{22}^L < g_{23}^L < g_{11}^F$
CASE IV	$g_{21}^L < g_{12}^F < g_{22}^L < g_{11}^F < g_{23}^L$
CASE V	$g_{21}^L < g_{12}^F < g_{22}^L < g_{23}^L < g_{11}^F$
CASE VI	$g_{21}^L < g_{22}^L < g_{12}^F < g_{11}^F < g_{23}^L$
CASE VII	$g_{21}^L < g_{22}^L < g_{12}^F < g_{23}^L < g_{11}^F$

TABLE A6 Stackelberg Nash equilibrium when the leader is the less efficient firm

Conditions on the setup cost	Stackelberg Nash equilibrium
$G < \min\{g_{12}^F, g_{21}^L\}$	(*FDI*,*FDI*)
$g_{12}^F < G < g_{22}^L$	(*FDI*,*E*)
$g_{22}^L < G < g_{11}^F or g_{21}^L < G < \min\{g_{12}^F, g_{22}^L\}$	(*E*,*FDI*)
$\max\{g_{11}^F, g_{22}^L\} < G$	(*E*,*E*)

TABLE A7 Nash equilibrium when the less efficient leader can commit or wait

Conditions	Equilibrium outcomes
$G < \min\{g_{12}^F, g_{21}^L\}$	Stackelberg (*FDI*,*FDI*)
$g_{12}^F < G < \min\{g_{11}^C, g_{11}^F, g_{23}^L\}$ or $g_{11}^C < G < \min\{g_{11}^F, g_{23}^L, g_{24}^L\}$ or $g_{11}^F < G < g_{22}^L$	Stackelberg (*FDI*,*E*)
$g_{21}^L < G < g_{12}^F$ or $\max\{g_{12}^C, g_{12}^F, g_{23}^L\} < G < \min\{g_{11}^C, g_{11}^F\}$ or $\max\{g_{11}^C, g_{23}^L\} < G \langle g_{11}^F \text{and} \beta \rangle 0$	Stackelberg (*E*,*FDI*)
$\max\{g_{11}^C, g_{24}^L\} < G < g_{11}^F \text{and} \beta < 0$	Cournot (*E*,*E*)
$\max\{g_{11}^F, g_{22}^L\} < G$	Stackelberg (*E*,*E*)

TABLE A8 Numerical example for $a = 40; c = 5; \delta = 1; G = 40$

Firm 2/Firm 1	early *E*	late *E*	early *FDI*	late *FDI*
early *E*	−8;8.8	128;81	−7.8;−30.8	120.1;55.1
late *E*	60.1;153.1	113.8;136.1	52.6;131.1	106.8;112.1
early *FDI*	−48.5;8.5	104.5;72.5	−48.3;−3.1	96.1;45.5
late *FDI*	32.3;144.5	88.4;128.4	24;12.2	81;104

will export. For intermediate values of the setup cost, between $\underline{B^c}$ and $\overline{B^c}$, firms will choose opposite internationalization strategies. This corresponds with the graphical representation of the simultaneous part in Figure 1.

TABLE A9 Numerical example for $a = 40; c = 5; \delta = 1; G = 10$

Firm 2/Firm 1	early *E*	late *E*	early *FDI*	late *FDI*
early *E*	−8;8.8	128;81	−7.8;−0.8	120.1;85.1
late *E*	60.1;153.1	113.8;136.1	52.6;161.1	106.8;142.1
early *FDI*	−18.5;8.5	134.5;72.3	−18.3;−1	126.1;75.6
late *FDI*	62.3;144.5	188.4;128.4	54;152	111;134

TABLE A10 Numerical example for $a = 40; c = 5; \delta = 3; G = 10$

Firm 2/Firm 1	early *E*	late *E*	early *FDI*	late *FDI*
early *E*	−23.6;32.8	91.1;105.1	−22.7;24.6	84.5;111
late *E*	34.5;175.8	81;156.2	28.9;185	75.1;163.4
early *FDI*	−35.4;31.9	95.1;95.1	−34.5;23.7	88;100.3
late *FDI*	33.9;166.5	83.4;148	27.5;175.3	77.1;154.7

NASH EQUILIBRIUM IN THE SEQUENTIAL GAME WITH AN EFFICIENT LEADER

We follow with the sequential model from Section 2. As the Stackelberg game presents different output and profit expressions, we have the following conditions to ensure positive quantities (*CPQ*) and profits (*CPP*) where superscript *S* stands for Stackelberg:

$$CPC^S \rightarrow a - c > 3t + 3\delta \tag{A7}$$

$$CPP^S \rightarrow G > \frac{(a-c-2\delta)^2}{16} \tag{A8}$$

Since the game is solved backwards, we first need to define the *BRs* of the follower firm, in this case firm 2, and then that of the leader firm. Suppose that firm 1 decided to export, which would be the *BR* of firm 2? We compare $\pi_2^F(E,E) > \pi_2^F(E,FDI)$, and we obtain the next inequality:

$$G > \frac{3t}{16}(2a - 2c + t - 6\delta) \equiv g_{21}^F \tag{A9}$$

Firm 2's *BR* will be to export, as long as the setup cost is below g_{21}^F, and to invest otherwise. We use superscript *F* to denote the follower firm in the Stackelberg game and L for the leader firm. Similarly, the remaining critical values are obtained:

$$\pi_2^F(FDI, E) > \pi_2^F(FDI, FDI) \rightarrow G > \frac{3t}{16}(2a - 2c - 3t - 6\delta) \equiv g_{22}^F \tag{A10}$$

$$\pi_1^L(E, FDI) > \pi_1^L(FDI, FDI) \rightarrow G > \frac{t}{2}(2a - 2c + t - 6\delta) \equiv g_{11}^L \tag{A11}$$

$$\pi_1^L(E,E) > \pi_1^L(FDI,E) \rightarrow G > \frac{t}{2}(a-c+\delta) \equiv g_{12}^L \tag{A12}$$

$$\pi_1^L(E,FDI) > \pi_1^L(FDI,E) \rightarrow G > \frac{3t}{8}(2a-2c+t+2\delta) \equiv g_{13}^L \tag{A13}$$

By using the CPQ^S we obtain that all the critical values increase with t the trade cost. Once more the cost gap δ is negatively (positively) related with the values of the less (more) efficient firm and, as it widens, the range of setup cost for which entry via *FDI* will be the follower's (leader's) *BR* decreases (increases). The ranking for the critical values indicates that g_{13}^L is the biggest one, followed by g_{12}^L and the smallest value is g_{22}^F. However, the ordering between g_{11}^L and g_{21}^F is unclear. Thus, $g_{11}^L > g_{21}^F$ when $a-c > \max\left[CPQ, \frac{11t-26\delta}{2}\right]$. Therefore, we again can have two different cases and in each of them the position of the setup cost will define the sequential Nash equilibrium, as displayed in the following tables.

From Tables A3 and A4, we observe the first difference with the Cournot setting: sequentiality eliminates any multiplicity of equilibria. We also find different critical values defining when both firms choose *FDI*, a setup cost below $\underline{B}^S \equiv g_{22}^F$ and also when both firms export, that is when G exceeds $\overline{B^s} \equiv g_{12}^L$. This corresponds with the graphical representation of the sequential part in Figure 1.

NASH EQUILIBRIUM IN THE SEQUENTIAL GAME WITH AN INEFFICIENT LEADER

We now assume that firm 2 is given the opportunity to act as the leader. The equilibrium profits expressions if she chooses FDI and the follower exports are given by: $\pi_2^L(FDI,E) = \frac{(a-c+t-2\delta)^2}{8} - G$ and $\pi_1^F(FDI,E) = \frac{(a-c-3t+2\delta)^2}{16}$. In the other three outcomes the expressions are the following:

$$\pi_2^L(FDI,FDI) = \frac{(a-c-2\delta)^2}{8} - G;\ \pi_1^F(FDI,FDI) = \frac{(a-c+2\delta)^2}{16} - G \tag{A14}$$

$$\pi_2^L(E,FDI) = \frac{(a-c-2t-2\delta)^2}{8};\ \pi_1^F(E,FDI) = \frac{(a-c+2t+2\delta)^2}{16} - G \tag{A15}$$

$$\pi_2^L(E,E) = \frac{(a-c-t-2\delta)^2}{8};\ \pi_1^F(E,E) = \frac{(a-c-t+2\delta)^2}{16} \tag{A16}$$

Comparing the profit expressions, we proceed in the same manner as above to obtain the critical values that define the follower's and the leader's *BRs*. These are shown next:

$$\pi_1^F(E,E) > \pi_1^F(E,FDI) \rightarrow G > \frac{3t}{16}(2a-2c+t+4\delta) \equiv g_{11}^F \tag{A17}$$

$$\pi_1^F(FDI,E) > \pi_1^F(FDI,FDI) \rightarrow G > \frac{3t}{16}(2a-2c-3t+4\delta) \equiv g_{12}^F \tag{A18}$$

$$\pi_2^L(E,FDI) > \pi_2^L(FDI,FDI) \rightarrow G > \frac{t}{2}(a-c-t-2\delta) \equiv g_{21}^L \tag{A19}$$

$$\pi_2^L(E,E) > \pi_2^L(FDI,E) \rightarrow G > \frac{t}{2}(a-c-2\delta) \equiv g_{22}^L \tag{A20}$$

$$\pi_2^L(E,FDI) > \pi_2^L(FDI,E) \rightarrow G > \frac{3t}{8}(2a-2c-t-4\delta) \equiv g_{23}^L \tag{A21}$$

Now the ordering of the bounds is more complicated, and we can find seven different orderings. We summarize the cases and the Nash equilibrium in the following tables.

When the less efficient firm has the opportunity to lead the lower value that delimits the follow- the-leader's behaviour in *FDI* may come from the *BR* of firm 1, g_{12}^F, or from firm 2, g_{21}^L. The same happens with the upper values ensuring that both firms export: it should be the maximum between g_{11}^F from the follower firm and g_{22}^L from the leader's best response. This critical upper bound when the leader is less efficient is always lower than $\overline{B}^s$, when the leader is firm 1 and the opposite happens with the lower bound, so it is higher than $\underline{B}^s$. That means that the range of setup cost values for which firms choose opposite internationalization strategies is narrower when the leader is the less efficient firm. However, the relationship with the Cournot bounds is ambiguous. Opposite internationalization strategies in equilibrium are more likely to be observed in this game compared to the Cournot setting as long as we ensure a minimum oligopoly profitability, given the interrelation between the trade cost and the cost gap. This means that the maximum upper bound of this game will lie above response. This critical upper bound when the leader is less efficient is always lower than $-B^s$ and at the same time the minimum one will be below $\overline{B}^s$. More precisely the conditions are the following:

$$\text{For } 0 < \delta \leq \frac{3t}{32} \text{ and } a-c > CPQ \tag{A22}$$

$$\text{For } \frac{3t}{32} < \delta \leq \frac{t}{8} \text{ and } a-c > \frac{1}{2}(28\delta + 3t) \tag{A23}$$

$$\text{For } \frac{t}{8} < \delta \text{ and } a-c > 26\delta \tag{A24}$$

ENDOGENOUS LEADERSHIP

More efficient leader

In this game the critical values are the same as the ones calculated in the Cournot and Stackelberg games above, see Equations (A3)–(A6) and (A9)–(A13). As the game is calculated backwards, profits of firm 1 when committing always exceed the ones obtained in a simultaneous game

for the same internationalization strategy. For that reason, in the equilibrium the only relevant values are those from the sequential game, leading to the same orderings and Nash equilibrium depending on the level of setup cost as shown in the Stackelberg game for the more efficient leader. This proves Proposition 2.

Less efficient leader

Now the less efficient firm is given the opportunity to commit its output or wait. For the resolution of the game, we obtain the same critical values as the ones calculated in the Cournot and Stackelberg games above, see Equations (A3)–(A6) and (A17)–(A21). As happens when firm 1 is given the chance to lead or wait, for the same internationalization strategy, profits of the leader firm when committing always exceed the ones obtained under the Cournot game. Two more critical values arise, one on the setup cost and another one that regards oligopoly profitability; these are given by:

$$\pi_2^C(E,E) > \pi_2^L(FDI,E) \rightarrow G > \frac{1}{8}(a-c+t-2\delta)^2 - \frac{1}{9}(a-c-t-2\delta)^2 \equiv g_{24}^L \tag{A25}$$

$$\pi_2^C(E,E) > \pi_2^L(E,FDI) \rightarrow 0 > \frac{1}{8}(a-c-2t-2\delta)^2 - \frac{1}{9}(a-c-t-2\delta)^2 \equiv \beta \tag{A26}$$

The conditions that characterize the equilibrium in internationalization strategies depending on the level of setup cost are summarized in Table A7 and this proves Proposition 3.

NUMERICAL EXAMPLES WHEN THE ORDER OF MOVES IS ENDOGENOUS

There are two Nash equilibria: (early *E*, late *E*) and (late *E*, early *E*).
Product of deviations if firm 1 leads is $(153.1 - 136.1) \times (60.1 + 8) = 1157.7$
Product of deviations if firm 2 leads is $(128 - 113.8) \times (81 - 8.8) = 1025.24$

So (early *E*, late *E*) is the risk dominant equilibrium.

There are two Nash equilibria: (early *FDI*, late *FDI*) and (late *FDI*, early *FDI*).
Product of deviations if firm 1 leads is $(152 - 134) \times (54 + 18.3) = 1301.4$
Product of deviations if firm 2 leads is $(126.1 - 111) \times (75.6 + 1) = 1156.7$

So (early *FDI*, late *FDI*) is the risk dominant equilibrium.

There are two Nash equilibria: (early *FDI*, late *E*) and (late *FDI*, early *FDI*).
Product of deviations if firm 1 leads is $(185 - 163.4) \times (28.9 + 34.5) = 1369.44$
Product of deviations if firm 2 leads is $(88 - 75.1) \times (100.3 - 23.7) = 988.14$
So (early *FDI*, late *E*) is the risk dominant equilibrium.