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Dipartimento di Informatica e Sistemistica - Università degli Studi di Roma "La Sapienza" -Via Buonarroti 12 - 00185 Roma - Italia

Abstract

A home firm signals her private cost information by expanding in a foreign firm's country. Credible signalling to deter counter-entry may occur through a direct investment (but not through exports) and may even entail entering an unprofitable market. While this produces social benefits, uninformative signalling may be welfare-reducing. Hence, we argue that moderate to high location costs may be socially desirable. We also show that there are not simple monotonic relationships between technology/demand conditions and firms' entry modes. Thus, the signalling explanation of international expansion makes it possible to motivate some controversial empirical findings on a theoretical ground.

Keywords. Foreign direct investments; exports; oligopolistic rivalry; signalling games.

JEL classification. F12; F23; D82; C72.

1. Introduction

It is widely recognized that tackling informational asymmetries is inevitable to a firm which is about to enter a foreign market. In the theoretical literature on multinationals, Markusen (1995) notes that an incumbent in the foreign market holds superior information on local market characteristics. On the empirical side, a vast sample of multinationals indicated in survey questionnaires that the lack of information on foreign market demand and local costs has often curbed firms' international operations (United Nations, 1997). While

these informational failures mainly relate to country-specific variables, firm-specific informational asymmetries (e.g., about the local firms' costs) are also frequently cited as a significant barrier to foreign entry. According to Porter (1980), incumbent local firms often hold proprietary production technology that is difficult to evaluate for a potential foreign competitor. This may be due to favourable access to local distribution channels, as well as established relations with the local government. In hi-tech industries, the local firm could be engaged in innovative activities that cannot be perfectly monitored by a foreign firm. Thus, by the foreign firm's viewpoint, the local firm may have either gained or not the sole access to a technology allowing her to produce at a low cost.

Although any industry performance depends on the amount and nature of information available to competing firms, quite surprisingly, the effects of asymmetric information in international markets have been assessed to a limited extent, which is generally confined to strategic trade policy (see e.g. Collie and Hviid, 1994; Qiu, 1994; Wright, 1998). The basic framework of these models is one of single-plant national firms competing internationally supported by local governments. Thus, firms' location is exogenous. Moreover, national firms usually compete in third markets, so that their own countries are not directly affected by foreign rivals. Finally, these models emphasise normative concerns over positive ones.

A number of game-theoretic models endogenously find the pattern of firm location, production and trade as the outcome of strategic interaction in oligopolistic industries (see e.g. Horstmann and Markusen, 1992; Motta and Norman, 1996), but they assume firms competing under complete information. Even when a foreign firm is at an information disadvantage *vis-a-vis* a domestic one, the former is able to gather the information needed to start up local production by incurring an exogenous fixed cost.

Thus, an intriguing issue which emerges as still unexplored from the literature review entails explaining firms' international expansion modes based on strategic interaction under asymmetric information. This is the main purpose of this paper. Firms' rivalry is modeled as a signalling game where a home firm which is privately informed about her production cost chooses her action (either direct investment or export) to enter the market of a foreign firm, which in turn may opt for

a counter-entry or not[1]. The source of this informational asymmetry is assumed to be firm-specific[2]. It is thus necessary to allow for information strategic manipulation by the privately-informed firm trying to gain advantage on her rival. The basic idea is that the home firm's commitment in her entry strategy is a signal of productive efficiency aimed at dissuading the foreign firm from going abroad. In contrast, a failure to enter her rival's market may indicate that she is a high-cost producer.

As most studies in strategic trade policy, the proposed model heavily borrows from the important literature strand in industrial organization whereby signalling models are used to explain a broad variety of oligopolists' strategies (for a review related to entry deterrence, see Wilson, 1992). However, the signal we analyse in this paper is the location decision, so that the home firm signals its (private) cost information by committing to a particular *mode* of entry. This is in contrast to strategic trade policy studies, where a firm signals its cost information by committing to a particular *level* of output for a given mode of entry.

In the literature on multinationals, the exchange of information between agents has usually played a role for a firm's internalization decision, in so far as setting up a new plant abroad is compared with making arms-length transactions with local partners. Following a well-known intuition by Vernon (1966), Bagwell and Staiger (2003) show in a very recent paper that information transmission is also crucial for understanding the location decision. In fact, a firm may be led to expand abroad in order to signal private cost information to foreign rivals. In their model, an established firm in a domestic country competes with a number of additional entrant firms in a foreign market. However, competition occurs only in the new market, since entry of any kind is prohibited in the domestic country. Moreover, entry accommodation is the only feasible alternative in the foreign country. Conversely, according to Brander (1995), our paper defines a "reciprocal-markets model". In addition, the home firm's location choice is a signalling device for entry deterrence. Finally, our

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[1] To prevent confusion, the home firm is hereafter referred to as "she" and the foreign firm as "he".

[2] Assuming asymmetric information is standard practice in signaling models. This simplifies the analysis compared to two-sided incomplete information, but is not crucial for the results.

model explicitly considers the possibility that a firm decides not to sell abroad at all[3].

The signalling interpretation of international expansion sheds new light on the dichotomy between the technology sourcing *versus* technology exploitation motivations for foreign direct investments[4]. In fact, by placing emphasis on *uncertainty* about technology, rather than on technology *per se* (as in the traditional paradigm), we are able to interpret both a low-cost and a high cost producer's investment abroad as an attempt to exploit her private information (i.e. ownership) advantage[5]. Consistent with some empirical evidence (Mutinelli and Piscitello, 1998), we also find that leading innovative firms might desist from investing abroad not so much to avoid technology dissipation as for the lack of information on their rivals' technology (i.e., an ownership disadvantage).

The results obtained in this paper may also provide further controversial empirical findings with a theoretical underpinning. In fact, plant-specific fixed costs and transport costs are widely

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[3] Haucap, Wey and Barmbold (2000) and Herander and Kamp (2003) are further relevant papers. The former explores the role the location of production may have as a signal for a firm's product quality, but it focuses on informational asymmetries between firms and consumers, rather than between domestic and foreign firms. The latter studies how an informed domestic firm may alter the entry mode of an uninformed foreign firm, but it considers the standard quantity-setting signal and prevents the domestic firm from expanding abroad.

[4] The traditional paradigm claims that foreign direct investments are undertaken to exploit some firm-specific technology-related advantage (see e.g. Dunning, 1993). However, recent work (see e.g. Fosfuri and Motta, 1999) suggests that firms may invest abroad not so much to exploit some advantage as to acquire new technological knowledge from localised spillovers (*technology sourcing*). In this framework, technological leaders might refrain from investing abroad to avoid knowledge diffusion (i.e. technology dissipation). The technology sourcing hypothesis has received fairly good support from survey evidence, but weak support from econometric evidence (see e.g. Neven and Siotis, 1996). Since the latter validates the *technology exploitation* hypothesis (in contrast to fear of technology dissipation), then firm-specific ownership advantages still appear to be powerful determinants of foreign direct investments (Love, 2003).

[5] If firms' capacities are strategic substitutes in the world market, then a foreign direct investment by one firm is expected to induce a rival to refrain from investing abroad. A relevant example is that of South Korean companies, such as Samsung and Hyundai, which in the 1990s collectively lost billions of dollars on their initial investments in the world market of memory chips. However, these investments pre-empted Japanese firms and caused them to scale back their plans, so that South Korean manufacturers replaced Japanese makers as the main producers of memory chips.

recognised as key determinants of firms' expansion modes. However, empirical studies, in contrast with the established theoretical literature, do not support a simple direct relationship. While in some cases distance (a *proxy* for transport costs) is found to encourage direct investments abroad to the detriment of exports (for US firms, see Brainard, 1997), in other cases the opposite result prevails (for Italian firms, see Mutinelli and Piscitello, 1998), or there is not a clear-cut relationship (for foreign direct investments into the US, see Blonigen, 2002).

In this perspective, this paper shows that firms' expansion modes cannot be univocally derived from technologies and market conditions. In addition, consistent with the general framework of signalling models, this paper investigates: (a) whether and how either credible signalling (in a separating equilibrium) or uninformative signalling (in a pooling equilibrium) affect firms' choices of which markets to serve; (b) what is the signalling value of each entry mode; (c) what are the related welfare effects and policy implications.

The strategic literature on multinationals assumes that foreign direct investments act to increase competition in host countries. This paper argues that informational aspects define a complementary view about the expected welfare effects of a location decision. While an inward investment reduces industry concentration in the host country, an outward investment may well be undertaken by an incumbent to preserve her domestic monopoly rents. In this framework, the home firm may enter the foreign market even if such an entry is not profitable *per se*, since it deters her rival's counter-entry[6]. We show that the net welfare effects depend on the home firm's decision of locating abroad being able to effectively transmit cost information to her rival. Thus, we argue that, whenever moderate to high location costs make a direct investment profitable to a low-cost firm, but not to a high-cost one, they might be socially beneficial (in the host country and at the world level). While this is fairly in contrast to much of the recent trade literature (even when strategic issues are considered; see e.g. Fumagalli, 2003), it is in line with other relevant signalling models (Bagwell and Staiger, 2003; Haucap, Wey and Barmbold, 2000).

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[6] Swedenborg (1979) finds that, inconsistent with a simple cost-minimizing view of the plant location decision, Swedish multinationals are more likely to invest in countries with comparatively high wage rates.

This paper is organised as follows. Section 2 introduces the model. Section 3 examines the direct investment option, while Section 4 analyses the exporting option. Section 5 deals with firms' international expansion mode choices. Section 6 contains concluding remarks.

2. The model

Consider a world of two countries, *A* and *B*, each with one domestic firm, *firm* 1 (the *home firm*) and *firm* 2 (the *foreign firm*) respectively. Each firm enjoys a monopoly in its own market, produces a homogeneous good and decides on quantities. National markets are segmented. Firm 1 may enter country *B* by either establishing a manufacturing plant or exporting her output. Then, firm 2 is allowed counter-entry in country *A* by either installing a plant or exporting his output. Firms incur either a plant-specific fixed cost *G* (related to a direct investment abroad) or a unit transport cost *s* (related to exporting). Since both firms have already established a plant in their own countries, then they have already sunk the costs relative to the knowledge-based assets necessary to operate. Thus, for simplicity, firm-specific fixed costs are normalized to zero.

Firms also incur a constant marginal and average variable cost. The home firm (but not the foreign firm) has private information about her marginal cost, which identifies her type. The home firm may achieve either a *low* (c_L) or a *high* (c_H) marginal cost, while that cost is c_2 for the foreign firm. This information structure is common knowledge. The following linear inverse demand function is considered in each country:

$$p_j = a - b(q_{1j} + q_{2j}) \tag{1}$$

where p_j denotes the price of the good in country j (j=A,B), q_{ij} denotes the quantity of the good sold by firm i (i=1,2) in country j, while $1/b$ measures the size of each market.

Let us indicate a firm's action with *F* if it makes a direct investment in the rival firm's country; with *E* if it supplies the host country via exports and with *N* if it does not sell abroad at all. Let (*U*-*V*) denote the market structure resulting from the combination of the home firm's choice *U* and of the foreign firm's choice *V*, with $U,V \in M=\{F,E,N\}$.

The timing of the game is as follows. Nature draws a type for the home firm from the set of feasible types $T=\{c_L,c_H\}$ according to the prior probability distribution $\{\Pr(c_L)=\alpha,\ \Pr(c_H)=1-\alpha\}$, where $0<\alpha<1$, that is assumed to be common knowledge. In the first stage of the game, the home firm learns her type and then chooses an action from the feasible set M. In the second stage, the foreign firm observes the home firm's action and updates his beliefs about his rival's type, which is not observable. Let $(\beta,1-\beta)$, $(\gamma,1-\gamma)$ and $(\delta,1-\delta)$ respectively denote the (posterior) foreign firm's beliefs at the information sets following the home firm's actions F, E and N. Then, the foreign firm chooses an action from M. When two firms operate in any given country (irrespective of their mode), they play *à la* Cournot. The final objective of both firms is to maximize their payoff. Firms' payoffs depend on the home firm's type and on both firms' actions.

The appropriate solution concept for this signalling game is the *perfect Bayesian equilibrium* (*PBE*). A pure-strategy *PBE* is a set of strategies and beliefs such that, at any stage of the game, strategies are optimal given the beliefs, and the beliefs are obtained from equilibrium strategies and observed actions by using Bayes' rule. A *PBE* of the game is *refined* if it satisfies a proper equilibrium refinement criterion[7]. Since the set of feasible moves and the number of types are discrete and finite, the game is also finite. Hence, there always exists at least one equilibrium (see e.g. Fudenberg and Tirole, 1991).

When each type selects a different action, the home firm is playing a *separating* strategy. Then, the first stage action fully reveals her type to the foreign firm, which accordingly updates his prior beliefs. When both types choose the same action, the home firm is playing a *pooling* strategy. Thus, the first stage action provides no additional information about her cost to the foreign firm, whose beliefs cannot be updated. A *PBE* is *separating* (*pooling*) whenever the home firm adopts a separating (pooling) strategy.

Depending on prior beliefs, for each possible market structure Table 1 shows each firm's profit functions, Table 2 indicates each firm's optimal output levels in each country under the Cournot assumption and Table 3 presents each firm's optimal profits, where $\bar{c} = \alpha c_L + (1-\alpha)c_H$. In the case of pooling strategies, posterior beliefs

[7] The requirements for a *PBE* and the equilibrium refinement criterion are formalized in Appendix A.

Table 1. Firms' profit functions for each possible market structure.

FIRM 2 / FIRM 1	***F***	***E***	***N***
F	$\Pi_1 = (a - b(q_{1A} + q_{2A}))q_{1A} + (a - b(q_{1B} + q_{2B}))q_{1B} + -c_k(q_{1A} + q_{1B}) - G$ $\bar{\pi}_2 = \left(\sum_k \Pr(c_k) \cdot \left[a - b\left(q_{1A}^k + q_{2A}\right) \right] q_{2A} - c_2 q_{2A} \right) +$ $+ \left(\sum_k \Pr(c_k) \cdot \left[a - b\left(q_{1B}^k + q_{2B}\right) \right] q_{2B} - c_2 q_{2B} \right) - G$	$\Pi_1 = (a - b(q_{1A} + q_{2A}))q_{1A} + (a - b(q_{1B} + q_{2B}))q_{1B} + -c_k(q_{1A} + q_{1B}) - G$ $\bar{\pi}_2 = \left(\sum_k \Pr(c_k) \cdot \left[a - b\left(q_{1A}^k + q_{2A}\right) \right] q_{2A} - (c_2 + s) q_{2A} \right) +$ $+ \left(\sum_k \Pr(c_k) \cdot \left[a - b\left(q_{1B}^k + q_{2B}\right) \right] q_{2B} - c_2 q_{2B} \right)$	$\Pi_1 = (a - b(q_{1A}))q_{1A} + (a - b(q_{1B} + q_{2B}))q_{1B} + -c_k(q_{1A} + q_{1B}) - G$ $\bar{\pi}_2 = \sum_k \Pr(c_k) \cdot \left[a - b(q_{1B}^k + q_{2B}) \right] q_{2B} - c_2 q_{2B}$
E	$\Pi_1 = (a - b(q_{1A} + q_{2A}))q_{1A} + (a - b(q_{1B} + q_{2B}))q_{1B} + -c_k(q_{1A} + q_{1B}) - s(q_{1B})$ $\bar{\pi}_2 = \left(\sum_k \Pr(c_k) \cdot \left[a - b\left(q_{1A}^k + q_{2A}\right) \right] q_{2A} - c_2 q_{2A} \right) +$ $+ \left(\sum_k \Pr(c_k) \cdot \left[a - b\left(q_{1B}^k + q_{2B}\right) \right] q_{2B} - c_2 q_{2B} \right) - G$	$\Pi_1 = (a - b(q_{1A} + q_{2A}))q_{1A} + (a - b(q_{1B} + q_{2B}))q_{1B} + -c_k(q_{1A} + q_{1B}) - s(q_{1B})$ $\bar{\pi}_2 = \left(\sum_k \Pr(c_k) \cdot \left[a - b\left(q_{1A}^k + q_{2A}\right) \right] q_{2A} - (c_2 + s) q_{2A} \right) +$ $+ \left(\sum_k \Pr(c_k) \cdot \left[a - b\left(q_{1B}^k + q_{2B}\right) \right] q_{2B} - c_2 q_{2B} \right)$	$\Pi_1 = (a - b(q_{1A}))q_{1A} + (a - b(q_{1B} + q_{2B}))q_{1B} + -c_k(q_{1A} + q_{1B}) - s(q_{1B})$ $\bar{\pi}_2 = \sum_k \Pr(c_k) \cdot \left[a - b(q_{1B}^k + q_{2B}) \right] q_{2B} - c_2 q_{2B}$
N	$\Pi_I = (a - b(q_{1A} + q_{2A}))q_{1A} - c_k q_{1A}$ $\bar{\pi}_2 = \left(\sum_k \Pr(c_k) \cdot \left[a - b\left(q_{1A}^k + q_{2A}\right) \right] q_{2A} - c_2 q_{2A} \right) +$ $+ \left(\left[a - b(q_{2B}) \right] q_{2B} - c_2 q_{2B} \right) - G$	$\Pi_I = (a - b(q_{1A} + q_{2A}))q_{1A} - c_k q_{1A}$ $\bar{\pi}_2 = \left(\sum_k \Pr(c_k) \cdot \left[a - b\left(q_{1A}^k + q_{2A}\right) \right] q_{2A} - (c_2 + s) q_{2A} \right) +$ $+ \left(\left[a - b(q_{2B}) \right] q_{2B} - c_2 q_{2B} \right)$	$\Pi_1 = \left(a - b\left(q_{1A}\right) \right) q_{1A} - c_k q_{1A}$ $\Pi_2 = (a - b(q_{2B}))q_{2B} - c_2 q_{2B}$

Table 2. Firms' optimal output levels for each possible market structure.

FIRM 2 / FIRM 1	*F*	*E*	*N*
F	$q_{1A}^{*}=\frac{2a-\bar{c}+2c_2-3c_k}{6b}$ $\quad q_{2A}^{*}=\frac{a+\bar{c}-2c_2}{3b}$ $q_{1B}^{*}=\frac{2a-\bar{c}+2c_2-3c_k}{6b}$ $\quad q_{2B}^{*}=\frac{a+\bar{c}-2c_2}{3b}$	$q_{1A}^{*}=\frac{2a-\bar{c}+2c_2+2s-3c_k}{6b}$ $\quad q_{2A}^{*}=\frac{a+\bar{c}-2c_2-2s}{3b}$ $q_{1B}^{*}=\frac{2a-\bar{c}+2c_2-3c_k}{6b}$ $\quad q_{2B}^{*}=\frac{a+\bar{c}-2c_2}{3b}$	$q_{1A}^{*}=\frac{a-c_k}{2b}$ $\quad q_{2A}^{*}=0$ $q_{1B}^{*}=\frac{2a-\bar{c}+2c_2-3c_k}{6b}$ $\quad q_{2B}^{*}=\frac{a+\bar{c}-2c_2}{3b}$
E	$q_{1A}^{*}=\frac{2a-\bar{c}+2c_2-3c_k}{6b}$ $\quad q_{2A}^{*}=\frac{a+\bar{c}-2c_2}{3b}$ $q_{1B}^{*}=\frac{2a-\bar{c}+2c_2-4s-3c_k}{6b}$ $\quad q_{2B}^{*}=\frac{a+\bar{c}-2c_2+s}{3b}$	$q_{1A}^{*}=\frac{2a-\bar{c}+2c_2+2s-3c_k}{6b}$ $\quad q_{2A}^{*}=\frac{a+\bar{c}-2c_2-2s}{3b}$ $q_{1B}^{*}=\frac{2a-\bar{c}+2c_2-4s-3c_k}{6b}$ $\quad q_{2B}^{*}=\frac{a+\bar{c}-2c_2+s}{3b}$	$q_{1A}^{*}=\frac{a-c_k}{2b}$ $\quad q_{2A}^{*}=0$ $q_{1B}^{*}=\frac{2a-\bar{c}+2c_2-4s-3c_k}{6b}$ $\quad q_{2B}^{*}=\frac{a+\bar{c}-2c_2+s}{3b}$
N	$q_{1A}^{*}=\frac{2a-\bar{c}+2c_2-3c_k}{6b}$ $\quad q_{2A}^{*}=\frac{a+\bar{c}-2c_2}{3b}$ $q_{1B}^{*}=0$ $\quad q_{2B}^{*}=\frac{a-c_2}{2b}$	$q_{1A}^{*}=\frac{2a-\bar{c}+2c_2+2s-3c_k}{6b}$ $\quad q_{2A}^{*}=\frac{a+\bar{c}-2c_2-2s}{3b}$ $q_{1B}^{*}=0$ $\quad q_{2B}^{*}=\frac{a-c_2}{2b}$	$q_{1A}^{*}=\frac{a-c_k}{2b}$ $\quad q_{2A}^{*}=0$ $q_{1B}^{*}=0$ $\quad q_{2B}^{*}=\frac{a-c_2}{2b}$

Table 3. Firms' optimal profits for each possible market structure.

FIRM 2 / FIRM 1	***F***	***E***	***N***
F	$\pi_1^* = \frac{(2a-\bar{c}+2c_2-3c_k)^2}{18b} - G$ $\pi_2^* = 2\left(\frac{2a-\bar{c}-4c_2+3c_H-3\alpha(c_H-c_L)}{6}\right)\left(\frac{a+\bar{c}-2c_2}{3b}\right) - G$	$\pi_1^* = \frac{(2a-\bar{c}+2c_2+2s)^2+(2a-\bar{c}+2c_2)^2-18c_k^2}{36b} + -c_k\left(\frac{4a-2\bar{c}+4c_2+2s-6c_k}{6b}\right) - G$ $\pi_2^* = \left(\frac{2a-\bar{c}-4c_2+3c_H-3\alpha(c_H-c_L)}{6}\right)\left(\frac{2a+2\bar{c}-4c_2-2s}{3b}\right) + -2s\frac{(a+\bar{c}-2c_2-2s)}{9b}$	$\pi_1^* = \frac{(2a-\bar{c}+2c_2-3c_k)^2+9(a-c_k)^2}{36b} - G$ $\pi_2^* = \left(\frac{2a-\bar{c}-4c_2+3c_H-3\alpha(c_H-c_L)}{6}\right)\left(\frac{a+\bar{c}-2c_2}{3b}\right)$
E	$\pi_1^* = \frac{(2a-\bar{c}+2c_2)^2+(2a-\bar{c}+2c_2-4s)^2-18c_k^2}{36b} + -c_k\left(\frac{4a-2\bar{c}+4c_2-4s-6c_k}{6b}\right)$ $\pi_2^* = \left(\frac{2a-\bar{c}-4c_2+3c_H-3\alpha(c_H-c_L)}{6}\right)\left(\frac{a+\bar{c}-2c_2}{3b}\right) + +\left(\frac{2a-\bar{c}-4c_2+3c_H-3\alpha(c_H-c_L)+2s}{6}\right)\left(\frac{a+\bar{c}-2c_2+s}{3b}\right) - G$	$\pi_1^* = \frac{(2a-\bar{c}+2c_2+2s)^2+(2a-\bar{c}+2c_2-4s)^2-18c_k^2}{36b} + -c_k\left(\frac{4a-2\bar{c}+4c_2-2s-6c_k}{6b}\right)$ $\pi_2^* = \left(\frac{2a-\bar{c}-4c_2+3c_H-3\alpha(c_H-c_L)}{6}\right)\left(\frac{2a+2\bar{c}-4c_2-s}{3b}\right) + -s\frac{(a+\bar{c}-2c_2-5s)}{9b}$	$\pi_1^* = \frac{(2a-\bar{c}+2c_2-3c_k-4s)^2+9(a-c_k)^2}{36b}$ $\pi_2^* = \left(\frac{2a-\bar{c}-4c_2+3c_H+2s-3\alpha(c_H-c_L)}{6}\right)\left(\frac{a+\bar{c}-2c_2+s}{3b}\right)$
N	$\pi_1^* = \frac{(2a-\bar{c}+2c_2)^2-9c_k^2}{36b} - c_k\left(\frac{2a-\bar{c}+2c_2-3c_k}{6b}\right)$ $\pi_2^* = \left(\frac{2a-\bar{c}-4c_2+3c_H-3\alpha(c_H-c_L)}{6}\right)\left(\frac{a+\bar{c}-2c_2}{3b}\right) + +\frac{a^2-c_2^2}{4b} - c_2\frac{(a-c_2)}{2b} - G$	$\pi_1^* = \frac{(2a-\bar{c}+2c_2+2s)^2-9c_k^2}{36b} - c_k\left(\frac{2a-\bar{c}+2c_2+2s-3c_k}{6b}\right)$ $\pi_2^* = \left(\frac{2a-\bar{c}-4c_2+3c_H-4s-3\alpha(c_H-c_L)}{6}\right)\left(\frac{a+\bar{c}-2c_2-2s}{3b}\right) + +\frac{a^2-c_2^2}{4b} - c_2\frac{(a-c_2)}{2b}$	$\pi_1^* = \frac{a^2-c_k^2}{4b} - c_k\frac{(a-c_k)}{2b}$ $\pi_2^* = \frac{a^2-c_2^2}{4b} - c_2\frac{(a-c_2)}{2b}$

are the same as prior ones, while the corresponding tables for separating strategies (and for the benchmark case with complete information) can also be obtained from Tables 1 to 3 by setting either α=1 (if the home firm is low-cost, i.e. c_k=c_L) or α=0 (if the home firm is high-cost, i.e. c_k=c_H).

For simplicity, in the following sections it is first analysed the *expansion vs. no expansion* dilemma, so that the cases where entry is based on either a direct investment or export are dealt with separately. The results obtained allow us to shed some light on the importance of strategic and informational incentives in firms' international rivalry. In addition, they provide us with fundamental insights to successively extend the analysis to the case where firms are allowed to select their entry modes.

3. The direct investment option

In this section, it is assumed that both firms may either invest abroad or stay in their domestic countries, so that each firm's set of feasible actions reduces to M={F,N}.

3.1. Benchmark case: complete information

By using backward induction, the binding parameter constraints can be easily derived for any combination of firms' actions to determine an equilibrium market structure and be part of a subgame-perfect Nash equilibrium of the two-stage game with complete information. By setting either α=1 (if c_k=c_L) or α=0 (if c_k=c_H) in Table 3, it follows that:

$$\pi_2(U-F) \geq \pi_2(U-N) \Leftrightarrow$$

$$G \leq \frac{(a+c_k-2c_2)^2}{9b} = \overline{G}_k, \qquad U=F,N; \;\; k=L,H, \tag{2}$$

where $\pi_i(U-V)$ denotes firm i's profit (i=1,2) when firm 1 plays U and firm 2 plays V (U,V∈M). The second stage game yields the optimal firm 2's choice as a function of firm 1's action in the first stage. Now, firm 1 plays F if:

$$\pi_1(F-V) \geq \pi_1(N-V) \Leftrightarrow$$