



## Cost heterogeneity and the destination of Japanese foreign direct investment: A theoretical and empirical analysis<sup>☆</sup>

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### ABSTRACT

This paper first of all develops a Cournot oligopolistic model with heterogeneous firms to examine each firm's choice between export-oriented foreign direct investments (FDI) and FDI to serve the host-country market. It is shown that there exist a critical level of efficiency such that all firms below that level choose the former and those above it the latter. The hypothesis is tested using firm-level data on 118,300 Japanese firms covering the entire manufacturing sector. Multinomial logit estimates strongly support our theoretical findings.

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## 1. Introduction

One of the consequences of globalization is an increased competitiveness in the world economy. Producers are having to find ways to serve the global marketplace in the most efficient possible way. Foreign direct investment (FDI) as a means to reach such a marketplace has been rapidly increasing in popularity. The importance of FDI in today's world economy cannot be over-emphasized. According to the recent UNCTAD FDI database, the ratio of FDI to global gross domestic product has surpassed 25 percent.<sup>1</sup> Rather than controlling inward FDI – which was the order of the 1960s and 70s – more and more countries are trying to attract FDI by creating favorable conditions. During the 1990s, 94 percent of FDI-related regulations were removed in both developed and developing countries (see UNCTAD (1998)).

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<sup>1</sup> In 2008, inward and outward FDI stock as a percentage of global GDP were 25 percent and 27 percent, respectively. In 2009, the ratio reached almost one-third partly due to the drop in GDP.

One reason for FDI is the proximity to consumers. However, this is not the only reason. For example, according to UNCTAD (1998), foreign-affiliate exports now make up about one-third of total world exports. Thus export-oriented FDI has also been increasing in currency. Furthermore, FDI can also take the form of either greenfield investment or cross-border acquisitions.

Because of its enormous importance in global economic activity, FDI has received a great deal of attention from academic economists, and the literature is vast. There are two broad strands in the theoretical literature. The first strand examines the incentives of foreign firms to take part in FDI and their choice among various alternative modes (including direct exports) to serve the intended markets. Brander and Spencer (1987), Ethier (1986), Helpman (1984), and Markusen (1984) are some of the early papers that belong to this aspect of the literature, and Ekholm et al. (2007) is a recent study. The second strand examines competition among host countries for FDI through public policies and analyzes the effects of FDI on the welfare of the host country. Grossman (1984), Haufler and Wooton (1999), Itagaki (1979), Janeba (1995), Lahiri and Ono (1998), and Tsai (1999) are some of the contributions to this part of the literature.

A growing body of recent literature acknowledges the fact that foreign firms are not homogeneous and examines to what extent firm heterogeneity can explain the choice of different modes of

reaching the global marketplace.<sup>2</sup> Yeaple (2003), and Grossman et al. (2005) examine the choice between vertical and horizontal FDI. Nocke and Yeaple (2007, 2008) consider the choice between cross-border acquisitions and greenfield FDI. In Helpman et al. (2004) the choice is between greenfield FDI and exports. Grossman and Helpman (2003) and Antras and Helpman (2004) consider the choice between foreign outsourcing and FDI.

This paper complements this new literature in three directions. First, we consider an oligopolistic industry rather than a monopolistically competitive one. Second, we consider the choice among heterogeneous firms between export-oriented FDI and FDI to serve the market in the host country. This distinction is important as, for example, FDI in Asia are heavily export-oriented, but FDI in the U.S. are mostly for serving local demand. Third, as opposed to the literature which uses U.S. data, we use Japanese manufacturing data.<sup>3</sup> We first of all develop a theoretical oligopolistic model with a number of firms that differ in their efficiency levels. Each of the firms has a choice of either making FDI in one host country and export all its output to its home country or investing in a second host country and sell its output in the host country. We characterize an equilibrium where one set of firms make export-oriented FDI and remaining firms invest in the second country. In the theoretical part we develop a number of hypotheses which are then tested, using multinomial logit analysis, for firm-level data from 118,300 Japanese firms covering the entire manufacturing sector there.

Empirical research on FDI has been severely constrained by the lack of availability of firm-level data. In the absence of such data, some of the early studies on FDI focused on host-country factors at aggregate levels (see, for example, Kravis and Lipsey (1982), Wheeler and Mody (1992), and Brainard (1997)). There is now a few micro data sets, and a new literature is growing side-by-side with the theoretical literature on FDI by heterogeneous firms. Head and Ries (2003) found that the Japanese firms investing in low-income countries seem weakly less productive than the firms investing in high-income countries, though their sample is limited to 1070 publicly listed firms. In the firm-country-year panel study for US FDI by Riker and Brainard (1997), the efficiency levels of firms is not considered at all. Helpman et al. (2004) relate intra-industry dispersion of efficiency levels with US firms' choice between FDI and exports. Finally, Nocke and Yeaple (2007, 2008) examine the role of efficiency levels among US firms in their choice between cross-border acquisitions and greenfield FDI. Finally, using the same data set as this paper, Tomiura (2007) examines Japanese firms' choice among outsourcing, FDI and exports.

The layout of the paper is as follows. The following section develops the theoretical framework. Section 3 carries out the econometric analysis, and some concluding remarks are made in Section 4.

## 2. A theoretical analysis

There are  $N$  firms belonging to a country (denoted by country  $H$ ) with constant marginal (average variable) costs  $c_i$ ,  $i = 1, \dots, N$ . These cost are assumed to be firm-specific, and not to depend on the location of the firms. These firms locate in one of two possible host countries. FDI in one of the host countries – called country  $a$  – is purely export oriented in the sense that outputs by the foreign

firms are exported back to either country  $H$  or any other country in the neighborhood of country  $H$ .<sup>4</sup> We assume that both countries have unemployment. The other host country – called country  $b$  – receives FDI to serve its own market. That is, outputs by foreign firms in country  $b$  are solely sold in country  $b$ . We shall call this country the consuming country. Thus, the motivation for investing in the two alternative host countries are quite different. We assume that country  $a$  offers some factor advantages which translate into a lower unit cost of production compared to both the home country and country  $b$ . In contrast, investing in country  $b$  is for reasons of market access which is often called trade-cost-jumping. This typically happens when the distance between country  $b$  and  $H$  is relatively high, as it is the case for Japanese FDI in OECD countries such as the U.S.A. and EU countries. High costs of factors such as land also translate into a relatively high fixed costs for investing in country  $b$  as compared to investing in country  $a$ . For these reasons, we assume that, in addition to the firm-specific costs, a firm that locates in country  $b$  will incur an *additional* location-specific unit cost  $k$  and an *additional* fixed cost  $F$ .

The firms located in countries  $a$  and  $b$  produce two different goods and compete in the Cournot oligopolistic markets in countries  $H$  and  $b$ , respectively. It should be noted that a firm must choose whether or not to FDI before choosing the destination of it. This first-stage choice is not an issue here, as Helpman et al. (2004) and others have already studied it.<sup>5</sup>

We shall establish an endogenous distribution of the firms in the two host countries, and this sorting equilibrium will be found by equating the profits of a marginal firm in the two countries. We consider a three-stage game. In stage 1, the firms make their location decisions. In stage 2, the governments decide on their policy levels, and in the final stage the firms compete in the output markets in Cournot oligopolistic manners. We work with backward induction in order to achieve a sub-game-perfect equilibrium.

Without loss of generality suppose that firms  $1, \dots, n$  are located in country  $a$  and firms  $n, \dots, N$  are located in country  $b$ . Since the marginal firm, *i.e.*, the  $n$ th firm, is indifferent between locating in the two countries, for characterizing the equilibrium we assume that this firm is located in both countries.

Total demand of goods in the two countries are  $D_b$  and  $D_H$ . Denoting the output of firm  $i$  while operating in country  $j$  by  $x_i^j$ , we have:

$$D_b = \sum_{i=n}^N x_i^b, \quad (1)$$

$$D_H = \sum_{i=1}^n x_i^a. \quad (2)$$

Inverse demand functions in the two countries are:

$$p_H = \alpha_H - \beta_H D_H, \quad (3)$$

$$p_b = \alpha_b - \beta_b D_b. \quad (4)$$

Profits of firms in the two countries are:

$$\pi_i^a(n) = (p_H - c_i + s_a)x_i^a, \quad i = 1, \dots, n, \quad (5)$$

$$\pi_j^b(n) = (p_b - c_j - k + s_b)x_j^b - F, \quad j = n, \dots, N, \quad (6)$$

where  $s_a$  is a uniform output subsidy in country  $a$  and  $s_b$  is uniform output subsidy in country  $b$ . We rule out firm-specific subsidies by implicitly assuming that such subsidies are informationally too

<sup>2</sup> Most of the papers in this literature uses the framework of monopolistic competition. An early paper that allowed for cost heterogeneity among monopolistically competitive firms is Montagna (1995) (see also Montagna (2001)). The wider literature on oligopolistic industry with heterogeneous firms is not voluminous either. An early work is Lahiri and Ono (1988). See Leavy and Montagna (2001) and Lahiri and Ono (2004) for more recent literature.

<sup>3</sup> There is also an emerging literature that examines the implications of FDI in Europe using micro firm-level data. See, for example, Conyon et al. (2002), Greenaway et al. (2004), and Görg and Greenaway (2004).

<sup>4</sup> Sometimes we shall call the host country where export-oriented FDI is made the export-oriented country.

<sup>5</sup> In our empirical analysis, we shall allow for this choice to test the robustness of our result.

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