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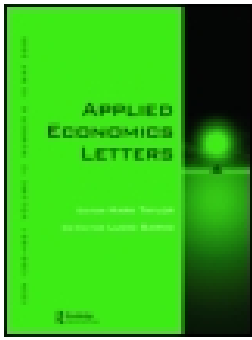
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## Exploring outward FDI and the choice of destination: evidence from Swedish firm-level data

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### ABSTRACT

Using Swedish firm-level data on all firms and their affiliates abroad, we investigate what observable firm and country characteristics affect the size of an affiliate in a particular destination. We employ the richness of the data to investigate the importance of destination country factors in explaining firm outward FDI activities and distinguish between the factors that affect such activities in manufacturing versus services firms as well as vertical versus horizontal investments. Our results lend support to existing theories of multinational activity of manufacturing but not services firms. We also find observable differences between vertical and horizontal manufacturing firms that are not always explained by theory.

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### I. Introduction

A vast amount of studies tries to explain the determinants of multinational activity. Empirical research has typically been conducted at the country-level, focusing on host-country characteristics and flows of aggregate FDI between countries. The driving forces at the level of the individual firm are, however, much less explored. As suggested by recent developments in international trade theory, firm characteristics are important determining factors of the firm's internationalization activities and mode of operation. The growing empirical literature on firm heterogeneity – made possible by accessible micro data sets – has so far mainly focused on the firm's export decision. Few studies have used firm-level data to analyse the operations of multinational firms – notable exceptions being Buch et al. (2005) and Görg, Mühlhens, and Nunnenkamp (2009) who use data on German firms, and Raff, Ryan, and Stähler (2012) who use data on Japanese firms.

This article makes use of a unique data set on Swedish firms' outward FDI for the period 2007–2011. Compared to the data used in the studies mentioned above, our data covers detailed information on the total population of firms and more distinctly all Swedish affiliates abroad, including their location over

a number of years. As we can combine a large number of firm attributes with characteristics of the host country, the data enable us to investigate the complex nature of the foreign investment decision. We concentrate on determinants of the size of the investment, and we distinguish between horizontal and vertical FDI, and between service and manufacturing firms. Our point of departure in explaining the size of the FDI are Helpman, Melitz, and Yeaple (2004) for firm-level determinants, and the proximity-concentration hypothesis of Brainard (1997) and the knowledge-capital model in Carr, Markusen, and Maskus (2001) in the case of destination country-level determinants.

Our contribution lies in the richness of the data and the main aim is to address the importance of country-level factors once heterogeneity at the firm level is controlled for. We also contribute to the empirical literature by proposing a method to distinguish between horizontal and vertical FDI in the data. Our findings suggest that traditional trade models explain the behaviour of firms well when it comes to FDI, but for manufacturing firms only. Thus, theoretical models need to be adapted to understand the factors that affect FDI decisions in the services sector, but also to account for observable differences between horizontal and vertical FDI decisions.

## II. Data and specification

Our firm-level data are obtained from the enterprise survey of Statistics Sweden and are matched with two data sets on firm trade data and firm FDI activity by destination. As the FDI data only cover the years 2007–2011, we restrict our investigation to these years. The trade data only cover manufacturing firms, while nontrade data cover both services and manufacturing. We are interested in the determinants of investment size and the location of Swedish outward FDI. For this aim, we estimate the following equation:

$$\log \text{empl}_{ijt} = \text{constant} + X'_{\{it\}}\alpha + Y'_{\{jt\}}\beta + \epsilon_{\{ijt\}} \quad (1)$$

Equation 1 describes investment size, proxied by the log number of employees of the Swedish firm  $i$ 's affiliate in destination  $j$  at time  $t$ ,<sup>1</sup> as a function of firm and destination characteristics, combined in the matrices  $X'_{\{it\}}$  and  $Y'_{\{jt\}}$ , respectively while  $\epsilon_{\{ijt\}}$  is the error term. We base our firm characteristics on the heterogeneous firm literature and control for the size of the parent firm (log employment) and total factor productivity (log TFP).<sup>2</sup> For manufacturing firms, we also include log exports and log imports to and from destination  $j$ . As previous studies suggest that agglomeration effects may be important in the firm's choice of FDI destination (see for example Head and Mayer 2004), we include as a control the percentage of firms in industry  $k$  that invest in destination  $j$  at time  $t$ .<sup>3</sup> Country characteristics are chosen in light of the proximity-concentration hypothesis (Brainard 1997) and the knowledge-capital model (Carr, Markusen, and Maskus 2001). These include market size (proxied by the log real GDP), log distance, a similarity index<sup>4</sup> to control for how similar the host country is to Sweden in terms of human capital and level of development, and measures for trade and investment climates, as well as the rule of the law to proxy for the quality of institutions.<sup>5</sup>

## Horizontal versus vertical FDI

To distinguish between horizontal FDI (motivated by market access) and vertical FDI (motivated by cost cutting), we use two different methods. The first method simply compares the core (2-digit NACE) industry of the affiliate with the top five core industries of the Swedish parent.<sup>6</sup> If there is at least one match, the affiliate is classified as horizontal, and otherwise it is classified as vertical. The second method makes use of the firm-level trade data to identify trade in intermediate or final goods between firm  $i$  and destination  $j$ . This method uses the industry comparison from method 1 but classifies affiliates as vertical if there are exports or imports of intermediate goods between the firm and the host country of the affiliate.<sup>7</sup> The rationale for this is that an import or export flow to the host country of the affiliate may signal that the affiliate is part of a global value chain that the firm has set up. Given that we only have trade data for manufacturing firms, the second method is limited to manufacturing. The two methods classify most of Swedish FDI as being horizontal but with significant vertical activity. This is in line with the knowledge-capital model that predicts a higher proportion of vertical FDI for a small and human-capital rich open economy such as Sweden.

## III. Results

We estimate Equation 1 using firm fixed effects and the results are presented in Table 1. In column 1, we include the entire population of Swedish firms with affiliates abroad. The coefficients on firm characteristics are insignificant suggesting that these have been controlled for by the fixed effects. The size of the affiliate is increasing in market size and in the quality of institutions (rule of law) of the host destination, and decreasing in distance and similarity. The latter finding implies that the less similar the host country is to

<sup>1</sup>We also have information on the sales by the affiliates, but the percentage of missing observations or zero sales are much higher than that of employment. We therefore choose to focus on employment by the affiliate as a measure of investment size.

<sup>2</sup>Measured according to the method by Aw, Chung, and Roberts (2000).

<sup>3</sup>Industry is defined as the 3-digit NACE industry.

<sup>4</sup>Calculated as  $1 - \left( \frac{\text{abs}(\text{GDP per capita}_j - \text{GDP per capita}_{\text{sweden},t})}{\max(\text{GDP per capita}_j, \text{GDP per capita}_{\text{sweden},t})} \right)$ ; the closer to 1 the more similar the host country is to Sweden in terms of development level and the closer to 0 the more dissimilar it is.

<sup>5</sup>GDPs and distances are taken from CEPII; rule of law index is from the World Governance Indicators of the World Bank; trade and investment climate measures are from the Heritage Foundation.

<sup>6</sup>This information is provided by Statistics Sweden.

<sup>7</sup>The classification of intermediate and final goods is made according to the Broad Economic Categories classification.

Table 1. Firm-destination regressions.

Dep. Var.: Log employment in affiliate	VFDI versus HFDI					
	(1) All	(2) Services	(3) Manuf.	(4) Services (method 1)	(5) Manuf. (method 1)	(6) Manuf. (method 2)
<b>Firm factors</b>						
Log empl	-0.019 (0.021)	0.010 (0.045)	-0.176*** (0.043)	0.018 (0.047)	-0.190*** (0.044)	-0.185*** (0.037)
Log TFP	-0.031 (0.025)	0.008 (0.028)	-0.048* (0.028)	0.013 (0.030)	-0.043 (0.027)	-0.040 (0.030)
FDI firms (%) in dest <i>j</i>	0.018 (0.014)	0.031* (0.017)	0.033 (0.020)	0.030* (0.017)	0.036* (0.020)	0.033* (0.019)
Log exports			0.033** (0.014)		0.035** (0.014)	0.185*** (0.037)
Log imports			0.031** (0.012)		0.031*** (0.012)	0.035*** (0.012)
<b>Country factors</b>						
Log real GDP	0.447*** (0.087)	0.205 (0.138)	0.539*** (0.089)	0.186 (0.136)	0.550*** (0.093)	0.563*** (0.097)
Log distance	-0.287*** (0.046)	-0.395*** (0.065)	-0.184** (0.079)	-0.403*** (0.074)	-0.195** (0.093)	-0.347*** (0.094)
Similarity index	-0.924*** (0.322)	-0.604 (0.629)	-0.898*** (0.234)	-0.697 (0.647)	-0.853*** (0.199)	-0.612** (0.274)
Trade climate	-0.001 (0.010)	0.006 (0.023)	-0.003 (0.011)	0.016 (0.023)	-0.010 (0.012)	-0.007 (0.012)
Investment climate	-0.000 (0.003)	-0.004 (0.005)	0.004 (0.003)	-0.004 (0.005)	0.003 (0.003)	-0.001 (0.004)
Rule of law	0.013** (0.006)	0.002 (0.011)	0.010* (0.006)	0.000 (0.011)	0.014*** (0.004)	0.013*** (0.004)
<b>Interactions</b>						
Log real GDP × VFDI				0.062 (0.058)	-0.072 (0.048)	-0.012* (0.060)
Log distance × VFDI				0.003 (0.125)	0.066 (0.086)	0.330*** (0.097)
Similarity × VFDI				0.244 (0.571)	-0.020 (0.384)	-0.369 (0.292)
Trade climate × VFDI				-0.026 (0.019)	0.027** (0.012)	0.008 (0.016)
Investment climate × VFDI				-0.000 (0.007)	0.007* (0.004)	0.011** (0.004)
Rule of law × VFDI				0.004 (0.012)	-0.016* (0.009)	-0.007 (0.006)
Constant	-7.024*** (2.676)	-0.213 (5.028)	-9.552** (2.277)	-0.392 (5.048)	-9.323*** (2.217)	-0.347*** (0.094)
R <sup>2</sup>	0.130	0.051	0.291	0.055	0.297	0.313
Observations	6585	3007	3578	3007	3578	3578

Notes: Each regression is based on firm fixed effects. All regressions include year dummies. SEs within parentheses are clustered by firm. Log denotes natural logarithm. \*\*\*Significant at 1%, \*\*significant at 5%, \*significant at 10%. VFDI: vertical FDI; HFDI: horizontal FDI.

Sweden, the larger the investment. This is opposite to findings for German firms (Buch et al. 2005), but in line with the knowledge-capital model for a small open economy. Combined with the coefficient on GDP, this result suggests that Swedish firms have significant vertical motives to tap into large factor markets.

In columns 2 and 3, we split the sample into services and manufacturing firms to check for differences between the two sectors. While the effect of agglomeration for manufacturing firms is not precisely estimated, it is similar in magnitude to the services sector where the coefficient is significant at the 10% level (elasticity 0.03). In manufacturing, trade flows to and from the destination country increase FDI to the host country (elasticity

0.03). There are also notable differences when it comes to host-country characteristics. In the case of services, the coefficients on market size and similarity are insignificant. The coefficient on distance is negative and significant and its size is more than twice that for manufacturing. Thus, services FDI seems to target countries that are closer geographically. On the other hand, for manufacturing firms, the coefficient for market size is positive and significant while that of the similarity index is negative and significant. This suggests that the vertical motives of FDI also identified in column 1 are more prevalent in manufacturing FDI in Swedish firms. Finally, the rule of law matters more for manufacturing firms. One possible reason may be

that manufacturing FDI may involve higher fixed costs than services FDI.

In columns 4–6, we distinguish between horizontal and vertical FDI using the classification methods presented above and by interacting a vertical FDI (VFDI) dummy with the country characteristics. We use classification method 1 for services and manufacturing firms in columns 4 and 5, respectively. In column 6, we use classification method 2 for manufacturing firms only. The results show no difference between horizontal and vertical FDI for services firms as signalled by the insignificant coefficients of the interaction terms. For manufacturing firms (column 5), the investment and trade climates of the host country matter more for vertical than horizontal FDI, while the rule of law matters less. The result for the rule of law is in line with the notion that horizontal FDI – which is market seeking – should be more concerned with the quality of institutions in the host country. In column 6, where we use a more restrictive classification for vertical FDI, the differences between the two types of manufacturing FDI become clearer. The coefficient of the interacted distance variable is positive and significant suggesting that vertical FDI goes where it is feasible to do so regardless of distance (the level and interacted variable coefficients for distance nearly cancel each other out). Also, vertical FDI is less market seeking than horizontal FDI and the investment climate matters more.

#### IV. Conclusion

We use a unique data set on Swedish firms' outward FDI to explain the size of the foreign affiliates using firm and country characteristics. When accounting for firm heterogeneity in different ways, we still find some support for existing theories on the determinants of FDI. We also uncover important differences between vertical and horizontal FDI of manufacturing firms as host-country GDP and distance seem to matter less for vertical FDI. Perhaps more importantly, our results suggest that services and manufacturing multinational firms behave differently in their FDI destination decisions, and that current models are better at explaining the manufacturing

firms' FDI behaviour. More theoretical work is therefore needed to help us understand FDI decisions in the services sector.

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#### Disclosure statement

No potential conflict of interest was reported by the authors.

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