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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 affiliate firms 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, including observable differences between vertical and horizontal manufacturing firms, as well as between services and manufacturing FDI firms.

Keywords: outward FDI, globalization, FDI destination, heterogeneous firms

JEL codes: F1, F2

I. Introduction

A vast amount of studies try 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 foreign direct investment (FDI) between countries. The driving forces at the level of the individual firm, however, are much less explored. As suggested by recent development in international trade theory, firm characteristics could be important determining factors of a firm's international status and mode of operation. The growing empirical literature on firm heterogeneity - made possible by new, disaggregated and more accessible data sets - has so far mainly focused on the firm's export decision. Few studies have

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used firm-level data to analyze the operations of multinational firms - notable exceptions being Buch et al. (2005) and Görg et al. (2009) who use data on German firms, and Raff et al. (2012) who use data on Japanese firms.

This paper makes use of a unique dataset 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 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 investment and we distinguish between horizontal and vertical FDI, and between service and manufacturing firms. 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.

2. 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 covers manufacturing firms, while the rest of the 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:

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

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*[1], 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 size of the parent firm (log employment) and log total factor productivity (TFP).[2] 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, e.g., Head

[1] 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.
[2] Measured according to the method by Aw et al. (2000)

and Mayer, 2004) we also control for this by including the percentage of firms in industry *k* that invested in destination *j* at time *t*.[3] Country characteristics are chosen in light of existing theories on the firm's FDI decision such as the proximity-concentration hypothesis of Brainard (1997) and the knowledge-capital model in Carr et al (2001). These include market size (log real GDP), log distance, a similarity index[4] 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.[5]

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 1st, 2nd, 3rd, 4th, and 5th core industries of the Swedish parent. If there is at least one match the affiliate is classified as horizontal, 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 will classify affiliates as vertical if there are exports or imports of an intermediate good between the firm and the host country of the affiliate.[6] 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.

3. 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 Sweden, the larger the investment. This is opposite to findings for German firms (Buch et al, 2005), but in line with the

[3] Industry is defined as the 3-digit NACE industry.

[4] Calculated as: $1-\left(\frac{abs(GDP\ per\ capita_{jt}-GDP\ per\ capita_{sweden,t})}{\max(GDP\ per\ capita_{jt},GDP\ per\ capita_{sweden,t})}\right)$; 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.

[5] 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.

[6] The classification of intermediate and final goods is made according to the BEC (Broad Economic Categories) classification.

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.

Table 1. Firm-destination regressions

	(1) All	(2) Services	(3) Manuf.	(4) Services	(5) Manuf.	(6) Manuf.
Firm Factors						
Log empl	-0.019	0.010	-0.176***	0.018	-0.190***	-0.185***
	(0.021)	(0.045)	(0.043)	(0.047)	(0.044)	(0.037)
Log TFP	-0.031	0.008	-0.048*	0.013	-0.043	-0.040
	(0.025)	(0.028)	(0.028)	(0.030)	(0.027)	(0.030)
FDI firms (%) in dest *j*	0.018	0.031*	0.033	0.030*	0.036*	0.033*
	(0.014)	(0.017)	(0.020)	(0.017)	(0.020)	(0.019)
Log exports			0.033**		0.035**	0.185***
			(0.014)		(0.014)	(0.037)
Log imports			0.031**		0.031***	0.035***
			(0.012)		(0.012)	(0.012)
Country factors						
Log real GDP	0.447***	0.205	0.539***	0.186	0.550***	0.563***
	(0.087)	(0.138)	(0.089)	(0.136)	(0.093)	(0.097)
Log distance	-0.287***	-0.395***	-0.184**	-0.403***	-0.195**	-0.347***
	(0.046)	(0.065)	(0.079)	(0.074)	(0.093)	(0.094)
Similarity index	-0.924***	-0.604	-0.898***	-0.697	-0.853***	-0.612**
	(0.322)	(0.629)	(0.234)	(0.647)	(0.199)	(0.274)
Trade climate	-0.001	0.006	-0.003	0.016	-0.010	-0.007
	(0.010)	(0.023)	(0.011)	(0.023)	(0.012)	(0.012)
Investment climate	-0.000	-0.004	0.004	-0.004	0.003	-0.001
	(0.003)	(0.005)	(0.003)	(0.005)	(0.003)	(0.004)
Rule of law	0.013**	0.002	0.010*	0.000	0.014***	0.013***
	(0.006)	(0.011)	(0.006)	(0.011)	(0.004)	(0.004)
Interactions						
Log real GDP × VFDI				0.062	-0.072	-0.012*
				(0.058)	(0.048)	(0.060)
Log distance × VFDI				0.003	0.066	0.330***
				(0.125)	(0.086)	(0.097)
Similarity × VFDI				0.244	-0.020	-0.369
				(0.571)	(0.384)	(0.292)
Trade climate × VFDI				-0.026	0.027**	0.008
				(0.019)	(0.012)	(0.016)
Investment climate × VFDI				-0.000	0.007*	0.011**
				(0.007)	(0.004)	(0.004)
Rule of law × VFDI				0.004	-0.016*	-0.007
				(0.012)	(0.009)	(0.006)
Constant	-7.024***	-0.213	-9.552**	-0.392	-9.323***	-0.347***
	(2.676)	(5.028)	(2.277)	(5.048)	(2.217)	(0.094)
R2	0.130	0.051	0.291	0.055	0.297	0.313
Observations	6585	3007	3578	3007	3578	3578

Note: Each regression is based on firm fixed effects. All regressions include year dummies. Standard errors within parentheses are clustered by firm. *** significant at 1%, ** significant at 5%, * significant at 10%

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 (a 1% increase in the number of industry peers with affiliates in a particular destination will increase the size of the affiliate by 3%). In manufacturing, trade flows

to and from the destination country increase FDI to the host country; a 1 per cent increase in the value of exports and imports increases the size of FDI by 3 per cent. 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 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 signaled 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 the law matters less. This is because horizontal FDI, which is market seeking, is 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 distance is irrelevant to the factor seeking vertical FDI. In other words, vertical FDI goes where it is feasible to do so regardless of distance. Also, vertical FDI is less market seeking than horizontal FDI and the investment climate matters more.

4. Conclusions

We have made use of a unique dataset 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 strong support for existing theories on the determinants of FDI. We also identify important differences between vertical and horizontal FDI of manufacturing firms as host-country GDP and distance seem to matter less for vertical FDI. In addition, our results suggest that services and manufacturing multinational firms behave differently and that current models are better at explaining the latter's FDI behavior.

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