What determines the FDI mode of entry?*

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Abstract

We examine the determinants of the mode of entry of multinational firms into the foreign economy using a novel firm-level dataset on German outbound FDI. Further, we allow the firm to select its investment mode (M&A vs. Greenfield investment) and its ownership mode (wholly-owned vs. partially-owned) simultaneously. We avoid the assumption of the independence of irrelevant alternatives by employing a simulated maximum likelihood estimator of a probit model. We find that as efficiency increases the firm is less likely to choose any mode of entry relative to a wholly-owned Greenfield affiliate. Firms with a high experience with host economy tend to select Greenfield entries to M&A entries regardless of the ownership structure. A high level of Corruption and a long distance from Germany both reduce the probability of M&A as a mode of entry.

Keywords: mode of entry, multinational firms, mergers and acquisitions, simulated likelihood, ownership structure, corruption

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1 Introduction

Multinational firms have to decide how to enter a foreign economy. This mode of entry decision is a combination of two decisions: the investment mode and the ownership mode. The decision on the investment mode is the decision between establishing a new venture (Greenfield investment) and merging with or acquiring an existing firm (M&A), while the decision on the ownership mode is the decision between establishing a wholly-owned affiliate and a joint venture (partially-owned affiliate). Hence, the set of entry alternatives available for a multinational firm consists of four options: wholly-owned Greenfield investment, wholly-owned M&A investment, partially-owned Greenfield investment and partially-owned M&A investment.

What determines the Foreign Direct Investment (FDI) mode of entry? We carry out an empirical analysis to provide the answer for this question and reconcile the evidence with the available theoretical predications. Variables of particular interest can be categorised as firm-specific characteristics (efficiency and experience of the parent firm) and country-specific characteristics (corruption and distance). Empirical evidence on the joint determinants of the mode of entry is rather scarce. Most available empirical studies consider a subset of possible entry options, i.e. either the investment mode or the ownership mode, omitting the rest. Typically, the estimation is carried out by employing a binary discrete choice model or in few cases a nested model in which a sequence of decisions is arbitrarily assigned. We argue that studying the mode of entry decision requires a joint and simultaneous consideration of all entry options. This task to be accomplished requires an adequate multinomial discrete choice model, and certainly a rich dataset that contains all needed information.

We organise our ideas as follows: In section two, we support our argument, and position our contribution to the literature by providing a brief survey of recent studies on the mode of entry of multinational firms. We point out how this topic is approached from different theoretical and empirical angels of international economics and industrial organisation. The main message is that most studies examine either the investment mode or the ownership mode. However, final conclusions end up stressing the importance of similar characteristics in affecting both decisions. For example, the strand in the literature on the investment mode concludes that more efficient firms prefer a Greenfield to a M&A investment; Nocke and Yeaple (2008). At the same time, the ownership strand concludes that more efficient firms prefer a whole ownership of the affiliate to a joint venture; Raff et al. (2009a). Then, will an increase in efficiency affect the mode of ownership or the mode of investment? What factors affects the decision to undertake a partially-owned Greenfield project or a wholly-owned cross-border acquisition? A similar pattern of questions arises in the context of the impacts of country-specific characteristics on the mode of entry decision. Will a decrease in corruption in the host economy affect the ownership preferences of the firm or will it affect the firm's decision to establish a Greenfield project or acquire another company? Probably both decisions will be affected. However, this would mean that both decisions will be affceted at the same time

and not necessarily in an independent manner. The firm considers all entry alternatives in its optimisation problem and picks the one that is associated with the maximum expected profit. It is this consideration that motivates us to allow for all four options at the same time in order to provide comprehensive evidence on the determinants of the FDI mode of entry.

In section three, we describe our econometrical approach in dealing with our question. The multiple entry alternatives available for a multinational firm require a multinomial discrete choice model. However, a standard multinomial logit model relies on the restrictive assumption of Independence of Irrelevant Alternatives (IIA). The IIA implies that, ceteris paribus, the relative odds of choosing between two alternatives are the same independently from the other available alternatives. We show that the assumption of the IIA is rejected in our sample. We circumvent the IIA assumption by employing a Maximum Simulated Likelihood Estimator (MSLE) of a probit model. The MSLE allows for a flexible pattern of error correlation. In this context, a proposal to model the entry mode as a sequence of decisions, i.e. a nested logit estimation, has the drawback of arbitrarily assigning a decision tree. The sequence of the moves is an assumption that can be debated. Do firms first decide the ownership share and then the mode of investment or the other way around? Our model allows the firm to simultaneously select among the four alternatives and avoids such assumptions about the decision tree.

In section four, we describe our data and present summaries from our non-parametric analysis. We use the Deutsche Bundesbank firm-level dataset on German outbound FDI covering about 2500 new affiliates in the period 2005-2007. This dataset enables us to directly identify the mode of entry since the German investor has to report the mode of investment (M&A or Greendfield) and the degree of participation in the affiliate aboard (ownership mode). Additionally, an important feature of this dataset is that we can identify new FDI entrants, i.e. we focus on firms' decisions at the entry. Furthermore, the data enable us to explicitly distinguish between horizontal and vertical FDI projects. The results of Kolmogorov-Smirnov tests suggest that there are statistically significant differences in the distributions of efficiency, international experience, host-economy-experience, corruption and distance depending on the ownership mode or the investment mode.

In section five, we present the results of our parametric analysis. We start by employing two binary logit models; one for the investment mode decision and one for the ownership mode decision. Our findings on German FDI confirm recent results on multinational U.S. firms by Nocke and Yeaple (2008) on the mode of investment and by Asiedu and Esfahani (2001) on the mode of ownership. For example, highly efficient firms tend to favour Greenfield to M&A investments and wholly-owned affiliates to partially-owned affiliates. Distance and corruption both have negative effects on the M&A probability and on the probability of a wholly-owned affiliate. However, there is a difficulty in interpreting these results because they are estimated independently for the probability of M&A and for the probability of wholly-owned affiliates. Hence, we proceed by presenting the results obtained from the MSLE. Our main findings can be summarised

as follows. (1) As efficiency increases the firm is less likely to choose any mode of entry relative to a wholly-owned Greenfield investment. (2) As international experience of the parent firm increases the likelihood of a wholly-owned M&A project increases relative to a wholly-owned Greenfield entry. (3) Firms that are highly experienced with host economy tend to select Greenfield entries to M&A entries regardless of the ownership structure. (4) A long distance from Germany to the host economy decreases the likelihood of choosing a M&A investment; especially a wholly-owned M&A investment. (5) A high corruption level in the host economy shift preferences of the parent firm away from M&A entries. (6) A high level of development in the host economy, as measured by GDP per capita, increases only the likelihood of a wholly-owned M&A project relative to a wholly-owned Greenfield investment.

We conclude this paper in section six. Our findings are relevant for theoretical modelling and for economic policy. Theoretically, our results obtained from the binary models support existing theoretical predictions. However, the results obtained from the multinomial MSLE probit model indicate in addition to the importance of incorporating in economic modeling all possible modes of entry. From a policy standpoint, different forms of market entry can have different implications on the host economy. Intuitively, M&A activities entail a reallocation of ownership rights while Greenfield investments involve international reallocation of capital, new labour demand and an increase in production capacity altering competition in the host economy. The pattern of technological spillover may also differ depending on the mode of entry. Understanding the determinants of the mode of entry decision of multinational firms is an important step for understanding the different economic implications of the different modes of entry.

2 Literature: Where do we stand?

2.1 Greenfield vs. M&A investments

While early studies on the theory of international trade and investment treat FDI firms as homogenous, recent contributions recognise the importance of differentiating between M&A and Greenfield investments.[1] Available models predict that firm-specific and country-specific characteristics play the major role in determining the mode of investment. Nocke and Yeaple (2008) show that more productive firms tend to enter the foreign market as a Greenfield rather than M&A investment. Additionally, more developed economies tend to attract M&A investments. They provide also empirical evidence on U.S. FDI firms from a binary model supporting this theoretical prediction. Neary (2007) introduces an oligopolistic market structure in a general equilibrium framework and shows that firms acquire their high cost revivals. In this model there are no Greenfield investments. In Nocke and Yeaple (2007), firms involve in M&A

[1] See Markusen (2002) and Faeth (2009) for overviews of earlier FDI theories. Helpman (2006) stresses the importance of considering the various forms of FDI projects.

activities to complement their abilities. In essence, the incentive of cross-border mergers is to exploit comparative advantages opportunities. While these models are essentially not necessarily models for horizontal FDI, similar conclusions arise in the context of horizontal FDI models. Raff et al. (2009a) show that highly productive firms tend to prefer Greenfield to M&A investments. Görg (2000) studies the decision between Greenfield vs. M&A in a duopolistic setup for horizontal firms. Bjorvatn (2004) shows that increased economic integration enhances cross-border M&A by reducing the reservation price and reducing the business stealing effect.

Empirically, Andersson and Svensson (1994) find that high technological skills and research and development intensity of the project favour Greenfield operations. Several recent empirical studies examine the determinants of cross-border bilateral M&A *flows*. For example, Coeurdacier et al. (2009) find that increased European integration and the Euro have fostered M&A activates in manufacturing sectors within Europe. Di Giovanni (2005) finds that financial deepening, as captured by the ratio of stock market capitalisation to GDP, plays a significant role in explaining M&A flows. Head and Rice (2008) estimate a model for evaluating multilateral inward and outward M&A flows. A number of studies consider differential implications of M&A FDI and Greenfield FDI on the host economy. Balsvik and Haller (2007) provide empirical evidence that the productivity spillover effect from multinational affiliates to domestic firms is negative in the case of Greenfield projects and positive in the case of M&A. A potential reason is a possible increase of domestic competition generated by Greenfield FDI. Egger and Egger (2008) examine the trade pattern and welfare effects of cross-border M&A. Haller (2009) shows that cross-border M&A can induce domestic M&A activities. Balsvik and Haller (forthcoming) examine differences in performance of Norwegian plans after acquisition distinguishing between domestic and foreign investors. Gugler et al. (2003) examine differences in performance after the occurrence of the M&A investment. Hebous et al. (2010) focus on the determinants of the location decision of multinational firms distinguishing between both modes of investment. Tekin-Koru (2010) studies how trade costs can have asymmetric effects on the mode of investment.

2.2 Wholly-owned vs. partially-owned subsidiaries

The efficiency of the firm is frequently stressed as an important factor determining the ownership mode. Less efficient firms prefer joint ventures to wholly-owned affiliates for efficiency gains considerations; Raff et al. (2009b) and Mugele and Schnitzer (2008). Hence, efficiency is deemed to be not only an important determinant of the investment mode as reviewed in the previous subsection but also of the ownership mode. In addition to firm-characteristics, several country-characteristics can affect the ownership mode. Distance in the model of Mugele and Schnitzer (2008) captures cultural differences, and serves as an information proxy. Therefore, long distance increases the value of a local partner to keep up with the host market conditions. Asiedu and Esfahani (2001) empirically examine the ownership decision and find that productivity,

infrastructure and country institutional setting impact the ownership structure of FDI firms. For instance, they find that high quality of law reduces the probability of choosing a wholly-owned affiliate. Javorcik and Wei (2009) find that a high level of corruption in the host economy shifts ownership preferences towards joint ventures. Openness to international investment is also an important factor. For example, some developing economies impose rules restricting the foreign ownership share in the affiliate. Kesternich and Schnitzer (2009) model how political risks in the host economy shift ownership preferences towards joint ventures. In their model, high risks induce whole ownership of the affiliate.

Another strand in the literature underlines that sharing the ownership of the affiliate is costly due to various reasons such as coordination and transaction costs, technology and control rights concerns, potential free riding by co-owners and difficulties in making decisions; Grossman and Hart (1986). A number of empirical studies emphasises in a panel framework differences between performances of wholly-owned and partially-owned affiliates; Desai et al. (2004) and Hebous and Weichenrieder (2010). Recent studies address the closely linked issue of whether or not the implication of FDI on the host economy differs depending on the mode of ownership. For example, the ownership structure may matter for productivity spillovers. Dimelis and Louri (2002) provide empirical evidence on positive productivity spillover from minority-owned foreign affiliates operating in Greece to Greek firms. Further, this effect is stronger than that in the case of wholly-owned affiliates. Javorcik and Spatareanu (2008) find a similar pattern for firms operating in Romania.

Overall, the overview presented in this section indicates the importance of similar factors in affecting both components of the mode of entry decision, the mode of investment and the mode of ownership, supporting a simultaneous consideration. A recent study by Raff et al. (2007) jointly estimates the ownership and investment mode probabilities using a nested model logit model. The sequence of the decisions in the theoretical framework and corresponding empirical analysis is based on the following assumptions: Given the decision to go abroad, the firm first decides between M&A and Greenfield investments. Afterwards, given that Greenfield is chosen the firm decides the ownership share. However, in case of a M&A the firm does not at all decide its ownership share. Using a sample on Japanese firms, they find inter alia that more productive firms prefer Greenfield to M&A, and wholly-owned to partially-owned affiliates given the choice of a Greenfield project.

3 Empirical methodology

Independently estimating the mode of investment and the mode of ownership can be accomplished by means of a binary discrete choice model; typically a logit model. For example, define the binary variable $ma = 1$ if the mode of entry is M&A and $ma = 0$ if the mode of entry is Greenfield. Then, the binary logit model estimates the log of the odds ratio $Pr(ma = 1)/1 - Pr(ma = 1)$. In the

same manner, one can define a binary variable capturing the ownership mode; $partial = 1$ if the affiliate is partially-owned and $partial = 0$ if the affiliate is wholly-owned.

However, as we argued, there are reasons to jointly consider all four entry options, that is to estimate a multinomial discrete choice model. Empirically, the use of a multinomial logit model is subject to the IIA assumption, which as we will show, can be rejected in our sample.[2] Instead, our approach for investigating the determinants of the choice of mode of entry is to rely on the Maximum Simulated Likelihood Estimator (MSLE) of a multinomial probit model. This is a highly flexible model that does not exhibit the IIA assumption and allows for correlation in the error terms.

Let $\pi_{i,m}$ stands for the expected utility (profit) of firm i associated with mode of entry m:

$$\pi_{i,m} = \mathbf{x}_i'\beta_m + \varepsilon_{i,m} \tag{1}$$

where $\mathbf{x}$ is a vector of regressors with the associated coefficient vector β_m. The choice of the regressors in $\mathbf{x}$ is based on the theoretical overview in the previous section. The errors are normally distributed $\varepsilon \sim N[0, \Sigma]$, where $\varepsilon = [\varepsilon_{i,1}...\varepsilon_{i,4}]$ and Σ is the variance-covariance matrix.

Let the variable y_i be defined to take the value m if the mth alternative is chosen by firm i. Let $m = 1$ denotes a wholly-owned Greenfield investment, $m = 2$ denotes a partially-owned Greendfield investment, $m = 3$ denotes a wholly-owned M&A investment and $m = 4$ denotes a partially-owned M&A investment. Further, introduce 4 binary variables ($y_{i,m}$) for each observation y_i such that $y_{i,m}$ equals 1 if the mode of entry m is the observed outcome:

$$y_{i,m} = \begin{cases} 1 \text{ if } y_i = m, \\ 0 \text{ if } y_i \neq m. \end{cases} \tag{2}$$

Among the four possible entry alternatives, a firm i selects the mode of entry m that is associated with the highest expected profit. The probability that the mode of entry m is chosen equals:

$$\begin{aligned} p_{i,m} &= \Pr[y_i = m] = \Pr[\pi_{i,m} \geq \pi_{i,k}] \\ &= \Pr[\varepsilon_{i,k} - \varepsilon_{i,m} \leq \mathbf{x}_i'\beta_m - \mathbf{x}_i'\beta_k] \ \forall k \neq m \end{aligned} \tag{3}$$

This is a trivariate normal integral. Specifically, let $m = 1$ be the reference alternative, $\varepsilon_{i,k} - \varepsilon_{i,m} = \varepsilon_{i,km}$ and $\mathbf{x}_i'\beta_m - \mathbf{x}_i'\beta_k = Z_{i,km}$ then:

$$p_{i,1} = \Pr[y_i = 1] = \int_{-\infty}^{Z_{i,41}} \int_{-\infty}^{Z_{i,31}} \int_{-\infty}^{Z_{i,21}} f(\varepsilon_{i,21}, \varepsilon_{i,31}, \varepsilon_{i,41}) d\varepsilon_{i,21} d\varepsilon_{i,31} d\varepsilon_{i,41} \tag{4}$$

[2] Recall, in the multinomial logit model $P_{i,m} = \frac{e^{\Pi^*_{i,m}}}{\sum_{k=1}^{4} e^{\Pi^*_{i,k}}}$, m =1, . . . , 4.

The log likelihood is approximated by a simulator $\tilde{p}_{i,m}$ that is based on a number of draws.[3] The MSLE maximises:

$$\ln \tilde{L}(\beta, \Sigma) = \sum_{i=1}^{N} \sum_{m=1}^{4} y_{i,m} \ln \tilde{p}_{i,m} \tag{5}$$

4 Data and descriptive statistics

According to the German foreign trade and payments regulation, all individuals investing abroad and satisfying the reporting requirements must report key figures such as the total balance sheet, total revenues and the degree of participation of the parent firm in the affiliate located abroad (ownership share). Ownership is defined as the share in nominal capital of the affiliate. Further, since 2005 investors are required to explicitly report whether the new investment is a Greenfield or M&A project by checking one out of four possible options in the reporting form: (1) new entry Greenfield project, (2) new entry M&A project, (3) already existing affiliate (the same affiliate has been reported in the last year), or (4) first time satisfying the reporting requirements (the affiliate existed last year but has not been reported). The first two options are the new FDI entrants; the focus of our study.[4] This is a notable piece of information that allows us to identify the mode of investment and moreover at the entry. Furthermore, we distinguish between vertical and horizontal FDI based upon information on the economic sector of the affiliate. We consider a project as a horizontal FDI if both the parent firm and its affiliate abroad are operating in the same sector and as a vertical (non-horizontal) FDI if the parent firm and its affiliate operate in two different sectors.[5]

The data covers the years 2005, 2006 and 2007. The first panel in figure (1) displays the total number of new outbound FDI projects (2508 affiliates) in our sample according to the mode of investment. About 61 percent of the new projects enter the foreign economy as M&A projects. This figure is similar for horizontal as well as vertical FDI. The second panel of figure (1) presents new FDI projects according to the mode of ownership. About 74.5 percent of the firms enter the host economy in the form of a wholly-owned affiliate. The proportion of wholly-owned affiliates is almost identical in both cases: horizontal and vertical FDI. The last panel of figure (1) shows detailed figures for every year in our sample according to the four possible modes of entry. In all considered three years, the most frequently selected mode of entry is wholly-owned M&A.

[3] The model is implemented by the Geweke-Hajivassiliou-Keane algorithm. The reader is referred to Train (2009) chapter (5) for a detailed description of this procedure. The estimated values of covariances can reflect any substitution pattern between the modes of entry avoiding the IIA assumption.

[4] These confidential data are stored at the research center of the Deutsche Bundesbank and named the MiDi dataset. See Lipponer (2008) for further details on the MiDi dataset and the reporting requirements.

[5] We exclude from both classifications affiliates that are reported as "holding" firms. This reduces the sample size.

Figure 1: Outbound FDI according to the mode of entry

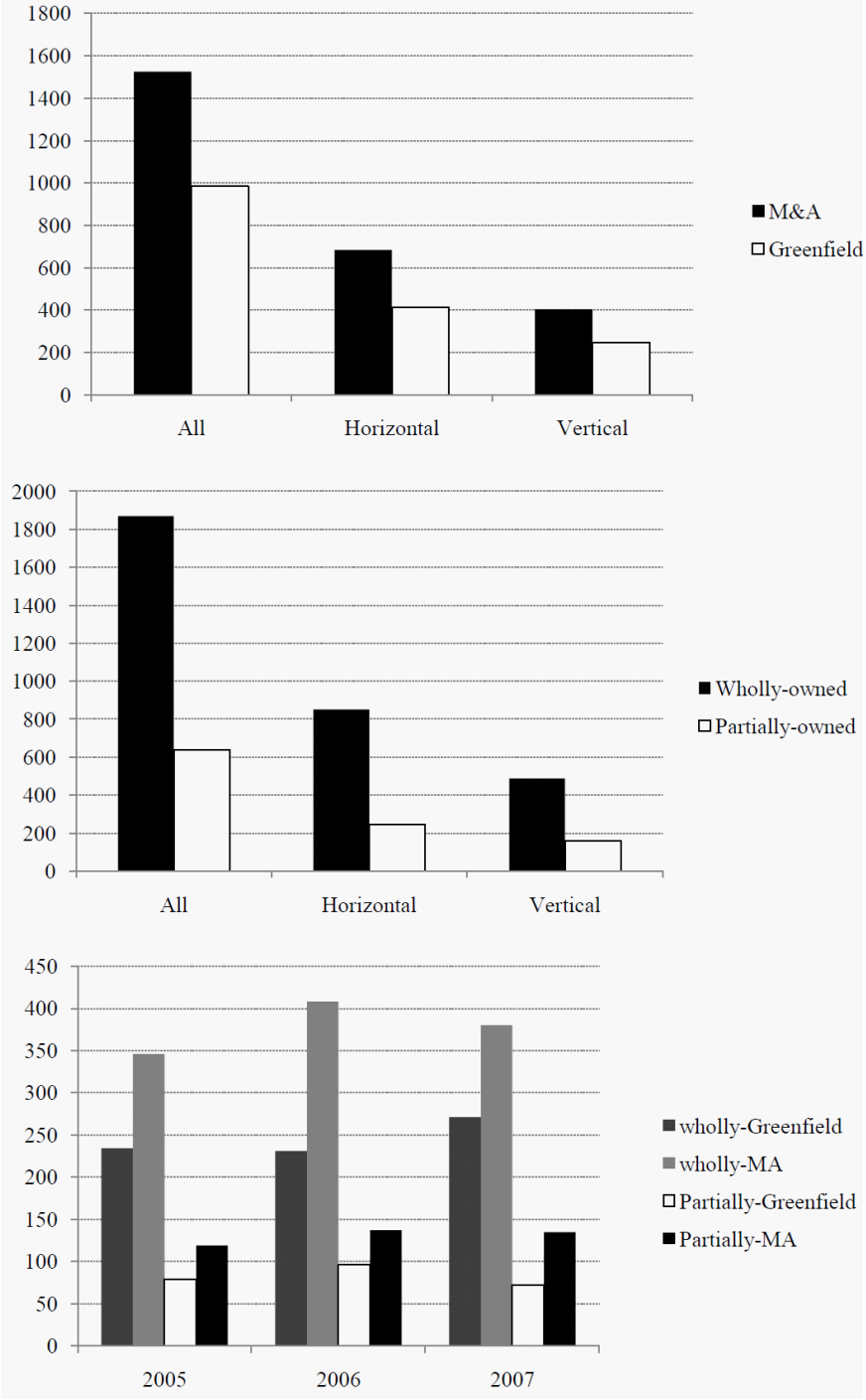

Table 1: Definitions and sources of varibales

Variable	Definition	Source
ma	dummy that takes the value 1 if the investment takes the form of M&A and zero if the investment is a Greenfield project	Deutsche Bundesbank
partial	dummy that takes the value 1 if the affiliate is partially-owned and zero if the is wholly-owned	Deutsche Bundesbank
y	count varibales that takes the value 1 or 2 or 3 or 4 denoting the mode of entry; $y = 1$ for W-Gr, $y = 2$ for W-MA, $y = 3$ for P-Gr, and $y = 4$ for P-MA.	Deutsche Bundesbank
y_m	dummy that is equal to 1 for the chosen mode and zero for the other three not selected modes; see relation (2)	Deutsche Bundesbank
$efficiency$	ratio of total revenue to total balance sheet	Deutsche Bundesbank
international experience	logarithm of the number of countries in which the parent firm operates	Deutsche Bundesbank
host economy experience	logarithm of the number of affiliates already operating in the host economy	Deutsche Bundesbank
GDP *per capita*	logarithm of gross domestic product per capita based on PPP of the host economy	WDI of the WB
distance	logarithm of the distance between Germany and the host economy	CEPII
corruption	minus the logarithm of the Corruption Perception Index. A high value indicates a high level of corruption	Transparency International
population	logarithm of the total number of inhabitants in the host economy	WDI of the WB
$rule\ of\ law$	rule of law index of the World Bank governance indicators. A high value indicates a high quality of law	the WB
openness	ratio of total trade (total imports plus total exports) of the host economy to gross domestic product of the host economy in current prices	IFS of the IMF
$economic\ freedom$	logarithm of the labour freedom component of the Heritage index of economic freedom	Heritage Foundation
market capitalisation	ratio of market capitalisation of listed companies to gdp	WDI of the WB
export share	ratio of exports to the host economy to total German exports	IMF Directions of Trade statistics
$R\&D/gdp$	ratio of government expenditure on research and development to gdp	UNESCO Statistics

The main message of figure (1) is that there is no dominating mode of entry for a specific year in our sample or for horizontal or vertical FDI. Table (1) summarises the definitions and the sources of the variables employed in our study. As mentioned in section (3), the first two variables: *ma* and *partial* are to be explained by binary logit models. The third and the fourth variables, y and y_m, are to be explained within the setup of the multinomial logit model (Hausman test) and the SML multinomial probit model, respectively. The rest of the variables listed in table (1) are explanatory variables chosen based on the survey in section 2. *Efficiency* is defined as the ratio of total revenue to total balance sheet, and serves as our proxy for the efficiency of the parent firm. It is expected to have a negative effect on *ma* and negative effect on *partial*. Further, we distinguish between international experience of the parent firm and experience that is specific to the host economy. *International experience* is measured by the logarithm of the number of countries in which the parent firm operates. *Experience with the host economy* is defined as the logarithm of the number of affiliates belonging to the parent firm that are already operating in the host economy. While high experience in general reduces the value of a local partner, high international experience may enable the firm to be more informed about international potential targets to be acquired and to be more effective in managing M&A challenges in conjunction with incorporating the new target in the group.

GDP per capita measures the level of development in the host economy. It is expected to have a positive effect on *ma* (Nocke and Yeaple; 2008) and a negative effect on *partial*. The variable *Distance* is the logarithm of the distance between Germany and the host economy. A long distance between the host economy and the country of parent firm is expected to have a negative effect on *ma* and a positive effect on *partial*; Raff et al. (2009) and Mugele and Schnitzer (2008). Distance can be interpreted as a proxy for cultural differences and information about the host economy. *Corruption* is captured by the Corruption Perception Index of Transparency International to capture the corruption level in the host economy. The index is redefined such that an increase in the index implies an increase in the level of corruption. *Population* measures the size of the host economy. *Rule of law* is the rule of law index published by the World Bank. A high value of this index indicates a high quality of law. *Openness* is the ratio of total trade (imports + exports) to GDP. It captures the openness of the economy to international trade. *Economic freedom* is the Heritage index of economic freedom. It reflects the openness of the host economy to international investment; Miller and Holmes (2009). *Market capitalisation* is the ratio of market capitalisation of listed companies to GDP, and is regarded as a proxy for financial deepening and the development of the market for equity in the host economy; Di Giovanni (2005). *Export share* is defined as the share of exports to the host economy in total German exports. It captures bilateral trade relations between Germany and the host economy and potential comparative advantage opportunities. All level variables are expressed in natural logarithm.

Additionally, we include the variable $R\&D/gdp$, that is the ratio of government expenditure on research and development (R&D) to the GDP of the host

economy. In the robustness analysis, to account for a potential role of differences in the nature of R&D across industries, we construct industry dummies based on the R&D intensity index of German FDI economic sectors.[6] This index is computed based on information on the ratio of R&D expenditure to the gross value added by industry, and published by the "Stifterverband für die Deutsche Wissenschaft" (the Association for the Promotion of Science) in Germany. The index has a minimum of 0.03% and a maximum of 18.32%, but exhibits a clear pattern of cluttering enabling us to categorise three groups of economic sectors: 1) low R&D sectors (a value of the index < 1.6; about 45% of the classified sectors), 2) high R&D sectors (value above 10; about 30% of classified sectors), and 3) moderate R&D sectors (values clustered around 5). Since the data contain affiliates in the wholesale trade sector (not classified), we add also a wholesale-trade dummy capturing this sector. Also, we add a dummy for holding firms since their "real" economic sectors are not observable.

Table (2) presents summary statistics including means and standard deviations of the included explanatory variables according to the four modes of entry. For example, average efficiency is the highest for the wholly-owned Greenfield mode of entry. International experience is reported to have the highest average for the group of wholly-owned M&A investments. Table (3) presents the coefficients of correlation between the explanatory variables. The coefficient of correlation between international experience and host economy experience is 0.35. The correlation between the corruption index and the rule of law index is positive and rather high (0.87). Also, the corruption index is negatively correlated with the share of R&D expenditure in GDP. Notably, the coefficient of correlation between *openness* and the *export share* is rather small.

For a further insight, we employ the two-sample Kolmogorov-Smirnov non-parametric test to check whether the distribution functions of our main variables of interest are statistically different depending on the mode of investment or the mode of ownership. The results of the tests are reported in table (4). For instance, the first entry in table (4) is the result of the combined tests that: 1) Efficiency for the group of M&A investments contains smaller values than efficiency of Greenfield investments. 2) Efficiency for the group of M&A investments contains larger values than efficiency of Greenfield investments. The combined significant statistic of 0.056 suggests that most efficient firms prefer Greenfield to M&A entries.[7] The results of the tests regarding the corruption level for example indicate that a high level of corruption discourages M&A projects (as compared to Greenfield investments) and shifts ownership preferences towards partially-owned affiliates. Overall, the results reported in table (4) suggest significant differences in the distribution functions of efficiency, international experience, host economy experience, distance and corruption depending on the mode of investment or the mode of ownership. To examine how these characteristics affect the FDI mode of entry decision, we present in the next

[6] Ideally, firm-specific R&D information can be used in the analysis. Alas, the data do not contain information on R&D expenditure at the firm level.

[7] See for example Conover (1999) for a detailed description of the Kolmogorov-Smirnov test.

Table 2: Descriptive statistics; averages and standard errors

	y = 1	y = 2	y= 3	y= 4
No. observation	736	1134	247	391
Variable:				
Efficiency	1.03	0.95	0.86	0.94
	(1.03)	(0.76)	(0.91)	(0.90)
International experience	1.77	2.11	1.56	1.70
	(1.20)	(1.24)	(1.27)	(1.28)
Host economy experience	1.15	1.14	1.17	0.98
	(0.60)	(0.63)	(0.71)	(0.47)
GDP per capita	9.95	10.14	9.79	9.89
	(0.80)	(0.58)	(0.92)	(0.81)
Distance	2.03	1.98	2.05	2.01
	(0.15)	(0.15)	(0.15)	(0.15)
Corruption	-1.68	-1.77	-1.57	-1.63
	(0.43)	(0.42)	(0.45)	(0.43)
Population	17.69	17.26	17.84	17.53
	(1.98)	(1.46)	(2.13)	(1.71)
Rule of law	0.91	1.13	0.77	0.84
	(0.94)	(0.83)	(0.98)	(0.90)
Openness	1.49	1.34	2.41	1.97
	(5.64)	(4.98)	(18.81)	(16.07)
Economic freedom	4.21	4.23	4.19	4.19
	(0.16)	(0.14)	(0.17)	(0.15)
market capitalisation	1.12	1.11	1.16	1.05
	(0.80)	(0.73)	(0.91)	(0.84)
Export share	0.04	0.03	0.03	0.03
	(0.03)	(0.03)	(0.03)	(0.03)
RD/gdp	1.67	1.80	2.10	2.00
	(0.81)	(0.80)	(0.10)	(0.10)

Standard errors are reported between parentheses

section the results of our parametric analysis usin discrete choice models.

Table 3: Coefficients of correlation

	Effic.	Inter. exper.	Exper. host econ.	GDP capita	Corrup.	Popul.	Rule of law	Openn.	Economic freedom	Market capital.	Distance	Export share	RD/gdp
Efficiency	1												
International experience	-0.01	1											
experience host economy	-0.10	0.35	1										
GDP per capita	-0.10	-0.09	0.09	1									
Corruption	-0.07	-0.05	0.10	-0.77	1								
Population	0.03	0.01	0.12	0.57	-0.42	1							
Rule of law	-0.07	-0.07	0.10	-0.85	0.87	-0.51	1						
Openness	0.00	0.01	-0.02	-0.00	-0.01	-0.13	-0.03	1					
Economic freedom	-0.08	-0.05	0.10	-0.80	0.79	-0.39	0.85	0.00	1				
Market capitalisation	-0.08	-0.05	0.05	-0.38	0.44	-0.17	0.44	-0.07	0.52	1			
Distance	-0.05	0.14	-0.01	0.42	-0.28	0.58	-0.43	-0.07	-0.16	0.09	1		
Export share	-0.04	-0.16	0.22	0.38	-0.37	0.25	0.43	-0.08	0.31	0.11	-0.29	1	
RD/gdp	-0.03	-0.10	0.10	0.54	-0.62	-0.04	0.66	-0.07	0.49	0.21	-0.16	0.46	1

Table 4: Kolmogorov-Smirnov two-sample tests

	MA vs. Greenfield		Partially vs. Wholly-owned	
	statistic	smaller group	statistic	smaller group
efficiency	0.056^b	MA	0.099^a	partially-owned
international experience	0.110^a	Greenfield	0.141^a	partially-owned
host economy experience	0.048	MA	0.088^a	partially-owned
distance	0.173^a	MA	0.088^a	wholly-owned
corruption	0.102^a	MA	0.115^a	wholly-owned

Note: ^{a}and ^{b} indicate significance at the level of 1% and 5%, respectively.

5 Empirical results

5.1 Binary (logit) model

Table (5) presents results from binary logit models. In specifications (1) to (3), the dependent variable is the log of the odd ratio of *ma* (mode of investment model) while in specifications (4) to (6) the dependent variable is the log of the odd ratio of *partial* (mode of ownership model). In non-linear models, estimated coefficients cannot be interpreted as marginal effects. Therefore, we compute the elasticity corresponding to each coefficient.[8] Robust heteroscedasticity-corrected standard errors are reported between parentheses. The findings can be summarised as follows. The model of the investment mode predicts that highly efficient firms and firms with high experience with the host economy tend to enter the foreign market as Greenfield investments. This finding is consistent with the theoretical predictions presented in for example Raff et al. (2009b). The coefficient of 0.47 indicates that firms with high international experience engage more often in M&A activities. A possible reason could be that firms with high international experience might be more informed about potential targets to be acquired than firms with low international experience. Also, highly internationally experienced firms might be more apt to manage the organisational challenges of incorporating the new acquired firm into the group. Concerning country-specific characteristics, corruption and distance both have negative effects on the M&A probability. Nocke and Yeaple (2008) find that the share of Greenfield projects of U.S. firms abroad in total U.S. outbound direct investment is decreasing in the distance between the US and the host economy. However, our finding suggests that this is not the case for German firms investing abroad. Potential reasons for this result is the central location of Germany in Europe and the importance of the share of east Europe in the total German outbound FDI stock. Large size of the host economy, as measured by population, and high level of development, as measured by GDP per capita, both have positive

[8] In terms of economic meaning (marginal effects), the logit and the probit models yield similar results. See for example Cameron and Trivedi (2005, chapter 14) for a rule of thumb to map the estimated coefficients of both types of models. Estimates from a binary probit model are available upon request.

effects on the probability of a M&A investment. These results are in line with Nocke and Yeaple (2008). The rule of law index and openness to international trade are both insignificant.

In specification (2), we include instead of the openness ratio the share of German exports to the host economy in total German exports. This measure might be a better proxy for bilateral trade relations than the openness ratio. The coefficient on the export share is negative and significant at the 5 percent level indicating that high share in German exports encourages establishing Greenfield FDI projects. The model of Krautheim (2009) predicts that some FDI projects are established especially to support exports. Our finding is consistent with this prediction, and suggests that the export-supporting FDI entry is more likely to take the form of a Greenfield investment. As a robustness check, we introduce in specification (3) industry-R&D intensity dummies to account for potential heterogeneity in preferences over the investment mode across various industry-R&D requirements as suggested by the model of Nocke and Yeaple (2007). Overall, the results are robust. The inclusion of these dummies does not affect the main findings.

The model of the ownership mode predicts a negative effect of the efficiency of the parent firm on the likelihood of entering the host economy as a partially-owned affiliate (for instance the coefficient of -0.128 in specification 4). This finding is consistent with the theoretical predictions reported in Javorcik and Saggi (forthcoming) and Raff et al. (2009b). High international experience increases the probability of entering the host economy as a wholly-owned affiliate. This finding is in line with the results reported in Asiedu and Esfahani (2001) on the effect of international experience on the preferences of U.S. multinational firms over the ownership structure. High experience with the host economy reduces the likelihood of entering the market as a joint venture. Distance and corruption both have a positive effect on the probability of a partial ownership of the affiliate. This finding supports the theoretical model of Mugele and Schnitzer (2008) in which distance serves as an information proxy. As the distance from Germany to the host economy increases, German investors become less informed about the host economy increasing the value a local partner. In line with our results on the impact of corruption on the mode of ownership, Javorcik and Wei (2009) also find that a high corruption level increases the value of a local partner.

Table 5: The mode of entry decision: binary models

Dependent variable:	the log of the odd ratio of ma						the log of the odd ratio of $partial$					
	(1)		(2)		(3)		(4)		(5)		(6)	
	coeff.	elast.	coeff.	elast.	coeff.	elast.	coeff.	elast.	coeff.	elast.	coeff.	elast.
$efficiency$	-0.079^c	-0.029^c	-0.104^b	-0.038^b	-0.090^c	-0.033^c	-0.128^b	-0.09^b	-0.117^c	-0.083^c	-0.129^b	-0.092^b
	(.04)	(.01)	(.04)	(.018)	(.05)	(.01)	(.06)	(.04)	(.06)	(.04)	(.06)	(.04)
international experience	0.319^a	0.23^a	0.315^a	0.23^a	0.314^a	0.236^a	-0.25^a	-0.35^a	-0.276^a	-0.399^a	-0.278^a	-0.402^a
	(.03)	(.02)	(.04)	(.03)	(.04)	(.03)	(.04)	(.05)	(.04)	(.04)	(.04)	(.06)
host economy experience	-0.470^a	-0.20^a	-0.443^a	-0.196^a	-0.420^a	-0.186^a	-0.02	-0.01	-0.059	-0.51	-0.080	-0.068
	(.08)	(.03)	(.08)	(.03)	(.08)	(.03)	(.09)	(.07)	(.10)	(.08)	(.10)	(.08)
gdp per capita	0.246^b	0.95^b	0.541^a	0.213^a	0.539^a	2.12^a	-0.40^a	-3.00^a	-0.281^c	0.212^c	-0.279^c	-2.11^c
	(.121)	(.46)	(.14)	(.08)	(.14)	(.58)	(.13)	(.96)	(.16)	(.12)	(.16)	(1.2)
distance	-2.40^a	-1.86^a	-2.99^a	-2.37^a	-3.03^a	-2.40^a	1.14^b	1.69^b	0.704	1.07	0.711	1.08
	(.43)	(.33)	(.55)	(.44)	(.07)	(.44)	(.47)	(.69)	(.60)	(.92)	(.60)	(.92)
corruption	-0.557^a	-0.378^a	-0.639^a	0.442^a	-0.659	-0.456^a	0.54^b	0.70^b	0.294	0.391	0.310	0.412
	(.20)	(.14)	(.21)	(.14)	(.21)	(.14)	(.21)	(.27)	(.22)	(.30)	(.22)	(.30)
population	0.059^c	0.40^c	0.235^a	1.62^a	0.225^a	1.55^a	-0.08^b	-1.08^b	0.030	0.40	0.035	0.476
	(.03)	(.23)	(.06)	(.43)	(.06)	(.44)	(.03)	(.49)	(.06)	(.92)	(.06)	(.92)
rule of law	-0.221	-0.08	-0.05	-0.02	-0.073	-0.02	0.20	0.14	0.411^b	0.302^b	0.423^b	0.311^a
	(.14)	(.05)	(.16)	(.06)	(.16)	(.06)	(.14)	(.10)	(.17)	(.12)	(.17)	(.12)
openness	-0.005	-0.003					0.007^b	0.008^b				
	(.005)	(.003)					(.003)	(.0003)				
economic freedom	0.14	0.24	-0.44	-0.73	-0.43	-0.71	-0.32	-0.99	-0.878	-2.80	-0.867	-2.767
	(.65)	(1.07)	(.70)	(1.17)	(.71)	(1.1)	(.72)	(2.2)	(.78)	(2.50)	(.78)	(2.51)
market capitalisation	-0.095	-0.040	-0.19^b	-0.08^b	-0.202^a	-0.084	0.10	0.08	0.115	0.092	0.120	0.096
	(.064)	(.02)	(.07)	(0.03)	(.07)	(.03)	(.06)	(.05)	(.08)	(.06)	(.08)	(.06)
export share			-7.62^a	-0.111^a	-7.53^a	-0.109^a			-2.20	-0.061	-2.27	-0.063
			(2.81)	(.04)	(2.8)	(.04)			(3.04)	(.08)	(3.04)	(.08)
R&D/gdp			-0.116	0.07	-0.115	-0.076			-0.276^a	-0.351^a	-0.277^a	-0.352^a
			(.08)	(.05)	(.08)	(.05)			(.09)	(.12)	(.09)	(.12)
Industry − R&D dummies	No		No		Yes		No		No		Yes	
No. observation	2508		2268		2268				2268		2268	
Log likelihood	-1601.3		-1447.6		-1444.1		-1418.3		-1234.8		-1233.2	

Note: ^{a}, ^{b}, and ^{c} indicate significance at the level of 1, 5, and 10%, respectively. $ma = 1$ if the mode of entry is M&A and $ma = 0$ if the mode of entry is Greenfield. $partial = 1$ for joint ventuers and $partial = 0$ if the ownership mode is wholly-owned. The reader is referred to table 1 for a detailed description of the explanatory variables. Robust standard errors are reported between parentheses.

Table 6: : Hausman test: IIA in the multinomial logit model

	All firms	Horizontal	Vertical
No. observation / unrestricted	2503	1097	649
No. observation / restricted	1375	570	340
χ^2	337.6	146.1	115.2
Hausman Test / H_0: IIA holds	$Pr > \chi^2$	$Pr > \chi^2$	$Pr > \chi^2$
	0.000	0.000	0.000

5.2 Multinomial logit model

While the results presented in the previous subsection are informative, they restrain the parent firm from selecting among all four possible modes of entry. A richer discrete multinomial choice mode is needed in order to relax this assumption and answer questions such as: How does a change in the efficiency of the firm alter its preferences over the investment mode and the ownership mode at the same time? A multinomial model enables us to estimate the effect of a change in an explanatory variable on the relative probability of choosing any of the four possible modes of entry.

The multinomial logit model however relies on the IIA assumption, according to which ceteris paribus the relative odds of choosing between two alternatives are the same independently from the other available alternatives. We employ a Hausman test to verify the validity of the IIA assumption in our data. The procedure of the test is as follows. First, estimate the unrestricted model including all modes of entry. Second, estimate a restricted model in which one mode of entry is discarded. Third, test whether or not there are systematic differences in the estimated coefficients of the restricted and the unrestricted model. The null hypothesis is that there are no systematic differences in the estimated coefficients; that is the IIA holds. Table (6) presents the results. The reference group in the estimated models is $y = 1$; wholly-owned Greenfield investments. According to the p-values (reported in the last row of table 6), we can reject the null of the IIA assumption at a high level of confidence in all specifications including both sub-samples; horizontal and vertical new entries.[9] This finding motivates the use of the SMLE of the multinomial probit model that does not exhibit the IIA assumption as outlined in section (3).

5.3 MSLE of a probit model

Table (7) presents the results obtained from the SMLE of the multinomial probit model. The reference group is $y = 1$; wholly-owned Greenfield investments. The p-values are computed based on robust standard errors corrected for possible heteroscedasticity. The main results can be summarised as follows. In the benchmark specification (column 1), the estimated coefficients on efficiency

[9] Since the multinomial logit model is rejected, its estimation results are not reported to economise on space. These results are available upon request.

are negative for all three modes of entry relative to the reference group. This suggests that as efficiency increases the firm is less likely to choose any mode of entry relative to a wholly-owned Greenfield investment. We could not draw such a conclusion from the binary model. The estimates of the binary model presented in the subsection (5.1) suggest that as efficiency increases the likelihood of choosing a wholly-owned affiliate increases regardless of the mode of investment; whether it is a Greenfield or M&A. The results obtained from the SMLE show that only the likelihood of a wholly-owned *Greenfield* investment increases but not that for a wholly-owned M&A investment.

The estimated effect of the level of international experience of the parent firm obtained from the SMLE is broadly consistent with the results obtained from the binary model. The coefficient of 0.287 in column (1) indicates that as international experience increases the likelihood of a wholly-owned M&A project increases relative to the reference group. However, the likelihood of a partially-owned Greenfield investment decreases relative to the reference group as indicted by the coefficient of -0.148. Succinctly, firms with high international experience tend to engage more in M&A activities than in Greenfield projects. Still, firms with high international experience prefer wholly-owned affiliates to partially-owned affiliates. A high level of international experience seems to reduce the value of a local partner. Specific experience with the host economy is estimated to have a negative sign for $y = 2$ relative to $y = 1$ (-0.291) and for $y = 4$ relative to $y = 1$ (-0.416). This finding suggests that familiarity with the host economy increases the likelihood of choosing a Greenfield project regardless of the ownership structure.

Concerning the effects of country-characteristics on the FDI mode of entry, we find that particularly three characteristics have significant explanatory power, namely, distance from Germany, the corruption index, and the level of development in the host economy as measured by GDP per capita. The results indicate that as the distance from Germany increases the preferences of the parent firm shift towards Greenfield investments while a wholly-owned M&A project becomes the least preferred mode. As the corruption level increases the likelihood of a wholly-owned M&A investment decreases relative to a wholly-owned Greenfield investment. The coefficient on the effect of corruption on the probability of a partially-owned Greenfield project (0.36) is significant only at the 15 percent level. However, by significantly affecting at least one mode of entry, a variable can indirectly affect the probabilities corresponding to the other modes. The level of development in the host economy has a positive effect on the likelihood of entering the foreign economy as a wholly-owned M&A affiliate. The SMLE add to the results of the binary models by indicating that especially partially-owned Greenfield entries are less likely to be selected in highly developed economies.

The estimation results reported in column (2) indicate that a high share in German exports reduces the likelihood of selecting a wholly-owned M&A as well as a partially-owned M&A investment as a mode of entry relative to a wholly-owned Greenfield investment. Additionally, the results are broadly robust for the inclusion of the R&D industry dummies (column 3). As a further

robustness analysis, we present separate results for Horizontal and vertical FDI affiliates in columns (4) to (7). However, since the SMLE is rather demanding in terms of degrees of freedom and power issues, the substantial shrink in the sub-sample size complicates convergence and significance. One notable results is that corruption seems to have asymmetric effects of on FDI mode of entry decision. In particular, vertical entries in the form of partially-owned Greenfield investments seem to be less sensitive to a high level of corruption in the host economy as compared to the results in the case of horizontal entries or the whole sample. Apart from the effects of corruption, overall, the main findings, particularly those for the firm-specific characteristics, seem to remain valid.

Hence, based on the estimated coefficients in tables (7), we can interpret the effects of the considered characteristics on a mode of entry *relative* to the reference group. However, although the likelihood of a certain mode of entry may increase relative to the reference group it may at the same time decrease in absolute terms. Further, based upon these estimates, we cannot infer the qualitative effects of a certain variable on selecting the mode of entry of the reference group. Therefore, to obtain more insights into the impacts on the likelihood of a wholly-owned Greenfield investment and the other three modes, we compute elasticities corresponding to each variable and for all modes of entry. These elasticities can be recovered as follows. First, based on our estimates and the observed values of the explanatory variables, we predict the probability of choosing a mode of entry. Second, we re-predict the probability of choosing a mode of entry after increasing the value of a single explanatory variable by 10 percent keeping all other variables fixed. Third, we compare both predicted probabilities before and after the change in the control. Thus, the reported elasticity of a certain variable is the *percentage change* in the probability due to a 10 percent increase in that variable while keeping all other variables unchanged.[10] We are particularly interested in the sign of the effect. Table (8) presents these elasticities. For instance, a 10% increase in the efficiency measure of the parent firm (for example from 35% to 38.5%) increases the probability of selecting a wholly-owned Greenfield entry by 1.13 percent (from 30% to 30.4%).

6 Conclusion

We have conducted an empirical investigation on the determinants of the mode of entry decision of multinational firms using a novel firm-level dataset on German outbound FDI and focusing on the decision of the firm at the entry in the foreign market. This study is the first to analyse the German FDI dataset for this purpose. Our empirical work is guided by recent theoretical contributions on the decision on the mode of entry of multinational firms. Broadly, our results obtained from the binary choice models have confirmed various existing theoretical predictions on the determinants of the mode of investment (M&A vs. Greenfield investment) and the mode of ownership (wholly-owned vs. partially-owned). For instance, the most efficient firms tend to prefer Greenfield to M&A

[10] See Cameron and Trivedi (2005).

and wholly-owned to partially-owned entry.

While these results are informative, we have demonstrated the difficulty in interpreting them. In particular, a variable may affect both components of the mode of entry, that is the investment mode decision and ownership mode decision, at the same time. Our additional contribution is to jointly consider all modes of entry by means of a Simulated Maximum Likelihood Estimator (SMLE) of a multinomial probit model. The SMLE does not exhibit the assumption of Independent of Irrelevant Alternatives (IIA). Our results can be summarised as follows. (1) As efficiency increases the firm is less likely to choose any mode of entry relative to a wholly-owned Greenfield investment. The preferences of most efficient firms over the four modes of entry can be ranked such that the most preferred mode is wholly-owned Greenfield affiliate, followed by wholly-owned M&A and partially-owned M&A investment while the least preferred mode is partially-owned Greenfield affiliate. (2) As international experience of the parent firm increases the likelihood of a wholly-owned M&A project increases relative to a wholly-owned Greenfield entry. (3) A high experience with the host economy tend to increase the likelihood of choosing a Greenfield investment (for both partially-owned and wholly-owned Greenfield projects) and to decrease the likelihoods of M&A projects . (4) A long distance from Germany to the host economy decreases the likelihood of choosing a M&A investment; especially a wholly-owned M&A investment. (5) A high level of corruption in the host economy particularly discourages wholly-owned M&A projects. (6) A high level of development in the host economy increases the likelihood of a wholly-owned M&A project.

The formulation of a deeper understanding of the characteristics that affect the decision of the multinational firm on its mode of entry is an important step towards further research on the different implications of the various modes of FDI on the host economy.

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Table 7: The mode of entry decision: SMLE model

	All firms			Horizontal		Vertical	
$y = 2$ (W-MA)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
efficiency	-0.083^b	-0.125^a	-0.189^a	-0.264^a	-0.245^a	-0.388^a	-0.238^b
international experience	0.287^a	0.287^a	0.253^a	0.274^a	0.260^a	0.301^a	0.324^b
host economy experience	-0.291^a	-0.281^a	-0.231^a	-0.141	-0.038	-0.151	-0.111
gdp per capita	0.205^c	0.454^a	0.355^b	0.290	0.249	0.350	0.299
distance	-2.122^a	-2.82^a	-2.83^a	-1.07^a	-2.05^a	-3.25^a	-3.27^a
corruption	-0.458^b	-0.479^b	-0.436^b	-0.572^c	-0.632	0.167	0.076
population	0.04^d	0.187^a	0.132^b	0.018	-0.019	0.104	0.086
rule of law	-0.21^d	-0.124	-0.010	0.128	0.094	0.120	0.101
openness	0.005						
economic freedom	0.58	-0.015	-0.026	-0.680	-0.639	0.607	0.401
market capitalisation	-0.07	-0.134	-0.065	-0.110	-0.140	-0.123	-0.102
export share		-6.649^a	-5.81^b	-1.55	-0.996	-10.6^b	-10.0^b
R&D/gdp		-0.012	0.042	-1.00	-0.103	0.066	0.120
$y = 3$ (P-Gr)							
efficiency	-0.167^b	-0.198^b	-0.222^b	-0.086	-0.098	-0.611^a	-0.526^a
international experience	-0.148^a	-0.167^a	-0.119^b	-0.209^b	-0.188^b	-0.331^b	-0.280
host economy experience	0.16	0.124	0.077	0.663^a	0.568^a	0.375^c	0.318
gdp per capita	-0.362^b	-0.245	-0.187	-0.683^b	-0.662^c	-0.095	-0.083
distance	0.33	-0.379	-0.732	1.36	1.25	1.08	-1.75
corruption	0.36	0.315	0.304	-0.417	-0.394	1.59^a	1.50
population	0.04	0.531	0.055	-0.219	-0.205	-0.015	-0.029
rule of law	-0.21	0.250	0.247	-0.220	-0.221	0.809^b	0.771
openness	-0.005						
economic freedom	0.58	0.059	0.012	0.226	0.462	-1.39	-1.43
market capitalisation	-0.07	0.131	0.1326	0.044	0.053	0.211	0.215
export share		-4.02	-4.07	5.14	5.13	0.693	1.05
R&D/gdp		-0.126	-0.102	-0.04	-0.040	-0.234	-0.228
$y = 4$ (P-MA)							
efficiency	-0.124^b	-0.119^c	-0.116^c	-0.012	-0.005	-0.384^a	-0.256
international experience	0.04	-0.003	-0.010	-0.028	-0.031	0.220^b	0.258^b
host economy experience	-0.416^c	-0.476^a	-0.441^a	-0.448^b	-0.431^b	-0.408	-0.426^c
gdp per capita	-0.13	0.165	0.117	0.209	0.212	-0.475	0.466
distance	-0.822^c	-1.379^b	-1.30^c	-1.18	-1.28	-1.80	1.00
corruption	-0.011	-0.353	-0.289	-0.592	-0.628	-0.408	-0.495
population	-0.013	0.179^b	0.157^b	0.154	0.129	-0.05	-0.085
rule of law	0.02	0.232	0.316	0.321	0.310	0.019	-0.032
openness	0.002						
economic freedom	-0.35	-1.19	-1.19	-1.69	-1.71	-0.349	-0.482
market capitalisation	0.01	-0.047	-0.057	-0.223	-0.233	-0.073	-0.033
export share		-6.71^b	-6.33^c	-7.85^c	-7.49	-2.57	-1.70
R&D/gdp		-0.308^a	-0.327^a	-0.392^b	-0.392^b	-0.016	-0.034
industry − R&D dummies	No	No	Yes	No	Yes	No	Yes
No. observation	10012	9076	9076	3924	3924	2376	2376
No. of affiliates	2503	2269	2269	981	981	594	594
Log likelihood	-3006.1	-2671.2	-2607.1	-1071.3	-1061.9	-650.3	-644.6

Note: ^{a}, ^{b}, and ^{c} indicate significance at the level of 1, 5, and 10%, respectively. p-values are computed based on robust standard errors.

Table 8: Elasticities: SMLE model

All	(W-Gr)	(W-MA)	(P-Gr)	(P-MA)
efficiency	1.13	-0.43	-1.28	-0.39
international experience	-1.28	1.99	-3.40	-1.07
host economy experience	2.25	-1.24	3.95	-3.24
gdp per capita	-2.33	2.88	-5.37	-0.35
distance	18.26	-14.30	13.43	-1.37
corruption	2.49	-2.74	6.41	-1.03
population	-1.39	0.81	-0.88	0.88
rule of law	-0.25	-1.19	2.60	3.53
economic freedom	1.95	2.03	2.91	-11.3
market capitalisation	0.64	-1.06	20.66	-0.14
export share	2.14	-1.01	0.05	-1.20
RD/gdp	1.50	0.79	-0.70	-5.26
Horizontal				
efficiency	1.87	-2.19	0.373	1.72
international experience	-1.20	2.02	-3.93	-1.71
host economy experience	0.81	-0.82	9.97	-4.64
gdp per capita	-1.18	2.14	-9.78	1.23
distance	12.16	-12.41	33.6	-2.82
corruption	4.78	-2.13	-0.97	-2.79
population	-0.14	0.06	-2.98	1.80
rule of law	-1.15	0.19	3.86	2.76
economic freedom	6.67	-1.52	9.08	-14.0
market capitalisation	0.99	-0.39	1.56	-2.05
export share	0.62	-0.05	3.19	-3.08
RD/gdp	2.28	0.09	1.12	-6.43
Vertical				
efficiency	3.01	-1.34	-4.72	-1.50
international experience	-1.79	1.95	-6.65	0.93
host economy experience	1.23	-0.87	6.79	-3.29
gdp per capita	-0.96	2.91	-3.10	-5.62
distance	22.18	-18.32	46.75	-3.92
corruption	-2.21	-0.41	18.67	-5.78
population	-0.48	0.72	-0.88	-0.92
rule of law	-2.03	-0.35	11.77	-1.13
economic freedom	-1.09	5.97	-20.23	-4.68
market capitalisation	0.57	-1.02	3.96	-0.37
export share	2.34	-2.38	3.14	0.73
RD/gdp	-0.14	1.26	-6.35	-0.48