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Which Entry Mode do Parent Firms Prefer**

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Acquired versus Non-Acquired Subsidiaries - Which Entry Mode do Parent Firms Prefer?

Esther Kalkbrenner[*][†]

Abstract

Despite the economic importance of international foreign direct investment (FDI) flows, investment decisions of multinational firms are not well understood. A multinational firm can establish a subsidiary in a foreign country through greenfield investment or through acquiring an existing firm in the target country. The goal of this paper is to shed some light on the determinants of foreign market entry modes. In particular to analyze the systematic variation in the mode choice of FDI, namely acquisition versus non-acquisition (greenfield) investments. We propose a transparent and general applicable method to construct a data base. This database includes information about parent firms and their majority owned affiliates in foreign countries. A particular feature is the construction of a variable which allows to differentiate the establishment mode of parent firms into foreign markets. For this purpose two databases from the Bureau van Dijk are interlinked: Osiris and Zephyr. We provide evidence that firm heterogeneity is important for U.S. multinational firms in determining their entry mode choice. However, this is not a distinguishing feature for European multinational firms. For both sets of parent firms the host country characteristics play an important role in deciding on the entry mode. Higher institutional quality increases the likelihood of acquisitions versus greenfield investments

Keywords: Acquisition, Greenfield, Subsidiaries, Mode Choice, FDI, Institutions;

JEL classification: L23, F23, P5;

1 Introduction

Despite the economic importance of international foreign direct investment (FDI) flows, it seems that investment decisions of multinational firms are not well understood. A multinational firm can either establish a subsidiary in a foreign country through greenfield investment or through acquiring an existing firm in the target country. The subsidiary can be wholly or jointly owned. How do such firms decide to organize their international production? Which investment mode serves best foreign markets? What matters more the parent firm characteristics or the characteristics of the target country to be entered? The goal of this paper is to shed some light on the determinants of foreign market investment modes. In particular to analyze the systematic variation in the FDI choice, namely between acquisition versus non-acquisition (e.g. greenfield) investments. Such questions have been studied in the international business literature and more recently in the international trade literature. We seek to contribute to the literature in several ways.

First, we propose a transparent and generally applicable method of data base construction. This method overcomes the lack of data regarding the entry mode decision of multinational corporations. We use existing empirical studies as a check on the quality of our data base.

Second, we analyze the determinants of the mode of foreign market entry for a sample of U.S. and Western European parent firms. We are the first to report results for so many countries of parent firms. Most studies in the international trade literature base their empirical results on U.S. data. We show that the results obtained for U.S. parent firms do not necessarily carry over to European parent firms.

Summarizing the key results we find evidence, that profitable U.S. parents prefer greenfield investments as an entry mode into foreign markets. We do not find significant variation in the mode choice of Western European parent firm characteristics. Our results imply that empirical evidence regarding the entry mode decision of U.S. parent firms does not necessarily answer questions about the behavior of Western European parent firms. For both sets of parent firms we find, that the higher the institutional quality of the subsidiary country, the more likely will parent firms choose to acquire the subsidiary rather than to undertake a greenfield

investment.

The paper is structured as follows. Section 2 gives an overview of the existing research and relevant literature. Section 3 describes the tested hypotheses regarding the determinants of entry mode. Section 4 and section 5 describe the data and estimation methodology. Section 6 shows the empirical results and section 7 concludes with a summary. In the appendix the reader will find a critical and detailed description of the data base construction.

2 Literature Review

The literature on the effects of foreign direct investment on acquiring firms is quite large. It compromises contributions from several fields of economic research such as the international business, international trade, institutional economics and international organizations literatures. We are most interested in the following questions: What best explains the behavior of multinational firms either setting up subsidiaries by greenfield investment or acquisition investments? Can we observe differences in parents choosing one alternative over the other?

Markusen (1995) provides an overview of the determinants of multinational economic activities. He describes six macro facts from aggregate data and six micro facts from industry and firm-level data regarding the activities of multinational firms.[1] The underlying determinants for a firm to enter foreign markets seem to depend on wether the FDI is horizontal or vertical. Analysis of horizontal FDI centers its arguments mostly on the proximity-concentration trade off, where transport costs are larger than costs of establishing a foreign market presence. Arguments for vertical FDI usually compromise rent and market power appropriation as main driving forces. Next to cost minimization and market failure arguments, the transfer of intangible, firm-specific assets (e.g. corporate culture) and comparative advantages seem

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[1]Macro facts: 1. FDI is growing rapidly around the world. 2. Developed countries are the performers and recipients of FDI. 3. We observe large two-way FDI flows between developed countries. 4. Most FDI seems to be horizontal. 5. 30% of trade is intra-firm trade. 6. There is little evidence that FDI is correlated with differences in factor endowments across countries.

Micro facts: 1. FDI is hugely different across industries. 2. Multinational firms usually have a higher share of R&D/Sales. 3. Multinational firms are tentatively firms with a high ratio of book to market value. 4. There is little evidence that plant level scale economies are negatively correlated with multinationality. 5. There exists a threshold size for multinational firms. 6. Mixed evidence is found to wether FDI is related to trade barriers or transport costs.

to be relevant for either type of FDI.[2] A complementary question to the determinants of the multinational activity of firms is to explain why multinationals choose FDI instead of arm's length licensing agreements with a foreign firm. Antras et al. (2009) propose that in the presence of monitoring problems and financial frictions, firms engage in FDI rather than in arm's length technology transfers. Another important line of discussion is the question wether the engagement of multinational firms in a foreign market is a complement or a substitute to domestic economic activities. Paffermayer (2004) analyzes the domestic growth performance of multinational firms with foreign affiliates in the Austrian manufacturing sector. Firms in the possession of intangible, firm specific assets do not substitute domestic economic activities for foreign economic activities (export/affiliates). Desai et al. (2009) show that expansion of US firms abroad results in higher domestic investment and strengthens the hypothesis that domestic and foreign economic activities are complements rather than substitutes. Only recently a small but growing literature is investigating the impact of different strategies to enter a foreign market (FDI mode choices). The major drawback for empirical applications is the availability of data. The entry mode is not registered systematically in most countries. An exception is the mandatory survey of the Bureau of Economic Analysis in the USA.[3]

The international business literature provides many empirical applications with different methodologies e.g. focusing on individual industries, countries or on multi-country/multi-industry studies. The studies vary quite substantially in data bases, sample sizes and scope.[4] This literature can broadly be divided into two streams. One is the foreign establishment mode literature, distinguishing between foreign market entry types such as acquisition or greenfield investment. The management literature concentrates on the choice of ownership such as wholly owned and joint ownership. The first is called establishment mode and the second entry mode. Our contribution lies within the establishment mode literature. Slangen and Hennart (2007) provide an overview of the most important studies in the establishment mode literature. Dikova and van Witteloostuijn (2007) are also studying the factors determining the choice between acquisition and greenfield, as well as the establishment of wholly

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[2]For horizontal FDI see Helpman et al. (2004). For vertical FDI see Hortacsu and Syverson (2009).

[3]Other examples are survey data for Sweden and Japan.

[4]One needs to distinguish between country variation in one or both regarding host and target countries, correspondingly industry variation in one or both regarding host and target industries.

owned or joint owned subsidiaries.[5] Equivalently they use the worldwide governance index to evaluate the importance of a country's level of institutional factors, and control for firm-specific variables such as experience and technology/advertising intensity. A distinguishing feature of our study is the scope of firm-specific variables, model specification and source of data. They use survey data of 160 Western European multinational firms investing in a pre-selected set of Central and Eastern European countries over the period 1992-2002. The number of observations is not given, industry specific variables are neglected and the timing of the investment decisions of the parent firms is not clear. Their results show that the institutional environment of the subsidiary country is an important factor for the type of entry and ownership choice. Larimo (2003) has a sample of 3,524 foreign entry mode decisions for parent firms from Denmark, Finland, Norway and Sweden. He controls for firm and target country related variables, though not for industry effects, and shows that the investment behavior regarding the entry type is not identical in all the Nordic countries. Swedish firms' behavior is determined more by target country variables, whereas Finnish and Norwegian firms are influenced by both firm and target country related variables.[6]

The international trade literature developed theoretical models to formalize the investment decisions of multinational firms across countries. Only recently those models incorporate differences in the modes of entry into foreign markets. Helpman et al. (2004) explain that firms within industries will engage differently in FDI according to their cost schedules. By paying a fixed cost, a firm can move its production facility to where it wants to serve the foreign market and incurs for that reason no trade costs. The most productive firms will engage in FDI, the intermediate productive firms will export and the least productive firms will serve the domestic market. The authors do not yet distinguish the mode choice of FDI but distinguish more traditionally between exporting and FDI. But it seems that the FDI they have in mind is greenfield investment. Yeaple (2009) suggests a *"pecking order"* of investing firms

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[5]The authors present factors simultaneously determining both choices and estimate two different types of models separately for each decision. They essentially test for 2 main hypothesis: 1. Higher institutional development is positively correlated with the likelihood of acquisition and full ownership 2. Higher institutional development results in a more pronounced likelihood for greenfield subsidiaries and joint ownership within technology-intensive industries. Other studies in this field stress the importance of potential sequential decision design Chang and Rosenzweig (2001).

[6]The sample is based on manufacturing firms undertaking foreign acquisitions and greenfield investments during the period 1960-1999.

across countries according to their productivity and country specific characteristics. Nocke and Yeaple (2007) explore the nature of firm heterogeneity more closely. They distinguish between mobile and non-mobile capabilities and how those affect the choice of FDI mode. Nocke and Yeaple (2008) provide not only a theory for the parent's investment decision, but also an empirical estimation of their model predictions. Their model compromises firm heterogeneity and countries differ by the cost of labor. Using U.S. data from the Bureau of Economic Analysis they confirm three of their model predictions.

> First, U.S. multinational firms engaging in greenfield FDI are more efficient than those engaging in cross-border acquisitions. Second, U.S. multinational firms are more likely to choose cross-border acquisition over greenfield FDI the more developed the host country. Third, U.S. multinational firms are more likely to choose cross-border acquisition over greenfield FDI the closer is the geographical proximity of the host country to the U.S.[7]

In their model the two foreign market establishment modes have different set-up costs. Greenfield investment involves set-up costs as a function of the country specific wage rate and the labor productivity in that country, whereas acquisitions depend on the market price of the target. Cross-border acquisitions allow a multinational firm to combine its assets in an optimal way, whereas greenfield set-ups allow the firm to transfer it's own capabilities to the foreign market. This difference in motives across the establishment modes is the reason for the present study.

We would like to explore a new path by using data regarding the type of multinational investment decision. The present method relies on ownership and balance-sheet data that are compared at different point in times. This method might allow a wider access to entry mode information for firms. The ultimate goal is to obtain results about the determinants of parents' entry mode decision in a given year for a variety of countries.[8] The focus lies

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[7]See Nocke and Yeaple (2008).

[8]The term entry of a new subsidiary is used here as the establishment of a subsidiary which is either newly build or newly acquired. Entry does not necessarily refer to the *first* establishment within an industry/country.

on a short-run analysis[9] and compares the establishment of new subsidiaries with acquired subsidiaries in several industries and countries. Parent firms are continually active multinational firms. New, non-acquired subsidiaries are defined as firms that did not previously exist in that industry/country and have not been acquired. New acquired subsidiaries are firms that did exist previously in that industry/country and a transfer of ownership on the parent level took place. One drawback is its short-run nature, as acquisition and merger activities come in waves. This implies that the pattern of mode choice through subsidiary creation and acquisition may well differ across time, because of variations in the timing and the intensity of merger and acquisition waves.[10]

3 Determinants of entry mode

Only recently has the trade and FDI literature investigated differences in entry decisions of multinational firms. The focus lies on three major arguments. The entry decision for a multinational firm depends on firm characteristics, but also on the industry and host/target country to be entered. Several studies have discussed how a mix between firm ownership-industry-host country variables are decisive for the entry mode.[11]

3.1 Firm characteristics

Firm size: The transaction cost theory argues that an acquisition is initially more capital intense and therefore larger firms, with better access to capital funds, will tend to acquire than to undertake greenfield investments. This leads to the following hypothesis.

H1: Larger firm are more likely to undertake an acquisition than greenfield investment.

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[9]Theoretically the method can be extended to include several points in time. Due to data limitations we focus on the decision within a one-year horizon.

[10]See Mueller (2003).

[11]See Larimo (2003), Slangen and Hennart (2007), Dikova and van Witteloostuijn (2007), the empirical part of Nocke and Yeaple (2008).

Firm R&D intensity: Firm specific technological knowledge, e.g. marketing knowledge or R&D needs to be protected against unwilling dissemination. Greenfield investments are usually considered to be more appropriate than acquisitions if firm specific assets are sizable. The transaction costs of greenfield are lower, as the knowledge can be installed directly. Firms lacking firm specific technological knowledge have an incentive to internalize it through acquisition.[12] The threat of unprotected firm-specific know-how dissemination might be lower in countries with high institutional quality. This leads to the following hypothesis:

H2: R&D intensive firms will more likely undertake greenfield investments than acquisitions.

Firm Efficiency: Nocke and Yeaple (2008) suggest that firms favoring greenfield investment over cross-border acquisitions are systematically more efficient due to differences in their cost structures.[13]

H3: Efficient firms are more likely to undertake greenfield investment than acquisitions.

3.2 Host country characteristics

Country institutional development: Corporate governance theory suggests that more developed countries provide a less risky environment for multinational's investments. According to Caves (1982) less risk is involved in acquiring a firm than setting up a new one, because the latter requires more in depth market information, is more time consuming and involves higher management costs. On the other hand, the better the institutional environment, the better are investors protected and the more able they are to enforce their rights. Even though Antras et al. (2009) do not distinguish the different types of FDI, they show that in the presence of monitoring problems between inventor and local entrepreneur, and due to financial frictions, the necessity for an external investor, leads to more FDI activity the stronger the institutional environment. Further strengthening this line of argument, looking at the empirical evidence of acquisition streams around the world, we observe that the majority of foreign acquisitions are taking place between highly developed countries (e.g. U.S. and Europe). This leads us to the following hypothesis.

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[12]See Nocke and Yeaple (2007) and Slangen and Hennart (2007).

[13]The authors use sales and value added per employee to measure the efficiency of U.S. multinational firms.

H4: Firms tend to favor acquisitions, the more developed the host country.

Country openness for trade: The possibility to acquire firms depends on the *openness* of the trade policies and knowledge of the host country. The more open a host country, the more readily available is information about the value of potential target firms. Information asymmetries are more prevalent the less accessible a host country is for international trade. A multinational firm may opt for a greenfield investment to internalize these information asymmetries. This strategy helps the multinational firm avoid having to pay a higher premium for a target firm, if the true value of the firm is difficult to assess. This leads to the following hypothesis.

H5: Firms favor greenfield investment in countries less exposed to international trade.

Geographical distance: Many studies argue that cultural distance is an important factor for the establishment mode decision, but also regarding ownership type.[14] Controlling for distance allows us to account for differences in the relative costs of the acquisition/greenfield entry modes depending on the geographical proximity of the host country.[15]

H6: Firms favor acquisitions the further away the target country.

4   Data

Ideally we would like to use information about the incorporation (birth) of subsidiaries in different host countries for a stable set of parents, for which the mode of incorporation by parent firm can unambiguously be determined. Either the newly incorporated subsidiary

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[14]Kogut and Singh (1988) analyze the effects of firms steaming from a variety of industries and countries entering the USA. They distinguish in the choice of ownership type between joint venture and wholly owned and entry type between acquisition and greenfield establishments. Using an index for cultural distance (based on power distance, risk avoidance, importance of individualism) they conclude that cultural distance matters significantly for the entry mode. The more cultural distance the more likely a firm will choose a joint venture greenfield/acquisition over a wholly owned greenfield/acquistion. Cho and Padmanabhan (2005) analyze differences in the ownership mode between Japanese firms and other host countries. They do not find significant differences regarding cultural distance if one uses a single index for cultural distance. Instead if a measure for firm-specific experience interacted with cultural distance is used, it is positively correlated with full ownership of Japanese foreign manufacturing entities.

[15]See Nocke and Yeaple (2008).

has been acquired through an acquisition/merger or built as a greenfield investment by the parent firm. Annual reports do not clearly identify greenfield investments, unlike acquisition and merger activity. Sometimes new investment strategies are outlined, but in most annual reports the information about greenfield investments is rather general. Merger and acquisition databases are commercially available, but firm-level greenfield databases are not widespread. The very few data sets that exist, which distinguish the incorporation mode between greenfield and acquired subsidiaries, are based on firm surveys. The U.S. Bureau of Economic Analysis (BEA) conducts a mandatory survey each year and collects firm-level data about U.S. parents' foreign affiliates and their incorporation mode.[16] The Swedish Research Institute of Industrial Economics sends out a survey every 4 years to Swedish multinationals to inquire about the incorporation mode of their foreign, majority-owned affiliates.[17] Several studies use a Japanese database, which provides a complete list of firms and countries for Japanese overseas investments.[18] Most FDI studies have used the data of the BEA, which are not accessible for non-U.S. citizens. It is important to evaluate from the results obtained from U.S. multinational firms, one can directly infer conclusions on the behavior of European multinational firms. European parent firms might follow very different investment strategies due to the diversity of legal backgrounds, institutional environments, development of financial markets and corporate structure. We want to explore the applicability of the U.S. results for European multinationals.

Various databases provide detailed firm-level, financial and ownership information. The idea of this paper is to propose an alternative use of commonly accessible databases to construct a data sample, which allows one to investigate determinants of incorporation mode choices for subsidiaries. We concentrate on foreign subsidiaries to compare our results to existing research. In the future we plan on extending the analysis to domestic subsidiaries. In order to allow for a tight definition of acquisition and greenfield investment, several criteria have been placed on the parent and the subsidiaries to construct the sample. We assume if the

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[16]See Nocke and Yeaple (2008) and Antras et al. (2009).

[17]The survey is not mandatory for firms to complete and covers all Swedish multinational firms in the manufacturing sector Bertrand et al. (2009).

[18]Cho and Padmanabhan (2005) describe that for the period 1969-1991 the database consists of 1,519 manufacturing FDI's by 402 manufacturing firms in 45 countries.

subsidiary is new and has not been acquired, then it is a greenfield subsidiary. We concentrate on listed parent firms and their decision to establish a new subsidiary in a foreign country in 2005.[19] Ownership structures and financial information of parent firms are take from the Bureau van Dijk Osiris database, as are information about mergers and acquisitions. Zephyr includes data on M&A, IPOs, Joint Ventures and private equity transactions. The advantage of Zephyr compared to other M&A databases such as Thompson Financial Securities is that in Zephyr all deals regardless of the deal value are included.[20]

The first step is to determine which subsidiaries are newly established. Incorporation dates for unlisted subsidiary firms are not available.[21] For this reason we are using the ownership structure provided by Osiris at two different points in times and observe subsidiaries entering as being newly established. A critical description of this step can be found in the appendix. We focus on subsidiaries with a direct ownership percentage of at least 50 percent. For all parent firms of newly established subsidiaries, which are majority owned, we find the corresponding acquisition activities for the whole time coverage in the Zephyr database.[22] Based on this information we determine which subsidiary has been acquired and not acquired for each parent-subsidiary pair (see appendix).

Using this method 1,470 listed parents from different countries have been identified with at least one new subsidiary. Those parent firms include many of the top 500 largest parent firms in the Osiris database in 2006.[23] 1,271 of these parent firms are included in the M&A database and have made at least one acquisition since 1998. A total of 6,631 subsidiaries have been identified as newly established between 2005 and 2006. For the analysis of the determinants of entry mode, we will concentrate on U.S. parent firms and European parent firms.

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[19]The methodology can potentially be extended to include several years of decision making by the parent firm; For a dynamic entry decision over time, the choice should allow for investment (by acquisition or greenfield) and no investment in a given time period.

[20]Thompson Financial Securities includes only deals above USD 10 million. Stiebale (2010) compares aggregate statistics for Zephyr and Thompson Financial Securities and reports that the coverage of transactions above USD 10 million is very similar.

[21]Amadeus by BvD is a data base of listed and unlisted European firms including incorporation year. We are interested in gathering the effects of multinational parent firms locating subsidiaries across the globe. We especially emphasize the country dimension of subsidiary location. One could concentrate on the European sub-sample of subsidiaries but the research question would be a different one.

[22]This step assures that all acquisition activities of a parent firm are accounted for. For example the parent firm acquires 10% of a subsidiary in 2000 and holds 50% of the same subsidiary in 2005, whereby the last acquisition is missing in the data, then the subsidiary is still considered to be acquired.

[23]Not all top 500 largest firms are manufacturing firms.

5 Estimation Methodology

In general, the probability that a firm n chooses alternative i over j depends on the known utility value V_{ni} and the unknown part ϵ_{ni}.

$$P_{ni} = Prob(V_{ni} + \epsilon_{ni} > V_{nj} + \epsilon_{nj}) \qquad \qquad \forall j \neq i \tag{1}$$

The estimation technique is a binary logit model of the likelihood of parents to acquire a subsidiary or not, whereby V_n is linear in parameters with coefficient β, such that the choice probability is given as

$$P = G(X\beta) = \frac{e^{X\beta}}{1 + e^{X\beta}} \tag{2}$$

Concretely X is a linear combination of variables such as parent, industry and host country characteristics and G is the logistic function.[24] The dependent variable is binary for every subsidiary-parent-industry-country pair being 1 if the subsidiary has been acquired, and 0 otherwise.[25] The parent characteristics include a performance measure such as Tobin's Q averaged over the years 2003/2004, firm size (log of sales) averaged over the years 2003/2004 and parent's research and development expenses averaged over the years 2003/2004. Tobin's Q is defined as market capitalization plus long term debt over total assets.[26] The FDI literature measures multinational activity by counting the number of foreign subsidiaries or the number of countries with foreign subsidiaries. For the count of subsidiaries we use the status at the beginning of 2004. We use averages over the years 2003/2004 to reflect parent's status prior to

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[24]See Train (2009).

[25]Note that Dikova and van Witteloostuijn (2007) define the dependent variable as being 1 if greenfield and 0 otherwise. We use the term establishment/entry mode interchangeably, which implies that the decision of ownership is independent to the decision about the entry type. In our setting subsidiaries can either be wholly owned greenfield (100%), majority owned greenfield ($> 50\%$ and $< 100\%$), wholly owned acquisitions (100%) or partially owned acquisitions ($> 50\%$ and $< 100\%$).

[26]For a discussion on marginal versus average Tobin's Q see Gugler et al. (2007).

the investment decision.[27] The host country characteristics include relevant variables for the location decision of the parent. We evaluate the quality of a subsidiary country's institutions using the worldwide governance index provided by the World Bank. We average the six indicators over the years 2003/2004: (1) voice and accountability (2) political stability (3) government effectiveness (4) regulatory quality (5) rule of law, and (6) control of corruption. The indicators are constructed using the unobserved components methodology described in Kaufmann et al. (2007). The indicators are measured in units ranging from -2.5 to +2.5, with higher values corresponding to better governance. We also use other country development variables such as the log of GDP, population, import plus export over GDP and distance between parent and host country. We add colonial past and common language in a later specification. All specifications include parent industry and parent country of origin fixed effects. Our approach follows closely the estimation technique of Nocke and Yeaple (2008) in order to assess if the methodology applied yields similar results for a U.S. sample.

6   Results

Unlike any other empirical analysis previously, we use Tobin's Q as a measure for firm efficiency. Nocke and Yeaple (2008) use parent firm sales and value-added per employee as measures of firm efficiency. Believing that sales is highly correlated with firm size, we opted for Tobin's Q as an alternative efficiency measure combined with firm sales. In a second specification we include R&D expenses as a determinant for the entry mode decision. The availability of R&D expenses cuts the sample size roughly in half. Regarding the host country characteristics, geographical distance between home and host country is included to account for entry mode preferences based on proximity. FDI might depend on the ease of access to international trade, therefore a measure for a host country's openness to international trade is included. This is our basic specification, where we control for parent industry and country fixed effects. We try to mirror the model specification used in Nocke and Yeaple (2008) to evaluate the fit of our data base. They relate a parent's mode choice to parent's efficiency and

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[27]We have experimented with averages over the years 2004/2005 also 2003/2005 and the results are quantitatively the same.

host country characteristics. Beside the difference in the firm efficiency measure, the authors provide additional specifications including more firm characteristics such as a measure for firm's diversification across industries, a measure for vertical integration (the parent's ratio of intra firm imports to total imports) and an experience dummy variable for wether the parent owned a subsidiary prior to the sample period in that country.[28]

Starting with the sample for U.S. parent firms, we are able to reproduce the key results by Nocke and Yeaple (2008).[29] Comparing the results for the first specification in table 3 to the results of Nocke and Yeaple (2008), where they use sales as a firm efficiency measure and we complement Tobin's Q to it, we find a quantitatively similar effect. With respect to the other coefficients, three out of four have the same sign. The country variables GDP, population and distance all increase the likelihood of an acquisition. All are significant in our data set. GDP and distance are significant in most specifications of Nocke and Yeaple (2008). The measure for a country's openness to trade is significantly negative in Nocke and Yeaple (2008) but insignificantly positive in our specifications.[30] In short, U.S. efficient parent firms will more likely undertake greenfield investments than acquisition investments (H3). U.S. parent firms tend to favor acquisition investments the higher the development status of the host country (H4). U.S. parent firms are more likely to undertake an acquisition the farther away the host country (H6). It seems that U.S. firms favor greenfield investments in countries which are less exposed to trade (H5), but this result is not statistically significant. As in Nocke and Yeaple (2008) the result about the efficiency of firms is robust, when we introduce host country fixed effects (specification (3) of table 3). This is an important result as it provides validity to the constructed database.

We therefore proceed to first narrow down the factors of host country development influ-

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[28]With our data set we can not compute the first two additionally employed variables as we don't have industry information of the subsidiary. We measure multinational experience as the number of majority owned, foreign subsidiaries of a parent at the beginning of the sample period.

[29]The Bureau of Economic Analysis only includes U.S. firms with foreign subsidiaries above a certain size threshold. Nocke and Yeaple (2008) pool over 5 years of firms together but they aggregate the data such that 'for each firm, a country-industry pair appears at most once', but the number of parent/subsidiary firms is not given for their sample.

[30]Likelihood of acquisition results showing logit coefficients and (se) using U.S. data:

Nocke and Yeaple (2008)		Sales	GDP	Population	Open	Distance	Obs.	LL
		-0.217**	0.768**	0.049	-0.656**	0.199	856	-487.5
		(0.076)	(0.172)	(0.092)	(-0.187)	(0.130)		
Table 3	Tobin's Q	Sales	GDP	Population	Open	Distance	Obs.	LL
	-0.275*	0.083	0.821***	0.543**	0.302	1.084***	1,342	-627.32
	(0.13)	(0.06)	(0.18)	(0.12)	(0.22)	0.17		

encing the entry mode choice and secondly to extend the analysis to European parent firms. In specification (2) we introduce the measure for institutional quality of the host country. We expect that including such a measure will clarify through which channel the development of the host country is influencing the entry mode of the parent. Indeed institutional quality is an important and significant determinant of the parent's choice. The higher the institutional quality of the host country, the more likely U.S. parent firms favor an acquisition over greenfield investment. The coefficient on GDP becomes surprisingly negative but remains insignificant.[31] All other coefficients remain quantitatively the same. In specification (4) of the same table, we include R&D/sales as a measure of parent firm research intensity. The sample size becomes much smaller. The country relevant variables do not change much, but the coefficient on firm efficiency loses its significance. At a later stage we no longer include R&D expenses as a variable due to the small sample size. We could produce a measure for industry level R&D expenses, but we control at the 3-digit level for all industry effects, such that the R&D channel is included within those industry effects.

Turning now to the sample of European firms[32] in table 4 we observe a different pattern for the entry mode choice. First, the firm efficiency measure remains insignificant varying positively/negatively around zero in the different specifications. GDP, population and openness for trade are still positive increasing the likelihood of acquisition. The distance measure becomes significantly negative, indicating that European parent firms tend to favor greenfield acquisitions farther away from the host country (this result is contradicting H6). Acquisition activities are certainly in a closer range of geographical proximity and many European parent firms have made many acquisitions in neighboring Eastern European countries. This can also be seen in the appendix figure 6. Introducing institutional quality increases the likelihood of acquisition by a European parent firm. These results imply that the results obtained for U.S. multinational firms can not straight forwardly be applied to explain the behavior of European multinational firms.

In our last step we concentrate even more on country relevant variables by introducing a

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[31]The governance index is highly correlated with GDP ($\rho = 0.88$).

[32]The estimation sample includes parents from Belgium (7.62%), Switzerland (5.34%), Germany (12.48%), Spain (2.65%), France (22.67%), UK (11.92%), Italy (22.90%), Netherlands (11.73%), Portugal (0.15%) and Sweden (2.54%).

measure for parent firm multinationality, one for corporate control and an alternative distance measure. An ideal measure regarding the impact of transportation cost differences on the entry mode would be the exact geographical distance between the home and foreign location. In the absence of such a distance measure[33], we experiment using a land border dummy. In a large country such as the U.S. most industrial firms will not be located close to the capital e.g. Silicon Valley firms will have a greater proximity to Canada or Mexico than to their own capital. The distance measure might in such cases be misleading. To proxy the degree of multinationality of the parent firm we count the majority owned, foreign subsidiaries prior to acquisition/greenfield investment. Corporate control is the degree of ownership a parent has in the subsidiary. We allow subsidiaries in either entry mode to have an ownership percentage between 50% and 100%. Table 5 provides results for U.S. parent firms and table 6 for Western European parent firms. For comparison purposes, the first column of the tables is identical to specification (2) of table 3 and respectively table 4.

With respect to characteristics of U.S. parent firms, including the additional variables absorbs the effect of parent firms productivity.[34] The higher the number of foreign subsidiaries, the higher the likelihood of acquisition compared to greenfield investment. Both variables are highly significant for U.S. parent firms, but not for European parent firms. It seems that firm characteristics do not have a distinguishing effect on the mode of entry for European firms. Regarding host country characteristics, not surprisingly the land border dummy is negative and significant for U.S. firms. But for European firms this variable does not seem to pick up the effect that the distance measure had before. Common colonial history or language are not a distinguishing feature of the entry mode decision for U.S. and Western European firms. The worldwide governance index remains significant for both sets of parent firms in all specifications.

In summary, the evidence shows that firm heterogeneity is important for U.S. multinational firms in determining their entry mode choice. This is not a distinguishing feature for

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[33]The main address of parent firm is available but the exact subsidiary location within the host country is not.

[34]This result is mainly driven by the ownership percentage of the parent firm in the subsidiary. The tighter the ownership, the higher the probability of an acquisition. This could be explained because the tighter the ownership the less different are the two entry modes as asymmetric information is reduced in both entry modes.

European multinational firms. For both sets of parents the host country characteristics play an important role in deciding on the entry mode. Higher institutional quality increases the likelihood of acquisitions versus greenfield investments.

7 Conclusion

The decision on how to enter a foreign market - by acquiring an existing subsidiary or by establishing a new subsidiary - gives important insights about the workings of multinational firms. This area of research still offers a number of possibilities for theoretical and empirical studies. The empirical evidence is quite heterogenous and replicability of estimates is difficult due to data limitations. We propose a transparent and replicable method to construct a data base. This method allows us to compare the investment behavior of U.S. based multinationals to Western European multinationals. Our key results show that profitable U.S. parents prefer greenfield investments as an entry mode into foreign markets. We do not find significant variation in the mode choice of Western European parent firm characteristics. Our results imply that the empirical evidence regarding the entry mode decision of U.S. parent firms do not necessarily answer questions about the behavior of Western European firms. But for both sets of parent firms it shows, that the higher the institutional quality of the subsidiary country to be entered, the more likely will parent firms choose to acquire a subsidiary rather than to do a greenfield investment.

Table 1: Number of firms and regional distribution

Parent home country	USA	Europe
Parents	302	591
Subsidiaries	1,465	3,346
Percentage of Subsidiaries		
Western Europe	33.29	41.64
Eastern Europe	5.74	12.27
North America	10.02	23.63
Middle/South America	19.58	10.77
Asia	20.50	13.49
Africa	2.11	3.12
Arab	2.57	2.45
South Pacific	6.20	2.63

Table 2: Descriptive statistics parent firm and subsidiary country by parent origin

Parent home country	USA		Europe	
	Mean	Std	Mean	Std
Parent firm				
Acquisition	0.26	0.44	0.32	0.46
Sales (1000 mil USD)	9.9	2.4	11.1	1.98
(Profit-loss)/total assets (th USD)	0.044	0.096	0.032	0.067
Market capitalization (mil USD)	22.6	52.7	9.7	21.5
Tobin's Q	2.19	1.45	1.43	0.89
$R\&D$/sales (th USD)	0.125	0.78	0.06	0.35
Ownership percentage	72.6	24.01	87.9	19.99
Number of subsidiaries	79.7	125.4	142.4	192.1
Number of foreign subsidiaries ownership $> 45\%$	44.6	91.5	71.8	106.3
Number of shareholders	16.9	6.4	9.9	13.1
Percentage largest shareholders: Bank	0.29	0.46	0.23	0.42
Percentage largest shareholders: Family	0.13	0.39	0.14	0.35
Percentage largest shareholders: State	0	0	0.04	0.18
Percentage largest shareholders: Industrial Firm	0.05	0.23	0.38	0.48
Percentage largest shareholders: Dispersed	0.52	0.49	0.22	0.41
Host country				
Governance index (GI)	0.78	0.84	0.79	0.84
Distance (th miles) btw. home/host countries	2,729	1,332	2,633	2090
(Import+export)/GDP	93.5	90.1	77.1	66.7
GDP	21,847	12,584	23,173	13,472
Population	$1.40e^8$	$3.14e^8$	$1.77e^8$	$3.25e^8$
Land border btw. home/host countries	0.18	0.38	0.14	0.35
Stock market capitalization/GDP	0.78	0.79	0.73	0.59
Private credit/GDP	0.83	0.47	0.97	0.62

Notes:

All variables represent mean values per firm/country over years 2003/2004. Acquisition is a dummy variable 1 if subsidiary was acquired.

To reflect the status influencing the actual choice of the parent firm. Tobin's Q is market capitalization + depreciation over total assets.

Ownership is the percentage the parent owns of the subsidiary. Number of subsidiaries a parent firm holds regardless of ownership percentage.

Number of foreign subsidiaries a parent firm holds with ownership of at least 45%. Number of shareholders that hold stakes in parent firm.

Percentage of largest shareholder refers to the stake being held in the parent firm. GI is an indicator for institutional quality of country.

Distance is the geographical distance between home/host country. Land border is a dummy variable 1 if common border, 0 otherwise.

Table 3: Likelihood of acquisition of subsidiaries depending on parent firm and host country

| | U.S. parent firms | | | |
	(1)	(2)	(3)	(4)
Parent firm characteristics				
Log Sales	0.083	0.087	0.096	-0.081
	(0.06)	(0.06)	(0.06)	(0.08)
Tobin's Q	-0.275*	-0.278*	-0.236*	-0.226
	(0.13)	(0.13)	(0.12)	(0.12)
Log R&D/Sales				-0.153
				(0.15)
Host country characteristics				
Log (Import+Export)/GDP	0.302	0.301		0.255
	(0.22)	(0.21)		(0.29)
Log Distance	1.084***	0.970***		1.084***
	(0.17)	(0.17)		(0.24)
Log GDP	0.821***	-0.149		-0.709*
	(0.18)	(0.28)		(0.32)
Log Population	0.543***	0.547***		0.483**
	(0.12)	(0.11)		(0.16)
GI		0.998***		1.455***
		(0.27)		(0.39)
FE: Parent Industry	Yes	Yes	Yes	Yes
FE: Parent Country	Yes	Yes	Yes	Yes
FE: Subsidiary Country	No	No	Yes	No
Nb of Subsidiaries	1,342	1,342	1,252	715
Nb of Parents	271	271	265	156
Log-Likelihood	-627.32	-618.37	-555.29	-332.42
Pseudo-R^2	0.21	0.22	0.27	0.23

Notes:

The standard errors are in parentheses, robust to heteroscedasticity, allow for clustering by parent firm and country.

* Significance level at 10%, ** Significance level at 5%, *** Significance level at 1%.

Log Sales is log sales of parent firm averaged over the years 2003/2004.

Tobin's Q is parent's market capitalization plus depreciation over total assets averaged over the years 2003/2004.

Log R&D/Sales is the log of parent's R&D expenses over total sales averaged over the years 2003/2004.

Log (Import+Export)/GDP is the trade ratio to GDP btw. parent and host country averaged over the years 2003/2004.

Log Distance is the geographical distance in miles between parent and host country.

Log GDP is the log of real GDP of the host country averaged over the years 2003/2004.

Log Population is the log of population of the host country for year 2003/2004.

GI is the worldwide governance index averaged per host country over the years 2003/2004.

Table 4: Likelihood of acquisition of subsidiaries depending on parent firm and host country

| | European parent firms | | | |
	(1)	(2)	(3)	(4)
Parent firm characteristics				
Log Sales	0.033	0.037	-0.004	0.077
	(0.05)	(0.05)	(0.05)	(0.08)
Tobin'S Q	0.047	0.055	-0.011	-0.022
	(0.08)	(0.08)	(0.08)	(0.10)
Log R&D/Sales				0.126
				(0.17)
Host country characteristics				
Log (Import+Export)/GDP	0.348*	0.372*		0.245
	(0.16)	(0.16)		(0.17)
Log Distance	-0.260***	-0.208**		-0.148
	(0.08)	(0.07)		(0.10)
Log GDP	0.683***	0.199		0.181
	(0.12)	(0.21)		(0.27)
Log Population	0.442***	0.472***		0.454***
	(0.07)	(0.08)		(0.08)
GI		0.550*		0.583*
		(0.24)		(0.28)
FE: Parent Industry	Yes	Yes	Yes	Yes
FE: Parent Country	Yes	Yes	Yes	Yes
FE: Subsidiary Country	No	No	Yes	No
Nb of Subsidiaries	2,677	2,677	3,109	1,337
Nb of Parents	433	433	533	198
Log-Likelihood	-1304.94	-1299.69	-1514.10	-726.81
Pseudo-R^2	0.21	0.21	0.24	0.17

Notes:

The standard errors are in parentheses, robust to heteroscedasticity, allow for clustering by parent firm and country.

* Significance level at 10%, ** Significance level at 5%, *** Significance level at 1%.

Log Sales is log sales of parent firm averaged over the years 2003/2004.

Tobin's Q is parent's market capitalization plus depreciation over total assets averaged over the years 2003/2004.

Log R&D/Sales is the log of parent's R&D expenses over total sales averaged over the years 2003/2004.

Log (Import+Export)/GDP is the trade ratio to GDP btw. parent and host country averaged over the years 2003/2004.

Log Distance is the geographical distance in miles between parent and host country.

Log GDP is the log of real GDP of the host country averaged over the years 2003/2004.

Log Population is the log of population of the host country for year 2003/2004.

GI is the worldwide governance index averaged per host country over the years 2003/2004.

Table 5: Likelihood of acquisition of subsidiaries additional ownership and country variables

| | U.S. parent firms | | |
	(1)	(2)	(3)
Parent firm characteristics			
Log Sales	0.087	-0.087	-0.089
	(0.06)	(0.10)	(0.10)
Tobin's Q	-0.278*	-0.146	-0.133
	(0.13)	(0.12)	(0.12)
Foreign Subsidiaries		0.007***	0.007***
		(0.00)	(0.00)
Ownership		0.050***	0.049***
		(0.01)	(0.01)
Host country characteristics			
Log (Import+Export)/GDP	0.301	-0.204	-0.098
	(0.21)	(0.23)	(0.27)
Log Distance	0.970***		0.502**
	(0.17)		(0.21)
Land Border		-0.589*	
		(0.28)	
Log GDP	-0.149	-0.199	-0.109
	(0.28)	(0.32)	(0.36)
Log Population	0.547***	0.232*	0.292**
	(0.11)	(0.10)	(0.12)
GI	0.998***	0.895**	0.660*
	(0.27)	(0.29)	(0.32)
Colony			0.213
			(0.33)
Language			0.048
			(0.23)
FE: Parent Industry	Yes	Yes	Yes
FE: Parent Country	Yes	Yes	Yes
FE: Subsidiary Country	No	No	No
Nb of Subsidiaries	1,342	1,165	1,165
Nb of Parents	271	219	219
Log-Likelihood	-627.32	-469.52	-467.92
Pseudo-R^2	0.21	0.31	0.31

The standard errors are in parentheses, robust to heteroscedasticity, allow for clustering by parent firm and country.

Foreign Subsidiaries is the number of foreign subsidiaries of parent firm with ownership > 49% in 2004.

Ownership is ownership percentage of parent firm in the subsidiary.

Land Border is a dummy variable indicating 1 for a common land border btw. parent/subsidiary countries.

Colony is a dummy variable indicating 1 if parent and subsidiary have a common colonial past.

Language is a dummy variable indicating 1 if parent and subsidiary share a common language.

Table 6: Likelihood of acquisition of subsidiaries additional ownership and country variables

	European parent firms		
	(1)	(2)	(3))
Parent firm characteristics			
Log Sales	0.037	0.026	0.035
	(0.05)	(0.06)	(0.06)
Tobin's Q	0.055	0.051	0.042
	(0.08)	(0.08)	(0.08)
Foreign Subsidiaries		-0.001	-0.001
		(0.00)	(0.00)
Ownership		0.003	0.002
		(0.00)	(0.00)
Host country characteristics			
Log (Import+Export)/GDP	0.372*	0.484**	0.410**
	(0.16)	(0.18)	(0.18)
Log Distance	-0.208**		-0.213**
	(0.07)		(0.08)
Land Border		-0.098	
		(0.24)	
Log GDP	0.199	0.051	0.211
	(0.21)	(0.23)	(0.23)
Log Population	0.472***	0.475***	0.501***
	(0.08)	(0.08)	(0.09)
GI	0.550*	0.860**	0.605**
	(0.24)	(0.29)	(0.27)
Colony			-0.0003
			(0.32)
Language			0.283
			(0.25)
FE: Parent Industry	Yes	Yes	Yes
FE: Parent Country	Yes	Yes	Yes
FE: Subsidiary Country	No	No	No
Nb of Subsidiaries	2,677	2,590	2,587
Nb of Parents	422	429	429
Log-Likelihood	-1304.94	1224.76	1218.63
Pseudo-R^2	0.21	0.21	0.21

The standard errors are in parentheses, robust to heteroscedasticity, allow for clustering by parent firm and country.

Foreign Subsidiaries is the number of foreign subsidiaries of parent firm with ownership > 49% in 2004.

Ownership is ownership percentage of parent firm in the subsidiary.

Land Border is a dummy variable indicating 1 for a common land border btw. parent/subsidiary countries.

Colony is a dummy variable indicating 1 if parent and subsidiary have a common colonial past.

Language is a dummy variable indicating 1 if parent and subsidiary share a common language.

Appendices

This section provides detailed information regarding the sample construction and underlying assumptions. We present a unique approach to construct a database to differentiate the establishment mode of parents entering a foreign market. We combine several different databases to obtain such database. First, we present an overview of the different data sources, see table 7. The main data sources are an ownership (Osiris) and an acquisition (Zephyr) data base from the Bureau van Dijk (BvD). We complement those with information for country related variables. We use a three step procedure to combine the data bases and present empirical evidence on each of the three steps.

Step one is to select a sample of parents, which have established new subsidiaries domestically and/or abroad. We define a parent-subsidiary pair as being new if the subsidiary was not observed in t but is observed in t+1. Parent-subsidiary pairs being observed at both points in time, t and t+1, are called matched subsidiaries. Parent-subsidiary pairs that are observed in t and no longer in t+1 are called divested subsidiaries. The term divestiture usually means the disposal of an asset through sale or closure. Another reason here could be that a parent firm changes the direct ownership structure within its business conglomerate. E.g. parent firm holds 100% of both subsidiaries B and C in t. The parent firm changes the corporate control structure such that in t+1 B owns C with 100% and the parent holds only an ultimate 100% ownership in C. In this sense divested subsidiaries are the result of either a sale, closure or change of corporate control structure.[35]

Step two involves the merger and acquisition data base. We use the same parents identified in the first step and find all acquisition activities corresponding to that parent. A dummy variable indicates, if the new and foreign subsidiaries can be matched to an acquisition activity. This results in the final sample (the third step).

In the next section, we present the criteria that we applied to the data to select the firms at each step. In figure 1 we show how the different data sources, together with the selection criteria that have been applied to obtain the final data sample. Table 8 presents the number

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[35]Throughout the text we do not refer to the classical term of 'divestiture', but rather to the one described above.

of observations corresponding to each of the selection criteria. In the last two sections, we present descriptive statistics regarding the first and second step of the data base construction. Our goal is to provide a transparent and replicable guide for this database. The summary statistics presented in the main part of the paper refer to the final sample.

A   Data sources

Table 7 provides an overview of the data sources used to create the data sample.

Table 7: Data Sources

Variables	Source	Provider
Ownership	Osiris disc 45, 53, 62	BvD
Financial variables listed firms	Osiris disc 45, 53, 62	BvD
Financial variables unlisted firms	Amadeus disc 128	BvD
Governance indicators (GI)	Kaufmann et al. (2007)	Worldbank
GDP, Population	Penn World Tables 6.3	webpage (2010a)
Country distance, colony and	Rose (2005)	webpage (2010b)
Country language, border		
Country (import+export)/GDP	Rose (2007)	webpage (2010b)
	Rose and Spiegel (2010)	webpage (2010b)

B   Criteria for samples selection

Selection criteria for firms in the ownership data base.

- Parent firms need to be observable for at least 2 consecutive years (that means to be included in three consecutive Osiris data disks, namely 45, 53, 62;)

- Parent firms main industry is in the tradable good sector. This implies all industries within SIC 100 to 399.

- Parent firms have a direct ownership stake in the subsidiary of at least 50%.

- Subsidiary firms must be classified as industrial companies (in order to exclude pure financial investment e.g. fund participation).

For this selection, we determine all subsidiaries that can be matched based on the same firm identifier or by the same name. The subsidiary name match requires that the subsidiary with an identical name needs to be located in the same country. In a second step we determine the subsidiaries disappearing and newly appearing by comparing the ownership structure in 2005 (Osiris BvD disk 53) to the one in 2006 (Osiris BvD disk 62). In a third step we want to ensure that we correctly identify the newly appearing subsidiaries. If a subsidiary newly appears and one with an almost identical name in the same country disappears, we do not consider this subsidiary as being new (but rather mismatched). This is a precautious step in order to avoid miss-categorization due to spelling mistakes.

Selection criteria for firms in the acquisition data base.

- Acquiring firms must have at least one M&A activity since 1995 to be included in the Zephyr data base.

- Acquiring firm main industry activity lies within SIC 100 to 399.

- First we match the deals to new subsidiaries using all completed deal types.

- Second we augment the database with deals, where we don't find a matching new subsidiary, if the deal type has a final stake of more than 50% and the acquiring country is not equal to the target country.[36]

Osiris and Zephyr are offered by the same database provider Bureau van Dijk (BvD). Each firm is assigned a unique firm identifier, which is then used for both databases. Unfortunately firm identifiers for identical firms do not seem to match in all cases. We relied not only on matching firm identifiers but also resorted to name matching. From all the parent firms

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[36]This step makes sure that *all* relevant merger & acquisition deals of a parent are included, even if for some reason we do not find a *'new'* subsidiary using the ownership structure between the two points of time. Less than 5% of all acquired subsidiaries account to this procedure.

having newly established subsidiaries only 5% cannot be linked to the merger and acquisition database. 10 firms have been selected randomly and their online annual reports have been searched to find indication if those firms should have been included in the merger database. The random sample for parent firms showed that those firms are indeed not acquiring firms. For those parent firms that have been matched between Osiris and Zephyr, all acquisition activities for targets are matched against the subsidiaries. This match has been performed by target/subsidiary firm identifier, target/subsidiary name and hand selection to account for spelling differences.

Figure 1 and table 8 provide a scheme of the selection rules and how the different data sources have been combined. The encircled numbers in the figure refer to the three different steps on how we have constructed the database. Step 1 refers to the raw data on ownership structure. Step 2 refers to the raw data from the merger and acquisition data base. Finally step 3 applies the selection rules to the ownership and acquisition data and results in the data sample that we base our estimations on. The table 8 shows the number of parent/subsidiary firms by parent home country at each step of the selection.

Figure 1: Construction of data base
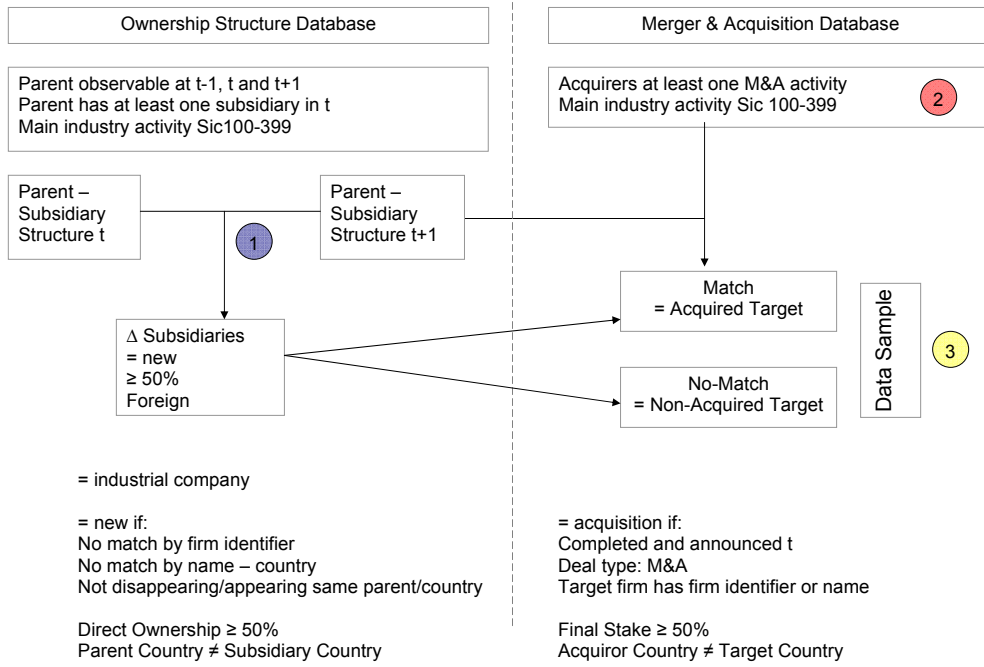
Notes:
Figure shows the combination of different data sources. The encircled numbers correspond to the different steps.

C   Analysis of ownership structure (step 1)

C.1   Descriptive statistics

Figure 2 looks at the ownership data before selection rules are applied and gives answers to the question how many subsidiaries do firms from Europe/USA have in general, how many domestic and how many foreign ones. How many of those subsidiaries do not observe an ownership change for the same parent, how many do observe an ownership change from within the year 2005. We observe that European parent firms have more than a third more subsidiaries than U.S. parent firms. The distribution of matched, new and divested subsidiaries is quite heterogenous across parent countries. Figure 3 seeks to answer the question concentrating on European/US parents, in which world region are their subsidiaries located? Do we observe regional differences with respect to the change in ownership of subsidiaries within the year 2005. European parent firms have most subsidiaries in Western Europe. Compared to

Table 8: Number of firms from different data sources

	Parent/ Acquirer	Subsidiary/ Target	Parent/ Acquirer	Subsidiary/ Target
Parent home country	USA		Europe	
Ownership data step 1	2,250	37,045	1,920	62,743
new entry	757	4,224	1,130	10,482
industrial firm	752	4,102	1,115	10,207
> 50% & not missing	701	3,613	917	5,077
Cross-country	378	1,518	667	3,576
Acquisition data step 2	1,583	2,765	2,555	3,881
Cross-country	492	721	1,068	1,736
Sample data step 3	302	1,465	591	3,346

Notes:

The tables indicates each step of the data base construction.

Step 1: Basic ownership structure. Step 2: Basic acquisition structure.

Step 3: Selection rules applied to basic ownership and acquisition structure.

U.S. parents, European parents have more subsidiaries in Eastern Europe. Surprisingly U.S. parent firms are not more engaged in Middle/South America than European multinationals.

Figure 2: Where do parent firms with subsidiaries come from?
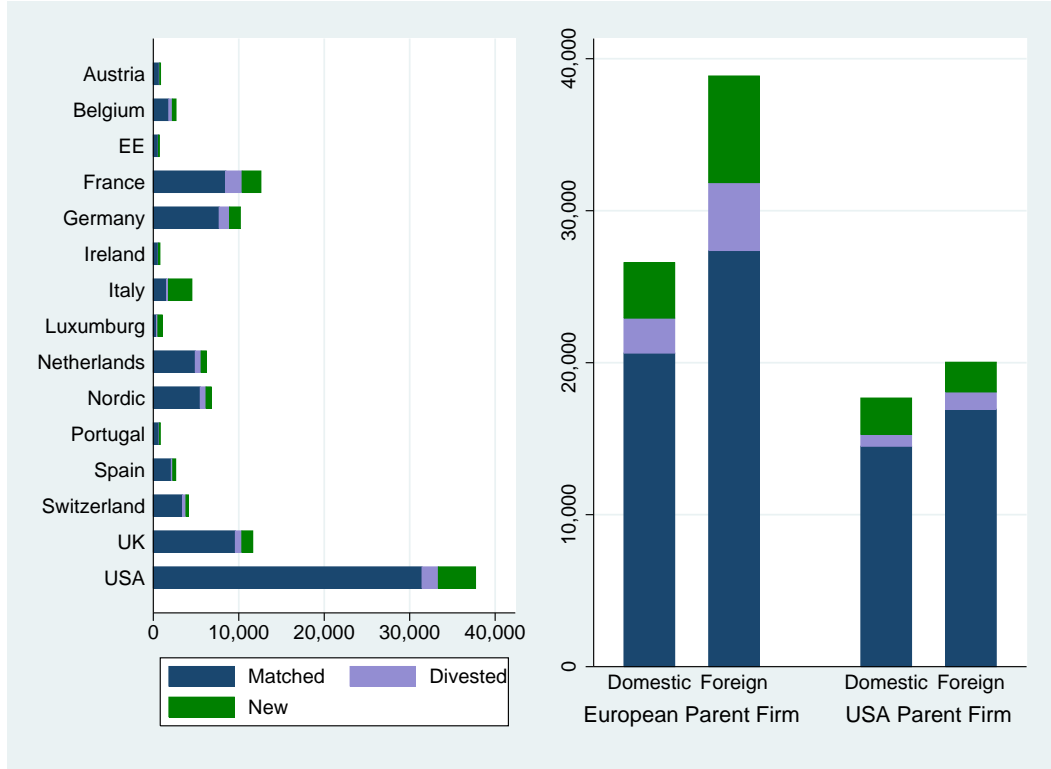
Notes:
Panel left shows subsidiaries matched, divested and new by parent origin country.
E.g. US parent firms have approx. 38,000 subsidiaries. Approx. 1/7 are new subsidiaries.
Panel right shows domestic/foreign subsidiaries matched, divested and new by parent origin country.
E.g. European parent firms have more than 39,000 foreign subsidiaries. 1/5 are new subsidiaries.
Matched subsidiary means that the subsidiary belongs in t and t+1 to the same parent.
Divested subsidiary means that the subsidiary belongs in t but not in t+1 to the same parent.
New subsidiary means that the subsidiary belongs in t+1 but not in t to the same parent.

C.2 Miss-classification of subsidiaries

Due to the lack of data on the incorporation date of subsidiary firms we resort to comparing the parent-subsidiary structure at two different point in time, to assess which subsidiary was newly established. One might be concerned that miss-matching of parent-subsidiary pairs between t and t+1 is an issue e.g. subsidiary B in a particular country is present in t and not in t+1. Therefore we classify B as a divested subsidiary. Subsidiary C of the same parent in the same country is not present in t but appears in t+1. We classify C as a new subsidiary. Unobserved to us - a name change/change in firm identifier causes B and C to be the same

Figure 3: Where do European/US parent firms have their subsidiaries?

Graphs by region

subsidiary. If such cases are frequently observed in the data then the ratio of new over the sum of new and divested subsidiaries per country and parent firm would show an accumulation around the midpoint of the distribution (possibly bell shaped). We plot the ratio in figure 4 and find that most cases occur at the opposing ends of the distribution. We are not able to resolve the issue of renaming of subsidiaries as such, but conclude that miss-matching between new and divested subsidiaries within the same country and parent firm does not seem to be frequent.

Another concern is the classification of subsidiaries being acquired or a greenfield investment. A greenfield investment is a newly established subsidiary, which has not been acquired.

Figure 4: Are new subsidiaries in reality divested subsidiaries due to miss-matching?

Source: Constructed by E.Kalkbrenner using Osiris Bureau van Dijk
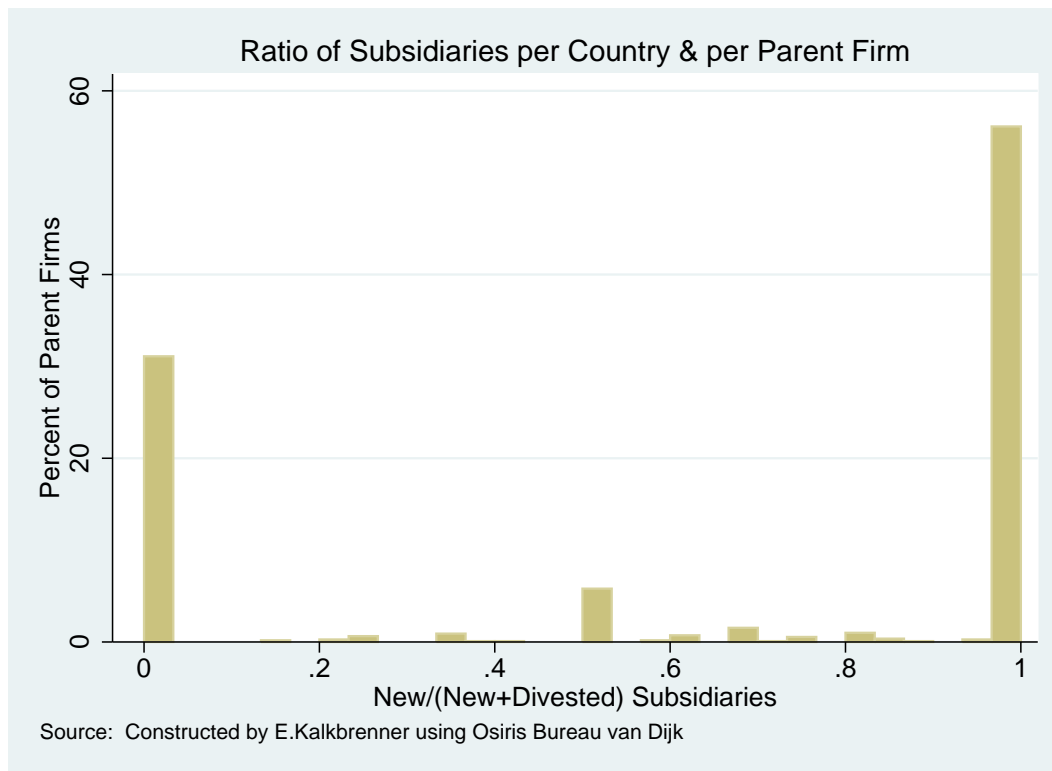
Notes:
The figure shows the ratio of new/(new+divested) subsidiaries per country and parent firm.
Divested subsidiary means that the subsidiary belongs in t but not in t+1 to the same parent.
New subsidiary means that the subsidiary belongs in t+1 but not in t to the same parent.

How can it be verified if a subsidiary, which has not been acquired (according to the here presented methodology) is indeed a greenfield subsidiary? With respect to greenfield investments annual reports and business journals usually report investment expansions e.g. creating a new plant or increasing investment in a particular region. Such an investment might or might not go hand in hand with incorporating a new subsidiary. This makes it very difficult to verify if a subsidiary, which is a new subsidiary in the organizational structure of the firm (according to the Osiris ownership structure) is indeed a greenfield investment.[37] Not being acquired,

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[37]Harsco announces 2004/2005 to expand its division line MultiServ in several regions such as in Guatemala, Mexico, United Kingdom and Spain. Using the here presented methodology, we find newly established greenfield subsidiaries belonging to the MultiServ division line in Guatemala, Mexico and Spain. Although quite likely that increased investment in a region is correlated with incorporating a new establishment in the region, we don't know for certain that those subsidiaries are indeed incorporated as greenfield start-ups.

means that for the same parent, we are not able to find a match in the merger database based on the subsidiaries name or firm identifier.

What - if not a greenfield investment - could those subsidiary mistakenly represent?

(a) The subsidiary is not new:

We observe approximately 25 parent firms for which more than 20 subsidiaries are newly established within the year period. This could either be a firm heavily expanding or a data entry problem in the ownership structure. Whereas the latter occurs in the case that the ownership structure of Osiris does not provide an exact account of the subsidiaries belonging to each parent at a particular point in time. Example: The ownership structure reveals that a parent firm, Harsco Corporation, has no subsidiary in Guatemala by the end of fiscal year 2004; but by the end of fiscal year 2005, Harsco owns a subsidiary in Guatemala called *Multiserv Guatemala SA*. According to the SEC 10-K filing of Harsco *Multiserv Guatemala SA* is a 100% owned subsidiary already by the end of fiscal year 2002. This results in a false classification of Harsco corporation subsidiaries as greenfield investments in 2005. If this is due to a data entry problem of the ownership structure of the parent firm, then several subsidiaries will appear to be newly established, when in reality they are not. Although such a database mistake is potentially observable, there is no reason to believe that such a database error is the result of a systematic pattern. Knowing the exact incorporation date of a subsidiary would certainly help. Due to the lack of this data, we resort to other data sources. The U.S. Securities and Exchange Commission requires publicly traded firms to disclose information among other things about their ownership structure (Ex.21 of the K-10 form to be filed); A list of subsidiaries/affiliates from the end of fiscal year 2004 was compared to the list from the end of fiscal year 2005. This allows us for a sample of US firms to verify if a subsidiary is indeed newly established within the applicable time period. Securities and Commission (2010) [38] The Amadeus database contains unlisted and listed

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[38]U.S. parent firms sample background check:
Arch Chemicals Inc: none of the 4 new subsidiaries appear in SEC filings 31.12.2003. All subsidiaries can be found in the SEC filing of 31.12.2005.
Conocophillis: only 4 of the 25 new subsidiaries appear in SEC filings 31.12.2003 and have been dropped from

firms in Europe. Further it includes the incorporation year of firms. The last available Amadeus database to us (Amadeus disc 128) includes firms up to incorporation year 2004 (mostly up to 2003). As an additional consistency check we would expect a poor match of the subsidiaries in our sample to the Amadeus disc 128, as the firms in our sample should be incorporated after 2004. If we find the majority of subsidiaries matching the firms in the Amadeus disc 128, it would be an indicator that subsidiaries have been incorporated at a prior time and are therefore not newly established subsidiaries. Indeed we don't find a high percentage of matches (approximately 10%), suggesting that most of the European subsidiaries in our sample are not incorporated prior to 2004. The ones for which we found a positive match were then not included in the final sample.

(b) The 'greenfield' subsidiary is in fact an acquired subsidiary:

It is important to define what a greenfield investment really represents. The empirical applications in the literature differ with respect to the definition of greenfield investment. For the US, the Bureau of Economic Analysis provides firm-level survey data about all U.S. foreign affiliates above a certain size threshold detailing the mode choice of the affiliate Nocke and Yeaple (2008). Larimo (2003) defines greenfield investment as a start-up investment involving a new facility. He uses data drawn from annual reports, business journals and direct contacts with the firms. The exact definition was not provided. Bertrand et al. (2009) do not provide an explicit definition of greenfield investment but distinguish them from acquired affiliates using survey data on Swedish multinational firms. According to our definition a greenfield subsidiary is a subsidiary, for which we can not find a match in the acquisition data base. It is although possible not to find a match with an acquisition due to the fact

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the sample.

Federal Mogul Corp: none of the 42 new subsidiaries appear in SEC filings 31.12.2003. All subsidiaries can be found in the SEC filing of 31.12.2005.

Hewlett Packard: none of the 7 new subsidiaries appear in SEC filings 31.12.2003. 5 subsidiaries can be found in the SEC filing of 31.12.2005, 2 in SEC filing 31.12.2006.

European Parent firms background check:

Henkel KGAA: about one third of new 99 subsidiaries appear in SEC filings 31.12.2003 and have therefore been dropped from the sample.

UCB NV SA: none of the subsidiaries appear in SEC filings 31.12.2003. All subsidiaries can be found in the SEC filing of 31.12.2005. But one subsidiary was not recognized as being an acquired subsidiary (UCB NV SA (BE) acquires Celltech (GB) all new subsidiaries from the Celltech acquisition are coded as *acquired* but one subsidiary Medeva Pharma Suisse AG not.

that a re-arrangement of ownership hierarchy takes place. E.g. Firm A acquires firm B and firm C is a 100% subsidiary of firm B. After the acquisition Firm A changes the total ownership structure of the corporation and A now owns C directly. C does not show up for the acquisition of B by A. We would falsely classify C as a new subsidiary, which has not been acquired. This is indeed problematic, but we believe that on average corporations do not immediately after acquisitions change the ownership hierarchy and therefore don't believe in a systematic pattern creating such observations.

D   Descriptive analysis of acquisition structure (step 2)

We use the Zephyr data base and select acquiring firms active in the tradable good industry and acquisition deals with a final stake of at least 50% in the year 2004 and 2005. We can observe the domestic and foreign acquisitions per parent country in figure 5. U.S. parent firms account for the majority of acquisition deals. Approximately two-thirds of acquisitions by U.S. parent firms are domestic, an indication that for future research domestic subsidiaries should not be neglected. With respect to European parent firms not surprisingly the UK shows the highest frequency of acquisition deals, whereby only a third involves a foreign target. Parent firms from Germanic and Nordic countries exhibit half of their acquisition deals being foreign targets.

If we are interested in the question where are the target firms of U.S. and European parent firms located, figure 6 provides the answer. It shows that European parent firms acquire heavily in Eastern Europe domestically and foreign, in North America and predominantly in Western Europe. U.S. parent firms acquired predominantly in North America and to a much smaller extend in Western Europe. Surprisingly small is the acquisition frequency in Middle/South America and Asia.
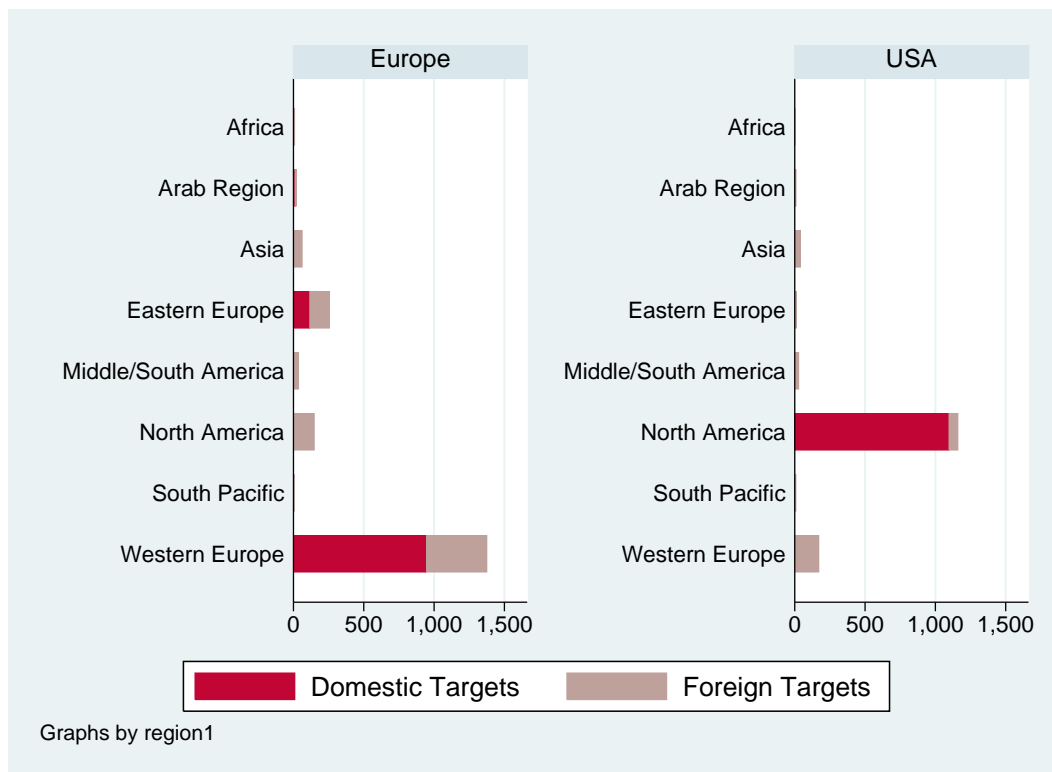
Figure 5: How many domestic/foreign acquisitions do we observe per parent country?
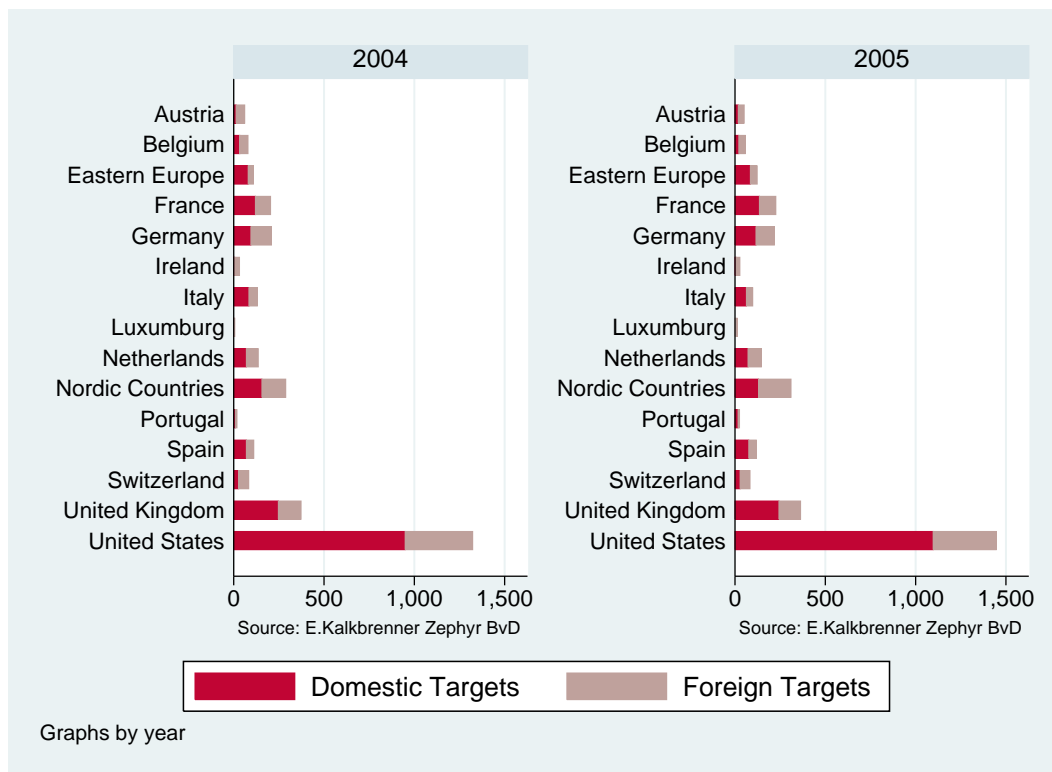
Notes:
The figure shows the number of majority acquiring merger and acquisitions within 2004/2005 for parents from the manufacturing industry. We differentiates between domestic and foreign targets;
e.g. In 2005 US parent firms have acquired approx. 1,500 targets, 1/3 of it are foreign acquisitions.

Figure 6: What are the target regions of European/US acquiring parents?

Notes:
The figure shows the number of majority acquiring merger and acquisitions in 2005 for parents
from the manufacturing industry by target region, differentiating by domestic/foreign acquisitions.
E.g. European parents acquired approx. 1,400 Western European targets. 1/3 are foreign acquisitions.

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