Department of Economics

Essays on Corporate Taxation

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Responsibility for the remaining errors is solely mine.

- Chapter 1 -

Introduction

Hall and Jorgenson (1969) open their seminal model of corporate taxation stating that "businessmen in pursuit of gain will find the purchase of capital goods more attractive if they cost less". When capital is mobile and heterogeneous, an increase of corporate tax rates rises the pre-tax return of capital and induces the "businessmen" to reduce the volume of investments. This explains why the literature on corporate income taxation and investment focuses on the impact of corporate tax policies on capital stock accumulation: a change in corporate taxes can induce a change in the volume of capital stock, or a shift of capital stock toward different types of investment, and less tax-costly locations. The arguments advanced by the corporate tax competition literature directly follow: as showed in the seminal works of Wilson (1986) and Zodrow and Mieszkowski (1986), countries tend to compete over capital income tax rates, in order to reduce the cost of domestic capital and attract larger volumes of investments. This "race to the bottom" induces the competing countries to lower their taxes to the point of causing a loss of revenue. When public goods and services are financed by capital income taxes, the loss of revenue translates into underprovision of public goods and services, and possibly into a reduction of welfare, which explains the concern of governments to identify policies of "harmful" tax competition.

During economic stagnation, the interest of policy makers might shift on designing instruments that enhance the profitability of domestic firms. They might see in the development and and internationalization of domestic firms an effective channel for growth. The arguments advanced by the literature on corporate tax competition can then be assessed under a different light, that focuses on the effect of corporate tax changes on the investment decision of domestic firms, rather than on the decision of foreign firm to invest in the home country. The first paper presented in this Thesis investigates how home corporate taxes affect the initial decision of a firm to undertake investment projects, such as cross-border merger or acquisitions (M&As). Drawing from the "new" new interna-

tional trade literature, corporate taxes are introduced in a model where heterogeneous firms make the decision to expand by undertaking domestic and cross-border acquisitions. The model permits the derivation of three predictions on the effect of corporate taxes on firms' expansion decisions. When M&A are associated with high fixed costs, (1) higher home corporate taxes make cross-border acquisitions relatively cheaper than the implicit alternative of serving foreign market through exports; (2) the adoption of reliefs on double taxation of foreign profit in the form of deduction also makes cross-border acquisitions relatively cheaper; (3) but none of the above affects the likelihood of making domestic acquisitions. The first two predictions are consistent with the literature on corporate tax competition, which suggests that firms relocate production abroad, in response to rises in home corporate taxes. A dynamic random parameter probit model is used to test the predictions of the theoretical model, and a firm-level dataset that follows the pattern of all ownership changes that occurred between 2005 and 2010 for a sample of 29,000 large European companies is constructed to this purpose. Results from the empirical investigation show that "established" multinationals are the most likely to undertake M&As. Results also show that, when domestic firms expand, they are more likely than multinationals to make consecutive acquisitions in subsequent years. More importantly, the effect of home corporate taxes differs across firms and expansions types. The predictions of the theoretical model hold only for multinational parent firms. Domestic parent firms react in the opposite way: a rise in home corporate taxes negatively affects their ability to undertake a cross-border acquisition and subsequently evolve into multinational organisations, but it has a positive effect on the probability that these firms expand local production (via the acquisition of a domestic subsidiary). As a result, Domestic policies whose goal is to discourage multinationals headquartered in the home country from acquiring additional foreign subsidiaries (and possibly exploit new profit shifting channels), can use corporate taxes as an instrument to encourage the internationalization of domestic firms.

The second paper presented in this Thesis uses firm-level data to investigate the impact of taxes on the international location of targets in M&A. In principle, a higher tax rate in the target's country could make an acquisition there more likely, less likely, or have no effect at all. Particular attention is dedicated to explain the possible motives behind an observed acquisition. The parent firm can choose to expand in order to fulfil efficiency motives, or rather strategy motives. Efficiency motives can justify five different predictions for the effect of taxes levied in the target's country. When the parent firm intends to expand in order to transfer its branding to the target firm and increase revenue, higher taxes in the target's country negatively affect the expansion decision; but when the parent firm intends to expand in order to transfer its technology to the target and reduce production costs, then higher capital allowances in the target's country positively affect the expansion decision. This second effect should hold also when parent firms intend to

undertake vertical acquisitions meant to transfer production to low-cost locations. When the acquirer intends to purchase the ownership of a target for the sole purpose of shifting profit and reduce tax-costs, then the difference between home and foreign tax rates is relevant for the investment decision. Finally, if the parent firm intends to gain efficiency by increasing its scale of production, then it will compare the share of profit that would be paid in taxes in the possible alternative location, and the effective average tax rate (EATR) should represent the relevant tax measure. When the parent firm is moved by a strategic motive, and intends to simply acquire a competitor to gain control of a larger share of the market, then the more attractive target firms will be those residing in the countries that apply higher tax rates. Financial and ownership data for companies in ORBIS in 2005 are combined with domestic and cross-border acquisitions data in ZEPHYR, for the period between 2006 and 2008. A random parameters form of mixed logit model is then estimated to test the various predictions. Results show that the statutory tax rate in the target country has a negative impact on the probability of an acquisition in that country, with an average elasticity of around 1. The size of the effect differs (i) between acquirers that were multinational or domestic in 2005; (ii) between domestic and cross-border acquisitions; and (iii) depending on whether the acquirer's country has a worldwide or territorial tax system.

The papers presented in this Thesis focus on two aspects of firms discrete investment decisions. Parent firms have to choose whether to maintain their *status quo* or rather expand their ownership structure by acquiring the controlling share of other pre-existing firms. If they decide to expand, they have to choose what is the most desirable location for the acquisition targets. In both papers, the empirical analysis relies upon an attentively built dataset, that follows the pattern of Ownership Structure changes due to all Merger and Acquisition transactions (M&As) undertaken during a fix period of time. The final chapter of this thesis explains the methodology followed to build the dataset.

- Chapter 2 -

Corporate Taxes and the Growth of the Firm

§ 2.1 Introduction

Foreign Direct Investments (FDI) inflows are of strategic importance for countries that expect capital investment to bring positive spillovers and boost economic growth. The public economics debate on international tax competition has widely studied the policy instruments available to attract these investments, particularly with regard to resources employed by multinational companies (MNCs). The general suggestion being that volume and location of capital are negatively affected by the host country marginal and average corporate tax rates, respectively. The *expansion* of domestic companies and their diversification into foreign markets represents a second channel for growth. A channel that could prove particularly suitable in a situation of economic stagnation and financial uncertainty. With a specific interest into capital taxation, this paper investigates how home corporate taxes affect the initial decision of domestic firms to undertake investment projects such as cross-border Merger and Acquisitions (M&As), and through them eventually grow into a multinational organisation.

The latest World Investment Report (UNCTAD (2012)) stresses how the rise of FDI outflows from the EU that touched its peak in 2007 was driven by cross-border M&As, and how the financial crisis caused this trend to revert into a steep fall. In 2011, outflows from developed countries reached levels comparable to the pre-crisis average of 2005-2007 (see Figure 2.1), but this renewed growth was originated mainly from the United States and Japan. Europe remains behind the World trend, excluding the few countries that witnessed a rise in FDI, such as the UK, Sweden and Denmark. Netherlands and Italy had their outflows fall by half in 2011 as compared to the previous year. In the same period, Germany and Spain had theirs reduced by no less than thirty and forty per cent. The World Investment Report draws particular attention to how future policies should frame the liberalisation of investment into a quest for growth:

> *A "new generation" of investment policies is emerging ... with simultaneous moves to further liberalise investment regimes and promote foreign investment, on the one hand, and to regulate investment in pursuit of public policy objectives, on the other. These policies are characterised by a shared recognition of the need to promote responsible investment as a cornerstone of economic growth. ... "New generation" investment policies increasingly incorporate targeted objectives to channel investment to areas key for economic or industrial development and for the build-up, maintenance and improvement of productive capacity and international competitiveness*

In the recession climate generated by the European sovereign debt crisis it is important to understand whether corporate taxes constitute an instrument for supporting the growth of domestic firms. In keeping with the well-known result of the "new" new trade theory, firms that break into foreign markets are characterised by productivity levels higher than those of firms who confine to their domestic borders. Policymakers should have an interest in designing incentives for these domestic companies to start serving the international demand, while maintaining their headquarters within domestic borders.

This paper departs from the international trade literature, to introduce corporate taxes in a model that describes the discrete choice of heterogeneous firms who intend to expand their production through domestic and cross-border M&As. Three propositions are derived from the model: (1) a raise in Home corporate taxes increases the probability that highly productive firms expand into foreign markets through cross-border acquisitions; (2) the application of a Tax Credit, as form of relief from international double taxation, negatively affects the probability that firms choose to serve the foreign market through a cross-border M&A; and (3) a raise in Home corporate taxes leaves the choice of making a domestic acquisition unaffected, for multinational firms. A firm-level dataset is constructed using detailed accounts unconsolidated to the subsidiary level, for the purpose of testing these three propositions. The dataset traces the pattern of corporate expansions followed by a sample of 29,000 European companies over a period of 6 years (2005-2010). It allows to estimate a model for the discrete choice of making a M&A, while paying particular attention to the way home corporate taxes affect such choices.

This paper extends on the existing literature in several ways. First, the proposed theoretical framework explicitly models the role of corporate taxes on the expansion of heterogeneous firms, following the literature initiated by Melitz (2003). Corporate taxes are introduced in a simplified version of the model by Helpman et al. (2003) to describe the mechanism driving both domestic and cross-border M&As. In the proposed model, acquisitions are associated with high fixed costs that are fully deductible. Under these conditions, a raise in home corporate taxes does not affect the probability that a firm

expands its activity by acquiring domestic subsidiaries, but it affects the probability that the same firm expands its activity by serving the foreign market through the acquisition of foreign subsidiaries. An increase in home corporate taxes raises the marginal cost savings from acquiring foreign subsidiaries rather than doing exports (the implicit alternative entry mode), so firms are more likely to choose serving foreign demand by relocating production abroad.

Second, firms heterogeneity plays a central role in understanding the way corporate taxes affect firms' investment decision. There is a tendency in the empirical literature on international corporate taxation to concentrate exclusively on multinational companies[1], so one of the main goal of this paper is to show that the expansion pattern of domestic firms is very different from that of multinationals. The dataset used in the empirical analysis constitutes a special feature of this paper. It combines two commercial databases provided by the Bureau Van Dijk, named ORBIS and ZEPHYR, to follow the ownership structure changes occurred to a sample of *circa* 29,000 Global Ultimate Owners (GUO) located in Europe. When a GUO itself or any of its subsidiaries (up to the tenth level) acquire the majority share of a pre-existing firm, the acquired target is added to the structure of the GUO and removed from that of the seller. This process guarantees perfect identification of the mode of expansion as an M&A and precise reconstruction of all changes occurred to a given company. It also allows to identify three different "types" of large firms: established multinational companies, large domestic companies (whose subsidiaries are all domestically located) and standalone companies (who are constituted only by their headquarter). The empirical evidence shows that multinational firms are more likely to expand their structure by acquiring a new subsidiary. Non-multinational firms do not expand as likely. However, the non-multinational firms that do expand have a higher probability to start expanding in sub-sequent years, and recursively acquire new subsidiaries. The empirical investigation then moves onto testing whether corporate taxes affect all three "types" of firms in the way predicted by the theoretical model.

Finally, this paper empirically investigates the possibility that the expansion choice is characterised by *true* state dependence. In particular, the empirical model allows to identify whether the M&As undertaken by the observed firms are single standing or rather are part of a complex restructuring that involves consecutive acquisitions of several different subsidiaries. The observation that non-multinationals are per se less likely to invest than multinationals, could motivate a lack of interest into supporting the expansion of domestic companies. However, showing that non-multinationals that begin expanding are to

[1] As Baldwin and Okubo (2009a) state, *"the public policy debate on international tax competition has long focused on large firms based on the premise that large firms are both the most likely to move in response to tax differentials and the sort of firms that a nation would be least happy about losing"*

continue their expansion in several consecutive periods could motivate the promotion of policies that support their development into multinational corporations. As expected, the results show that the expansion choice is characterised by time dependence. In addition, the time dependence is stronger for standalone firms, that, before the first expansions are constituted only by their headquarter, rather than for firms with more sophisticated ownership structures.

The results from this paper seem to suggest that policies intended to enhance firms productivity should support the internationalization of simply structured firms. Home corporate taxes are a potential instrument for such policies. In particular, they could be used to support firms that undertake their first acquisition while choosing to maintain their headquarter within the domestic borders, and distinguish them from broad multinational firms that continue to expand, possibly in an attempt to exploit profit shifting opportunities.

Section 2.2 reviews the related literature. Section 2.3 presents the model for the firms discrete choice of making an expansion. Section 2.4 describes the Data and shows key descriptive statistics. Section 2.5 explains the empirical methodology, and section 2.6 presents the results. Section 2.7 concludes.

§ 2.2 Literature Review

During the last twenty years a growing body of literature has focused on the role played by taxes in defining the volume and direction of Foreign Direct Investments (FDI) [2]. The general result that lower tax jurisdictions guarantee higher post-tax returns has inspired the literature on corporate tax competition, which predicted a *race-to-the-bottom* in setting corporate tax rates among different countries (among others, see Ferrett (2005) and Devereux et al. (2008)). Recently, the diffusion of firm-level data has allowed new studies to overcome the limits of conducting analysis exclusively on aggregate FDI.

Three main aspects related to the taxation of capital have attracted particular attention. First, there has been a revision of the analysis on the *direction of foreign direct investments* (FDI). A firm that is looking to make an investment follows some criteria to choose one out of a number of mutually exclusive alternative locations, which are compared also in terms of corporate tax legislation. Several empirical works estimate the role and importance of differences among the tax systems of a number of countries that qualify as potential investment destinations (see Devereux and Griffith (1998a), Buettner and Ruf

[2] Extensive surveys are Devereux (2007) and de Mooij and Ederveen (2008) and, more broadly on FDI determinants, Blonigen (2005)

(2007), Barrios et al. (2009) and Arulampalam et al. (2012)). The evidence brought by this literature confirms the initial result of Devereux and Griffith (1998a): corporate taxes affect the extensive margins of the investment project. Moreover, discrete decisions, such as the one of comparing potential investment locations, depend, among other things, on the effective average tax rate (EATR), which compares the various mutually exclusive alternatives by measuring what portion of profit would be paid as taxes under each scenario.

Secondly, the topic of *international double taxation*. Corporate organisations constituted by subsidiaries located in different countries pay corporate taxes in each country where profit is realised. The firm's parent also pays additional home taxes upon repatriation of the foreign profit. The parent's domestic government can alleviate the burden of double taxation in different ways. It can exempt the parent from domestic taxation of the repatriated profit. It can offer deduction of the taxes already paid in the foreign country. Or it can grant a credit for the taxes paid in the foreign country, so to bring taxation of all profits to the same level. The literature has focused on how to attain tax rules that are *nationally* and *globally* optimal [3]. Desai and Hines (2003, 2004) argue that the exemption system is optimal from a national point of view, because it reduces the ownership distortions that would be caused by double taxation. But the literature on FDI and, in particular, Greenfield Investments agrees on the fact that it is with the tax credit system that global optimality is achieved. Huizinga and Voget (2009b) propose an empirical investigation of the effect of different double taxation systems. With a particular attention devoted to M&A investments, Devereux and Hubbard (2003) and Becker and Fuest (2011) show how, in a theoretical model where capital is not limited to the domestic supply, the exemption system can be shown to be both nationally and globally optimal.

Finally, the possibility of observing data on the activity of multinationals at the unconsolidated level has allowed to study how corporate taxes influence the headquarters decision to shift profit among subsidiaries so to minimise the costs related to tax payments. The literature focuses on the channels used to exploit profit shifting opportunities: notably *strategic allocation of over-head costs, intra firm financial transactions,* and *transfer pricing*. Early works, like Clausing (2003), look at the channel of transfer pricing through intra firm trade. Dischinger (2007) use data similar to those of this paper to provide empirical evidence of a general pattern of profit shifting outside of European countries. Dischinger and Riedel (2007) give empirical support to the hypothesis that the transfer pricing channel is particularly exploited by multinationals with high volume of intangible assets. Dischinger and Riedel (2010) show how profit shifting opportunity

[3] Becker and Fuest (2011) define National optimality as prevailing "if investment decisions cannot be changed without reducing national income" and Global optimality if "investment decisions cannot be changed without reducing global income"

due to differentials in home and foreign corporate tax rates are generally in favour of the headquarters location, to finally generate a flow toward the parents home countries and away from the high-tax subsidiary locations. Heckemeyer and Overesch (forthcoming) present a meticulous meta-review of all the most recent empirical evidence on the topic. One aspect arising from this framework, on which the entire literature seem to convey, is that established multinationals are the most responsive to profit shifting opportunities.

The literature of international trade initiated by Melitz (2003) and Helpman et al. (2003) provides a theoretical framework to study investment decisions of heterogenous firms. It shows why more productive firms earn larger profit and it uses entry fixed costs to explain the endogenous selection of the mass of expanding firms. Only sufficiently productive firms will be able to serve the foreign demand. Among these, the most productive will engage in merger and acquisitions (M&A) and the others will simply export. Nocke and Yeaple (2007) extend the model by Helpman et al. (2003) to include non-mobile productivities such as market and managerial capabilities, that are reflected in the quality of production. When these capabilities represent a second source of heterogeneity across firms, they can explain the specific advantage of making M&A over Greenfield Investments (which is purchasing a pre-existing firm instead of setting a new plant from scratch) so to motivate the existence of domestic acquisitions. This literature has been recently adapted to study the effect of corporate taxation, with a particular focus on profit shifting and tax competition. Baldwin and Okubo (2009b,a) propose a model of tax competition with agglomeration economies and firm heterogeneity to show how the large and more productive firms are more sensitive to tax differences across countries and hence more likely to relocate in reaction to high taxes. Small countries attempt to attract these firms by inefficiently lowering their tax rate. They propose that a reform that increases the tax base can raise tax revenue while limiting relocation. Davies and Eckel (2007) also show how tax competition, realised through a race-to-the-bottom in corporate tax rates to attract foreign investors, leads to underprovision of public goods and overabundance of entering firms. In line with the empirical results of Desai et al. (2006), Krautheim and Schmidt-Eisenlohr (2011) introduce firm heterogeneity in a tax competition model to show how the larger more productive firms are more likely to shift profit to Tax Heavens. Finally, Lockwood (2012) applies the Melitz framework to a model for the optimal rule of foreign-source profits. He shows that the optimality of a double tax rule depends on the level of trade costs: high trade costs imply that all firms serving the foreign market choose to do so through FDI, and in this case the exemption rule is nationally optimal. With low trade costs, instead, only the more productive firms choose FDI, in which case the deduction rule is the nationally optimal one.

The “new” new international trade theory explains the endogenous sorting of firms

into different market entry modes in a static framework. A firm's productivity is a random draw from a given distribution function, but once firms learn their productivity type they face no other source of uncertainty. The possibility that the fixed costs associated with specific entry modes, such as exports (like in Melitz (2003)) or also FDI (like in Helpman et al. (2003)), have the characteristics of sunk costs has drawn new attention upon this literature. Recent works like Ghironi and Melitz (2005), Alessandria and Choi (2007) and Ruhl (2008) extend Melitz' model into a dynamic framework where changes over time of productivity and prices also affect the sorting of firms into different foreign market entry modes. At the same time, the empirical literature initiated by Roberts and Tybout (1997) explores the hypothesis that sunk entry costs explains the persistence of export participation. Bernard and Jensen (2004) explores the difference in the exporting pattern of new and "established" exporter, Das et al. (2007) propose a structural model for both exit and entry into the export market that allows to estimate firms productivity growth over time and the size of export sunk costs. Non of these paper assess the issue of time dependence in the choice of entering domestic or foreign markets with modes alternative to exports.

§ 2.3 Theoretical Model

This section draws from the "new" new international trade literature started by Melitz (2003) to present a theoretical framework for the firms discrete choice of whether to expand production by acquiring pre-existing subsidiaries located in foreign countries. Departing from a simplified version of the model by Helpman, Melitz, and Yeaple (2003) (HMY), corporate taxes are introduced and comparative statics for their effect on the probability of expanding production to foreign markets are derived.

The HMY's model explains the international organisation of production when firms differ in terms of productivity and can choose whether and how to serve foreign demand of a differentiated good. The model shows that firms face the same *proximity-concentration tradeoff* suggested by Brainard (1997), but also that the response to such tradeoff depends on their productivity level. Any firm wanting to serve foreign demand needs to choose whether to cover the transport costs necessary to export part of the domestic production to the foreign market, or avoid paying transport costs and instead cover the fixed costs necessary to purchase a subsidiary that is already active in that foreign market. Ultimately countries where the distribution of firms productivity is highly dispersed will witness a higher number of firms choosing to serve foreign demand through cross-border M&As. Because the data used in this paper does not allow to observe firms exit from the domestic market or export to foreign market, the model assumes that expanding firms face fixed

costs only when choosing to make cross-border acquisitions.[4] This simplifies Melitz result on the sorting of firms into different modes of production: under these assumptions all active firms can realise a positive profit from serving foreign demand through exports, but only the most productive realise a even higher profit from undertaking a M&A project. This section is closed by a discussion of an extension to the model that allows to explain domestic acquisitions.

2.3.1 The Economy

There are K countries, Home and $K-1$ Foreign countries. Variables indexed by k refer to the Foreign countries. Each country has a specific labour endowment (L for Home and L_k for each Foreign country), which constitutes the only input used for production. Two different types of goods are produced in each country. The first good is the *numeraire*, x_n: an homogenous good produced in an integrated market with no transport cost and unit price. The second good is the *differentiated good* , $x(\omega)$: it has varieties denoted by $\omega \in \Omega$ and can be exported only at a non-zero cost. Varieties are substitutable with constant elasticity $\eta > 1$. Each variety ω has a country-specific price, denoted as $p(\omega)$ ($p_k(\omega)$ for the Foreign countries). Because each variety ω is produced by only one firm, characterised by a specific productivity level $1/m$, to simplify notation set $\omega = m$. Marginal productivity of labour is also different across countries, so the Home country produces w units of the differentiated good with 1 unit of labour, and foreign countries produce w_k.

To focus the attention on corporate taxes, assumption is made that the labour income tax, t_L, and the ad-valorem tax on consumption of the differentiated goods, t_x, are both zero. Corporate taxes, instead, are levied on the volume of profit realised by all production sites located within the domestic borders at the statutory rate t. Fixed costs are fully deductible. However, when a firm decides to purchase a foreign subsidiary, the acquisition price is non-deductible. The profits realised by production sites located outside of the domestic borders are initially taxed at the foreign corporate tax rate t_k by the foreign government, and, upon repatriation to the home country, also taxed by the home government at the domestic rate T.

Individuals have two sources of income. They collect total (post-tax) profit, Π, and supply labour, L, at the country wage rate w. So their budget constraint can be written as $I = \Pi + \mathrm{w}L = (1-\mu)x_n + \mu \int_m x(m)p(m)dm$. Utility from consuming the homogenous good, x_n, is constant and additively separable, whereas the utility from consuming the differentiated good has CES form, so that:

[4] This assumption follows Yeaple (2009)

$$U(x_n, x(m)) = (1-\mu)\log x_n + \frac{\mu}{\alpha}\log\left(\int_m x(m)^\alpha dm\right), \tag{2.1}$$

where $\alpha = \frac{\eta-1}{\eta}$. Solving the maximisation problem yields Home country's demand for variety m of the differentiated good

$$x(m) = \mu\frac{I}{P}\left(\frac{p(m)}{P}\right)^{-\eta}, \tag{2.2}$$

where P represents the Home country's price index, a weighted average of the price set for all demanded varieties of the differentiated good, which can be written as

$$P = \left(\int_m p(m)^{1-\eta}dm\right)^{\frac{1}{1-\eta}} \tag{2.3}$$

In the $K-1$ Foreign countries demand for the differentiated good and price index have the same functional form. Given $U_k(x_n, x(m))$, demand of the differentiated good will be $x_k(m) = \mu\frac{I_k}{P_k}\left(\frac{p_k(m)}{P_k}\right)^{-\eta}$ with price index $P_k = \left(\int_m (p_k(m)^{1-\eta}dm\right)^{\frac{1}{1-\eta}}$.[5]

2.3.2 Firm Heterogeneity and Production

On the supply side, in each country there is a mass N of potential entrant firms. Potential firms, like in Melitz (2003), need to pay a sunk cost, S, before being able to observe their randomly drawn productivity type and choose whether to start producing or exit the market. The productivity type is defined by the level of marginal costs, it is denoted by m and follows distribution $G(m)$[6]. For the firms that pay the sunk cost, the profit from serving domestic demand of the differentiated good in the Home country is given by

$$\pi_D = (1-t)\left[x(m)\left(p(m) - c(m)\right) - f_D\right], \tag{2.4}$$

where $c(m) = \mathrm{w}m$ indicates variable cost and f_D indicates fixed costs. As mentioned earlier, the data used in this paper do not allow to observe firm-level exit and entry in

[5] In Helpman et al. (2003) the differentiated good is produced in H sectors, each having a different set of varieties Ω_h with $h = 1, ..., H$, so demand for the differentiated good and price index are both specific to each sector within each country. Here the setup is simplified by assuming there is only one sector producing the differentiated good $x(\omega)$. This does not affect the result on corporate taxes.

[6] It is here implicitly assumed that the support of G(m) is the positive real line. Helpman et al. (2003) and Yeaple (2009) assume that G(m) is Pareto, implying its support corresponds to the interval $[b, \infty)$, with $b > 0$,

the domestic market: all observed firms started production before the beginning of the panel and stayed active during its own length. This lead to the assumption that $f_D = 0$, which implies that all firms with strictly positive productivity actively serve the domestic demand.

Firms in the differentiated good sector are monopolistically competitive: they take demand for the variety they produce and price index for the country they serve as given, and maximise profit by charging the optimal price $p(m) = c(m)\frac{\eta}{\eta-1} = \frac{m\mathrm{w}}{\alpha}$. This yield maximum profit from domestic production, which is

$$\pi_D = (1-t)\left[\frac{\mu I}{\eta P^{1-\eta}}\left(\frac{m\mathrm{w}}{\alpha}\right)^{1-\eta}\right]. \tag{2.5}$$

The differentiated good is demanded worldwide, so each domestic firm can expand its activity in order to serve foreign demand of the variety it specialises in. Foreign demand can be served by increasing the scale of domestic production to export the share in excess of domestic demand to the foreign market, or alternatively by purchasing the control of a foreign firm to adapt its technology and have it serve demand for local consumers.[7] The first option implies no fixed cost[8], but it requires that τ units of differentiated good are transported to the foreign market for a single unit to be delivered (so $\tau_k > 1$ denotes iceberg transport costs between the Home country and the destination country k). The second option involves no transport costs, but requires that the fixed cost f_A is paid, together with the acquisition price for the purchase of the foreign subsidiary.

The market for corporate control is perfectly competitive, so any potential target is acquired at the target's shareholders reservation price, which corresponds to the post-tax domestic profit realised by the target firm, denoted by $(1-t_k)\bar{\pi}_k$. The target firms technology can be adapted by the acquirer firm to produce the variety of differentiated good in which the acquirer specialises, so the determinants of $\bar{\pi}_k$ are not modelled. The fixed costs associated with making an acquisition can be thought of as including also the cost of adapting the technology of the target for production of the acquirer's differentiated good

[7]Helpman et al. (2003) do not explicitly talk about acquisitions in their original model. They only talk about the option of locating production abroad, which implicitly means that domestic firms can make Greenfield Investments by setting up new subsidiaries in the foreign market. Nocke and Yeaple (2007) extend the HMY model by allowing firms to make either Greenfield Investment or Acquisitions in order to serve foreign demand. Here interest lies on the determinants of the choice of making an acquisition, rather than on the determinants of the choice between Greenfield Investment and Acquisitions. Also, the data used in this paper do not include expansions of domestic firms through Geenfield Investments. For this reason the Greenfield Investment option is not modelled.

[8]In Helpman et al. (2003) there is a fixed cost also associated with export, which implies that there exist a productivity cutoff below which firms cannot afford serving foreign demand through export. Once more, the assumption of no fixed costs associated to export is due to the fact that the dataset used here does not allow to observe entry and exit in the export market.

variety.

Defining the *mark-up adjusted demand* of the Home country as $A = \frac{\mu I}{\eta(P\alpha)^{1-\eta}}$ allows to rewrite Equation 2.5 as

$$\pi_D = (1-t)\left[A(m\mathrm{w})^{1-\eta}\right], \tag{2.6}$$

and also to derive the equations for the additional profit from export ($\pi_{ij,E}$) and from cross-border acquisition ($\pi_{ij,A}$) as

$$\pi_{k,E} = (1-t)\left[A_k(m\mathrm{w}\tau_k)^{1-\eta}\right] \tag{2.7}$$

$$\pi_{k,A} = (1-t_k-T)\left[A_k(m\mathrm{w}_k)^{1-\eta} - f_A^k\right] - (1-t_k)\bar{\pi}_k \tag{2.8}$$

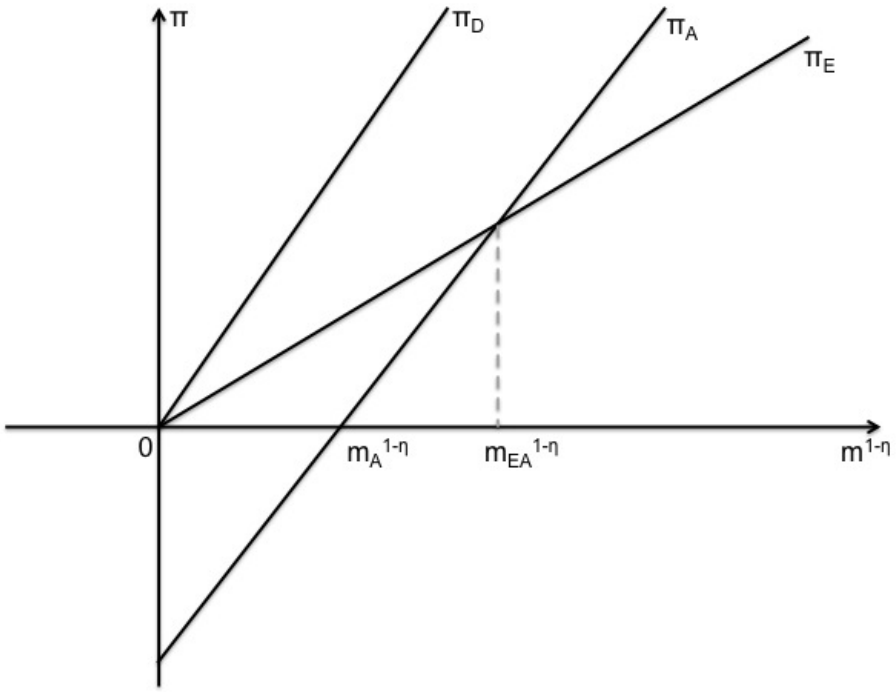
Condition necessary to guarantee a specific ordering in the sorting of firms into different foreign market entry mode is that the tax-adjusted transport cost between Home and the Foreign country k is relatively high with respect to the wage differential between the two countries, which is

$$\tau_k^{\eta-1}\frac{(1-t_k-T)}{(1-t)} > \frac{\mathrm{w}_k^{\eta-1}}{\mathrm{w}^{\eta-1}}. \tag{2.9}$$

This condition adapts the assumption of Helpman et al. (2003) to an environment where corporate taxes are levied by both the domestic and foreign government (Lockwood (2012)). It implies that the profit from making an acquisition is more responsive to m than the profit from doing export, which is $\frac{\partial \pi_A}{\partial m} > \frac{\partial \pi_E}{\partial m}$. Additionally, it rules out the possibility that firms engage in "export platform FDI", which is setting up production in a foreign country in order to export from that country to a third locations.

The Figure shows the different profit functions for the case where countries are symmetric in terms of demand, wage and corporate taxes. It shows the well known result of Melitz's model, adapted to the case where there are no fixed costs associated to domestic production or export. With a positive level of productivity ($1/m > 0$), all firms can afford to produce domestically and export to foreign countries, because a positive profit can be realised in both markets. The domestic profit function is more responsive to m than the export profit function because of the iceberg transport costs. At the same time, the acquisition profit function is shifted below the domestic profit function because of the fixed costs associated with purchasing a foreign subsidiary. In particular, from $f_A > 0$ it

Profit from Domestic Production (π_D) and addition Profit from Export (π_E) and cross-border M&A (π_A) in the case of symmetric countries



follows that firms choose how to serve the foreign demand according to their productivity. Firms with $m > m_A$ would realise positive profits from acquiring a foreign subsidiary, but they will not choose this strategy over exports unless $m > m_{EA}$, which is the productivity cutoff of indifference between doing exports and purchasing a foreign subsidiary.

At equilibrium, firms will expand their activity through the acquisition of a foreign subsidiary only if, conditional on their productivity level, they expect to realise a strictly positive profit. At equilibrium, the condition of indifference between making or not the cross-border acquisition is given by equating the profits from export and cross-border acquisitions:

$$(1 - t_k - T)\left[A_k \frac{m^{1-\eta}}{\mathrm{w}_k^{\eta-1}} - f_A^k\right] - (1 - t_k)\bar{\pi}_k = (1 - t)\left[A_k \frac{m^{1-\eta}}{(\mathrm{w}\tau_k)^{\eta-1}}\right] \tag{2.10}$$

2.3.3 Effect of Corporate Taxes on Cross-Border Acquisitions

The interest of this paper lies on understanding the effect of corporate taxes on a firm's decision to expand the scale of its activity by acquiring another pre-existing firm located in a foreign country. As discussed above, all firms have the ability to serve foreign demand through exports, but it is the cutoff level m_{EA}^k that, at equilibrium, defines the position of indifference for making cross-border acquisitions. The number of firms headquartered

in the Home country that will complete a M&A in the foreign country k is given by $N_A^k = N(1 - G(m_{EA}^k))$. So the probability of being among these firms is determined by the cutoff productivity level m_{EA}^k, which can be derived from Equation (2.10), as

$$(m_{E,A}^k)^{\eta-1} = \frac{1}{A_k}\left(\frac{\left[(1-t_k-T)f_A^k + (1-t_k)\bar{\pi}_k\right]}{\left[(1-t_k-T)\mathrm{w}_k^{1-\eta} - (1-t)(\mathrm{w}\tau_k)^{1-\eta}\right]}\right) \tag{2.11}$$

An analysis of the equilibrium condition for the cutoff m_{EA}^k allows to make some predictions on the effect of corporate taxes on the probability that a firm can afford the fixed costs associated with making the cross-border acquisition. The first term on the RHS is an inverse measure of the size of the mark-up adjusted demand in the foreign country, and the second term is a relative measure of the fixed costs associated with making the acquisition. In particular, the denominator of the second term gives the marginal cost savings from expanding through M&A (rather than through the implicit alternative represented by exports).

Proposition 1: *An increase in the Corporate Statutory Tax Rate of the Home country, t, raises the marginal cost savings from making acquisitions instead of exports. So it causes the productivity cutoff level $m_{E,A}$ to fall*

Proposition 1 implies that, following an increase in the home statutory tax rate, the mass of firms making cross-border $M\&A$ is larger and their average productivity is lower. This is in line with the literature on tax competition, according to which high home corporate taxes drive capital toward locations with "lighter" tax jurisdictions. Firms whose productivity is just below the level that would allow them to afford the high costs associated with acquiring a foreign subsidiary will be affected by a change in t. When facing an increase in home corporate taxes, these firms see in cross-border acquisitions an opportunity to save marginal costs by locating production destined to serve foreign demand directly abroad.

However, the effect of an increase in home corporate taxes is relevant for firms with productivity in the neighbourhood of $m_{E,A}$. Firms with a very low level of mobile capability might not be able to benefit from the shift in the productivity cutoff $m_{E,A}$. This particularly applies to firms that are just productive enough to serve foreign demand with exports. Conjecture could be made that an increase in Home corporate taxes has on these firms the opposite effect of what stated in Proposition 1. An increase of home corporate taxes could represent to these firms a reduction in domestic post-tax profit, with the result of delaying any ongoing internationalization process. The empirical investigation conducted in this paper pays particular attention to controlling for different sources of

heterogeneity across firms, and testing whether Proposition 1 equally holds for "all types" of firms observed in the sample.

Proposition 2: *An increase in the Foreign Profit Repatriation Tax, T, reduces the marginal cost savings from making acquisitions instead of exports. So it causes the productivity cutoff level $m_{E,A}$ to raise*

Proposition 2 implies that, following an increase in the Repatriation Tax (T), the mass of firms making cross-border M&As is smaller, and their average productivity is larger. Because a higher repatriation tax reduces the post-tax profit realised by the foreign subsidiary, it makes cross-border M&As less desirable and it pushes the cutoff productivity level toward the right. This argument is in line with the suggestions advanced from the literature on double taxations. In fact, in a situation where firms from different countries compete over the acquisition of a particular target, firms located in countries that apply exemption reliefs from double taxation of foreign repatriated profit will have an advantage w.r.t. firms that are located in countries that don't.

These two propositions can be empirically tested in a model for the probability that a firm expands its ownership structure through the acquisition of a pre-existing subsidiary. From Equation (2.10) follows the condition necessary for any firm to be able to afford a cross-border M&A, which is $\pi_A \geq \pi_E$. Impose that all acquisition fixed costs are firm i and time s specific, and that they have both a stochastic and a non-stochastic component, so that

$$(1 - t_k - T)f_A + (1 - t_k)\bar{\pi}_k = F_i \exp(\epsilon_{i,s}). \tag{2.12}$$

After defining $y_{i,s}$ as an indicator function for whether firm i chooses to make a cross-border acquisition in year s, Equation (2.10) and (2.12) can be combined into

$$y_{i,s} = 1\left[(1 - t_k - T)A_k \mathrm{w}_k^{1-\eta}\left(1 - \frac{(1-t)}{(1-t_k-T)}\frac{(\mathrm{w}\tau)^{1-\eta}}{\mathrm{w}_k^{1-\eta}}\right)m_i^{1-\eta} \geq F_i \exp(\epsilon_{i,s})\right],$$

whose logarithm motivates the following reduced form econometric specification

$$y_{i,s} = 1[\beta'_{ind} Ind_i + \beta'_y Year_s + \beta'_t TAX_{is} + \beta'_z Z_{i,s} + \beta'_h Home_i + c_i + \epsilon_{i,s} \geq 0]. \tag{2.13}$$

Dummies for the Industrial Sector and the Year of the acquisition (Ind_i and $Year_s$) control for the economic climate in which the expansion takes place[9]. Characteristics

[9] As discussed in section 2.4, any variable specific to the acquisition target or its location, meant to proxies for the target country Demand (A_k) or for the target country tax system (t_k), are endogenous to

of the acquirer's Home country tax system ($TAX_{i,s}$) allow to test Proposition 1 and Proposition 2. Characteristics of the acquirer's Home country ($Z_{i,s}$ and $Home_i$) control for the marginal cost savings from serving foreign demand through acquisitions, and firms heterogeneity (c_i) control for the acquirer's specific unobserved heterogeneity, such as the productivity level and the specific fixed costs.

2.3.4 Domestic Acquisitions

The model presented in Section 2.3.3 explains how productivity determines the mode chosen by firms to serve foreign demand. Firms that are highly productive can afford the fixed costs associated with cross border acquisitions and become multinationals. This section extends the model in order to explain the motives behind a different kind of expansion: the acquisition of domestic subsidiaries made by multinational firms. Under the proposed extension, Proposition 1 and 2 hold for all firms in the economy. In addition, it can be shown that the Home Corporate Statutory Tax rate, t, has no effect on multinational firms' decision of acquiring a domestic subsidiary in order to expand domestic production.

The "OLI" framework, introduced by Dunning (1997), argues that multinational firms benefit from advantages derived from their Ownership, Location and Internalization features. In particular, Internalization advantages arise when multinational firms benefit from taking control of firms that would otherwise conduct production at higher costs, or lower quality. Following this argument, the model of Helpman et al. (2003) can be extended by assuming that marginal costs of production are higher for domestic firms that do not own the comparative advantages described by Dunning.[10] Under this assumption, the *total* post-tax profit for a domestic firm is

$$\pi_k^{Dom} = (1-t)\lambda \left[A(m\mathrm{w})^{1-\eta} + A_k(m\mathrm{w}\tau_k)^{1-\eta}\right], \tag{2.14}$$

and the *total* post-tax profit of a multinational firm is

$$\pi_k^{MNE} = (1-t)\left[A(m\mathrm{w})^{1-\eta}\right] + (1-t_k-T)\left[A_k(m\mathrm{w}_k)^{1-\eta} - f_A\right] - (1-t_k)\bar{\pi}, \tag{2.15}$$

where $\lambda \in (0,1)$ represents an efficiency parameter, common to all domestic firms.[11] The differences between the two profit functions indicate that drawing a low productivity type

the firm's choice of expanding through M&As, and cannot be used in a probit model

[10] Nocke and Yeaple (2007) also extend HMY in this direction. Their model suggests that firms are characterised by two types of productivity, and that these productivities differ in terms of mobility. *Technological capabilities* (the $1/m$ in HMY's model) are fully mobile and can be freely transferred across production sites, whereas *Marketing capabilities* can be transferred only at a non-zero cost. In this setup domestic M&A are used by firms to match capabilities and acquire the "productivity profile" that maximises overall profit.

[11] *Total* post tax profit includes all profits from serving domestic and foreign demand

($m < m_{EA}$) not only determines the decision on how to serve foreign demand (whether through exports or cross-border acquisitions), but also limits access to the OLI comparative advantages and negatively affects production efficiency.

At equilibrium, the cutoff productivity level of indifference between choosing cross-border acquisitions over exports is now given by

$$(m^k_{E,A})^{\eta-1} = \frac{\left[(1-t_k-T)f^k_A + (1-t_k)\bar{\pi}_k\right]}{A\left[(1-\lambda)(1-t)\mathrm{w}^{1-\eta}\right] + A_k\left[(1-t_k-T)\mathrm{w}_k^{1-\eta} - \lambda(1-t)(\mathrm{w}\tau_k)^{1-\eta}\right]},$$

The first term of the denominator measures the efficiency gains from serving domestic demand as a multinational, and the second term of the denominator measures the marginal cost savings from serving foreign demand with cross-border acquisitions, rather than with exports. When all firms are equally efficient ($\lambda = 1$), the cutoff is equivalent to the one discussed in the previous section. However, the wider is the efficiency gap between domestic and multinationals (i.e. the closer λ is to 0) and the lower the productivity cutoff of indifference for undertaking cross-border acquisitions. This recalls HMY's result on the distribution of productivity: countries with higher firms heterogeneity are characterised by a larger mass of firms choosing to serve foreign demand with FDI.

The existence of an efficiency gap between domestic and multinationals also explains the motives for domestic acquisitions. Multinational firms now have the incentive to acquire domestic firms, transfer technology on to the target, and benefit from the synergies generated in terms of efficiency gains. This implies that all firms with high productivity ($m > m_{EA}$) now have the additional option of expanding domestic production with the acquisition of a (less-efficient) domestic firm, and realise the additional profit

$$\pi^{MNE}_{DA} = (1-t)\left[A(m\mathrm{w})^{1-\eta} - f_{DA}\right] - (1-t)\left[A(m\mathrm{w})^{1-\eta}\lambda\right],$$

where f_{DA} is fully deductible fixed cost from the acquisition and the second term is the price paid to purchase the target firm. At equilibrium, multinational firms will choose this option if $\pi^{MNE}_{DA} > 0$, which implies the productivity cutoff level of indifference with respect to domestic acquisitions

$$(m_{DA})^{1-\eta} = \frac{f_{DA}}{A\mathrm{w}^{1-\eta}(1-\lambda)} \tag{2.16}$$

Equation (2.16) implies that larger differences in efficiency between multinational and domestic firms (i.e. a lower λ) increase the incentive for domestic acquisitions, because imply larger efficiency gains from domestic expansions. The derived condition also leads to a preposition on the effect of taxes on domestic acquisitions. In particular

Proposition 3: *An increase in the Home Corporate Tax Rate, t, does not affect the probability that a multinational firm expands domestic production with the acquisition of a (less efficient) non-multinational firm.*

§ 2.4 The Data

Two facts stressed in the UNCTAD reports are of particular interest to this paper. First cross border M&A have covered, on average over the last ten years, about 60% of total FDI flows. Second, M&A deals worth over 1 Billions USD are increasing in number and are made mostly by large multinationals located in the World largest economies. These facts reconcile with the environment described in the literature initiated by Melitz (2003) and Helpman et al. (2003). This section describes the methodology followed to build a firm-level dataset that allows to test the three prepositions derived from the theoretical model of section 2.3. It also presents descriptive statistics that show evidence of two key features of the data: the heterogeneity across firms, in terms of firms size and performance, and the persistence of the expansion choice, defined as time dependence in the parent firms' decision of acquiring new subsidiaries.

2.4.1 Firm Expansion Data

The data on firms' expansions were drawn from three commercial databases compiled by Bureau Van Dijk (B.v.D.): Orbis 2004, Zephyr 2010 and Amadeus 2010. Orbis contains information on the identity and location of all known shareholders and subsidiaries of firms active worldwide. Zephyr contains information on all ownership transactions that involved the companies listed in Orbis. The third source, Amadeus, contains historical financials of the European firms listed in Orbis.[12] These sources were combined in order to reconstruct the decision pattern followed by headquarters that expanded through the acquisition of one or more pre-existing subsidiaries.

The data sources were combined using a two-step procedure. In the first step, data from Orbis were used to identify all the ownership links that connect *large* and *very large*[13]

[12] Amadeus constitutes a subset of Orbis. Access to the sources used in this paper included only information on the ownership links reported in the 2004 CD update of Orbis, and on the historical data for the financial years 2002-2010 reported in the 2011 internet update of Amadeus.

[13] B.v.D. defines a firm as "very large" if its operating revenue is above 140 mil USD, if its total assets are above 280 mil USD or if its employees are more than 1000. It defines a firm as "large" if these figures are reduced to, respectively, over 14 mil USD, over 20 mil USD and over 150 employees. The internet version of any B.v.D. database provides no access to information on medium and small companies, which generally cover about the 85% of the overall sample.

firms to their shareholders, as at the end of financial year 2004.[14] The reconstructed ownership maps list each firm under the control of its direct majority shareholder, and report it as part of the corporate structure of a unique "Global Ultimate Owner" (GUO) (hereafter also referred to as "parent" or "headquarter"). This simplification reflects the assumption that, for a given level of dependency, the largest shareholder has the power to influence all changes in the ownership of its controlled subsidiaries, so that, for a given organisation, the "Global Ultimate Owner" can be held accountable for the expansion decisions that involve the subsidiaries linked to its ownership structure.[15] Through this first step, three different types of firms were identified: *standalone* firms (consisting of a single company with no subsidiaries), *domestic* firms (consisting of a parent linked to one or more subsidiaries, all located within the parent's domestic borders), and *multinational* firms (consisting of a parent linked to at least one subsidiary located in a foreign country). The classification of firms into types is based on 2004 data and it is time-invariant, so it is exogenous to all ownership changes that occurred between 2005 and 2010. This step resulted in the identification of a *base sample* of 28,940 European parent firms.

The second step involved the selection of mergers and acquisitions reported in Zephyr, that affected the composition of the base sample identified in the previous step. All M&A deals that involved the purchase of the *controlling* share of a pre-existing firm made by a *known* acquirer (matching a parent or a subsidiary of the base sample) were used to update the ownership structures, as to the end of the financial year 2005. Such M&A deals unambiguously affect the composition of the base sample, because they imply the addition of a new subsidiary to the ownership structure of the acquiring parent. This updating process was recursively repeated for all years up to 2010, so to form a final panel spanning six financial periods. This step resulted in the creation of an indicator variable that defines a parent firm as making an "expansion" in year s if, by the end of financial year s, at least one new subsidiary was added to its ownership structure, following the acquisition of its controlling share.[16]

One of the advantages of the dataset is that it does not require sample restrictions based on firm characteristics. In fact, the only conditions imposed are: (1) an ownership link is defined on the basis of the largest share of the subsidiary, and (2) an M&A deal is considered only upon availability of full information about its ownership effects. This

[14]The Bureau Van Dijk lists all types of shareholders, among which private individuals, public authorities, institutions and foundations. For the purpose of reconstructing the corporate ownership structures, only shareholders corresponding to firms were considered.

[15]The ownership structure reconstructed at this stage can have up to ten different subsidiary dependency levels.

[16]A parent firm makes a "direct" acquisition if it is reported in Zephyr as the acquirer of the completed deal, whereas it makes an "indirect" acquisition if one of its subsidiaries (irrespective of their dependency level) is reported in Zephyr as the acquirer of the completed deal.

guarantees perfect identification of the expansion mode[17], and at the same time preserves the heterogeneity across parent firms.

2.4.2 Firm Heterogeneity and Expansion Persistency

The final sample of 28,940 parent firms is constituted by 3,268 multinational firms (the 11% of the sample), 10,855 domestic firms (the 38% of the sample) and 14,817 standalone firms (the 51.20% of the sample). Firms' size, measured in terms of number of subsidiaries controlled by the parent at the end of 2004 represents a source of (observable) heterogeneity. As shown in Table 2.2, the average multinational parent controls 11 subsidiaries, while the largest control more than 121. Domestic firms are considerably smaller than multinationals, but equally diverse, with the average parent controlling only 3 subsidiaries and the largest controlling above 20. Finally, as revealed by the top graph in Figure 2.2, the distribution of size for the subsample of firms that never made an acquisition between 2005 and 2010 is more (positively) skewed than that of firms that made at least one acquisition. The same level of heterogeneity seems to be preserved by a second measure of size, defined as the number of countries where the controlled subsidiaries are located. Table 2.2 and the bottom graph of Figure 2.2 report statistics for this second variable. Note that size, measured by number or geographic spread of owned subsidiaries, does not directly capture the scale of production. It rather controls for the complexity of the ownership structure of a parent firm, relevant when the expansion is defined in terms of newly acquired subsidiaries. Table 2.3 and Table 2.4 report the geographic and industrial sector coverage of the sample. United Kingdom, Spain and France are the countries where the largest number of parent firms is legally registered; while Financial Services, Retail and Manufacturing are the industrial sectors in which the largest number of parent firms operate. As can be noted in these Tables, a second source of heterogeneity is represented by the distribution of firms' types within each country or industrial sector.

Part of the international trade literature has focused on testing the presence of a relation between productivity and firms self selection into the export market (see Wagner (2005) for a comprehensive survey). This has been done following different methodologies: linear model estimation for the direct effect of exports on firms productivity growth; quantile regressions for the effects of exporting on firms productivity; or comparison of

[17]Other definitions of the expansion choice could generate ambiguity on the nature of the ownership change. For example, an alternative to the methodology proposed here would be to compare the ownership structure of the parent companies at two different points in time, and build an indicator variable for the expansion choice based on whether a new subsidiary is observed in the second period. This procedure would require an assumption on the very nature of the expansion, because it would be based on no information on whether the expansions followed an acquisition, a merger or rather a Greenfield Investment (i.e. the creation of a new firm)

productivity between matched firms. The dataset described above does not allow to directly test the hypothesis that productivity is higher among firms involved in M&A projects, simply because productivity remains unobserved. The dataset, however, allows to build an indirect test based on those firms observed characteristics that, as suggested by the model, are related to productivity. [18]

For each firm "type" (multinational, domestic and standalone), the characteristics of the parent firms who never expanded between 2005 and 2010 were compared to the characteristics of the parent firms that expanded at least once during the same period. Firms were compared in terms of size (measured by Volume of Sales), in terms of stock of intellectual capital (measured by Intangible Assets), performance (measured by Revenues and Profit) and labour cost. All size and performance characteristics were measured in terms of average over the pre-acquisition period (2002-2004). The results are reported in Table 2.5. The tests on the multinational firms were conducted on the full sub-sample, and then repeated after excluding the largest 5% of parent firms, those that controlled more than 8 subsidiaries by the end of 2004. For each size and performance variable, the Table reports the mean for the groups of non-expanding and expanding firms (column [1] and [2]), a test for the difference in these mean (column [5]), and a two-sample Kolmogorov Smirnov tests for the equality of the distributions of each characteristic across the two groups (column [6]).

The table shows three different results. First, for all characteristics and for all parent firm types, the group of expanding firms stochastically dominates the group of non-expanding firms, suggesting that expanding firms are larger and better performing than non-expanding ones. Second, the mean characteristics for standalone firms are always lower than the mean characteristics for domestic firms, and the mean characteristics for domestic firms are lower than those of multinationals, suggesting that there is a sorting of firms into "types". Finally, the difference in mean characteristics between expanding and non-expanding firms is considerably larger for standalone firms than for domestic, and even more so for multinationals, suggesting that heterogeneity in size and performance is higher between standalone firms, and those standalone firms who do expand are considerably better performing than the average of their type.

The second feature of the dataset is persistence in the expansion decision. Table 2.6 shows statistics on firms transition across different ownership "types". Column [a] reports the number of acquisitions completed every year: it shows that domestic and multinational parent firms are more involved into M&A transactions than standalone firms, and

[18] Amadeus allows to collect information on the consolidated financial accounts of the observed parent firms

that in general over the years the total number of completed acquisitions has more than halved for all firm "types". Column [b] reports the percentage of firms that transition into a different ownership "type", cases like those of Standalone and Domestic firms acquiring across borders, or those of Standalone firms acquiring domestically. The table shows that around 20% of the acquisitions completed in the observed period involved domestic firms acquiring their first international subsidiary and transitioning into a multinational organisation. Table 2.7 reports the probability that a parent firm expands through M&As, conditional on the previous period expansion decision. The first three columns report statistics for the total sample, while the remainder of the table separately looks at the different firm "types". The unconditional probability of making an expansion is between 0.015 and 0.036 for the overall sample, but raises as high as 0.16 for multinational parent firms and drops as low as 0.001 for standalone firms: this indicates that multinational firms are unconditionally more likely to expand than domestic and standalone firms. The ratio of raw probabilities from Table 2.7 computed on the whole sample indicates that firms that did expand in period $s-1$ are twenty times more likely to expand also in period s than firms that did not expand in $s-1$. The same ratio varies largely across firms types: multinationals that expanded in $s-1$ are only six times more likely to expand also in period s than multinationals that did not expand in $s-1$, whereas standalone firms that have expanded in $s-1$ are up to one hundred times more likely to expand again in s than standalone that did not expand in $s-1$.

2.4.3 Corporate Tax Data

The empirical literature on corporate taxation argues that different measures of corporate taxes matter at each stage of an investment decision process (Devereux (2007)). This paper looks at the first stage of the process, when a firm decides whether to undertake an ownership transaction that will cause the expansion of its corporate structure. Alternative tax measures for the parent firm's Home country are included in the data. The corporate statutory tax rate (STR) simply reports the highest rate legally imposed on corporate profits by the Home country. It includes also local and regional taxes, and it does not include the tax alleviations recognised to small firms. The effective average tax rate (EATR) is a forward looking tax measure that reflects the portion of profit paid as tax in the home country, also accounting for capital tax allowances. Devereux and Griffith (1998b) and Auerbach et al. (2008) suggests that this second tax measure is particularly relevant for the stage of the investment decision process when a firm compares the capital tax treatment in the alternative locations where the investment could take place.

Choosing to purchase the controlling share of a foreign subsidiary has other tax effects

for the acquiring parent. The profit of a domestic firm is simply taxed at the corporate tax rate levied by the Home country, but the taxation of a multinational firm depends on the international tax system applied by all countries where the firm operates. The profit realised at Home by the multinational parent will be taxed at the home corporate statutory rate, while the profit realised by the foreign subsidiaries is taxed at the corporate statutory rate applied by the countries where the subsidiaries are located. Following the notation of the model, denote these tax rates as t and t_k, respectively. If the post-tax profit realised by the foreign subsidiaries is not re-invested, a (non-resident) dividend withholding tax rate, d_k, can be applied by the foreign country before the profit is repatriated as dividends to the parent firm, so that total tax rate levied by the foreign country is $t_k + (1 - t_k)d_k$. If the Home country applies a source-based system and taxes only profits realised within the domestic borders, the repatriated profit is practically exempted from further taxation. In principle, however, the repatriated profit can also be taxed by the parent firm's Home country. If the Home country applies a residence-based system, worldwide profits of the parent firms resident within the domestic borders are taxed at rate t. In order to reduce the burden of international double taxation, countries can coordinate and provide different tax reliefs. In particular, the Home country can allow a tax-credit for the overall amount of taxes already paid in the foreign country (indirect credit system) or a tax-credit for the amount of withholding dividend taxes already pad in the foreign country (direct credit system). The tax credit is given when foreign tax rates are higher than domestic tax rates (which is $t_k + (1 - t_k)d_k > t$ in the case of indirect credit and $d_k > t$ in the case of direct credit), and guarantees equal tax treatment of all profits realised by the multinational firm. The data used in this paper include information on the double tax system applied by the Home country of the observed firms, which allows to tests the second proposition derived from the model. Table 2.8 reports descriptive statistics for the tax variables applied in all countries where the parent firms observed in the sample reside. The table also indicates whether the parent Home country applies the Credit or the Exemption system to foreign repatriated profit.

Characteristics of the tax system applied by the country where the acquired subsidiary is located, are, instead, endogenous to the binary choice of whether or not to make the ownership expansion. One way to overcome this limitation would be to include information on the characteristics of the "most generous foreign tax system", which is common to all firms, and exogenous to the expansion choice. In fact, other things being equal, any expanding firm should prefer directing its investment toward this tax-favourable location. However, variables that capture the main features of the most advantageous fiscal system available among a given pool of countries (or even the entire World) do not have enough variation over the observed six years period, so their effect on the expansion choice cannot be estimated.

§ 2.5 Empirical Strategy

The dataset built for this paper tracks all M&A deals completed by the base sample of 28,940 European companies over a period of six years (2005-2010). It allows to follow the time-pattern of corporate structure changes and to extend the static discrete choice model of Equation (2.13) into a setup that accounts for the presence of time-dependence in the choice-outcome.

Time-dependence in the decision of making a M&A can be explained by different arguments. First, a single M&A could represent only one stage of a complex ownership restructuring process. The headquarter might be going through a phase of diversification into new markets. It could be starting a large expansion that implies extending production to different locations, or it could be transitioning from a standalone, into a domestic and finally a multinational corporation. All these changes are radical enough to potentially require several periods to be completed. This effect would be particularly captured by data with a short time coverage, like those used in this paper. Second, time-dependence could be due to an "acquisition *learning* process" that affects the cost structure faced by firms that repeat the same choice over time. In the model presented, the fixed cost of making an acquisition is time invariant, so it is similar to a sunk cost, that firms need to pay in order to break into the acquisition market. Once the fixed cost is paid, the acquiring firm needs to cover only the marginal cost of additional acquisitions. An extension of the theoretical model into a second period would show that firms who already acquired in the first period have an advantage in undertaking acquisitions also in the second period with respect to firms who did not acquire in the first period. Alternatively, similarly to what suggested by Roberts and Tybout (1997), Bernard and Jensen (2004) and Das et al. (2007), the level of fixed cost could depend on the amount of experience that the firm has in the matter of M&As. Having successfully completed M&As in the past means that a firm has already adapted its organisation to the existence of dependent subsidiaries, so that making additional acquisitions comes at a lower cost. Finally, conjectures could be made in support of a negative effect of past acquisitions on the probability of making new acquisitions. For example a firm that persistently enters the same market could find it increasingly costly to complete a new investment, because of the gradual market saturation resulting from previous M&As. Or a firm with an already sophisticated structure might find it particularly difficult to stretch its managerial capacity and its coordination network to an additional subsidiary.

To allow for the dynamics in the estimated model, Equation (2.13) is rewritten as

$$y_{i,s} = 1[\gamma y_{i,s-1} + \beta' \mathbf{X}_{i,s} + c_i + \epsilon_{i,s} > 0] \tag{2.17}$$

where $y_{i,s}$ is a dichotomous variable, equal to 1 if the headquarter of company i completes the acquisition of at least one new subsidiary by the end of accounting period s.[19] $\mathbf{X}_{i,s} = (TAX_{i,s}, Z_{i,s-1}, H_i, Y_s, Ind_i)$, where $TAX_{i,s}$ is a vector of variables capturing different aspects of the parent home country fiscal system, $Z_{i,s-1}$ is a vector of macroeconomic indicators for the parent home country, H_i, Y_s and Ind_i are parent home country, year and industry-specific dummies. c_i denotes the unobserved firm-specific heterogeneity. Testing for the presence of time-dependence in the acquisition choice, corresponds to investigate on the significance of γ.

Assuming a normal distribution for the disturbances, $\epsilon_{i,s}$, a dynamic Random Effect (RE) Probit for the probability that a parent firm undertakes an "ownership expansion" is specified

$$Pr(y_{i,s} = 1 | y_{i,s-1}, \mathbf{X}_i, c_i) = \Phi(\gamma y_{i,s-1} + \beta' \mathbf{X}_{i,s} + c_i) \tag{2.18}$$

Conditional on the dynamics of Equation (2.17) being well specified and on $\mathbf{X}_{i,s}$ being strictly exogenous, the likelihood contribution of firm i can be written as

$$L_i = \prod_{s=1}^{S} f(y_{i,s} | y_{i,0}, \mathbf{X}_{i,s}, c_i) = \prod_{s=1}^{S} \Phi[(\gamma y_{i,s-1} + \beta' \mathbf{X}_{is} + c_i)(2y_{i,s} - 1)]$$

The advantage of this specification is that it can capture the presence of state-dependence (which is observed if $\gamma \neq 0$), while distinguishing its effects from that of unobserved heterogeneity. It allows to quantify how much the likelihood of a firm's expansion is affected by the fact that the same firm has already expanded in the previous period. At the same time it guarantees that the observed dynamic effect is due to true state dependence, rather than due to unobserved time-invariant characteristics specific to the firm under observation.

Dynamic probit models, defined as in (2.18), suffer from the well-known *initial condition problem*. The unobserved heterogeneity captured by the random coefficient c_i is correlated with the initial value of the dependent variable, $y_{i,0}$. The co-presence of these

[19] A firm is defined as undertaking an "ownership expansion" if at least one subsidiary is acquired for the majority share during the course of a particular financial year. This definition allows to control also for expansions that correspond to the contemporaneous acquisition of several subsidiaries. The data section gives an accurate description of how the definition of expansion was applied to construct the dataset. In the empirical investigation, distinction is made between expansions that involve only cross-border acquisitions and expansion that involve both domestic and cross-border acquisitions.

two elements in the equation for the conditional probability of $y_{i,s} = 1$ would make the parameter estimates inconsistent and would cause a positive bias in the estimation of γ. The "naive" approach of treating y_{i0} as non stochastic (which corresponds to assuming its exogeneity with respect to c_i) represents a solution to the problem only if the first period observed in the sample corresponds to the beginning of the true data generating process.[20] In that case the density of c_i would be integrated out of the Likelihood function and the conditional probability of observing an expansion would be estimated using maximum likelihood. In this paper, the dataset starting period does not correspond to the incorporation date of the firms observed in the sample[21], hence this first approach cannot be applied.

The econometric literature presents other solutions to the initial condition problem. All proposed alternatives mainly consist of integrating the unobserved heterogeneity out of the likelihood function, to approximate the density of $\mathbf{y}_i$ conditional on the exogenous variables $\mathbf{X}_i$. Heckman (1981a,b) suggests to approximate the distribution of the initial value of the dependent variable, y_{i0}, conditional on the unobserved heterogeneity and the exogenous variables, while also making an assumption on the unobserved heterogeneity. Orme (1997, 2001) suggests to follow a two step procedure and find an approximation of the unobserved heterogeneity that is uncorrelated to the lagged dependent variable. Wooldridge (2005) shifts the attention on the unobserved heterogeneity, and claims another solution to the problem consists in finding an approximation of the distribution of $\mathbf{y}_i$ conditional on the initial condition and the exogenous variables, while again making an assumption on the distribution of the unobserved heterogeneity.[22]

Two recent papers have compared the performance of these different methodologies. Arulampalam and Stewart (2009) propose a shortcut to implement the Heckman estimator using standard softwares. In addition, they examine the difference between the methodologies proposed by Heckman, Orme and Wooldrige in a real application on UK unemployment data, and in a series of Monte Carlo experiments. The results from the simulations suggest that none of the three estimators performs better than the others in all cases. Akay (2011) compares the performance of the Heckman and the Wooldridge estimators, in an empirical application once more based on labour force participation, and in a series of Monte Carlo experiments. Akay's empirical application focuses on studying

[20] Wooldridge (2010) argues that the exogeneity between $y_{i,0}$ and the c_i is questionable, regardless of whether y_{i0} corresponds to the beginning of the data generating process, in all cases where the unobserved heterogeneity is supposed to affect the dependent variable in $s > 0$.

[21] Also consider that a panel including all firms from their incorporation date would be very difficult to handle due to severe unbalanceness

[22] A different route is that of using Bayesian techniques of estimation. For Bayesian modelling and computation of discrete responses model see Lancaster (2004), Chib (1992), Albert and Chib (1993) and Chib and Greenberg (1996)

the performance of the different estimators in unbalanced panels. The results from his simulation show that the Heckman estimator performs better, in term of bias, in very short panels (where $T < 5$), while the Wooldridge estimator performs better for medium length panels ($5 \leq T \leq 8$).

In this paper the methodology used by Wooldridge is preferred for three specific reasons. First, the dataset used covers a period of six years, and, according to Akay (2011) Wooldridge's is the better performing estimator on this time length. Second, implementing this methodology over the available alternatives has the advantage of computational efficiency and feasibility of estimation of the average partial effects (APE). Finally, the methodology proposed by Wooldridge can be used in an extension of the random effect model where some of the parameters are allowed to vary across firms, which represents an alternative way to explore the heterogeneity in the data (see Greene (2004)).

Wooldridge's suggestion involves proposing an assumption for the distribution of c_i, conditional on the initial condition $y_{i,0}$ and on a set of strictly exogenous explanatory variables, z_i. Following this method,

$$c_i | y_{i,0}, z_i \sim N(\phi_0 + \phi_1 y_{i,0} + \phi' z_i; \sigma_a^2) \tag{2.19}$$

so that

$$c_i = \phi_0 + \phi_1 y_{i,0} + \phi' z_i + a_i \tag{2.20}$$

where $a_i \sim N(0, \sigma_a^2)$. This allows to substitute out the unobserved heterogeneity, c_i, with Equation (2.20) so that the indicator function becomes

$$y_{i,s} = 1[\gamma y_{i,s-1} + \beta' \mathbf{X}_{i,s} + (\phi_0 + \phi_1 y_{i0} + \phi' z_i + a_i) + \epsilon_{i,s} > 0] \tag{2.21}$$

and the unconditional likelihood contribution of firm i is

$$L_i = \int \left(\prod_{t=1}^{T} \Phi \left[(\gamma y_{i,s-1} + \beta' \mathbf{x}_{i,s} + \phi_0 + \phi_1 y_{i,0} + \phi' z_i + a_i)(2y_{i,s} - 1) \right] \right) \frac{1}{\sigma_a} f\left(\frac{a_i}{\sigma_a} \right) da \tag{2.22}$$

with $f(a_i)$ indicating the density of the random effects, a_i, uncorrelated with the initial condition and with the other exogenous regressors.

Wooldridge suggests that Equation (2.20) should contain the full history (over $s = 1, ..., S$) of the explanatory variables z. Arulampalam and Stewart (2009) specify that one could follow Mundlak and substitute $z_i = (z_{i1}, ..., z_{i,S})$ with $\bar{z}_{i\cdot} = \sum_{s=1}^{S} z_{i,s}$. They stress

how Equation (2.13) should contain *any* exogenous time-invariant individual characteristic that explains the correlation between c_i, the initial condition $y_{i,0}$ and the other variables of the model. This constitutes a useful flexibility for the application presented in this paper, where the vector z_i can be defined in terms of observable parent-specific characteristics. Firm-specific variables are naturally affected by the contemporaneous acquisition choice, and they cannot enter the vector z_i. The same holds for firms characteristics averaged over the full length of the panel (years 2005 to 2010), but not for characteristics measured over the years preceding the first observed expansion choice (made in 2005). So for the specification of z_i, the within average over the years from 2002 to 2004 is used for each continuous variable, and the value observed at 2004 is used for each qualitative variable. The resulting set of instruments is exogenous to the expansion choices taken during the period 2006-2010. The data allows to define three kinds of firm-specific characteristics: characteristics on financial performance of the parent firm; on the size of the firm (both in terms of volume of sales and in terms of number of owned subsidiaries); and on the level of "internationality" of a firm.

Computational convenience for this model is guaranteed by the fact that the likelihood contribution, conditional on the c_i, as above specified, corresponds to that of a standard random effects probit model. So that consistent maximum likelihood (ML) estimation of the parameters β, γ, ϕ and σ_a^2 can be obtained using standard softwares that approximate the log likelihood function using adaptive Gauss-Hermite quadrature (such as STATA12 and NLOGIT5). Note that a robust estimate of $\rho = \sigma_a^2/(\sigma_a^2 + 1)$ gives a measure of what portion of the total variance is explained by the unobserved heterogeneity. Additionally, this model allows to quantify the size of the effect of any variable of interest by deriving its Average Partial Effects (see Appendix B).

Finally, the model is extended to allow for the effect of the tax variable and of the lagged dependent variable to be random. This implies that the effect of a given variable on the probability of making an expansion is specific to each firm i, and follows a distribution with heterogenous mean. This extension of the classic random effect model represents an alternative way of exploring the unobserved heterogeneity in the data. The possibility of allowing the parameters to vary across firms is crucial, as it represents a way of considering that unobserved differences across firms goes as far as defining the way in which various factors, and especially corporate tax measures, affect the probability of a future corporate expansion.

The model in Equation (2.17) is extended as follows:

$$y_{i,s} = 1\left[\theta_{1i} y_{i,s-1} + \theta_{2i} TAX_{i,s} + \beta' \mathbf{X}_{i,s} + (\phi_0 + \phi_1 y_{i,0} + \phi' z_i + a_i) + u_{i,s} > 0\right] \tag{2.23}$$

with

$$\boldsymbol{\theta}_i = \boldsymbol{\theta}' \mathrm{k}_i + \boldsymbol{\zeta} v_i$$

where $\boldsymbol{\theta}_i = (\theta_{1i}, \theta_{2i})$ are the random parameters for the $i = 1, ..., N$ parent firms, whose mean is shifted by the firm characteristics k_i. Normality of the stochastic component of the parameters, v_i, can be assumed so that $\theta_i \sim N(\theta' \mathrm{k}_i, \zeta^2)$. Exogeneity of the mean shifting firm characteristics k_i is required for consistency with the Wooldridge's initial condition model. In the empirical analysis, k_i are characteristics of the parent firm's ownership structure, as measured before any expansion took place. By substituting the equation for the random parameter in the indicator function, the model becomes

$$\begin{aligned} y_{i,s} = 1[(\theta_1' \mathrm{k}_i) y_{i,s-1} + (\theta_2' \mathrm{k}_i) TAX_{i,s} + \beta' \mathbf{X}_{i,s} + \\ (\phi_0 + \phi_1 y_{i,0} + \phi' z_i + a_i) + (\zeta_1 v_i y_{i,s-1} + \zeta_2 v_i TAX_{i,s} + \epsilon_{i,s}) > 0] \end{aligned} \tag{2.24}$$

Simulated Maximum Likelihood (SML) can be use to consistently estimate the structural parameters of Equation (2.24), with simulation conducted by building $\boldsymbol{\theta}_{i,d}$ over D draws of $\zeta_{i,d}$ the likelihood contribution of firm i can be approximated by

$$\begin{aligned} L_i = log \frac{1}{D} \sum_{d=1}^{D} \Bigg[\int \prod_{s=1}^{S} \Phi \Bigg((\theta_{1i,d} y_{i,s-1} + \theta_{2i,d} TAX_{i,s} + \beta' \mathbf{X}_{i,s} + \phi_0 + \phi_1 y_{i,0} + \phi' z_i + a_i) \\ (2y_{it} - 1) \Bigg) \frac{1}{\sigma_a} f\left(\frac{a_i}{\sigma_a}\right) da \Bigg] \end{aligned} \tag{2.25}$$

§ 2.6 Results

This section presents the results from the econometric analysis. Table 2.9 and 2.10 give a list of all the variables, their definition and descriptive statistics. Table 2.11 presents estimates of different dynamic probit specifications where the parent firm is recorded as making an expansion if it acquires the controlling share of at least one pre-existing subsidiary. Table 2.12 extends Table 2.11 by including additional tax variables. Table 2.13 and 2.14 restrict the definition of the choice variable and present results for models where the expansion decision is limited to only *cross-border* acquisitions and only *domestic* acquisitions, respectively. Table 2.13 and 2.14 constitute a test for the propositions

derived from the theoretical model. Finally, Table 2.15 extends the preferred model for each choice variable using a random parameter dynamic probit.

Table 2.11 presents estimates of the baseline model for the parent firm's choice of making at least one acquisition, without conditioning the definition of the dependent variable on the location of the acquired subsidiary. All acquisitions are recorded as expansions at this stage, irrespective of whether they are only domestic, only cross-border or a combination of the two. Column [1] presents the results from a simple Pooled Dynamic probit model for the effect of the lagged expansion choice and of the statutory corporate tax rate levied by the parent firm's Home country (STR) on the probability of making an expansion at time s. The model also controls for observable firm heterogeneity, by including a set of dummies for the parent firm's initial type (multinational, domestic or standalone), and allowing these dummies to shift the effect on the expansion choice of both the STR and the lagged dependent variable. Column [2] estimates a random effect dynamic probit, equivalent the model in column [1], using the Wooldridge's method. The c_i are assumed to be a linear function of the first observed choice $y_{i,0}$, and of key characteristics of the parent firm, the z_i. Motivated by the discussion of Section 2.4, the time-invariant firm characteristics that enter Equation (2.20) are the number of subsidiaries and the number of foreign countries where the subsidiaries are located, both measures of parent firms' size. Column [3] uses a richer specification for Wooldridge's assumption on the unobserved heterogeneity, by including also squared measures of the size variables. Column [4] further extends the model by controlling for macroeconomic variables reporting characteristics of the economic environment in which the parent firm operates. Finally, Column [5] presents a robustness check where the c_i are assumed to be a function of financial variables that are meant to capture the pre-acquisition performance of the parent firm. The parent firm's "type" is defined on the basis of the ownership structure as at the end of 2004, and the base category is the group of standalone firms. Parent firm's size measures are also based on the number of subsidiaries owned in 2004, and have the group standalone firms as the base case. Finally, the variables capturing the parent firm performance are measured on the average between 2002 and 2004. Dummies for the expansion year, for the Home country and for the parent firm's industrial sector are always included.

The Pooled Dynamic probit estimated in Column [1] ignores the presence of unobserved heterogeneity across firms, and estimates a large time dependence: $\hat{\gamma} = 1.948$, with $SE(\hat{\gamma}) = 0.100$ for the reference group of standalone firms. Dividing the lagged choice variable coefficient estimated in Column [2] by $\sqrt{1-\rho}$ gives a scaled coefficient of 0.776 (for standalone firms), which can be directly compared with the much higher coefficient of 1.948 estimated in Column [1].[23] In terms of Average Partial Effects (APE, reported

[23]RE probit coefficient estimates need to be scaled before being compared to the pooled probit coefficient estimates, see Arulampalam (1998). ρ is the constant cross-period error correlation

at the bottom of Table 2.11), the results from the model of Column [2] imply that the probability of making an expansion in period s is 0.02 points higher for standalone firms that expanded in $s-1$ than for standalone firms that did not expand in $s-1$. According to the results from Column [1], the effect of having made an expansion in $s-1$ on the probability of making an expansion also in s is ten times higher than what estimated in Column [2]. Similar results hold for domestic and multinational firms. The model in Column [2] also allows to test whether the effect of corporate taxes is homogenous across firms' types. When interacted with the parent firm's initial type, the tax effect on the probability of making an expansion is significant at the 1% level, but it has different sign for the different types of parent firms. In particular, according to the APE from Column [2], a raise of 10 percentage points in the Home Statutory Tax rate increases the probability of an expansion for a Multinational and a Domestic firm by, respectively, 1.5 and 0.3 percentage points, but reduces the probability of an expansion for a Standalone company by 0.1 percentage points.

The model in Column [3] provides further investigation on the role of firms' size. Theories on the growth of the firm suggest that firms expand only until the marginal benefit from a further expansion is zero. Accordingly, a multinational firm with a very complex structure and subsidiaries spread worldwide might represent a case where opportunities have been already exploited, and the map of potential international locations has been saturated, so that the acquisition of one more subsidiary would only increase fixed costs. This implies that there is an optimal "size" for each company, beyond which any further expansion represents a loss of efficiency. Consistently with the hypothesis of a bell shape relationship between size and probability of expansion, the results reported in Column [3] show that the estimated coefficient of parent firms' initial size (measured both in terms of number of subsidiaries and number of countries where the subsidiaries are located) is positive and significant, whereas the estimated coefficient of the squared of these measures has negative sign.

Column [4] introduces control variables for the characteristics of the Home country's economy. First, firms headquartered in larger and more industrialised countries are generally characterised by high productivity, as suggested by Melitz (2003). Also, during economic expansions firms might have stronger incentives to increase their scale of production through the acquisition of domestic subsidiaries. For this reason, the logarithm of real GDP and the industry value added (as a share of GDP) are both included in the model. The GDP variable is non-significant, whereas the Industry Value Added is positive and significant. Second, flexible and easy access to financial assets might affect the feasibility of an M&A project (see di Giovanni (2005)). This argument justifies the inclusion of three variables measuring the parent firm's home country financial "depth": the volume of domestic credit to private sector, the domestic credit provided by the banking

sector and the market value of listed domestic companies, all expressed as a share of GDP. The results of Column [4] interestingly show that a greater involvement of the banking sector into the domestic credit market deteriorates the probability that parent firms undertake M&As, but larger availability of credit services to the private sector improves this probability. The size of the stock market, measured by the market capitalisation of listed company (as a share of GDP), is instead insignificant. Finally, countries whose firms are greatly involved in serving foreign markets through exports might see a low participation in the cross-border M&As, which justifies the inclusion of three variable capturing characteristics of the domestic export market. Trade, as a share of GDP, measures the size of net exports. Consistently with the theoretical model, the effect of exports on the probability of an expansion is negative, because it indicates that domestic firms prefer serving foreign markets with exports rather than with cross-border M&As. The remaining two variables measure concentration and diversification of the export market.[24] Including both indices allows to identify different aspects of the involvement of domestic firms in international trade. A high concentration index indicates that firms undertaking exports are all concentrated in the production of few specific goods, which implies that exports is the dominant foreign market entry mode only in a minority of industrial sectors. Once the concentration index is controlled for, a high diversification index indicates that domestic exports are diversified over many goods, which translates into the fact that firms choose exports over M&A in the majority of industrial sectors. As expected, the effect of the concentration index is positive and significant, while that of the diversification index is negative and significant. With the inclusion of these macroeconomic indicators the estimated coefficients of the lagged dependent variable remain unchanged, but the size of the estimated effect of the statutory corporate tax rate for Multinational and Domestic firms falls of few points. The APEs from Column [4] indicate that a raise of 10 percentage points in the Home Statutory Tax rate increases the probability of an expansion for a Multinational firm by 0.7 percentage points (instead of 0.9 of [3]), increases the probability of an expansion for a Domestic firm by 0.1 percentage points (instead of 0.3 of [3]), but still reduces the probability of an expansion for a Standalone firm by 0.1 percentage points (as estimated in [3]). The maximised log likelihood in Column [4] is also the highest of all models estimated in Table 2.11, so this represents the preferred specification, base for further extension in the remainder of the econometric analysis.

Column [5] presents a robustness check for Column [4], where variables extracted from the consolidated financial accounts of the parent firm enter the vector z_i. Firm size is now captured by the natural logarithm of total sales, while performance is captured by

[24] In particular, the concentration index is an Herfindahl-Hirschmann for the export market: it is increasing in the share of total export given by exports of a single product and decreasing in the number of exported products. Instead, the diversification index measures whether the composition of net exports of a given country differs from the World composition of net exports. It is close to 1 when exports are more concentrated or when they are more diversified than in the World aggregate composition

the solvency ratio and by the profit margin. Including these variables causes a significant reduction in the sample size, due to the fact that financial accounts are available only for a subset of the observed firms (11,221 of the 28,940 parent firms). [25] The profit margin variable is not significant, but the coefficient of the sales volume and of the solvency ratio is always positive and significant. The other results are consistent with those reported in the rest of the table.

Table 2.12 extends the preferred model by adding variables that control for additional aspects of the home corporate fiscal regime. Column [1] reproduces Column [4] of Table 2.11. Column [2] adds a dummy variable controlling whether the home country applies a credit system or an exemption system on repatriated foreign profit. Column [3] includes a control variable accounting for the size of domestic capital allowances, and Column [4] substitutes the corporate tax measure, by using the Effective Average Tax rate (EATR) instead of the Statutory Tax rate (STR). The coefficient for the dummy variable on the double tax system is not significant, and neither is the coefficient for the variable on capital allowances. The EATR variable is a non-linear combination of the STR and of the variable measuring the generosity of capital allowances recognised by the Home country. The argument that firms compare EATR, when evaluating the corporate tax treatment applied in possible investment locations (Devereux and Griffith (1998b)), would imply that a raise in home corporate taxes reduces the likelihood of domestic acquisitions and increases the likelihood of cross-border acquisition, because it makes domestic taxes more unfavourable relatively to foreign taxes. The coefficient for the EATR is significant and negative, but the results indicates that changes in this variable equally affect all types of firms. In this Table, the dependent variable includes both domestic and foreign acquisitions, so at this stage it is not possible to distinguish between the effect of tax on one or the other kind of expansions.

2.6.1 Effects of Corporate Taxes on Cross-Border Acquisitions

The main hypothesis advanced by the theoretical model presented in Section 2.3 is that multinational firms are more productive than domestic firms, and consequently more likely to favour *cross-border* acquisitions over the implicit alternative represented by exports. Proposition 1 suggests that, under these conditions, a raise of Home STR lowers the productivity cutoff level of indifference between making or not a cross-border acquisition, and increases the likelihood that a high productivity firm chooses to complete the

[25] The sample changes also in composition, because the consolidated financial accounts are provided to the BvD to the *discretion* of each company's headquarter. In general, simply structured firms, such as standalone and domestic firms, submit only the unconsolidated accounts,so they are the group with more missing values for these variables.

cross-border acquisition. Proposition 2, instead, suggests that parent firms located in countries that apply a Tax Credit on foreign repatriated profit are less likely to serve the foreign market with a cross-border acquisition, than parent firms located in countries that exempt foreign repatriated profits from double taxation. Additionally, the literature on profit shifting suggests that the complex ownership structure of established multinationals constitutes *per se* a comparative advantage with respect to that of domestic firms, in terms of ability to capture opportunities and shift profit to locations that are more "tax-advantageous" than the Home country.

Table 2.13 allows to test Proposition 1 and Proposition 2, by estimating a model for the parent firms' choice of expanding their ownership structure through the acquisition of at least one *foreign* pre-existing subsidiary. Column [1] re-estimates the baseline model from Table 2.11 on the newly defined dependent variable. Column [2] presents a model specification that only controls for whether the parent firm already had the structure of a multinational organisation by the end of 2004, without distinguishing domestic parent firms from standalone parent firms, while Column [3] omits the irrelevant macroeconomic variables from Column [1]. The remainder of the table extends Column [3] with additional tax variables: Column [4] includes the dummy indicating whether the Home country applies the Credit System on foreign repatriated profits, Column [5] includes a measure of capital allowances, and Column [6] substitute the STR with the EATR.

Column [1] of Table 2.13 presents two interesting results. First, when it comes to cross-border acquisitions only, standalone parent firms do not seem to be significantly different from domestic parent firms. The model's estimates indicate that a change in Home STR would not affect the choice of foreign acquisition of a domestic parent firm differently than how the same change in Home STR would affect a standalone firm; and also having completed an acquisition in $s-1$ affects the probability of making a new acquisition in period s in a similar way for domestic and standalone parent firms (the Average Partial Effect (APE) estimated with respect to the lagged dependent choice variable is 0.0066 for Domestic Firms and 0.0070 for Standalone Firms). This first result motivates the specification of Column [2]. Second, the results reported in Column [1] suggest that the macroeconomic variables accounting for Home market size and financial sector "depth" do not play a role in the parent firms' decision of whether to acquire a foreign subsidiary. In fact, only the coefficients estimated for the export concentration and diversification indices are significantly different from zero. This result motivates the specification of Column [3]

Column [3] allows to conclude that the tax effects from the base line model estimated for the choice of making any acquisition (domestic and/or cross-border) also hold for the model estimated for the choice of making cross-border acquisition only. In terms of APE,

the model predicts that a 10 percentage points increase in the Home STR increase the probability that a multinational parent firm acquires a foreign subsidiary by 0.6 percentage points, but reduces the probability that a standalone or a domestic firm makes the same acquisition by 0.1 percentage points. This suggests that Proposition 1 holds only for multinational firms, and that parents that do not already have a multinational structure would not find the acquisition option more profitable than exports, following an increase of Home corporate taxes. In line with the theory, this would seem to indicate that non-multinational firms are considerably less productive than multinational firms and do not benefit from marginal shifts in the cutoff productivity level.

The results from Column [4] indicate that the probability of making a cross-border acquisition is not affected by whether the Home country applies a Tax Credit on foreign repatriated profit. This result contradicts the hypothesis advanced by Proposition 2, but could be driven by the low variation in the Tax Credit System dummy due to the fact that most countries in Europe do apply the Exemption System. Column [5] suggest that an increase of capital allowances reduces the probability that any firm chooses to make cross-border acquisitions. More generous capital allowances constitute an improvement in the domestic tax treatment of capital expenditure, that might represent an incentive to concentrate production at home, instead of locating it to a foreign location through cross-border acquisitions. Column [6] substitutes the STR measure with the EATRA, and finds results similar to those of Table 2.12, column [4].

A final important result from Table 2.13 regards the time dependence of the cross-border acquisition choice. The estimated coefficients for the lagged dependent variable are significant in all model specifications. According to the APE, multinational firms that did acquire foreign subsidiaries in $s-1$ are more likely to acquire also in period s with respect to multinationals that did not acquire in $s-1$ by only 0.002 percentage points, whereas the same difference in probabilities amounts to 0.005 for non-multinationals. This indicates that there is time dependence in the cross-border acquisition choice. However, the interesting fact is that the time dependence measured in terms of Average Partial Effects is for this choice up to five times lower than how it was for the general acquisition choice (cross-border and/or domestic acquisition).

2.6.2 Effects of Corporate Taxes on Domestic Acquisitions

The extension to the theoretical model presented in section 2.3.4 was closed by a proposition on the effect of Home corporate taxes on the choice made by multinational parent firms to acquire domestic firms, in order to increase their domestic production. In particular, proposition 3 suggested that such investment choice is affected by the size of the

(mark-up adjusted) demand in the Home market and by the inefficiency of domestic firms, but it is not affected by changes in Home corporate taxes. Table 2.14 presents results from model specifications estimated on the parent firms choice of acquiring the controlling share of at least one domestic subsidiary. Column [1] replicates the specification of the base line model from Table 2.11, Column [4], after omitting the macroeconomic variables controlling for the export market (that were found to have no significant effect on the domestic expansion choice). Column [2] adds the dummy controlling for whether the Home country applies the Tax Credit System, Column [3] adds the capital allowance variable and Column [4] substitute the STR with the EATR measure.

The main result from table 2.14 is that, in line with Proposition 3, the estimates for the coefficient of the Statutory Tax rate applied by the Home country lose significance with respect to the estimates from the models on the choice of making a general (cross border and/or domestic) or a cross-border acquisition. Column [3] accounts from the tax allowances. The estimated coefficient of the STR for domestic parent firms is significant only at the 10% level, and the estimated coefficient of the capital allowances indicates that a more generous treatment of capital expenditure represents an incentive for any type of firm to expand domestic production through the acquisition of a pre-existing domestic subsidiary, which is consistent with the results from Table 2.13. Finally, the estimated coefficients of the lagged dependent variable , and the respective Average Partial Effects (APE), suggest that the time dependence of the domestic acquisition choice was the driver of the results on time dependence from Table 2.11. In fact, whereas the time dependence in the cross-border acquisition choice is very low, Table 2.14 indicates that multinational firms that did acquire domestic subsidiaries in $s-1$ are more likely to acquire also in period s, with respect to multinationals that did not acquire in $s-1$, by 0.007 percentage points, and the same difference in probabilities amounts to 0.015 for domestic firms and to 0.017 for standalone firms.

2.6.3 Results from the Random Parameter Dynamic Probit

Table 2.15 present the results from model specifications that attempt a different approach to investigate the role of firm heterogeneity. The random effect dynamic probit is extended to a random *parameter* dynamic probit, that allows the estimate a firm-specific effect of corporate taxes on the probability of making an expansion. This is combined with the assumption that the observable firm heterogeneity (the parent firms' type) shifts the mean effect of the tax variable on the probability of making an acquisition.

Column [1], Column [3] and Column [5] replicate the best preferred models from Table 2.11, Table 2.13 and Table 2.14, respectively; while Column [2], Column [4] and Column [6] re-estimate these models allowing for a random parameter in the effect of the Home

STR and of the lagged dependent variable, as shown in Equation (2.20). The mean of the distribution of the random parameters is allowed to vary according to the "original firm type" (the k_i of Equation (2.20)), and the stochastic component of the random parameters are assumed to follow a normal distribution.

For the mean effect of the Home Statutory Tax Rate and of the lagged expansion choice, the results from the random parameter probit are quite similar to those from the random effect probit, for all dependent variables. However, Column [2], [4] and [6] of Table 2.15 predict a large significant variance in the distribution of the random parameters, suggesting that there is a large unobservable variation across firms in the impact of corporate taxes on the probability of an expansion, and that the same is true for the size and direction of the state dependence.

Figure (2.3), (2.4) and (2.5) show the Kernel Density Estimate for the Distribution of the Tax Effect, as estimated in Column [2], [4] and [6], respectively. Figure (2.3) shows that for standalone firms (which are the largest mass) the decision of making any kind of acquisition is negatively affected by an increase in the Home Statutory Tax Rate. The same result holds when the expansion decision is restricted to cross-border acquisitions only, Figure (2.4). In Figure (2.3) there is a second mass of firms whose expansion decision is affected negatively by an increase in home corporate taxes, the mass of domestic firms. The effect for these firms is smaller, as the predicted tax coefficient is closer to zero, but still negative. Finally, both Figure (2.3) and Figure (2.4) show how there is a small mass of firms whose expansion decision is positively affected by an increase of corporate taxes, as predicted by the proposition derived from the theoretical model. This smaller mass represents the multinational firms, and supports the argument that productivity advantages such as those owned by these firms allows to afford the high costs associated to an acquisition and locate production abroad when facing an increase of home corporate taxes.

§ 2.7 Conclusions

This papers analyses the effect of home corporate taxes on the decision of a firm to expand its ownership structure through the completion of an M&A deal. The results from the existing literature suggest that home corporate taxes could affect this decision in different ways. The argument proposed here is that the dominating effect depends on the composition of the observed sample, given that different types of firms are affected in different ways. In particular, the main result of the paper is that standalone firms are likely to be negatively affected by a rise of the home statutory corporate tax rate. This is in contrast with what the literature on corporate tax competition suggests, namely that firms tend to relocate their capital investment when facing a rise in home corporate taxes. On the

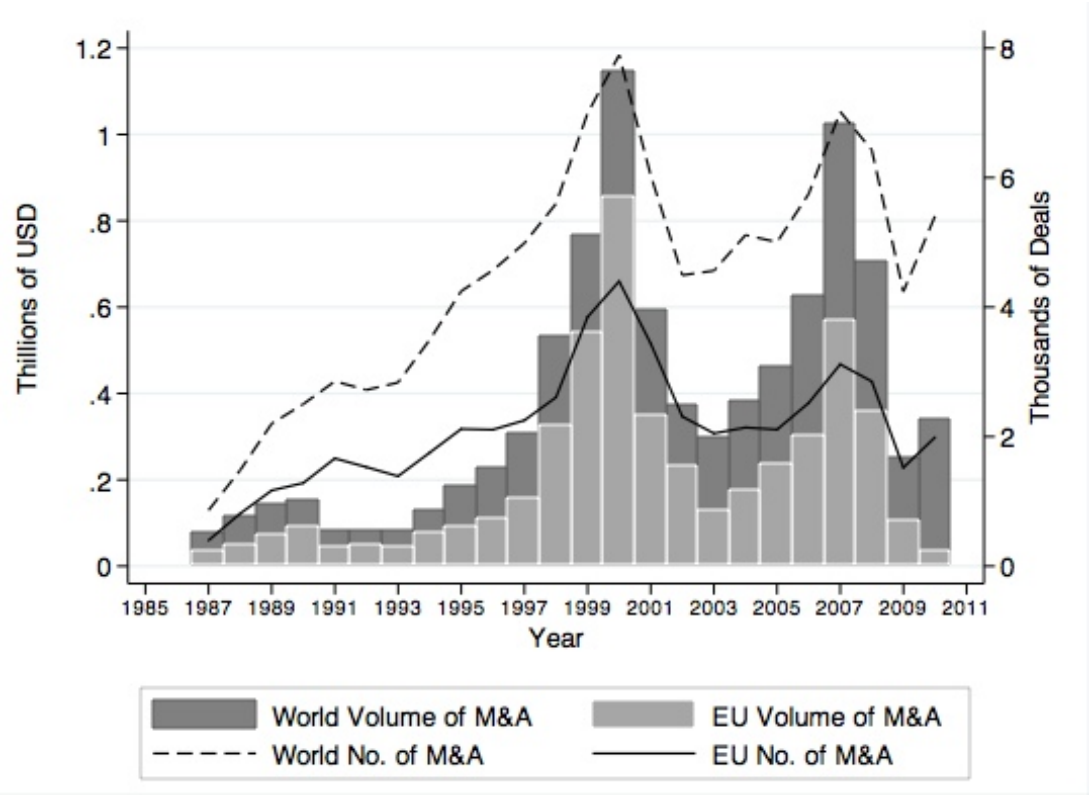
other hand, a rise in the home corporate statutory tax rate could incentivise more sophisticated firms to enlarge their structure even further, possibly in search of profit shifting opportunities.

The paper also accounts for the expansion pattern followed by the observed companies over a period of six years. The results show evidence that the firms that are more likely to expand are those that have completed other acquisitions in the recent past and that had a simple structure at the beginning of the sample. This confirms the hypothesis that a domestic firm that is in the process of evolving into a multinational is likely to continue and complete the transformation with a series of consecutive acquisitions, but that this firm will find it inconvenient to keep expanding once a large enough number of subsidiaries have come under its control.

This paper suggests that firms' heterogeneity should not be ignored by policy makers. Corporate tax systems should be flexible enough to differentiate between firms types. A reduction of the Statutory Corporate Tax Rate would attract more inward FDI, as shown by the literature on investment location, but it would also incentivise domestic companies to undertake their first acquisitions and grow into multinational corporations.

§ 2.8 Tables and Figures

Figure 2.1: *Trend in worldwide FDI and cross-border M&A*



Note: information on volume and number of cross-border merger and acquisition deals are collected from UNCTAD Stastistics. Cross-border M&A purchases are calculated on a net basis as follows: Purchases of companies abroad by home-based companies (-) Sales of foreign affiliates of home-based companies. The data cover only the deals that involved an acquisition of an equity stake of more than 10%. Data refer to the net purchases by the region/economy of the ultimate acquiring company

Table 2.1: *M&A deals worth over 1 Billion USD completed in 2010*

Parent Country	Number of "MegaDeal"	Total Value (Bil USD)
European Countries		
France	9	24.8
United Kingdom	8	14.1
Spain	7	21
Switzerland	6	11.7
Germany	5	18.9
Netherlands	5	18.3
Sweden	4	5.5
Luxembourg	2	5.6
Russia	2	6.6
Austria	1	1.4
Belgium	1	1.1
Denmark	1	1.3
Greece	1	1.1
Ireland	1	1.6
Rest of the World		
United States	36	96.9
China	10	26.2
Canada	9	23.4
Japan	8	18.5
Brazil	6	11.5
Bermuda	5	6.5
India	5	21
Singapore	3	5.5
Australia	2	11
Colombia	2	4.1
Guernsey	2	7.5
Korea	2	4.8
Hong Kong	1	9.1
Israel	1	4.9
Malaysia	1	2.4
Mexico	1	1.2
New Zeal.	1	4.5
Qatar	1	2.2
Thailand	1	1.6

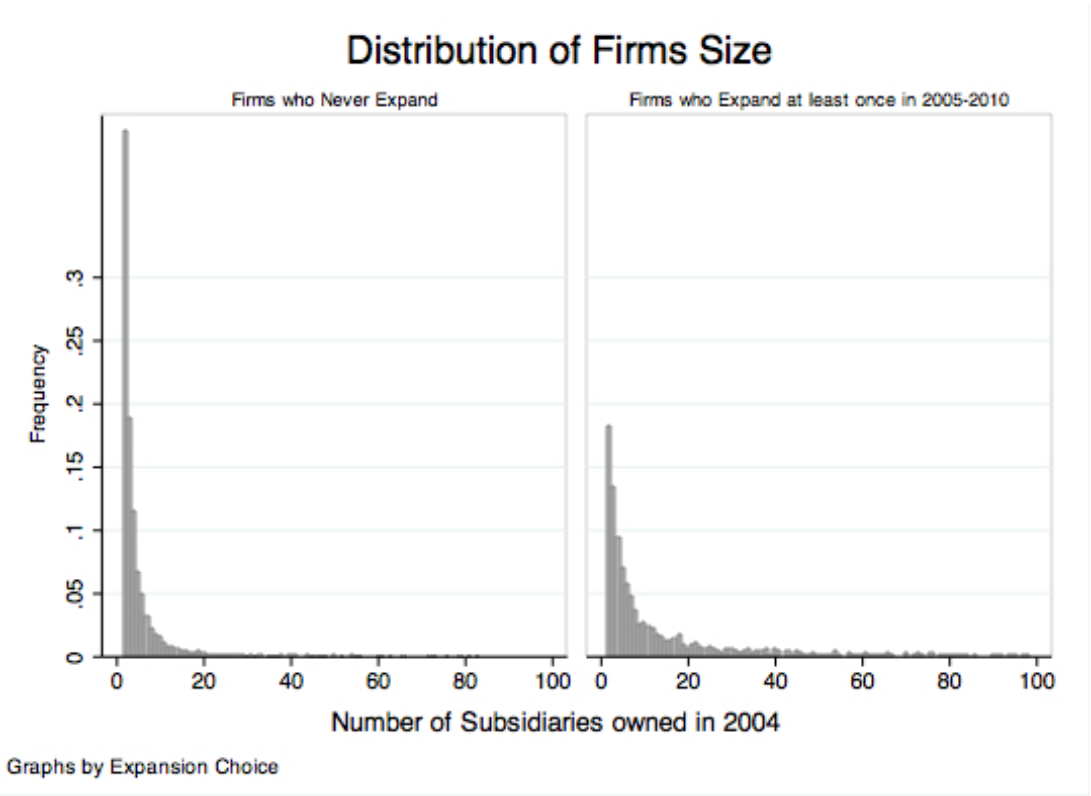
Note: information on "mega-deals" is extracted from the UNCTAD World Investment Report 2011 and they cover the largest M&A deals completed in 2010. The Total value of the observed deals is reported in terms of Billions of USD

Table 2.2: *Sample composition and Firms Size*

Initial Type	Number of Firms	Average Firm Size				
		Size as Number of Controlled Subidiaries				
		Average Size	St. Dev.	Median	75th Perc	99th Perc
Multinational	3,268	11.42	29.64	4	10	121
Domestic	10,855	2.64	4.20	1	3	20
Standalone	14,817	0.00	0.00	0	0	0
		Size as Number of Countries of Controlled Subsidiaries				
		Average Size	St. Dev.	Median	75th Perc	99th Perc
Multinational	3,268	3.11	3.18	2	3	17
Domestic	10,855	1.00	0.00	1	1	1
Standalone	14,817	0.00	0.00	0	0	0

Note: two firms' size measured are used. Total number of controlled subsidiaries or total number of foreign countries where the controlled subsidiaries are located. Both measures are based on all subsidiaries directly or indirectly controlled by the Global Ultimate Owner up to the tenth level of dependency as at the end of 2004. Any link in the reconstruction of the corporate ownership tree is conditional on the parent being the largest shareholder for a given subsidiary. This condition guarantees the pattern of control from the Global Ultimate Owner to all listed subsidiaries

Figure 2.2: *Distribution of Parents size, conditional on Expansion Choice*



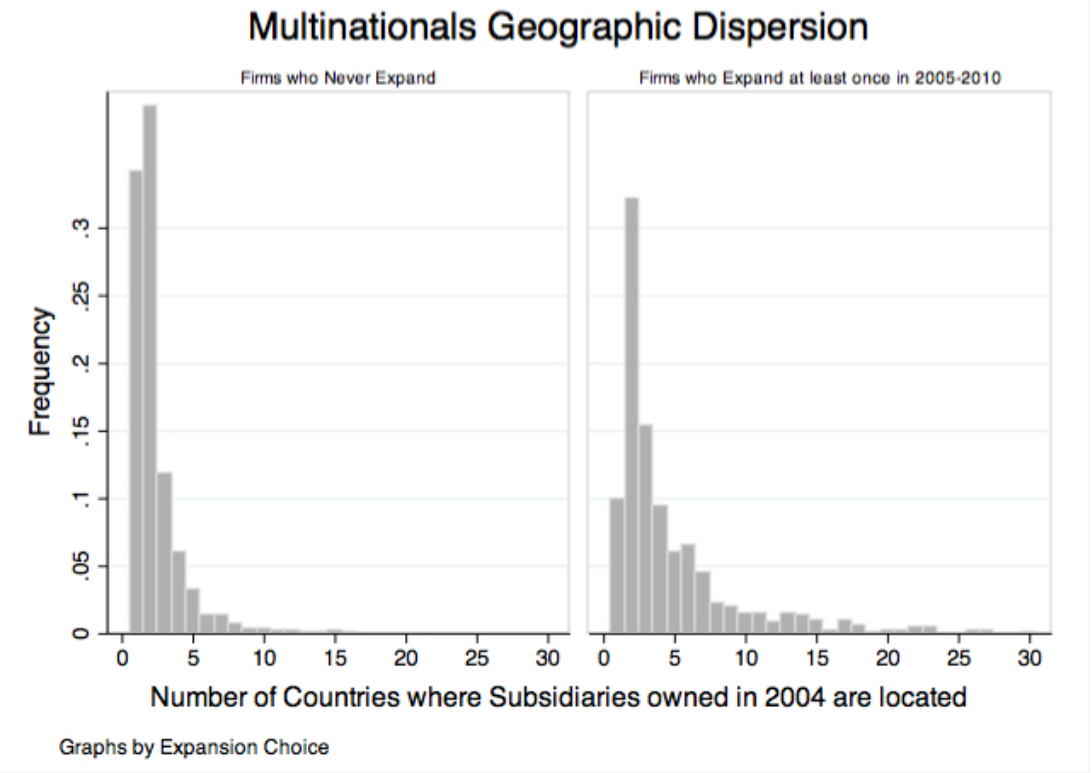


Table 2.3: *Geographic Distribution of Parent Companies*

Country	All Firms	Distribution of Firms Types:		
		Multinational	Domestic	Standalone
United Kingdom	8518	5.93%	54.80%	39.27%
Spain	3445	4.76%	24.06%	71.18%
France	3107	10.72%	30.54%	58.74%
Italy	3096	7.24%	20.22%	72.55%
Sweden	2142	15.83%	68.95%	15.22%
Germany	1894	28.09%	29.14%	42.77%
Denmark	1009	17.84%	57.19%	24.98%
Belgium	943	20.47%	22.16%	57.37%
Netherlands	853	50.29%	21.69%	28.02%
Greece	761	3.81%	23.92%	72.27%
Poland	746	1.21%	10.46%	88.34%
Ireland	677	12.70%	28.80%	58.49%
Portugal	470	6.38%	23.83%	69.79%
Romania	297	0.00%	13.47%	86.53%
Finaland	259	30.50%	27.80%	41.70%
Austria	152	48.68%	19.74%	31.58%
Bulgaria	115	0.00%	31.30%	68.70%
Lithuania	98	0.00%	12.24%	87.76%
Czech Republic	93	1.08%	2.15%	96.77%
Estonia	71	5.63%	19.72%	74.65%
Latvia	71	1.41%	5.63%	92.96%
Luxembourg	64	68.75%	3.13%	28.13%
Hungary	31	19.35%	6.45%	74.19%
Slovenia	18	27.78%	0.00%	72.22%
Slovakia	10	10.00%	20.00%	70.00%
All Countries	28,940	11.29%	37.51%	51.20%

Note: each row reports the total number of parent firms located in the country indicated by the first column, together with the percentage of these firms represented by multinational, domestic and standalone firms. A parent is defined as a firm whose shares are not (directly or indirectly) owned by other firms. A parent firm's location country is defined on the bases of the country where the firm was legally incorporated. A parent firm's "type" is identified according to the ownership structure as at the end of 2004. A firm is multinational if it owns at least one subsidiary located in a foreign country. It is a domestic if it owns one or more subsidiaries, all located within the home country. It is a standalone if it owns no subsidiaries

Table 2.4: *Distribution of Parent Companies across Industrial Sectors*

Sector	All Firms	Distribution of Firms Types:		
		Multinational	Domestic	Standalone
Finance, Ins. & Real Est.	9,075	16.44%	50.07%	33.49%
Wholesale & Retail Trade	6,345	6.05%	26.34%	67.61%
Manufacturing	6,037	14.83%	27.81%	57.36%
Construction	2,814	2.31%	36.25%	61.44%
Trasp., Storage and Comm.	2,072	13.18%	36.82%	50.00%
Other Services	871	2.64%	41.91%	55.45%
Electricity Gas & Water	596	4.53%	32.05%	63.42%
Agriculture, For., Fish.	244	3.69%	39.34%	56.97%
Mining & Quarrying	196	13.78%	43.37%	42.86%
Unknown	690	10.58%	63.91%	25.51%
All Sectors	28,940	11.29%	37.51%	51.20%

Note: each row reports the total number of parent firms operating in the industrial sector indicated by the first column, together with the percentage of these firms represented by multinational, domestic and standalone firms. A parent firm's industrial sector is defined according to the main activity reported by the BvD. There is a total of 690 firms whose Industrial Sector is unknown. Industrial Sectors reported in this table follow the main categories given by the ISIC rev.4 classification

Table 2.5: *Mean Difference between expanding and non-expanding firms*

	[1] non-Acquirers	[2] Acquirers	[3] Difference [1]−[2]	[4] Max Difference	[5] Test Difference Means	[6] KS Test
Firm Characteristics Differentials between Multinational parents who expand at least once and Multinationals who never expand						
ln(Total Sales)	16.257	16.618	-.361	0.143	0.0014	0.0010
	(.049)	(.110)	(.120)			
ln(Intangible Fixed Assets)	12.515	13.861	-1.346	0.296	0.0000	0.0000
	(.084)	(.117)	(.144)			
ln(Financial Revenue)	11.017	11.286	-.269	0.111	0.0208	0.0060
	(.065)	(.115)	(.132)			
ln(Operating Revenue)	16.192	16.490	-.299	0.128	0.0024	0.0010
	(.045)	(.095)	(.105)			
ln(Profit or Loss Before Tax)	13.117	13.739	-.621	0.193	0.0000	0.0000
	(.063)	(.0108)	(.125)			
Av. Cost of Employees	8.271	8.398	-.127	0.195	0.0000	0.0001
	(.018)	(.027)	(.032)			
Firm Characteristics Differentials between Domestic parents who expand at least once and Domestic who never expand						
ln(Total Sales)	15.802	15.177	-.625	0.234	0.0000	0.0000
	(.024)	(.080)	(.084)			
ln(Intangible Fixed Assets)	11.360	12.894	-1.534	0.273	0.0000	0.0000
	(.040)	(.082)	(.092)			
ln(Financial Revenue)	10.199	10.975	-.776	0.160	0.0000	0.0000
	(.031)	(.078)	(.084)			
ln(Operating Revenue)	15.130	15.607	-.478	0.192	0.0000	0.0000
	(.018)	(.058)	(.061)			
ln(Profit (Loss) Before Tax)	12.007	12.990	-.983	0.254	0.0000	0.0000
	(.024)	(.069)	(.074)			
Average Cost of Employees	8.250	8.305	-0.055	0.109	0.0033	0.0000
	(.008)	(.019)	(.020)			
Firm Characteristics Differentials between Standalones who expand at least once and Standalones who never expand						
ln(Total Sales)	14.026	14.823	-.797	0.266	0.0000	0.0000
	(.013)	(.211)	(.212)			
ln(Intangible Fixed Assets)	8.716	10.775	-2.058	0.308	0.0000	0.0000
	(.027)	(.286)	(.287)			
ln(Financial Revenue)	8.414	9.786	-1.372	0.275	0.0000	0.0000
	(.021)	(.221)	(.222)			
ln(Operating Revenue)	14.067	14.715	-.648	0.229	0.0000	0.0000
	(.012)	(.150)	(.151)			
ln(Profit (Loss) Before Tax)	10.797	12.107	-1.310	0.308	0.0000	0.0000
	(.016)	(.190)	(.191)			
Average Cost of Employees	7.989	8.213	-0.223	0.239	0.0030	0.0000
	(.008)	(.079)	(.079)			

Note: characteristics distribution comparison tests were conducted on the three groups of firms observed in our sample. All characteristics are measured on the basis of the firms consolidated financial accounts, averaged over the period 2002-2004. Column [1] and [2] report mean values of each characteristic. Column [3] reports the mean difference of the two distributions. Column [5] reports the p-value for a test of the null hypothesis of equal means in column [1] and [2] against the alternative of of a smaller mean in column [2]. Column [6] reports the result of a test of the null hypothesis of identical distribution in column [1] and [2], against the alternative that the distribution in column [1] stochastically dominates that in column [2]. Multinationals with more than 8 different subsidiaries (representing the top 5% of the size distribution of all firms) are excluded from the sample. The final sample includes a total of 28,023 firms: 14,817 standalone, 10,855 domestic firms and 2,351 multinationals

Table 2.6: *Firms transition into Multinational Companies*

	Total Sample			Domestic			Standalone		Multinationals	
Year	[a]	[b]	[c]	[a]	[b]	[c]	[a]	[c]	[a]	[c]
2006	**1,045**	13.68%	19.43%	**483**	39.54%	14.08%	**40**	12.50%	**522**	24.90%
2007	**937**	18.89%	19.10%	**431**	27.61%	15.55%	**56**	12.50%	**450**	23.33%
2008	**743**	21.40%	22.61%	**310**	33.55%	18.71%	**53**	22.64%	**380**	25.79%
2009	**521**	24.18%	29.58%	**233**	32.62%	20.60%	**49**	26.53%	**239**	39.33%
2010	**423**	15.13%	23.88%	**194**	21.65%	21.65%	**21**	33.33%	**208**	25.00%

Note: the table reports, in percentage, the share of expansions that lead the acquiring firm to switch to a new "type". Column [a] reports the total number of expansions completed every year, simply defined as the acquisition of the control share of a pre-existing subsidiary. Column [b] reports the share of expansions from column [a] that corresponds, for the acquirer, to a corporate "re-structuring". This happens when - given the acquisition - the company switches from a Domestic to a Multinational or from a Standalone to either a Domestic or a Multinational. Finally, column [c] reports the number of expansions consisting in a parent firm acquiring the controlling share of a subsidiary that was already owned before the M&A, but only for a minority share. Column [b] is not reported for Standalone and Multinational companies because trivial: by definition, all Standalone firms change their type when completing an acquisition, and none of the Multinationals do.

Table 2.7: *Number of Expanding Parents and Probability of Expansion, conditional on Expansion History and Firms Type*

		Total Sample			Multinational			Domestic			Standalone		
		$Choice_{t-1}$=0	$Choice_{t-1}$=1	Total	$Choice_{t-1}$=0	$Choice_{t-1}$=1	Total	$Choice_{t-1}$=0	$Choice_{t-1}$=1	Total	$Choice_{t-1}$=0	$Choice_{t-1}$=1	Total
2006	N	709	336	1,045	309	213	522	365	118	483	35	5	40
	Prob.	0.025	0.400	0.036	0.108	0.513	0.160	0.035	0.295	0.044	0.002	0.208	0.003
	SD	(.16)	(.49)	(.19)	(.31)	(.5)	(.37)	(.18)	(.46)	(.21)	(.05)	(.41)	(.05)
2007	N	524	413	937	195	255	450	286	145	431	43	13	56
	Prob.	0.019	0.395	0.032	0.071	0.489	0.138	0.028	0.300	0.040	0.003	0.325	0.004
	SD	(.14)	(.49)	(.18)	(.26)	(.5)	(.34)	(.16)	(.46)	(.2)	(.05)	(.47)	(.06)
2008	N	426	317	743	183	197	380	202	108	310	41	12	53
	Prob.	0.015	0.338	0.026	0.065	0.438	0.116	0.019	0.251	0.029	0.003	0.214	0.004
	SD	(.12)	(.47)	(.16)	(.25)	(.5)	(.32)	(.14)	(.43)	(.17)	(.05)	(.41)	(.06)
2009	N	330	191	521	115	124	239	176	57	233	39	10	49
	Prob.	0.012	0.257	0.018	0.040	0.326	0.073	0.017	0.184	0.021	0.003	0.189	0.003
	SD	(.11)	(.44)	(.13)	(.2)	(.47)	(.26)	(.13)	(.39)	(.14)	(.05)	(.39)	(.06)
2010	N	304	119	423	136	72	208	151	43	194	17	4	21
	Prob.	0.011	0.228	0.015	0.045	0.301	0.064	0.014	0.185	0.018	0.001	0.082	0.001
	SD	(.1)	(.42)	(.12)	(.21)	(.46)	(.24)	(.12)	(.39)	(.13)	(.03)	(.28)	(.04)

The general definition of expansion has been used. Accordingly, a company is observed to have expanded if, by the end of the accounting year, it has completed the acquisition of the controlling share of a pre-existing subsidiary. Data are shown for the number of companies that do make at least one expansion per year. Probability of completing an expansion, and its standard deviation (in parenthesis), are also shown. This is reported for the whole sample, as well as for the specific groups identified by the different firm "types". All statistics are also reported conditioning on whether the observed firm had just completed another expansion in the following accounting year.

Table 2.8: *Corporate Taxes in the Parent Home Countries*

	Statutory Tax Rate		Effective Average Tax Rate		Allowances		Double Tax Relief
	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.	
Austria	0.2500	(0.00)	0.2310	(0.00)	0.1180	(0.00)	Exemp.
Belgium	0.3399	(0.00)	0.2844	(.003)	0.1961	(.003)	Exemp.
Bulgaria	0.1167	(.024)	0.1010	(.02)	0.0738	(.015)	Credit
Czech Republic	0.2233	(.025)	0.2341	(.02)	0.0983	(.009)	Exemp.
Denmark	0.2650	(.015)	0.2342	(.009)	0.1471	(.012)	Exemp.
Estonia	0.2200	(.012)	0.3142	(.018)	0.0000	(0.00)	Exemp.
Finland	0.2600	(0.00)	0.2233	(0.00)	0.1449	(0.00)	Exemp.
France	0.3333	(0.00)	0.2892	(.002)	0.1998	(.001)	Exemp.
Germany	0.2000	(.05)	0.3437	(.028)	0.1693	(.028)	Exemp.
Greece	0.2667	(.029)	0.2053	(.023)	0.1956	(.022)	Credit
Hungary	0.1917	(.015)	0.1598	(.016)	0.1065	(.011)	Exemp.
Ireland	0.1250	(0.00)	0.1150	(0.00)	0.0612	(0.00)	Exemp.
Italy	0.3025	(.028)	0.3073	(.025)	0.1921	(.014)	Exemp.
Latvia	0.1500	(0.00)	0.1146	(0.00)	0.0992	(0.00)	Exemp.
Lithuania	0.1583	(.019)	0.1094	(.011)	0.1276	(.013)	Exemp.
Luxembourg	0.2167	(.005)	0.2694	(.014)	0.1512	(.016)	Exemp.
Netherlands	0.2718	(.024)	0.2473	(.024)	0.1448	(.014)	Exemp.
Poland	0.1900	(0.00)	0.1438	(0.00)	0.1313	(0.00)	Exemp.
Portugal	0.2500	(0.00)	0.2228	(.004)	0.1608	(.003)	Exemp.
Romania	0.1600	(0.00)	0.1097	(.002)	0.1218	(.003)	Credit*
Slovakia	0.1900	(0.00)	0.1800	(0.00)	0.0878	(0.00)	Exemp.
Slovenia	0.2267	(.019)	0.1985	(.004)	0.1332	(.019)	Exemp.
Spain	0.3208	(.022)	0.3131	(.021)	0.1473	(.01)	Exemp.
Sweden	0.2743	(.008)	0.2317	(0.00)	0.1604	(0.00)	Exemp.
United Kingdom	0.2900	(.01)	0.2640	(.001)	0.1476	(.014)	Credit*

Note: country-specific averages and standard deviations (in parenthesis) of the various measures of corporate tax rates are reported in the table. Statutory Corporate Tax Rate is equivalent to the top rate imposed by each country's jurisdiction. Effective Average Tax Rate is calculated using Devereux and Klemm method. The Double Tax Relief can be either exemption or tax credit. (*) indicates a country has switched to the exemption system

Table 2.9: *Explanatory Variables - definition*

Variable	Definition
Characteristic of the Parent Firm's Country	
Domestic Credit to Private Sector (%GDP)	Financial resources provided to the private sector, such as through loans, purchases of nonequity securities, and trade credits and other accounts receivable, that establish a claim for repayment. (WDI, The World Bank)
ln(real GDP)	GDP measured in constant 2005 U.S. dollars. (WDI, The World Bank)
Industry Value Added (annual % growth)	Value added in manufacturing sectors (ISIC divisions 15-37). It measures the net output of a sector after adding up all outputs and subtracting intermediate inputs. It is calculated without making deductions for depreciation of fabricated assets or depletion and degradation of natural resources. (WDI, The World Bank)
Mkt Capitalization of Listed Companies (%GDP)	Market Value (measured as the share price times the number of shares outstanding) of listed domestic companies. These are the domestically incorporated companies listed on the country's stock exchanges at the end of the year. Listed companies does not include investment companies, mutual funds, or other collective investment vehicles. (WDI, The World Bank)
Trade (%GDP).	Sum of exports and imports of goods and services measured as a share of gross domestic product. (WDI, The World Bank)
Concentration Index	Herfindahl-Hirschmann index, is a measure of the degree of market concentration. An index value that is close to 1 indicates a very concentrated market (maximum concentration). On the contrary, values closer to 0 reflect a more equal distribution of market shares among exporters or importers. (UNCTAD)
Diversification Index	Differences between the structure of trade of the country and the World average. The index value closer to 1 indicates a bigger difference from the World average. Diversification index is computed by measuring absolute deviation of the country share from world structure. (UNCTAD)
Characteristic of the Parent Firm	
ln(Operating Revenue)	Four years average of Revenue realized in the course of yearly normal operations. Only ordinary revenue rather than unexpected, one-time income, is included. (Amadeus, Bureau Van Dijk)
ln(Sales)	Volume of Total Yearly Sales, averaged over four years. (Amadeus, Bureau Van Dijk)
Profit Margin (%)	(Profit before tax / Operating revenue) $\times$ 100. (Amadeus, Bureau Van Dijk)
Solvency Ratio (%)	(Shareholders funds / Total assets) $\times$ 100. (Amadeus, Bureau Van Dijk)
Number Owned Subsidiaries	Total Number of Subsidiaries owned with majority share at the end of the accounting year 2004. (Own Calculation)
Number Foreign Countries	Number of Different Foreign countries where the Subsidiaries Owned by the end of 2004 were located. (Own Calculation)

Table 2.10: *Descriptive Statics of Explanatory Variables*

Variable		Mean	St. Dev.	Obs.
Statutory Corporate Tax Rate	overall	0.2778	0.0521	N = 144700
	between		0.0487	n = 28940
	within		0.0185	T = 5
Effective Average Tax Rate	overall	0.2649	0.0527	N = 144700
	between		0.0505	n = 28940
	within		0.0148	T = 5
Allowances	overall	0.1577	0.0317	N = 144700
	between		0.0288	n = 28940
	within		0.0132	T = 5
Domestic Credit to Private Sector (%GDP)	overall	1.4515	0.5120	N = 144700
	between		0.4797	n = 28940
	within		0.1791	T = 5
ln(real GDP)	overall	27.3542	1.0446	N = 144700
	between		1.0439	n = 28940
	within		0.0378	T = 5
Industry Value Added (annual % growth)	overall	0.0067	0.0329	N = 144700
	between		0.0193	n = 28940
	within		0.0267	T = 5
Mkt Capitalization of Listed Companies (%GDP)	overall	0.8384	0.3966	N = 144700
	between		0.3093	n = 28940
	within		0.2481	T = 5
Trade (%GDP)	overall	0.7608	0.3196	N = 144700
	between		0.3171	n = 28940
	within		0.0402	T = 5
Index of hourly compensation costs (US=100)	overall	113.0210	28.2502	N = 141030
	between		27.3170	n = 28206
	within		7.2026	T = 5
ln(Operating Revenue) average 2002-2005	overall	14.7075	1.6897	N = 99150
	between		1.6898	n = 19830
	within		0.0000	T = 5

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Table 2.10 – continued from previous page

Variable		Mean	St. Dev.	Obs.
ln(Financial Turnover) average 2002-2005	overall	14.6016	1.6525	N = 68735
	between		1.6525	n = 13747
	within		0.0000	T = 5
Profit Margin (%) average 2002-2005	overall	4.5044	13.8669	N = 97540
	between		13.8672	n = 19508
	within		0.0000	T = 5
Solvency Ratio (%) average 2002-2005	overall	32.8041	25.3809	N = 107725
	between		25.3814	n = 21545
	within		0.0000	T = 5
Total No. Subsidiaries owned in 2005	overall	2.2788	10.8602	N = 144700
	between		10.8603	n = 28940
	within		0.0000	T = 5
No. Foreign Countries in 2005	overall	0.7262	1.4434	N = 144700
	between		1.4434	n = 28940
	within		0.0000	T = 5

Note: all the macro variables are taken from the WDI (World Bank). The TAX variables are from the CBT (Oxford Said Business School). Finally, the accounting variables are from Bureau Van Dijk, and refer to the consolidated financial accounts averaged over the years 2002-2005

Table 2.11: *Dynamic Probit Model Estimates - All Acquisitions*

	Dynamic Pooled Probit	Dynamic RE Probit	[2] + Sq. Size	[3] + Macro Controls	[4] + Financial Accounts
	[1]	[2]	[3]	[4]	[5]
Expansion $s-1$	1.948***	0.982***	1.012***	0.996***	0.900***
	(.100)	(.115)	(.114)	(.116)	(.189)
Expansion $s-1$ * Multinational	-.738***	-0.840***	-0.893***	-0.879***	-0.796***
	(.105)	(.12)	(.12)	(.122)	(.197)
Expansion $s-1$ * Domestic	-.686***	-0.688***	-0.711***	-0.701***	-0.635***
	(.106)	(.12)	(.119)	(.121)	(.205)
Statutory Tax Rate	-1.131***	-1.604***	-1.618***	-1.644**	-2.204**
	(.390)	(.598)	(.591)	(.721)	(.969)
Statutory Tax Rate*Multinational	2.534***	2.901***	2.511***	2.274***	2.553**
	(.471)	(.722)	(.717)	(.767)	(1.087)
Statutory Tax Rate*Domestic	1.706***	2.315***	2.187***	1.752**	1.069
	(.481)	(.716)	(.71)	(.731)	(1.072)
Characteristics of Parent Country measured in the year before the expansion					
Domestic credit by banking sector				-0.615*	-1.237**
				(.314)	(.523)
Domestic credit to private sector				0.478*	1.439***
				(.28)	(.506)
Ln (real GDP)				-0.011	0.056
				(.039)	(.041)
Industry Value Added				2.024***	2.902***
				(.678)	(1.039)
MKT Capitalization of Listed				-0.022	-0.071
Companies				(.065)	(.094)
Trade (% GDP)				-0.120*	0.290**
				(.07)	(.131)
Concentration Index				3.046***	4.466**
				(1.045)	(2.191)
Diversification Index				-2.089***	-3.638***
				(.594)	(1.364)
Characteristics of Parent Firm measured in 2004					
Type = Multinational	0.683***	0.618***	0.459**	0.540**	0.639**
	(.129)	(.199)	(.199)	(.214)	(.292)
Type = Domestic	0.326**	0.279	0.202	0.299	0.627**
	(.134)	(.197)	(.196)	(.203)	(.282)
Subidiaries Locations		0.069***	0.151***	0.156***	
		(.007)	(.017)	(.017)	
(Subidiaries Locations)^2			-0.006***	-0.007***	
			(.001)	(.001)	
Number of Subsidiaries		0.007***	0.018***	0.017***	
		(.000)	(.001)	(.001)	
(Number of Subsidiaries)^2			-0.2D-04***	-0.2D-04***	
			(.000)	(.000)	
Ln (Total Sales) (av. 2002-2004)					0.228***
					(.016)
Solvency Ratio (av. 2002-2004)					0.006***
					(.001)
Profit Margin (av. 2002-2004)					-0.001

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Table 2.11 – continued from previous page

	[1]	[2]	[3]	[4]	[5]
					(.002)
Expansion Choice in 2005	1.236***	1.220***	1.143***	1.121***	1.114***
	(.052)	(.051)	(.05)	(.05)	(.084)
Constant	-2.723***	-3.490***	-3.464***	-2.360***	-1.708***
	(.107)	(.168)	(.166)	(1.207)	(2.525)
Rho		0.376***	0.367***	0.365***	0.314***
		(.016)	(.016)	(.016)	(.028)
Log-L	-12431.83	-11608.9	-11530.5	-11488.1	-3671.02
Sample	28,940	28,940	28,940	28,940	11,221
Average Partial Effects (APE)					
APE for Expansion $s-1$:					
Multinational Firms	0.3009	0.0158	0.0136	0.0135	0.0138
	(.011)	(.006)	(.006)	(.006)	(0.011)
Domestic Firms	0.1980	0.0167	0.0172	0.0167	0.0140
	(.009)	(.033)	(.003)	(.003)	(0.006)
Standalone Firms	0.1733	0.0171	0.0184	0.0177	0.0110
	(.024)	(.004)	(.005)	(.004)	(0.004)
APE for Statutory Tax Rate:					
Multinational Firms	0.2155	0.1458	0.0987	0.0696	0.0479
	(.011)	(.049)	(.048)	(.061)	(.109)
Domestic Firms	0.0351	0.0335	0.0268	0.0051	-0.0532
	(.018)	(.020)	(.019)	(.025)	(.004)
Standalone Firms	-0.0091	-0.0096	-0.0098	-0.0099	-0.0090
	(.003)	(.004)	(.004)	(.004)	(.004)

Notes: (1) the dependent variable is the parents choice of acquiring at least one new subsidiary at period s, acquisitions can be only cross-border or cross-border and domestic at the same time (int he case of multiple acquisitions); (2) all models include dummy variables specific to the country of the parent firm, dummies specific to the industrial sector of the parent firm and dummies specific to the year when the acquisition took place (unreported); (3) standard errors are given in parenthesis; (4) asterisks indicate significance at *** (1%), ** (5%), * (10%); (5) rho indicates the proportion of the total variance contributed by the panel-variance component; (6) dummies of firms "type" identify whether the firm is Multinational or Domestic, and use the type Standalone as reference group; (7) for Standalone companies, number of subsidiaries and number of countries where the subsidiaries are located is 0; (8) sample size is 28,940 parent firms observed for the five years between 2006 and 2010 (2005 is the base year), sample size for column [6] is reduced due to incompleteness of data on firms financial accounts; (9) the Average Partial Effects (APE), reported at the bottom, have standard errors computed using the delta method, bootstrap standard errors were also computed by they are not reported here; (10) Average Partial Effects conditional on firms types were computed by restricting the sample to all parent firms who were of a specific type in 2004; (11) the *raw* unconditional probability of making an acquisition at any point in time between 2006 and 2010 is 0.1559.

Table 2.12: *Dynamic Probit Model Estimates - Extension of Tab 11 Column 4*

	Tab 11, Col. [4] (TAX=STR)	Double Tax System (TAX=STR)	Capital Allowances (TAX=STR)	TAX=EATR
	[1]	[2]	[3]	[4]
Expansion $s-1$	0.996***	1.015***	1.014***	1.031***
	(.116)	(.120)	(.12)	(.119)
Expansion $s-1$ * Multinational	-0.879***	-0.921***	-0.920***	-0.941***
	(.122)	(.126)	(.126)	(.125)
Expansion $s-1$ * Domestic	-0.701***	-0.694***	-0.696***	-0.711***
	(.121)	(.125)	(.125)	(.124)
TAX	-1.644**	-1.685**	-2.201**	-2.415**
	(.721)	(.790)	(.894)	(1.017)
TAX*Multinational	2.274***	2.738***	2.813***	-0.343
	(.767)	(.843)	(.848)	(.861)
TAX*Domestic	1.752**	1.464*	1.502*	-0.048
	(.731)	(.803)	(.801)	(.759)
Dummy for Credit System		-0.032		
		(.049)		
Capital Allowances			1.557	
			(1.16)	
Characteristics of Parent Country measured in the year before the expansion				
Domestic credit by banking sector	-0.615*	-1.089***	-1.137***	-0.556
	(.314)	(.394)	(.381)	(.407)
Domestic credit to private sector	0.478*	0.886**	0.974***	0.456
	(.28)	(.348)	(.351)	(.36)
Ln (real GDP)	-0.011	0.032	0.013	0.118**
	(.039)	(.050)	(.051)	(.059)
Industry Value Added	2.024***	1.935**	2.202***	2.090***
	(.678)	(.740)	(.759)	(.724)
MKT Capitalization of Listed	-0.022	-0.020	-0.013	-0.175**
Companies	(.065)	(.081)	(.076)	(.079)
Trade (% GDP)	-0.120*	-0.035	-0.037	0.139
	(.07)	(.079)	(.079)	(.104)
Concentration Index	3.046***	2.670***	2.684**	3.220**
	(1.045)	(1.301)	(1.304)	(1.305)
Diversification Index	-2.089***	-2.094***	-2.280***	-2.176***
	(.594)	(.795)	(.822)	(.716)
Characteristics of Parent Firms measured in 2004				
Type = Multinational	0.540**	0.348	0.327	1.197***
	(.214)	(.233)	(.234)	(.239)
Type = Domestic	0.299	0.325	0.315	0.742***
	(.203)	(.221)	(.22)	(.201)
Subsidiaries Locations	0.156***	0.164***	0.164***	0.165***
	(.017)	(.017)	(.017)	(.017)
(Subsidiaries Locations)^2	-0.007***	-0.007***	-0.007***	-0.007***
	(.001)	(.001)	(.001)	(.001)
Number of Subsidiaries	0.017***	0.016***	0.016***	0.016***
	(.001)	(.001)	(.001)	(.001)
(Number of Subsidiaries)^2	-.2D-04***	-.2D-04***	-.2D-04***	-.2D-04***
	(.000)	(.000)	(.000)	(.000)
Expansion Choice in 2005	1.121***	1.128***	1.131***	1.118***

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Table 2.12 – continued from previous page

	[1]	[2]	[3]	[4]
	(.05)	(.052)	(.052)	(.052)
Constant	-2.360*	-3.391**	-2.959*	-5.875***
	(1.207)	(1.614)	(1.649)	(1.719)
Rho	0.365***	0.364***	0.364***	0.364***
	(.016)	(.017)	(.017)	(.017)
Log-L	-11488.1	-10348.8	-10348.2	-10350.5
No. Firms	28,940	24,729	24,729	24,729
Average Partial Effects (APE)				
APE for Expansion $s-1$:				
Multinational Firms	0.0135	0.0105	0.0105	0.0101
	(.006)	(.006)	(.006)	(.006)
Domestic Firms	0.0167	0.0184	0.0182	0.0184
	(.003)	(.004)	(.004)	(.003)
Standalone Firms	0.0177	0.0197	0.0197	0.0204
	(.004)	(.005)	(.005)	(.005)
APE for Tax Variable:				
Multinational Firms	0.0696	0.1147	0.0666	-0.3010
	(.061)	(.066)	(.076)	(.115)
Domestic Firms	0.0051	-0.0104	-0.0328	-0.1156
	(.025)	(.03)	(.035)	(.048)
Standalone Firms	-0.0099	-0.0112	-0.0146	-0.0160
	(.004)	(.005)	(.006)	(.007)

Notes: (1) the dependent variable is the parents choice of acquiring at least one new subsidiary at period s, acquisitions can be only cross-border or cross-border and domestic at the same time (int he case of multiple acquisitions); (2) all models include dummy variables specific to the country of the parent firm, dummies specific to the industrial sector of the parent firm and dummies specific to the year when the acquisition took place (unreported); (3) standard errors are given in parenthesis; (4) asterisks indicate significance at *** (1%), ** (5%), * (10%); (5) rho indicates the proportion of the total variance contributed by the panel-variance component; (6) dummies of firms "type" identify whether the firm is Multinational or Domestic, and use the type Standalone as reference group; (7) for Standalone companies, number of subsidiaries and number of countries where the subsidiaries are located is 0; (8) sample size is 28,940 parent firms observed for the five years between 2006 and 2010 (2005 is the base year), sample size for column [2] to [4] is reduced due to incompleteness of data on tax variables; (9) the Average Partial Effects (APE), reported at the bottom, have standard errors computed using the delta method, bootstrap standard errors were also computed by they are not reported here; (10) Average Partial Effects conditional on firms types were computed by restricting the sample to all parent firms who were of a specific type in 2004; (11) the *raw* unconditional probability of making an acquisition at any point in time between 2006 and 2010 is 0.1559.

Table 2.13: *Dynamic Probit Model Estimates - Cross-Border Acquisitions Only*

	Baseline Model (TAX=STR)	Col. [1] + Only MNE and non-MNE	Col. [2] no WDI	Col. [2] + Double Tax System (TAX=STR)	Col. [2] + Capital Allowances (TAX=STR)	Col. [2] + TAX=EATR
	[1]	[2]	[3]	[4]	[5]	[6]
Expansion $s-1$	1.052***	0.515***	0.513***	0.513***	0.513***	0.535***
	(.214)	(.108)	(.107)	(0.107)	(0.107)	(0.106)
Expansion $s-1$ * MNE	-1.005***	-0.492***	-0.490***	-0.490***	-0.492***	-0.511***
	(.22)	(.115)	(.114)	(0.114)	(0.114)	(0.113)
Expansion $s-1$ * DOM	-0.665***					
	(.242)					
TAX	-2.195*	-2.16***	-2.08***	-2.075***	-1.860***	-1.060*
	(1.202)	(.714)	(.579)	(0.579)	(0.608)	(0.620)
TAX*MNE	2.840**	2.578***	2.748***	2.757***	2.752***	-0.083
	(1.224)	(.731)	(.724)	(0.723)	(0.726)	(0.737)
TAX*DOM	0.032					
	(1.266)					
Dummy for Credit System				-0.035		
				(0.055)		
Capital Allowances					-1.924*	
					(0.993)	
Characteristics of Parent Country measured in the year before the expansion						
Domestic credit by banking sector	-0.410	-0.364				
	(.475)	(.474)				
Domestic credit to private sector	0.409	0.396				
	(.419)	(.418)				
Ln (real GDP)	-0.033	-0.033				
	(.058)	(.058)				
Industry Value Added	1.124	1.030				
	(1.118)	(1.114)				
MKT Capitalization of Listed	-0.071	-0.023				
Companies	(.087)	(.087)				
Trade (% GDP)	-0.044	-0.024				
	(.093)	(.094)				
Concentration Index	3.539**	3.760***	3.610***	3.835***	2.856***	3.303***
	(1.438)	(1.416)	(.984)	(1.040)	(1.073)	(0.983)
Diversification Index	-2.109**	-2.389***	-1.825***	-1.949***	-1.915***	-1.848***
	(.87)	(.859)	(.342)	(0.392)	(0.342)	(0.366)
Characteristics of Parent Firms measured in 2004						
Type = MNE	0.647**	0.235	0.174	0.167	0.185	0.963***
	(.329)	(.202)	(.199)	(0.199)	(0.200)	(0.205)
Type = DOM	0.571*					
	(.342)					
No. Subs Locations	0.199***	0.250***	0.250***	0.250***	0.251***	0.249***
	(.02)	(.019)	(.019)	(0.019)	(0.019)	(0.019)
Sq. No. Subs Locations	-0.007***	-0.009***	-0.009***	-0.009***	-0.009***	-0.009***
	(.001)	(.001)	(.001)	(0.001)	(0.001)	(0.001)
No. Subsidiaries	0.011***	0.011***	0.011***	0.011***	0.011***	0.011***
	(.002)	(.002)	(.002)	(0.002)	(0.002)	(0.002)
Sq. No. Subsidiaries	-0.1D-04***	-0.1D-04***	-0.1D-04***	-0.1D-04***	-0.1D-04***	-0.1D-04***

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Table 2.13 – continued from previous page

	[1]	[2]	[3]	[4]	[5]	[6]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Expansion Choice in 2005	1.092***	1.083***	1.092***	1.092***	1.086***	1.071***
	(.08)	(.08)	(.08)	(0.079)	(0.079)	(0.079)
Constant	-2.633	-2.340***	-3.452***	-3.429***	-3.144***	-3.707***
	(1.793)	(1.793)	(.228)	(0.232)	(0.264)	(0.250)
Rho	0.406***	0.412***	0.413***	0.413***	0.413***	0.410***
	(.024)	(.024)	(.023)	(0.024)	(0.023)	(0.023)
Log-L	-5410.6	-5452.69	-5455.26	-5445.36	-5453.3	-5461.11
Number of Firms	28,940	28,940	28,940	24,729	24,729	24,729
Average Partial Effects						
APE for Expansion $s-1$:						
Multinational Firms	0.0040	0.0020	0.0019	0.0019	0.0017	0.002
	(.006)	(.005)	(.005)	(0.005)	(0.005)	(0.006)
Domestic Firms	0.0066					
	(.003)					
Standalone Firms	0.0070					
	(.003)					
Non-Multinational Firms		0.0053	0.0052	0.0052	0.0052	0.0056
		(0.002)	(.002)	(0.002)	(0.002)	(0.002)
APE for Statutory Tax Rate:						
Multinational Firms	0.0545	0.0351	0.0559	0.0569	0.0744	-0.0956
	(.06)	(.059)	(.048)	(0.048)	(0.049)	(0.052)
Domestic Firms	-0.0256					
	(.009)					
Standalone Firms	-0.0039					
	(.002)					
Non-Multinational Firms		-0.0129	-0.0128	-0.0125	-0.0112	-0.00639
		(0.004)	(.004)	(0.003)	(0.004)	(0.004)

Notes: (1) the dependent variable is the parents choice of acquiring at least one new subsidiary at period s, acquisitions can be only cross-border; (2) all models include dummy variables specific to the country of the parent firm, dummies specific to the industrial sector of the parent firm and dummies specific to the year when the acquisition took place (unreported); (3) standard errors are given in parenthesis; (4) asterisks indicate significance at *** (1%), ** (5%), * (10%); (5) rho indicates the proportion of the total variance contributed by the panel-variance component; (6) dummies of firms "type" identify whether the firm is Multinational or Domestic, and use the type Standalone as reference group, in columns [6] and [7] the reference group is constituted by all non-multinational parent firms; (7) for Standalone companies, number of subsidiaries and number of countries where the subsidiaries are located is 0; (8) sample size is 28,940 parent firms observed for the five years between 2006 and 2010 (2005 is the base year); (9) the Average Partial Effects (APE), reported at the bottom, have standard errors computed using the delta method, bootstrap standard errors were also computed by they are not reported here; (10) Average Partial Effects conditional on firms types were computed by restricting the sample to all parent firms who were of a specific type in 2004; (11) the *raw* unconditional probability of making a cross-border only acquisition at any point in time between 2006 and 2010 is 0.0685.

Table 2.14: *Dynamic Probit Model Estimates - Domestic Expansions Only*

	Baseline Model (TAX=STR)	Col. [1] + Double Tax System (TAX=STR)	Col. [1] + Allowances (TAX=STR)	TAX=EATR
	[1]	[2]	[3]	[4]
Expansion $s-1$	1.007***	1.020***	1.017***	1.027***
	(.148)	(.155)	(.155)	(.155)
Expansion $s-1$ * Multinational	-0.899***	-0.904***	-0.901***	-0.911***
	(.161)	(.168)	(.168)	(.168)
Expansion $s-1$ * Domestic	-0.717***	-0.719***	-0.718***	-0.726***
	(.152)	(.158)	(.159)	(.158)
TAX	-0.354	-0.052	-0.888	-1.945
	(.827)	(.955)	(1.066)	(1.185)
TAX*Multinational	1.134	0.591	0.798	-0.192
	(.885)	(.975)	(.982)	(1.019)
TAX*Domestic	1.963**	1.382	1.478*	-0.533
	(.807)	(.882)	(.877)	(.807)
Dummy for Credit System		0.020		
		(.054)		
Capital Allowances			2.841*	
			(1.456)	
Characteristics of Parent Country measured in the year before the expansion				
Domesticestic credit by banking sector	-1.079***	-1.544***	-1.974***	-0.961*
	(.336)	(.443)	(.452)	(.493)
Domesticestic credit to private sector	0.777**	1.224***	1.673***	0.769*
	(.303)	(.393)	(.425)	(.435)
Ln (real GDP)	.107***	.151***	0.148***	0.235***
	(.024)	(.030)	(.029)	(.052)
Industry Value Added	1.737**	2.032**	2.273***	1.963**
	(.712)	(.819)	(.837)	(.806)
MKT Capitalization of Listed	0.018	-0.045	-0.006	-0.074
Companies	(.082)	(.092)	(.093)	(.093)
Characteristics of Parent Firms measured in 2004				
Type = Multinational	0.687***	0.818***	0.758***	1.031***
	(.252)	(.276)	(.279)	(.291)
Type = Domestic	0.331	0.464*	0.435*	0.986***
	(.225)	(.244)	(.243)	(.217)
No. Subs Locations	-0.035	-0.036	-0.036	-0.037
	(.024)	(.025)	(.025)	(.025)
Sq. No. Subs Locations	-0.001	-0.001	-0.001	-0.001
	(.001)	(.001)	(.001)	(.001)
No. Subsidiaries	0.039***	0.038***	0.039***	0.039***
	(.002)	(.003)	(.003)	(.003)
Sq. No. Subsidiaries	-0.0001***	-0.0001***	-0.0001***	-0.0001***
	(.000)	(.000)	(.000)	(.000)
Expansion Choice in 2005	1.018***	1.036***	1.041***	1.028***
	(.062)	(.065)	(.065)	(.065)
Constant	-5.876***	-7.185***	-7.335***	-9.422***
	(.703)	(.840)	(.835)	(1.346)
Rho	0.314***	0.321***	0.322***	0.319***
	(.02)	(.022)	(.022)	(.022)

Continued on next page

Table 2.14 – continued from previous page

	[1]	[2]	[3]	[4]
Log-L	-8222.83	-7383.76	-7381.65	-7383.87
Number of Firms	28940	24729	24729	24729
Average Partial Effects, SD computed with Delta Method				
APE for Expansion $s-1$:				
Multinational Firms	0.0062	0.0065	0.0065	0.0066
	(0.005)	(0.005)	(0.005)	(0.005)
Domestic Firms	0.0145	0.0149	0.0148	0.0150
	(0.004)	(0.004)	(0.004)	(0.004)
Standalone Firms	0.0161	0.0173	0.0172	0.0177
	(0.005)	(0.006)	(0.006)	(0.006)

Notes: (1) the dependent variable is the parents choice of acquiring at least one new domestic subsidiary at period s; (2) all models include dummy variables specific to the country of the parent firm, dummies specific to the industrial sector of the parent firm and dummies specific to the year when the acquisition took place (unreported); (3) standard errors are given in parenthesis; (4) asterisks indicate significance at *** (1%), ** (5%), * (10%); (5) rho indicates the proportion of the total variance contributed by the panel-variance component; (6) dummies of firms "type" identify whether the firm is Multinational or Domestic, and use the type Standalone as reference group; (7) for Standalone companies, number of subsidiaries and number of countries where the subsidiaries are located is 0; (8) sample size is 28,940 parent firms observed for the five years between 2006 and 2010 (2005 is the base year), sample size for column [2] to [4] is reduced due to incompleteness of data on tax variables; (9) the Average Partial Effects (APE), reported at the bottom, have standard errors computed using the delta method, bootstrap standard errors were also computed by they are not reported here; (10) Average Partial Effects conditional on firms types were computed by restricting the sample to all parent firms who were of a specific type in 2004; (11) the *raw* unconditional probability of making a cross-border only acquisition at any point in time between 2006 and 2010 is 0.07062

Table 2.15: *Dynamic Random Parameter Probit Model - Extension of Preferred Models from Tab 11 and Tab 13*

Dependent Variable:	All Expansions		Only Cross-Border Expansions		Only Domestic Expansions	
	Tab 11, Col [4]	RPM	Tab 13, Col [3]	RPM	Tab 14, Col [1]	RPM
	[1]	[2]	[3]	[4]	[5]	[6]
Random Parameter						
Expansion $s-1$						
Intercept	0.996***	1.033***	0.513***	0.620***	1.007***	1.149***
	(.116)	(.104)	(.107)	(.084)	(.148)	(.149)
Multinational Type Effect	-0.879***	-0.912***	-0.490***	-0.577***	-.899***	-1.069***
	(.122)	(.111)	(.114)	(.097)	(.161)	(.155)
Domestic Type Effect	-0.701***	-0.722***			-.717***	-0.874***
	(.121)	(.110)			(.152)	(.145)
Standard Deviation		0.320***		0.206***		0.461***
		(.025)		(.037)		(.035)
Statutory Tax Rate						
Intercept	-1.644**	-2.724**	-2.08***	-2.355***	-0.354	0.016
	(.721)	(.642)	(.579)	(.461)	(.827)	(.821)
Multinational Type Effect	2.274***	2.901***	2.748***	2.858***	1.134	0.987
	(.767)	(.644)	(.724)	(.568)	(.885)	(.792)
Domestic Type Effect	1.752**	2.109***			1.963**	1.762**
	(.731)	(.621)			(.807)	(.712)
Standard Deviation		1.338***		0.570***		1.522***
		(.038)		(.053)		(.047)
Constant						
Intercept	-2.360***	-2.135**	-3.452***	-3.280***	-5.876***	-5.681***
	(1.207)	(1.023)	(.228)	(.174)	(.703)	(.619)
Multinational Type Effect	0.540**	0.338*	0.174	0.114	0.687***	0.684***
	(.214)	(.177)	(.199)	(.157)	(.252)	(.224)
Domestic Type Effect	0.299	0.188			0.331	0.356*
	(.203)	(.170)			(.225)	(.199)
Standard Deviation		0.620***		0.786***		0.833***
		(0.012)		(0.019)		(.079)
Characteristics of Parent Country						
Domestic credit by banking sector	-0.615*	-0.608**			-1.079***	-1.098***
	(.314)	(.281)			(.336)	(.304)
Domestic credit to private sector	0.478*	0.478*			.777**	.793***
	(.280)	(.247)			(.303)	(.272)
Ln (real GDP)	-0.011	-0.007			.107***	.100***
	(.039)	(.033)			(.024)	(.021)
Industry Value Added	2.024***	1.935***			1.737**	1.700**
	(.678)	(.634)			(.712)	(.676)
MKT Capitalization of Listed Companies	-0.022	-0.019			0.018	0.012
	(.065)	(.058)			(.082)	(.075)
Trade (% GDP)	-0.120*	-0.108*			-0.139	-0.153**
	(.07)	(.499)			(.088)	(.074)
Concentration Index	3.046***	2.787***	3.610***	3.450***		
	(1.045)	(.870)	(.984)	(.797)		
Diversification Index	-2.089***	-2.011***	-1.825***	-1.817***		
	(.594)	(.499)	(.342)	(.270)		
Characteristics of Parent in 2004 (t=0)						
No. Subs Locations	0.156***	0.157***	0.250***	0.246***	-0.035	-0.029

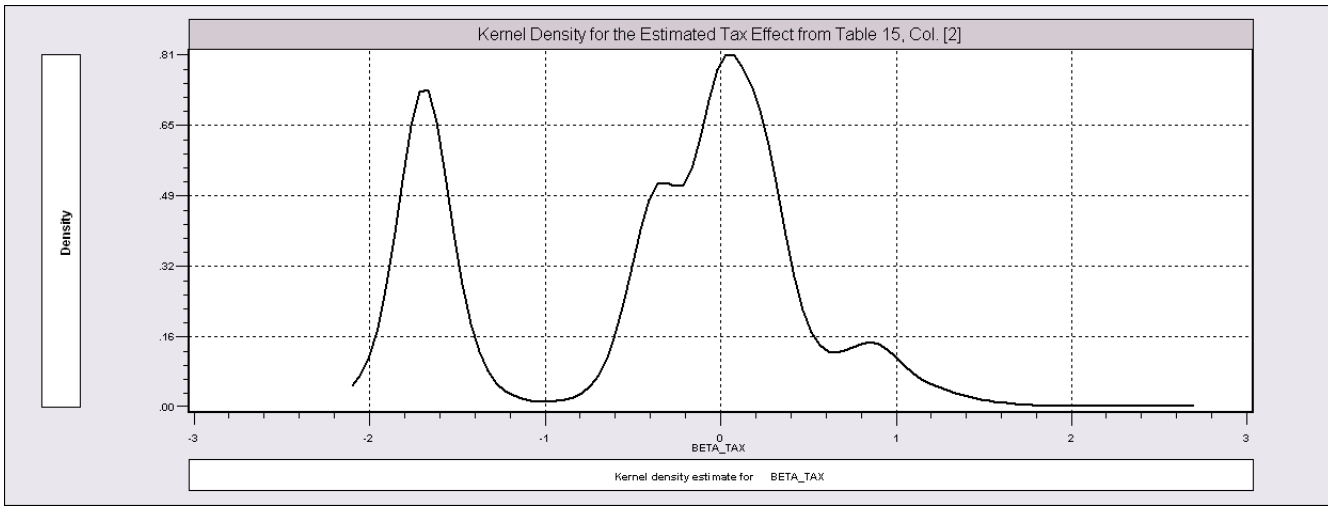
Continued on next page

Table 2.15 – continued from previous page

	[1]	[2]	[3]	[4]	[5]	[6]
	(.017)	(.012)	(.019)	(.013)	(.024)	(.019)
Sq. No. Subs Locations	-0.007***	-0.007***	-0.009***	-0.009***	-0.001	-0.001
	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)
No. Subsidiaries	0.017***	0.017***	0.011***	0.010***	.039***	0.038***
	(.001)	(.001)	(.002)	(.001)	(.002)	(.002)
Sq. No. Subsidiaries	-0.2D-04***	-0.1D-04***	-0.1D-04***	-0.1D-04***	-.0001***	-.0002***
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
Expansion Choice in 2005	1.121***	1.079***	1.092***	1.045***	1.018***	0.947***
	(.05)	(.031)	(.08)	(.049)	(.062)	(.042)
Log-Likelihood	-11488.1	-11497.93	-5455.26	-5466.51	-8222.83	-8226.55
Number of Firms	28,940	28,940	28,940	28,940	28,940	28,940

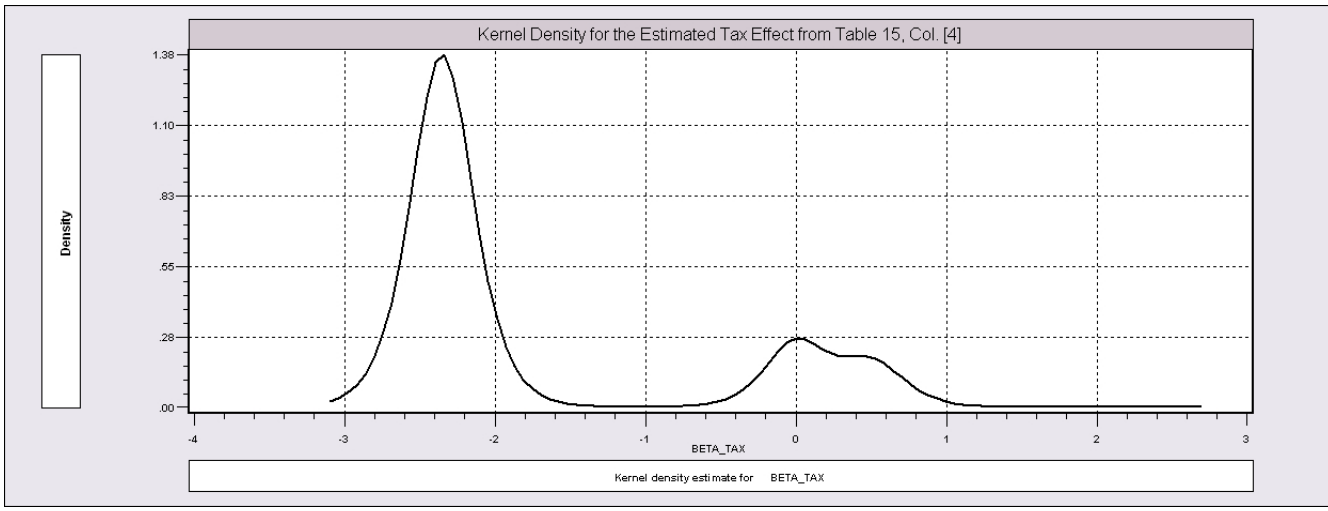
Notes: (1) dependent variable is the parents choice of acquiring at least one new subsidiary at period s, acquisitions can be only cross-border in columns [3] and [4]; (2) models in column [2] and [4] are estimated by simulated maximum likelihood; (3) for each random parameter, the table gives the "intercept", which is the constant term in the means of the random parameters, the effect of the firm-specific characteristics that are supposed to shift the intercept and the conditional standard deviation of the estimated parameter; (4) all models include dummy variables specific to the country of the parent firm, dummies specific to the industrial sector of the parent firm and dummies specific to the year when the acquisition took place (unreported); (5) standard errors are given in parenthesis; (6) asterisks indicate significance at *** (1%), ** (5%), * (10%); (7) dummies of firms "type" identify whether the firm is Multinational or Domestic, and use the type Standalone as reference group, in columns [6] and [7] the reference group is constituted by all non-multinational parent firms; (8) for Standalone companies, number of subsidiaries and number of countries where the subsidiaries are located is 0; (9) sample size is 28,940 parent firms observed for the five years between 2006 and 2010 (2005 is the base year)

Figure 2.3: *Distribution of the effect of Home Corporate Statutory Tax Rate on Acquisition Choice across Parent Firms*



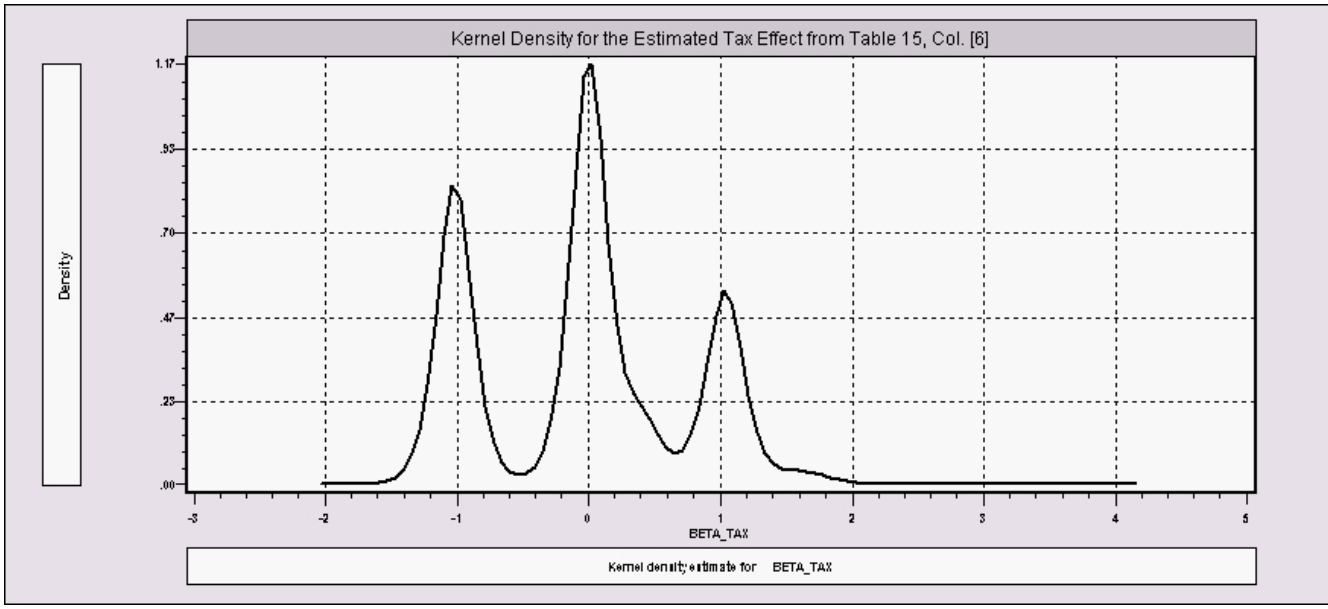
Kernel Density for Tax Parameter estimated in Column [2] of Table 15. Mean effect shifted by Multinational and Domestic Type Dummies, Standalones being the reference group. Effect estimated on the full sample of 28,940 firms. Mean Value = -0.449, Std Deviation = 0.871, Skewness = -0.374, Excess Kurtosis -3 = -1.093, Minimum = -1.998, Maximum= 2.640

Figure 2.4: *Distribution of the effect of Home Corporate Statutory Tax Rate on cross-border Acquisition Choice across Parent Firms*



Kernel Density for Tax Parameter estimated in Column [4] of Table 15. Mean effect shifted by Multinational Dummy, non-Multinationals being the reference group. Effect estimated on the full sample of 28,940 firms. Mean Value = -1.743, Std Deviation = 1.097, Skewness = 1.284, Excess Kurtosis -3 = -0.267, Minimum = -2.959, Maximum= 2.611

Figure 2.5: *Distribution of the effect of Home Corporate Statutory Tax Rate on domestic Acquisition Choice across Parent Firms*



Kernel Density for Tax Parameter estimated in Column [6] of Table 15. Mean effect shifted by Multinational Dummy, and Domestic Type Dummies, Standalones being the reference group. Effect estimated on the full sample of 28,940 firms. Mean Value = -0.042, Std Deviation = 0.764, Skewness = 0.155, Excess Kurtosis -3 = -0.877, Minimum = -1.949, Maximum= 4.121

- Chapter 3 -

Taxes and the Location of Targets

(with Wiji Arulampalam [1] and Micheal P. Devereux [2])

§ 3.1 Introduction

The growth of international cross-border mergers and acquisitions (M&A) over the last two decades is well documented. UNCTAD (2011) reports that the total value of cross-border M&A deals rose from around $21 million in 1991 to $338 million in 2010. But this was no steady increase: during that period there were two major waves, peaking at $905 million in 2000 and just over $1 trillion in 2007. This growth can be seen in the context of total mergers and acquisitions, and in the context of total cross-border investment. Erel et al. (2012) report that the percentage of all mergers and acquisitions accounted for by cross-border deals rose from 23% in 1998 to 45% in 2007. And, according to UNCTAD data, the percentage of all foreign direct investment that took the form of cross-border mergers and acquisitions rose from 14% in 1991 to over 50% by 1999. Following the financial crash, it has since declined to 27%, but in several recent years the proportion has been well in excess of 50%.[3]

This paper examines one aspect of the determination of mergers and acquisitions: the choice of international location of the target company by an acquirer. We analyse the determinants of choices made by 2,623 individual acquiring corporations from 47 countries across 19 possible locations of domestic and cross-border target corporations. We pay

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[3] A useful description of the pattern of cross-border M&A activity is provided by Brakman et al. (2006)

particular attention to the role of taxation in affecting this location choice. A number of features of this paper differentiate it from previous research.

First, in the case of a multinational company, we combine two different datasets (ZEPHYR and ORBIS, described further below) to identify how an acquisition affects the geographic spread of the whole company. Most previous studies identify the acquiring company as the immediate new owner of the target company.[4] By contrast, by combining these two datasets we are able to identify the acquirer as the parent company of the multinational (as well as to control for characteristics of the parent). Suppose, for example, that a British subsidiary of a US parent company acquired a German company. In one sense that represents a flow of foreign direct investment from the UK to Germany. However, control of the German company effectively passes to the US parent. It seems reasonable to suppose that an acquisition of any size would be approved, or more likely be organised, by the parent, which could be considered to have expanded into a third country, and which would, directly or indirectly, control the activities of the whole group.

Second, in identifying the location of target companies, we pay particular attention to heterogeneity in the characteristics of the acquirer. For example, many of the acquiring corporations in our dataset do not have foreign subsidiaries prior to the acquisition being examined. It seems plausible to suppose that there are fixed costs associated especially with a corporation's first foreign acquisition; in choosing between a domestic and foreign target, this would imply that the gross benefits of acquiring a foreign target would need to be greater for a wholly domestic corporation than for the parent of a corporation that was already multinational. This suggests that, for a first foreign expansion at least, the decision to acquire a foreign corporation is more likely to be determined by strategic considerations, and is less likely to be influenced by marginal differences in taxation. The possible existence of fixed costs also suggests that the size of the corporation may also matter. We explore both of these dimensions.

Third, we pay particular attention to the role of corporate taxation. Of course many factors will contribute both to the choice of whether to acquire another corporation, and which target to choose. Many factors have been extensively analysed, both in the context of domestic deals, and in the context of aggregate cross-border flows, and are briefly reviewed in Section I below. The role of taxes on profit is far from straightforward, and may differ substantially depending on whether the target is domestic or foreign. For example, even in the absence of all other factors, in a domestic context it is possible that a merger could release unused taxable losses in the target company to be set against taxable profit

[4] A common popular data source for mergers and acquisitions is the SDC database, although as noted below, several others have been used

in the parent. Such a merger would create private value, at the expense of tax revenue for the government. However, it is very rare for a government to allow losses to be offset in this way across international borders.

We show below that, in principle, a higher tax rate in a country could raise, reduce, or leave unchanged the probability that its corporations are the subject of a cross-border acquisition. Suppose that an acquisition may take place because the acquirer is able to increase its revenue stream, through improved efficiency, greater knowledge or perhaps simply use of a brand name. Taxes on future profit of the existing corporation should already be capitalised into its value to existing shareholders. Similarly taxes on any surplus generated by the acquisition would be capitalised into the value to the acquirer. In a case in which existing shareholders had greater bargaining power in the deal, and captured the entire surplus, then tax should have no impact on the probability of the deal going ahead. This is because the acquirer is simply making a zero net present value transaction. A higher tax rate would reduce the value of the surplus, but would not change the value to the acquirer. In a less extreme case, a higher tax rate would reduce the post-tax surplus to the acquirer, making it more likely that the acquirer would seek an alternative. However, it may also be the case that the acquisition takes place for strategic reasons, with the acquirer intending to close down the activities of the target to reduce competition (see, for example, Neary (2007)). In this case, a higher tax rate would reduce the value and hence the price of the target, making it more attractive for the acquirer. We discuss these and other possible cases below.

We also consider other aspects of the tax regime in both the target's country and acquirer's country. For example, in considering the case in which the acquirer may seek to shift production to a lower cost environment, the rate of capital allowance may be a factor. This consideration moves the analysis much closer to a conventional treatment of taxation in the case of cross-border greenfield investment. The discrete decision as to where to locate a new greenfield investment should in principle depend on an effective average tax rate, taking into account all relevant aspects of the tax regime (see Devereux and Griffith (1998a)). In the context of a cross-border acquisition, however, this effect is likely to be secondary, unless the acquirer intends to undertake significant new capital expenditure in the target, post-acquisition.

We also allow for the possibility that tax would be levied by the acquirer's country on returns ultimately paid back to the parent corporation, especially in the form of dividends. This element of the international tax regime was the primary focus of the analysis by Huizinga and Voget (2009a) which investigated, in the context of cross-border mergers, which of the two companies involved in a merger became the new parent company. For

example, they cite the case of the merger which led to a multinational firm with a parent (Daimler) located in Germany and a subsidiary (Chrysler) in the US as resulting to a large extent from Germany exempting foreign source dividend income while the US taxed such income (net of a foreign tax credit). In the context of our analysis, this consideration would imply that the tax rate in the target company's country would be less important in the case where that rate was lower than the rate in the acquirer's country, and where the acquirer's country taxed worldwide income.

Fourth, we pay careful attention to the econometric structure of the problem. Unlike almost all previous empirical work on the location of M&As, we investigate directly at firm level the choices of corporations as to where they acquire a target company, conditional on choosing to make an acquisition. We use a form of the mixed logit model, which allows us to avoid making the assumption of the independence of irrelevant alternatives inherent in a standard multinomial logit model.[5] We allow for randomness in the effects of some of the variables. In our central approach, we consider only companies that make a single acquisition in the three year period 2005-8. However, as a robustness check we also allow for companies to acquire companies in more than one location in the period considered.

Our results suggest that the host country tax rate in general has a negative effect on the probability of a company in that country being acquired. However, the size of the effect differs according to the characteristics of the acquirer and whether the acquisition is domestic or cross-border. More specifically, we find no effect of taxation on the choice for domestic companies as to whether to make their first cross-border acquisition. However, tax does affect the choice between cross-border locations. By contrast, multinational companies are sensitive to taxes for both domestic and cross-border acquisitions, although they are less sensitive to differences in taxation between cross-border acquisitions than are domestic companies. There is some evidence that these effects are particularly strong for large companies.

We find evidence that the effect of the tax rate of the target company plays a much less significant role, or no role at all, when that tax rate is below that of the acquirer's country, and where the latter operates a worldwide, rather than territorial, tax system. This is consistent with the acquirer taking into account home country taxation on profits earned in the target. This element of the tax system has also been found to be important in the location of parent companies (see Huizinga and Voget (2009a), and Voget (2011)),

[5] Independence of Irrelevant Alternatives is a consequence of assuming independent errors across different choices for each company. This implies that the ratio of two choice probabilities is independent of the other choices/alternatives in the choice set

and in the location of new subsidiaries (Barrios et al. (2008)).

Section 2 presents a brief review of the relevant literature on which we draw. This literature informs the approach in Section 3 which explores the role of taxes in two simple frameworks, drawing on efficiency and strategic considerations. We develop a number of hypotheses concerning the role of tax in different situations. In the remainder of the paper, we confront these hypotheses with firm-level data on cross-border acquisitions taking place between 2005 and 2008 from the ZEPHYR database. We combine these data with information on corporate structures and financial positions in 2005, from the ORBIS database. Both datasets are commercially provided by Bureau van Dijk. In Section 4, we set out our empirical methodology and describe the data in more detail. In Section 5 we present our results. We conclude in Section 6.

§ 3.2 Literature Review

There have been numerous theoretical and empirical contributions to understanding the pattern of cross-border M&A activity, on which we draw in this paper. The finance and industrial organisation literatures have explored the motives for M&As, and to a lesser extent have applied similar analysis to cross-border M&As. The finance and international economics literatures have explored the role of cross-border investment flows, though again only to a lesser extent has the analysis been applied specifically to cross-border M&As. In the space available here we focus primarily on empirical studies that are close to ours.

A number of papers focus on various aspects of the valuation of the target and acquirer for cross border M&As. For example, Erel et al. (2012) investigate differences in valuation which could arise from imperfect integration of capital markets so that a high-valued acquirer may purchase a low-valued target following movements in exchange rates or stock market valuations in local currency. Baker et al. (2009) similarly argue that mispricing of securities could generate arbitrage through cross-border M&As, particularly when the mispricing is expected to revert the following year[6] and particularly in the presence of capital account restrictions that limit other mechanisms of cross-country arbitrage. This could arise due to overpricing of the acquirer (the "cheap financial capital" hypothesis, similar to the model of Shleifer and Vishny (2003)) or underpricing of the target (the "cheap assets" hypothesis, similar to the model of Shleifer and Vishny (1992)). Both papers find support for these hypotheses using aggregate flows between bilateral pairs of countries, Erel et al using the total number of M&A deals and Baker et al using aggregate flows of FDI.

[6] Though permanent differences could also generate more cross-border M&A (see Froot and Stein (1991))

Permanent differences in valuation may arise from differences in investor protection across countries. Erel et al. (2012) and Rossi and Volpin (2003) both find support for the view that relatively weak investor protection in a country increases the probability of a cross-border acquisition.[7] Rossi and Volpin examine this in the context of an empirical model which analyses the proportion of targets acquired in a country where the acquirer is from a different country. A similar empirical approach is taken by Ferreira et al. (2010), in identifying whether foreign portfolio ownership of target companies makes them more or less likely to be acquired in a cross border acquisition. A substitution hypothesis implies it will be less likely, since shareholders can use international portfolio investment to diversify around the world, and therefore have less need of FDI by domestic multinationals. However, they instead find support for a facilitation hypothesis that implies that large institutional shareholders are more likely to look favourably on bids from foreign multinationals, compared to purely domestic shareholders.[8] Ferriera et al also explore this at the firm level, examining whether a given target is acquired by a domestic or foreign acquirer.

Beyond specific issues of valuation, there have been many theoretical contributions of the role of M&As in the development of multinational companies[9]. Very broadly, these tend to distinguish two motives: an efficiency motive where gains arise through economies of scale, internal technology transfer or coordination of decision making, and a strategic motive, as firms seek to reduce competition in the market. The extent of these motives may differ between firms, and across countries. For example, the strategic motive depends on the degree to which the markets in the two countries are integrated. And clearly greenfield investment has very different strategic implications from acquisition. Host country governments also sometimes view inbound investment in the form of an acquisition rather differently from inbound greenfield investment, on the grounds that it primarily constitutes a change of ownership rather than an addition to the country's capital stock[10].

A small number of studies have examined macroeconomic factors in the determination of cross-border M&As[11]. di Giovanni (2005) and Coeurdacier et al. (2009) examine the

[7] Bris and Cabolis (2008) find that merger premia for cross-border mergers relative to domestic mergers increase with investor protection and accounting standards in the acquirer's country. Ellis et al. (2011) also find that acquirers from countries with better governance gain more from acquisitions and that their gains are higher when their targets are from countries with worse governance

[8] Desai and Dharmapala (2009) investigate the tradeoff in international diversification between foreign direct investment and foreign portfolio investment; from the perspective of the US, FDI faces a tax disadvantage but has an advantage where the target country has weak investor protection.

[9] See, for example, Ferrett (2005), Nocke and Yeaple (2007), Neary (2007) and Neary (2009), Norback and Persson (2007)

[10] That raises the general question of the optimal tax treatment of inbound and outbound M&A activity, which is addressed by **?** and Norback and Persson (2007). These papers aim to identify whether the classical optimal tax results in the literature also apply to cross-border investment in the form of M&As

[11] Seth et al. (2002) investigate the sources of gains and losses on cross border M&As, but do not examine the locations

determinants of aggregate M&A flows between bilateral pairs of countries, using data from 1990-1999 and 1985-2004, respectively. Di Giovanni finds that the size of domestic financial markets has a strong positive association with domestic firms investing abroad, while Coeurdacier et al find significant effects of membership of the EMU and the EU. Both papers find a significantly negative impact of corporate taxation in the country of the acquired company. Bertrand and Mucchielli (2007) follow a more similar approach to that used in this paper, estimating a conditional logit model to determine the location of the target for a given acquirer. Using data on 400 European acquisitions, they find that market size, labour costs, market access and financial openness all play a role in determining the location of the target.

There is an extensive theoretical and empirical literature on the effects of taxation in FDI flows, surveyed by, for example, Devereux (2007) and de Mooij and Ederveen (2008). A small part of the empirical work distinguishes the extensive and intensive margins, reflecting the literature on multinational companies (see, for example, Markusen (2004)). The extensive margin refers to various discrete choices, for example, whether to locate production abroad, and if so, where to locate it. The intensive margin is the decision as to how much to invest, conditional on deciding to invest in a given form in a given country. As emphasised by Devereux and Griffith (1998a), the role played by tax differs between these two margins: discrete choices are generally influenced by an effective average tax rate, while the continuous investment decision depends on the effective marginal tax rate.

A sparse literature has investigated the role of tax on the extensive margin of location. Using a nested logit framework, Devereux and Griffith (1998a) consider the determinants of a decision by a US company to choose to locate in one of France, Germany and the UK. It identifies whether the parent owns a subsidiary in each of the other countries at a specific moment in time; however, it does not observe the location decision itself, which may have been some time in the past. Three other papers, Buettner and Ruf (2007), Barrios et al. (2008) and Hebous et al. (2010) also use firm level data to investigate discrete location choices of multinational companies. All, however, use a logit model that implies that the choice of a parent firm to invest in another country j is independent of whether it invests in a third country k. In this sense, these papers do not therefore consider the choice between countries. The first three of these papers do not specifically consider M&A location decisions. Devereux and Griffith consider whether the parent company has a firm in location i at a given moment in time. Buettner and Ruf identify cases where a German parent company has subsidiary in country i in period t, but not period $t-1$, which could be the result of an acquisition or greenfield investment. Barrios et al effectively identify the birth of new companies owned by a foreign parent, which is most easily interpreted as greenfield investment. Nevertheless, all three papers find that taxes in the host country play a significant role in location decisions. Barrios et al also investigate the role of taxes in the parent country, and also find these to be significant.

The fourth paper, Hebous et al, uses data on German parents which identify whether location decisions result from greenfield investment or an acquisition, and estimates the impact of taxation in each case, finding that greenfield investment responds more strongly to higher taxation than do acquisitions.

§ 3.3 Alternative hypotheses of the role of tax in the location of targets

Mergers and acquisitions occur when combining two corporations increases private value, as perceived by the decision makers. As noted above, there are at least three sets of reasons why value may increase, relating to differences in valuation, improvements in efficiency and restriction of competition. We do not specifically investigate these factors here. Instead we attempt to identify the role of taxation in the choice of location of the target company, conditional on the plans for the new firm after the acquisition has taken place, and in the light of alternative factors which may generate the acquisition in the absence of tax considerations. We do not set out to provide a general framework or develop general equilibrium conditions. Rather we have the more modest aim of identifying the interaction of taxes and the key features of acquisitions and mergers. We consider separately the two motives of efficiency improvement and strategic behaviour, although recognizing that these may not be independent of each other. In this context, differences in valuation usually have similar effects to changes in efficiency.

3.3.1 Efficiency motive

We begin with a basic model emphasizing efficiency considerations. We will analyse this primarily in the context of companies which are seeking either to expand their activities, or to reduce their costs. Prior to the acquisition, the acquiring companies may be purely domestic, or they may already be active in more than one country[12]. In the conceptual framework, we assume that the company seeks to acquire another company, either in the same country (country i) or abroad (the "host" or "foreign" country, j). In the empirical section we generalise this to consider a number of possible foreign locations: this does not add any issues of principle, other than that the size of the response to differences in tax rates may vary between the choices available to the acquirer. In the simple analysis set out here, we assume that the acquiring company makes either one acquisition or no

[12]We do not explore the precise pattern of ownership. For example, the parent company may own a subsidiary in country, B, which in turn owns a further subsidiary in C. We do not distinguish this case from that in which the parent company directly owns both companies

acquisition at all[13]. In robustness checks in the empirical work, we allow a company to undertake more than one acquisition. The central question posed is whether, and how, the tax system can affect the choice of where to acquire a target. We nevertheless identify a rich range of channels by which taxes can affect the acquisition decision, and in particular in which country the acquirer is likely to purchase the target company.

First consider the value of a potential target company to its existing owners. Suppose that the company expects to earn a stream of income with a present value of Y, and to incur costs with a present value of C. In the absence of taxes, the value of the company to existing owners is therefore simply $\hat{V} = Y - C$, where the hat indicates the value before taxes.

Now suppose that corporation tax is levied on taxable profit at rate τ. Relief is given for costs. However, this relief may have a present value which is less than the present value of the stream of costs itself. For example, capital expenditure may not be immediately deductible against tax; as a result the present value of the tax deduction will be less than C. Define the proportion of the present value of costs that represent a deduction as α, so that the present value of the tax liability is $T = \tau (Y - \alpha C)$, and the value of the company after tax is

$$V = (1 - \tau)(Y - \beta C) \tag{3.1}$$

where$\beta = (1 - \alpha\tau)/(1 - \tau)$ is a measure of the generosity of the definition of the tax base.[14] We do not consider other taxes in this analysis. Equation (3.1) could apply to a potential target in either country, which we denote below with a subscript i or j. Note that all of the elements in (3.1) may vary between the two countries.

Now consider the value to the acquiring company. We assume that the acquisition will not take place unless the acquiring company values the target company more highly than the existing shareholders. That is, some surplus must be generated from the acquisition – which must be divided between the acquiring company and the existing owners of the target company. Further, we assume that in choosing between alternative targets, the acquiring company chooses the target that generates the highest surplus to the acquiring company.

Before identifying the source of this surplus, an important issue to consider is how the surplus is distributed between the two parties. At the two extremes, the whole surplus

[13]Implicitly, then, either the costs of making more than one acquisition are too high, or the benefits in terms of higher income are too low

[14]For example, for a cash flow tax, levied only on economic rent, then $\alpha = \beta = 1$

will be captured by one of the parties. The maximum price that the acquirer is willing to pay is his own valuation of the target. In this case, the acquirer does not share in the surplus at all. This may happen, for example, if there are many bidding companies, but only one possible target. In this case, the target shareholders would be able to hold out for the entire surplus[15]. In this case, the tax system should have no impact on whether the acquisition goes ahead since the acquirer's valuation is post-tax – a higher tax rate would lower his valuation, and hence also lower the price paid. The acquirer would be indifferent between paying higher tax, but a lower acquisition price, and lower tax but a higher acquisition price; in either case the surplus to the acquirer would remain at zero. This leads to:

Proposition 1. *If the target firm captures the entire surplus generated by the acquisition, then tax has no effect on the acquisition decision*

In what follows, we assume instead that the acquirer captures at least some fraction of the surplus. More specifically, we assume that the fraction captured by the acquirer does not depend on the location of the target. In comparing targets located in different countries, the proportion of the surplus captured by the acquirer then becomes irrelevant. Given this, we make the simplifying assumption that the acquirer captures the whole of the surplus.

In this simple framework, there are four ways in which the acquirer could raise the value of the target company, and thereby create a surplus: (a) increase income, Y; (b) reduce costs, C; or (c) reduce tax liabilities, by reducing the relevant tax rate by shifting profit between locations; or (d) undertake additional investment in the target company which creates a surplus. Consider each of these in turn.

Scenario (a)

First, suppose for example that the acquiring and target companies are in a horizontal relationship: that is, they each produce a similar good which is sold on the world market. But the acquiring company may be larger and have a recognised brand name, which allows it to charge a higher price for its output. By acquiring the target company, the acquirer can increase the value of the target by re-labelling the product with the acquirer's brand, thereby increasing the income stream, Y. Denote the change in the value of the target's income stream as a result of the acquisition to be ΔY. Then the post-tax surplus generated from the acquisition is

[15]This is assumed by Norback and Persson (2007), for example

$$\text{Home: } S_i = (1 - \tau_i)\Delta Y_i \tag{3.2}$$

$$\text{Foreign: } S_j = (1 - \tau_j^*)\Delta Y_j \tag{3.3}$$

where τ_j^* is defined below. It is clear from these expressions that the surplus depends only on ΔY and the statutory tax rate. Assuming that the acquirer chooses the target which would generate the highest post-tax surplus, then:

Proposition 2. *If the acquirer could increase the value of the income stream in the target, then ceteris paribus it would be more likely to acquire a target company in the country with the lower statutory tax rate.*

To test this proposition empirically it is clearly necessary to control for any differences in the pre-tax surplus that might be systematically expected across countries. There are many possible factors that could create differences in the pre-tax surplus across countries, some of which have been discussed above; they include, for example, the financial depth in the country of the target relative to the country of the acquirer, the extent of foreign portfolio ownership of the target, differences in valuations between the two countries, the size of the available market in the country of the target, the general economic prospects in that country, and the availability of cheap inputs. We discuss below the control variables used in the empirical work. These would have a direct effect on the size of the pre-tax surplus for each target, which may well outweigh the effects of taxation. Note also, though, that the effect of an increase in the tax rate on the post-tax surplus depends on the size of the pre-tax surplus.

Comment is also required about the tax rate applied to the surplus in the foreign country, denoted here τ_j^* rather than simply τ_j . The asterisk denotes that the term includes not only tax due in the foreign country on profits made there, but also potentially a withholding tax levied on the payment of a dividend or other return to the home country parent, and further tax levied in the home country on receipt of the return. In particular, ignoring deferral, then if the home country uses a credit system, foreign dividends will be taxed at rate τ_i with a credit for foreign taxes paid. Broadly in this case, if $\tau_j < \tau_i$, then additional tax will be charged by the home country, so that, effectively $\tau_j^* = \tau_i$. In practice the home country tax can be deferred by not repatriating the profit made abroad. In general though, where the home country operates a credit system, there may be an asymmetric effect of the foreign tax rate. Where $\tau_j < \tau_i$ and the home country operates a system of worldwide taxation with credit, then there may be little effect of the foreign tax rate, τ_j, on the post-tax surplus (depending on whether all profits are repatriated). For $\tau_j \geq \tau_i$, the predictions of proposition 2 hold.

Scenario (b)

Second, suppose that the acquiring company is low cost, that the target is initially high cost, and that post-acquisition the acquiring company is able to reduce the costs in the target from high cost, say C_H, to low cost, say C_L. This may occur through the use of better technology, organisation, or management skills. Again, suppose this holds whether the target is a domestic or foreign company.

In this case, the surplus generated from the acquisition is

$$\text{Home: } S_i = (1 - \alpha_i \tau_i)(C_H - C_L) \tag{3.4}$$

$$\text{Foreign: } S_j = (1 - \alpha_j \tau_j^*)(C_H - C_L) \tag{3.5}$$

In this case, the impact of tax depends on the value of the tax allowances, measured by $\alpha_i \tau_i$ and $\alpha_j \tau_j^*$. Note that the higher the value of allowances, the smaller the gain from reducing costs. This implies that:

Proposition 3. *If the acquirer can reduce costs in the target, then it will be more likely to acquire a target company in the country with a low value of tax allowances. A lower value of allowances could be generated by less generous allowances, or by a lower statutory tax rate.*

Proposition 3 abstracts from any difference in the reduction in cost across countries. A related possibility is that the acquiring company has high costs (say C_H) because it is located in a high-cost economy. Such a company may seek to reduce costs (say to C_L) by relocating its production, or part of its production, to a low-cost economy. In this case, the surplus from moving production abroad would be

$$\text{Foreign: } S_j = (1 - \alpha_i \tau_i) C_H - (1 - \alpha_j \tau_j^*) C_L \tag{3.6}$$

Here the value of the tax allowances in the foreign country has a positive effect on the value of the surplus since additional expenditure takes place there. This implies:

Proposition 4. *If the acquirer intends to shift production from a high-cost home country to a lower-cost foreign country, then the acquirer will be more likely to choose a foreign country with a higher value of tax allowances. A higher value of allowances could be generated by more generous allowances, or by a higher statutory tax rate.*

The stark difference between Propositions 3 and 4 reflects a difference in where the cost saving is assumed to take place. In Proposition 3, it takes place in the country of the target, and the value of the saving is reduced by the tax allowance. In proposition 4, it takes place in the home country. The saving is then reduced by the value of the foregone

tax allowance in the home country, at the cost of higher expenditure in the foreign country.

Scenario (c)

Another possibility is that the acquirer can affect the tax liability itself and can generate private surplus at the expense of tax authorities. There are at least two ways in which this could happen. To explore these, suppose that the acquirer makes no other changes to the target company.

The first possibility is that either the target company or the acquiring company is in a country with a high tax rate, while the other is in a country with a low tax rate. Now suppose that the relationship between the two companies is a vertical relationship: that is, the company in one country produces a good or service which it sells to the other. To make this more concrete, suppose that the target company supplies a good to its new parent. This good is unique, and hence difficult to value for tax purposes. This gives the new combined company the opportunity to mis-price the transaction to shift income from the high-tax country to the low-tax country. Another possibility for shifting profit is simply to lend from the low tax country to the high tax country, gaining a tax relief in the high-tax country on the interest payment at the expense of a (lower) tax charge in the low-tax country. In any case, suppose that the amount of income shifted is X. Then the surplus generated by the newly-acquired opportunity to shift profit is

$$\text{Foreign: } S_j = \left|(\tau_i - \tau_j^*)\right| X \geq 0 \tag{3.7}$$

Clearly this opportunity does not exist in the case of a purely domestic acquisition, since this does not create the opportunity to shift profits between countries[16]. More generally, though, the size of the surplus depends both on the extent to which profit-shifting becomes possible (measured by X), and by the difference in statutory tax rates. Summarising:

Proposition 5. *If a cross-border acquisition introduces an opportunity to shift profits between countries, then the surplus is higher the greater the difference in statutory tax rates between the two countries.*

Note that the opportunities to shift profits between jurisdictions are likely to depend on the number of jurisdictions in which the company already operates, and the skills which it has already acquired in doing so. An acquirer that was purely domestic prior to the acquisition has only two countries between which it can shift profit. A large multinational has rather more options to shift profits around foreign countries. Thus, while expression

[16]Other opportunities may arise instead, such as combining profits in one company with losses in another

(3.7) points to the comparison of the home country tax rate with a single foreign country tax rate, the more general case considered in the empirical work below also implies comparison between the tax rates in other jurisdictions in which the company has a presence.

The possibility of shifting profit out of a high-tax country may reduce the negative impact of the high tax rate on the probability of acquiring a target there. By contrast, the possibility of shifting profit into a low-tax country would reinforce the positive impact of the low tax rate on the probability of acquiring a target there. This suggests a possible asymmetric response to the foreign country tax rate, depending on whether or not it is an attractive location in which to shift profit, which depends in turn on the other tax rates faced by the acquirer in its worldwide operations.

Scenario (d)

A final possibility which we consider under the general heading of efficiency is that acquirer seeks a bigger operation than the target currently undertakes. That is, the acquirer intends to purchase the target and then to invest further to expand operations. The surplus from the acquisition is generated by the additional investment, which we assume could not be undertaken by the current owners. Given that we focus only on acquisitions, we also assume that this is a cheaper option for the acquiring company than undertaking a completely new greenfield investment.

The role of tax in affecting the surplus in this case is very similar to the role of tax in a greenfield investment: new investment receives an allowance that can be set against the existing taxable profit of the target company, and the higher future income is subject to tax. In comparing the discrete choice of in which country to undertake such an operation, the relevant measure of taxation is the effective average tax rate (EATR), denoted T below (see Devereux and Griffith (1998a) and Devereux and Griffith (2003)). This measure is in effect simply a non-linear combination of the statutory rate and the value of allowances.

Denoting W as the pre-tax net present value of the surplus generated by additional investment, the post-tax surplus is

$$\text{Home: } S_i = (1 - T_i)W_i) \tag{3.8}$$

$$\text{Foreign: } S_j = (1 - T_j^*)W_j) \tag{3.9}$$

Clearly a lower EATR increases the post-tax surplus, which implies:

Proposition 6. *If a cross-border acquisition is based on the intention to expand the activities of the target, then the acquirer will be more likely to acquire a target company*

in the country with the lower effective average tax rate (EATR)

3.3.2 Strategic Motive

So far we have explored only efficiency aspects of acquisitions, through generating higher income, lower costs, or simply lower tax liabilities. However, in an industry with a relatively small number of companies, there is clearly the possibility of a strategic motive. One simple approach to analysing strategic behaviour – see for example, Neary (2007) – is to assume constant unit costs for each firm. This implies that a low cost firm does not need to acquire a target as part of its expansion, since there is no cost constraint on the amount of output it can produce, but only a constraint imposed by the demand side of the market. As a result, in this type of model, a low cost firm will acquire a higher cost firm only with the intention of closing it down. In a market where there are barriers to entry, this would reduce industry output, thereby allowing a rise in the output price and an increase in the per unit profitability of the remaining firms including the acquirer.

Although we do not explicitly present the model here, the implications for taxation are intuitive, and are:

Proposition 7. *In the case of a strategic acquisition of a high cost target firm, which is closed down after acquisition, then (a) the statutory tax rate applied to the target company has a positive impact on the probability that the target is acquired, and (b) the statutory tax rate applied to the acquirer has a negative impact on the probability of the acquisition proceeding.*

That is, since the target is acquired with the intention of closing it, then the lower price that the acquirer must pay, the higher the surplus. Because taxation is capitalised into the value of the target, a higher tax rate reduces its value, and hence raises the surplus. A second effect applies to the acquirer. Since the output price and revenue rise, then the surplus also depends negatively on the tax rate that the acquirer must pay on the additional revenue.

3.3.3 A Summary of Propositions

We have set out 7 propositions reflecting the effects of taxation in the country of the potential target company and in the country of the potential acquirer, on the probability that the target is acquired by the acquirer. These are summarised in the following table.

	Reason for surplus to acquirer	**Effect on probability of acquiring a target in given country of that country's:**	
		Statutory Tax Rate	**Value of Allowances**
1	Surplus captured by shareholders of target company	No effect	No effect
2	Raise value of income in target	< 0 BUT effect weaker when (i) home country has credit system and (ii) $\tau_j < \tau_i$	No effect
3	Reduce costs in target	Negative indirect effect	< 0
4	Shift production to low cost target	Positive indirect effect	> 0
5	Increased opportunity for shifting income to low-tax countries	< 0 BUT profit shifting weakens effect of Proposition 2 for high τ_j and reinforces it for low τ_j	No direct effect
6	Additional investment post acquisition	EATR has negative effect on probability	
7	Strategic motive	> 0	No direct effect

§ 3.4 Empirical Approach

3.4.1 Methodology

An acquiring company indexed by i in our model, is assumed to acquire a target in a country j which provides the largest expected surplus over all countries, where the latent surplus associated with the target in country j is given by

$$S_{ij} = \beta_j^{'} z_i + \gamma x_j + \varepsilon_{ij} \tag{3.10}$$

and z_i is a vector of choice invariant (company) characteristics. For ease of exposition, we assume that there is only one alternative specific variable x, say the target country specific tax rate. A standard multinomial model assumes that the errors in (3.10) are *iid* Gumbel, which implies the assumption of IIA (independence of Irrelevant Alternatives). We relax the IIA assumption by allowing the parameter γ to be randomly distributed across the companies. That is, we assume that every company in our sample has its own γ which is known to the company but unknown to the econometrician, and write this as

$$\gamma_i = \gamma' w_i + \sigma u_i \text{ where } u_i \sim iidN(0,1) \tag{3.11}$$

i.e. $\gamma_i \sim iidN(\gamma' w_i, \sigma^2)$. w_i are company specific variables that are assumed to shift the mean effect of γ_i. This model collapses to the standard multinomial choice model when $\sigma = 0$[17].
Substituting (3.11) into (3.10) gives

$$S_{ij} = \beta_j^{'} z_i + (\gamma' w_i + \sigma u_i) x_j + \varepsilon_{ij} = \beta_j^{'} z_i + (\gamma' w_i) x_j + (\sigma x_j u_i + \varepsilon_{ij}) \tag{3.12}$$

The company specific error term $\sigma x_j u_i$ also induces correlation between alternatives which is not present in the standard multinomial choice model, and which relaxes the IIA assumption. Also note, the new additional error term is now heteroskedastic due to the presence of x_j. Under the assumption that ε_{ij} is *iid* Gumbel, the conditional probability (conditioned on γ_i) that alternative j will be chosen will be of the form of the multinomial logit probability,

$$Prob(y_{ij} = 1) = \frac{exp\left(\beta_j^{'} z_i + \gamma_i x_j\right)}{\sum_I exp\left(\beta_l^{'} z_i + \gamma_i x_l\right)} \tag{3.13}$$

where y_{ij} is a dummy variable which takes the value of 1 if company i chooses alter-

[17] It is customary to call the fixed coefficient logit model, a multinomial logit model when all the variables are choice invariant and a conditional logit model when all the variables are choice specific. However, there is no reason why one cannot have both types of variables in the model as we have. For ease of exposition, we describe the model as a multinomial model when the coefficients are not random

native j[18]. The new composite error term $v_{ij} = \sigma x_j u_i + \varepsilon_{ij}$ will be a mixture of normal and Gumbel distributions. Since γ_i is not known, we have to integrate out the u from the conditional choice probabilities to obtain the unconditional choice probabilities,

$$p_{ij} = Prob(j \text{ is chosen}) = \int \frac{exp\left(\beta_j' z_i + (\gamma' w_i)x_j + \sigma x_j u_i\right)}{\sum_I exp\left(\beta_l' z_i + (\gamma' w_i)x_k + \sigma x_l u_i\right)} \phi(u)du \tag{3.14}$$

where ϕ denotes the standard Normal density. The log likelihood will consist of terms like in (3.14). The model is estimated using simulated maximum likelihood using the fact that (3.14) is a calculation of an expected value. We replace the integral by a sample average of the function constructed by drawing enough observations from $\phi(u)$ to calculate this average. It can be shown that this sample average consistently estimates the choice probabilities given by (3.14). In our simulations we use 50 Halton draws.[19].

Relative to a standard multinomial logit model, because of the correlation between alternatives, this allows us to model (i) random variations in the response probability to changes in variables, (ii) unrestricted substitution patterns, and (iii) correlated unobserved factors Train (2009) [20].

3.4.2 Data

The data for the analysis come from the 2005 [21] file of ORBIS compiled by the Bureau van Dijk (BvD). This commercial world-wide dataset provides firm-level accounting information on companies including ownership structure consisting of a full list of recorded shareholders in these companies. We use this to construct a chain of majority-owned subsidiaries for each company, down to the 10th level of dependency. The M&A activities recorded in another commercially available dataset ZEPHYR (BvD), were then merged with the original data from ORBIS to trace the changes in the firms' ownership structure from 2005 to the end of 2008. The final dataset contains, for each parent company, a list of location of all majority owned subsidiaries in each year between 2005 and 2008. This identification of all ownership changes due to M&A deals allows us to look at the location aspects of all the observed majority-owned acquisitions.

[18](3.12) collapses to the error components multinomial logit model when we allow for a company specific random intercept

[19]Although there are different ways of drawing random numbers from a particular distribution, the Halton draws have been proven to be very effective Train (2009). The results were very similar with 50 and 100 draws

[20]The model parameters are estimated in NLOGIT 4 (NLOGIT, 2007) using simulated maximum likelihood

[21]The year 2005 refers to the period 1st April 2005 to 31st March 2006

Our analysis is based on a cross-section sample of parent companies not defined as 'micro' in European Commission (2003) in 2005.[22]. From this sample, we selected those parent companies that made at least one acquisition during the three year period 2006 to 2008 regardless of whether they already had a presence in the new country or not. The ultimate parent of the group is treated as being responsible for the expansions directly made and for those undertaken by its subsidiaries.

The final sample consists of 2,623 parent companies residing in 47 countries. We used ownership information from the original full set of data to identify companies in the same group in our sample. Based on the information in our base year of 2005, companies were classified as: (i) belonging to a multinational group if they were connected to at least one other company in a different country by an ownership link of at least 50 per cent of the capital; (ii) belonging to a domestic group if the company was connected to other companies by an ownership link of at least 50 per cent but with none of those companies located in a different country; or (iii) as a stand-alone company if it did not have any such ownership links with other companies.

The main dependent variable of interest in our model is the choice of a location country and hence if a parent acquires five subsidiaries in a single country in the same year, this parent is recorded as having made one location choice. In that sense, we use the word 'acquisition' to mean a location choice. Some characteristics of the nature of expansions in the dataset are provided in Table 3.1. Multinationals and domestic groups equally dominate the sample of companies that are engaged in acquisitions during our sample period with only about 15% of stand-alone companies in the sample. 87% of the parents were observed to make only one expansion during our sample period, while 41% of the total observed expansions were to a new location where the parent did not already have a subsidiary.

We define the choice set to preserve reasonable cell sizes for the statistical analysis, we consider only those alternatives that have been chosen by at least 15 different parent companies. This yields us a choice set with eighteen possible countries. Since 59% of the observed expansions were in the same country as the parent, we also add an alternative 'domestic' to the choice set. If the parent company is located in one of the 18 countries, it will have a reduced choice set of 17 alternatives plus the "domestic" option.

The distribution of the location of our parent companies is provided in Table 3.2. The UK has the largest number of companies undertaking an acquisition, with 674 companies,

[22]Selecting non-micro companies involved selecting only companies with at least two subsequent years of recorded total assets greater than 2,000EURO and at least one employee

followed by the USA with 261 and France with 205. Table 3.3 provides the distribution of target locations chosen by this sample of parents. In this sample, the United States has the largest number of targets of cross-border acquisitions, and the United Kingdom the largest number of domestic acquisitions.

3.4.3 Variables

We use a number of variables informed by previous literature and the theoretical section to examine the determinants of M&A activity. We use three different measures of the corporation tax system in each country. The statutory tax rate is the headline corporation tax rate in the country, including typical local tax rates. The measure of allowances reflects the present value of allowances for a unit of new investment, based on a range of different assets. The EATR is the effective average tax rate, which broadly measures the proportion of the net present value of an investment taken in tax. The EATR is based on the methodology set out in Devereux and Griffith (2003).

Clearly we need to control for non-tax factors that affect acquisition location decisions. Informed by the literature described above, we include a number of control variables from various sources: the World Bank World Development Indicators (WDI) database, the GeoDist database (Mayer and Zignago (2011) and from Porta et al. (2008). Details are given in 3.4 presents means for each of the following variables for each of 18 potential target countries:

- Statutory tax rate
- Present value of allowances
- EATR
- GDP: log of real GDP per capita in constant 2000 US
- GDP growth
- Cost of business start-up, measured as a percentage of GNP
- Disclosure index, which measures the extent to which investors are protected through disclosure of ownership and financial information. This ranges from 0 to 10, with 10 being the maximum disclosure
- Unemployment as a percentage of labour force
- Dummy variables for whether the countries of the acquirer and target are contiguous, share a common language, and share a common legal system

- The distance between the capital cities of the countries of acquirer and target
- The WDI measure of corruption in the target country
- The ration of market capitalization to GDP
- The average credit to private companies as a proportion of GDP
- The number of domestic companies

	Variable Description	Source
Tax Variables:		
Statutory Tax Rate	Main statutory tax rate, including typical local taxes	Centre for Business Taxation database
Effective Average Tax Rate	Effective average tax rate, using the Devereux-Griffith (2003) method	CBT database
Allowance	The present value of tax allowances permitted per unit of investment	CBT database
Economic Indicators:		
ln(GDP)	ln of GDP (originally measured in constant 2000 USD)	WDI, 2011
GDP growth	GDP growth (annual %)	WDI, 2011
Cost Bus. Start-up	Cost of business start-up procedures (% of GNI per capita)	WDI, 2011
Bus. Discl. Index	Business extent of disclosure index (0=less disclosure to 10=more disclosure)	WDI, 2011
Unempl.	Total Unemployment (% of total labor force)	WDI, 2011
Distance Variables:		
Contiguity	Dummy for Contiguity (=1 parent country and alternative location share borders)	GeoDist Database, 2011
Common Language	Dummy for Common Language (=1 parent country and location have same official or primary language)	GeoDist Database, 2011
Distance btw Capitals	Simple distance between capitals (measured in km)	GeoDist Database, 2011
Common Legal Syst.	Dummy for Legal System (=1 if parent country and location have same Legal System)	La Porta et al., 2008
Institutional Variables:		
Corruption Score	Average corruption score over the period 1996-2000	WDI, 2011
Mkt Capit. To GDP	Ratio of market capitalisation to GDP, av. 1999-2003	WDI, 2011
Private Credit to GDP	Private credit to GDP, av. 1999-2003	WDI, 2011
ln(No. Dom. Firms)	ln(No. Domestic Firms pc), av. 1999-2003	WDI, 2011

§ 3.5 Results

We first present the results from our base model estimation in Table 3.5. In column [1] we begin with a standard multinomial logit (MNL) model. As discussed above, we distinguish between the alternatives of domestic expansion (dom expansion) from that of a cross-border expansion (cb expansion) and allow the effect of tax to be different across these two sets of alternatives. In addition, we also interact the tax variable with the binary indicator variable for whether the acquirer was a multinational enterprise in 2005 (mne2005). This means that we estimate 4 different coefficients on the tax variable. We include the 13 choice-specific control variables described above in all specifications. The 'distance' measures were only allowed to affect the cross-border choices. In addition, in all specifications we include choice specific intercepts, and the parent country tax rate, the coefficient of which is permitted to vary across the choices as shown in (3.12). We report the coefficients of the choice-specific control variables, but in order to keep the presentation manageable, we do not report the choice-specific intercepts or coefficients on the parent country tax rate.

Several of the control variables are strongly significant in all of the specifications in Table 3.5. The size of the economy, measured by GDP, has a strong positive effect on the probability of acquiring a target in a given country. Also, as expected, targets are also more likely in countries that are contiguous with the country of the acquirer, share a common language and legal system and are closer to each other. The cost of business start-ups has a negative effect on the probability of choosing a particular location, and in some specifications, greater disclosure also has a negative effect. These variables may proxy for a number of aspects of the regulatory framework in the choice country. The size of private credit also has a negative effect. This may reflect a substitution effect: companies may be more prone to being acquired by a foreign company in countries where the supply of credit, and so the possibility of internal expansion, is restricted. Conditional on these effects, unemployment has a positive effect, which may reflect the relative availability of workers.

The tax variable used in the model results presented in Table 3.5 is the statutory tax rate in the target country. The coefficient on this variable is significant only for a multinational considering the domestic expansion choice. This is surprising, but this result is not robust to varying the econometric specification.

In column [2] we instead estimate the random parameters (RP) model, in which every parent company in our sample has its own tax coefficient for the cross-border choice, and

we assume them to be drawn from a normal distribution. Allowing also for a random tax effect for the domestic expansion choice did not produce results different to the one where only the cross-border expansion choice tax effect is random. We therefore concentrate on only allowing the tax effects to be random for the cross-border expansions from now on. Including this random component has an important effect on the estimated coefficients – those presented in the table should be interpreted as a mean effect. The effect of tax on the domestic choice remains similar to the previous specifications. But now the tax rate on cross-border acquisitions also becomes significant. Specifically, the first line, which can be interpreted as the effect for acquirers that were purely domestic in 2005, has a negative and significant effect. The positive and significant coefficient reported in the second line indicates that multinational companies respond less in cross-border expansion than domestic companies to differences between the tax rates in foreign countries. Also important is that the estimated standard deviation of the random parameters (RP) term is highly significant, indicating that this random components model should be preferred over the previous specifications. (This is also indicated by the higher maximised log likelihood.) Column [2] is therefore our preferred specification in Table 3.5, and we use it as a base for the extensions to model specification.

Before doing so, we comment on the different effects of the tax rate for the different types of company, and for the different options. One obvious interpretation is as follows. For purely domestic companies, their first acquisition abroad is likely to have an important strategic motive and to involve substantial fixed costs. In this context, marginal differences in statutory tax rates are unlikely to have a large effect as to whether to undertake a cross-border acquisition or a domestic acquisition. However, in choosing between alternative locations for a cross-border acquisition, tax appears to play a highly significant role for domestic companies, in accordance with Proposition 2. By contrast, for companies that are already multinational, undertaking a cross-border acquisition is likely to be less of a major strategic development for the company. For such companies, marginal differences in tax rates have a significant effect on the choice between undertaking a domestic or a cross-border acquisition, also in accordance with Proposition 2. Multinationals are also sensitive to differences in tax rates between alternative cross-border locations, though less so that domestic companies. One reason for this may reflect greater skill and experience in international taxation, and in particular, a greater opportunity to shift profit between countries in order to reduce aggregate tax liabilities. In line with Proposition 5, the effect of the statutory rate on the probability of making an acquisition in a particular country may therefore be weaker for multinational companies.

We further explore the heterogeneity of responses to taxation in rest of the columns in Table 3.5. In columns [3] and [4] we investigate whether the effects of taxation differ

according to the size of the acquirer in addition to whether it is multinational or domestic. Size may matter for several reasons. First, it seems plausible that a larger acquirer is more likely to be able to capture a larger share of the surplus generated in it that it is has a stronger bargaining power. This may make it more sensitive to differences in taxation. Second, larger companies can more easily bear fixed costs of expansion to new countries, and any fixed costs associated with shifting profit between countries. The first of these may make them more sensitive to marginal differences in taxation between countries, but the latter may make them less sensitive. In column [3] we identify a "large" company as one that owned at least 4 subsidiaries in 2005. In column [4] we instead identify a "large" company as one that was present in at least 4 separate countries in 2005 – clearly this second measure applies only to multinational companies. In both cases we experimented by choosing different numbers of subsidiaries or locations and chose the results with the highest maximised value of the log likelihood.

The results of columns [3] and [4] are mixed, perhaps reflecting these conflicting issues. In column [3] large multinationals appear to be more sensitive to tax differences than small multinationals for the location of both domestic and cross-border expansion. This suggests that large multinationals may consider a wider choice of locations, where the choice is particularly sensitive to the host country characteristics. In column [4].measuring instead size by the number of countries in which the multinational is already located in 2005, the tax effects for domestic expansion are larger, but there is no difference to smaller multinationals in the tax effects of the location of cross-border expansion. In column [3] there is no significant difference in the response of large and small domestic acquirers.

In column [5] we examine whether the effects of taxation depend on whether the acquirer is already located in the host country in 2005. Clearly, this also applies only to cross-border acquisitions by multinational companies, which are located outside of the home country in 2005. It is possible that acquiring a company in a new, as opposed to existing, host country is more significant step for multinationals than the choice between cross-border and domestic. In fact, the results indicate that this distinction is not very large. Coefficients on both variables are positive and of a roughly similar magnitude, although the expansion into existing countries is marginally more significant.

In column [6] we explore the second part of Proposition 2, which indicates that the effect of a foreign tax rate may be smaller when the acquirer is resident in a country that taxes worldwide income with a credit system, and where the host country has a lower statutory tax rate. We investigate this by allowing the coefficient on the host country tax variable to differ in such circumstances. We find a striking effect for multinational

acquirers, though not for domestic acquirers. For the former, we find a large, positive and significant effect, which approximately cancels out the other effects applying to multinational companies (in the first two rows), indicating that in such circumstances the tax rate in the host country effectively has no effect on the choice of cross-border target. Given the possibilities of international tax arbitrage, this is a striking result, which is, however, consistent with results in other contexts. For example, Huizinga and Voget (2009a) find that the identity of the parent following a cross-border merger depends on this effect (indicating that parents are less likely to be located in the US, for example). Voget (2011) also finds that such taxation in the country of the parent has a significant impact on relocation of parents.

In column [7] we expand this line of investigation to investigate Proposition 5 in more detail. In particular, we examine whether there is an asymmetric effect of the host country tax rate, which could be due to profit shifting combined with location choice. If the host country tax rate is high, this may not dissuade acquirers from choosing that location if they can subsequently shift taxable profit to another low-taxed location. But if the host country tax rate is low, then it may prove advantageous to shift profit into that country, creating a double reason for that choice of target. This would imply that we should find a larger effect for host countries with lower tax rates. We investigate this, relative to column [6], by allowing the coefficient to differ where the host country tax rate exceeds the home country tax rate. However, while the coefficient is positive for both domestic and multinational acquirers, as would be expected, neither term is significant, indicating no asymmetric effect of the host country tax rate when the home country has a territorial system of taxation. However, it is possible simply that such an effect is dominated in the data by the case of worldwide tax treatment by the home country.

In Table 3.6 we explore Proposition 3, 4 and 6 which relate to capital expenditure. The first two consider cases where it is intended to increase, or reduce, capital expenditure in the target post-acquisition. The value of capital allowances should potentially play a role here: more generous treatment of capital expenditure is beneficial when it is intended to undertake more expenditure, but less beneficial when it is intended to reduce expenditure. More generally, previous literature (for example, Devereux and Griffith (1998a)) has argued that the *effective average tax rate* (EATR) is the relevant measure of taxation for new greenfield investment. To the extent to which it is intended to expand the target company post-acquisition, then the EATR may be relevant to the choice of target.

Column [1] reproduces column [2] from Table 3.5, which is the baseline used in Table 3.7. Column [2] replaces the host country statutory tax rate with the host country EATR, to see whether the EATR is the more relevant measure. A problem here is that

the two measures are highly correlated with each other, and so it is difficult to determine separate and individual effects. Including both tends to raise standard errors, with few of the coefficients remaining significant. Including just the EATR indicates that the EATR has a similar effect to the statutory rate. The most notable difference is that domestic expansion by non-multinational companies does depends significantly on the EATR. This is consistent with cross-border acquisition being seen as an alternative to domestic greenfield expansion through additional capital expenditure, especially for domestic companies.

Column [3] instead adds a variable measuring the generosity of capital allowances in the host country, allowing the coefficient to vary according to whether the acquisition is domestic or cross-border and whether the acquirer is a multinational or domestic company. Again, the results for the tax rates are very similar. According to column [3], allowances do play a significant and positive role for domestic acquisitions. This is consistent with the result for the EATR in column [2], since the EATR is in effect a non-linear combination of the measure of allowances used in column [3] and the statutory rate. Consistent with column [2], the more generously domestic capital expenditure is treated by the tax system, the less likely is the company to choose a cross-border acquisition.

Table 3.7 returns to the issue of the nature of the sample. The results presented so far relate only to acquirers that undertake exactly one acquisition in the period 2005-8. This induces a potential selection bias, since companies undertaking multiple acquisitions may be more or less responsive to taxation. In Table 3.7, as a robustness check, we therefore take the alternative approach of including all acquisitions in our database. However, in order to make this feasible, we treat each acquisition as being independent – in effect treating each of them as if they were being undertaken by a separate company. An acquirer that has made, say, 3 acquisitions will therefore appear in the data 3 times. Clearly, this approach also has econometric problems in that we treat the error terms as being independent. However, the nature of the error is different from our previous approach, and we can gauge how important these problems are by following both approaches.

Table 3.7 reproduces the specifications in Table 3.5, but including these multiple acquisitions. Across the 7 columns, the results are broadly similar to those in Table 3.5. The coefficient estimates differ to some extent, but they are never significantly different from the estimates in Table 3.5. Standard errors tend to be slightly smaller, reflecting the larger sample size. The effects of size are slightly different from those in Table 3.5, though the coefficient estimates are of the same sign and broadly of the same magnitude. The effects of allowing for a worldwide tax system in the home country are also similar, though in Table 3.7 the additional variable is insignificant. Given that we are not allowing for correlation in the error terms between multiple acquisitions by the same company, the

precise significance of these results is questionable. We include them rather to provide a check on the results in Table 3.6, and from that perspective, they provide a reasonable confirmation of those results.

Finally, we consider the magnitude of the effects of taxes that we find on the location of acquisitions. Tables 3.8 and 3.9 summarise elasticities based on Table 3.5 column [1] and column [2]. In each case, the diagonal shows the own-elasticity: the effects of a 1 percent change in the host country tax rate on probability that an acquirer will choose a target in that country. The off-diagonals show the cross-elasticities: the ij^{th} element shows the effect on the probability that an acquirer would choose j of a change in the tax rate in i. By construction, for the standard multinational logit model (Table 3.8), the off-diagonal elasticities are the same for each row by assumption; that is, a change in the tax rate in, say, Austria, has the same effect on the probability of choosing any other country. This assumption is relaxed in Table 3.9.

In both tables, the own-elasticities are generally quite large, and approximately half of them exceed 1. For a typical country in our dataset, with a tax rate of around 30%, a reduction to 27%, for example, would increase the probability that an acquirer chose that country by more than 10%. Not surprisingly, the cross-elasticities are much smaller, with the exception of elasticities for the domestic tax rate, a change in which has relatively large effects on the probability of choosing each other country.

Figure 1 shows the distribution of estimated effects of taxation across acquirers, again based on Table 3.5, column [2]. This takes into account the heterogeneity of effects across domestic and cross-border acquisitions, and between domestic and multinational companies, and also the random component of the model. There is clearly a wide dispersion of effects of taxation on location choice. The single largest peak is at a coefficient of around -0.13, with a smaller peak at around -0.03. The mean (S.D.) estimated tax coefficient is -10.48(4.98). The estimated coefficient varies from -17.30 to +5.28 with about 45 parents having an estimated positive tax effect.

§ 3.6 Conclusions

This paper investigates the impact of corporation taxes on the location of mergers and acquisitions. It contains four novel contributions. First, we are able to identify the acquirer as the parent company of a multinational company by combining two datasets, ZEPHYR and ORBIS, containing information on acquisitions and existing ownership patterns, respectively. Second, in identifying the effects of taxation on the location of

target companies, we allow for heterogeneity in the characteristics of the acquirer. In particular, we distinguish between companies that, prior to the acquisition, were already multinational compared to those that were purely domestic. We also consider the size of the acquirer and whether it already has an operation in a given potential host country. Third, we pay particular attention to a variety of mechanisms by which corporate taxation could affect the location of the acquisition. We show that, in principle, a higher tax rate in a country could raise, reduce, or leave unchanged the probability that its corporations are the subject of a cross-border acquisition. We consider aspects of the tax regime in both the target's country and acquirer's country. Fourth, we pay careful attention to the econometric structure of the problem. We estimate directly at firm level the choices of corporations as to where they acquire a target company, conditional on choosing to make an acquisition. We use a form of the mixed logit model which allows us to avoid making the assumption of the independence of irrelevant alternatives inherent in a standard multinomial logit model.

The conceptual framework leads to several hypotheses about the impact of taxes, summarised in Section II. The host country tax rate would have a negative effect on a target being chosen if the acquirer believed that it could generate higher income than the existing owners. But if, for example, the acquirer intended to close down the operations of the target to improve its market share, then the main effect of the host country tax would be to reduce the price which the acquirer needs to pay for the target; in this case as well, a higher tax rate would make an acquisition more likely. Section II also considers several other cases, including the role of tax in the country of the acquirer.

The impact of taxes on the location of a target in an acquisition is therefore an empirical issue. To study this, we analyse individual domestic and cross-border acquisitions between 2006 and 2008 taken from the ZEPHYR database. We combine these data with information on acquiring companies in 2005, before the acquisitions took place, from the ORBIS database, which provides financial and ownership data. We estimate a location choice model in which the choice of target country depends on the characteristics of the acquirer and characteristics of the country of the target company.

Our results suggest that the host country tax rate in general has a negative effect on the probability of a company in that country being acquired. On average, elasticities are around 1: around half the countries have elasticities in excess of 1. However, the effects differ according to the characteristics of the acquirer and whether the acquisition is domestic or cross-border. More specifically, we find no effect of taxation on the choice for domestic companies as to whether to make their first cross-border acquisition. However, tax does affect the choice between cross-border locations for such companies. By contrast,

multinational companies are sensitive to taxes for both domestic and cross-border acquisitions, although they are less sensitive to differences in taxation between cross-border acquisitions than are domestic companies. There is some evidence that these effects are particularly strong for large companies.

We also present evidence that the host country tax rate does not play a role in the location decision when the acquirer's country operates a worldwide tax system with a credit for foreign taxes, and where the host country tax rate is lower than the home country tax rate. This is consistent with acquirer's taking account of home country taxation on future dividends from the newly-acquired target company. Finally, we find a significant of allowances and the EATR on the choice of target location for domestic companies, which is consistent with cross-border acquisition being seen as an alternative to domestic greenfield expansion through additional capital expenditure.

§ 3.7 Tables and Figures

Table 3.1: *Characteristics of Observed Expansions*

The sample of 2,623 companies chosen for the analyses, made at least one acquisition between the end of 2005 and the end of 2008. Companies were categorised as Multinational, Domestic or Standalone based on the information in the base year 2005. A Parent is defined "standalone" when it does not own any subsidiaries; a "domestic" when it only owns subsidiaries in the same country; and a "multinational" when it owns at least one subsidiary recorded in a country different from its own

	Firms	
	Number	%
Total	2,623	
Multinational	1,106	42.2
Domestic	1,127	43
Standalone	390	14.9
Expanding only in one year	2,132	81.3
Expanding in two years	400	15.2
Expanding in three years	91	3.5
Expanding to a New Location	1,085	41.4
Expanding to a Old Location	1,538	58.6
Making only one expansion	2,282	87
Making two expansions	255	9.7
Making more than two expansions	86	3.3
Domestic Expansion (new location same as the Parent Country)	1,806	58.3
Cross-border Expansion	817	41.7

Table 3.2: *Geographic Distribution of Parent Firms*
The geographic distribution is provided for various samples in the following columns: (1) Total sample; (2) Multinational Parent Companies only; (3) Parents expanding in new locations only; (4) Parents making one expansion only. The location of the parent is the country where the company was initially incorporated and this information is obtained from the BvD database

Parent Country	(1)	(2)	(3)	(4)
Australia	50	21	40	44
Austria	19	13	8	18
Belgium	64	44	25	54
Brazil	15	5	6	15
Canada	93	40	69	83
Colombia	6	2	3	6
Cyprus	1	1	1	1
Denmark	61	28	31	52
Estonia	1	1	1	1
Finland	69	37	28	57
France	205	117	71	170
Germany	124	81	51	102
Greece	20	6	6	19
Hong Kong	1	1	1	0
Hungary	2	2	2	2
Iceland	7	5	3	6
India	52	21	47	45
Ireland	19	10	5	19
Italy	77	44	31	70
Jamaica	1	0	1	1
Japan	19	18	6	19
Kazakhstan	2	1	2	2
Kuwait	2	1	2	1
Lithuania	1	1	1	1
Luxembourg	1	1	1	0
Mexico	7	2	6	7
Morocco	1	1	1	1
Netherlands	109	85	48	88
New Zealand	2	0	2	2
Norway	53	14	25	47
Peru	2	0	1	2
Poland	21	1	10	21

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Table 3.2 – continued from previous page

Parent Country	(1)	(2)	(3)	(4)
Portugal	15	6	5	15
Romania	2	0	2	2
Russia	120	3	56	116
Singapore	10	4	8	10
Slovakia	1	0	1	1
South Africa	16	5	8	16
South Korea	45	9	29	45
Spain	115	41	44	102
Sweden	195	110	68	156
Switzerland	52	45	23	39
Turkey	4	3	3	4
Ukraine	5	0	4	5
United Kingdom	674	192	224	573
United States	261	83	75	241
Venezuela	1	1	0	1
Total	2,623	1,106	1,085	2,282

Table 3.3: *Expansion Location Choice Made in Observed Acquisitions*
This table lists the countries where the parents chose to acquire during the sample period end of 2005 to end of 200: in the full sample (columns 1 and 2); among those making only one choice (columns 3 and 4); among the multinational companies (column 5 and 6). The information is split according to whether the acquisition was domestic (Dom) or cross-border (CB). The percentages are calculated for the chosen category.

Location of Targets	Full Sample		Parents Making One Choice		Multinationals	
CB acquisitions	1,290	41.66%	725	31.36%	960	64.17%
Austria	16	0.52%	7	0.44%	11	0.74%
Belgium	40	1.29%	27	1.70%	30	2.01%
Brazil	28	0.90%	16	1.01%	22	1.47%
Canada	41	1.32%	14	0.88%	26	1.74%
Switzerland	16	0.52%	6	0.38%	11	0.74%
Denmark	18	0.58%	10	0.63%	12	0.80%
Finland	36	1.16%	18	1.13%	28	1.87%
France	75	2.42%	40	2.52%	57	3.81%
Germany	115	3.71%	55	3.47%	83	5.55%
Ireland	33	1.07%	15	0.95%	20	1.34%
Italy	39	1.26%	17	1.07%	29	1.94%
Netherlands	53	1.71%	31	1.95%	36	2.41%
Norway	36	1.16%	21	1.32%	23	1.54%
Russia	42	1.36%	26	1.64%	35	2.34%
Spain	56	1.81%	38	2.39%	49	3.28%
Sweden	75	2.42%	50	3.15%	52	3.48%
United Kingdom	242	7.82%	147	9.26%	196	13.10%
United States	329	10.63%	187	11.78%	240	16.04%
Dom acquisitions	1,806	58.33%	1,587	68.64%	536	35.83%
Australia	18	0.58%	18	1.13%	4	0.27%
Austria	8	0.26%	8	0.50%	4	0.27%
Belgium	34	1.10%	31	1.95%	16	1.07%
Brazil	11	0.36%	11	0.48%	2	0.13%
Canada	62	2.00%	53	3.34%	20	1.34%
Colombia	6	0.19%	6	0.38%	1	0.07%
Denmark	30	0.97%	24	1.51%	7	0.47%
Finland	43	1.39%	37	1.60%	15	1.00%

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Table 3.3 – continued from previous page

Location of Targets	Full Sample		Parents Making One Choice		Multinationals	
France	137	4.43%	123	7.75%	54	3.61%
Germany	81	2.62%	67	4.22%	46	3.07%
Greece	17	0.55%	17	1.07%	11	0.74%
India	13	0.42%	13	0.56%	2	0.13%
Ireland	7	0.23%	7	0.44%	2	0.13%
Italy	53	1.71%	48	3.02%	27	1.80%
Japan	7	0.23%	7	0.44%		0.00%
Mexico	1	0.03%	1	0.04%	1	0.07%
Netherlands	45	1.45%	34	2.14%	25	1.67%
Norway	32	1.03%	27	1.70%	6	0.40%
Peru	2	0.06%	2	0.13%	1	0.07%
Poland	20	0.65%	20	0.87%	10	0.67%
Portugal	9	0.29%	9	0.57%	5	0.33%
Romania	2	0.06%	2	0.13%		0.00%
Russia	117	3.78%	113	7.12%	2	0.13%
Singapore	6	0.19%	6	0.26%		0.00%
South Africa	7	0.23%	7	0.44%	5	0.33%
South Korea	37	1.20%	37	2.33%	11	0.74%
Spain	93	3.00%	84	5.29%	22	1.47%
Sweden	121	3.91%	98	4.24%	55	3.68%
Switzerland	14	0.45%	12	0.76%	10	0.67%
Ukraine	3	0.10%	3	0.19%	1	0.07%
United Kingdom	554	17.89%	460	28.99%	126	8.42%
United States	216	6.98%	202	8.74%	45	3.01%
Total	3,096	100.00%	2,312	100.00%	1,496	100.00%

Table 3.4: *Corporate Tax Rates and Explanatory Variables by Expansion Location Alternative*

The means for the variables used in the estimations are provided for the 18 countries used as a possible location choice. The tax data (columns (1) to (3)) were provided by the Oxford University Centre for Business Taxation database, this in turn has been developed from country reports of the International Bureau for Fiscal Documentation (IBFD) and other sources; Columns (4) to (11) were taken from the World Bank World Development Indicators (WDI) database; Columns (12) to (14) were taken from the GeoDist database (Mayer and Zignago, (2011) and La Porta et. al (2008). Details for each variable are given in Section 4.3

Alternative	STR	EATR	Capital All.	ln(GDP)	GDP growth	Cost Bus. Start-up	Bus. Discl. Ind.	Unempl.	Dist. btw Capi-tals	Comm. Legal Syst.	Corrupt. Score	Mkt Capit. to GDP	ln(Dom. Firms)	Priv. Cred. to GDP
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Austria	0.25	0.23	0.12	26.12	3.25	5.38	3	4.34	2625.81	0.1	1.83	0.16	2.49	1.01
Belgium	0.34	0.28	0.2	26.31	2.37	5.44	8	7.6	2258.08	0.27	1.21	0.67	2.74	0.78
Brazil	0.34	0.33	0.16	27.43	5.11	9.6	6	7.91	9312.17	0.29	0.01	0.38	0.89	0.35
Canada	0.35	0.31	0.18	27.48	1.99	0.8	8	6.13	5829.38	0.42	2.27	1.05	4.3	0.96
Switzerland	0.21	0.17	0.13	26.38	3.15	2.13	0	3.68	2474.11	0.09	2.26	2.52	3.58	1.59
Germany	0.37	0.35	0.17	28.36	2.48	5.47	5	8.92	2498.51	0.06	1.85	0.54	2.3	1.16
Denmark	0.27	0.23	0.15	25.92	1.39	0	7	3.67	2428.62	0.13	2.34	0.57	3.67	1.1
Domestic	0.31	0.27	0.16	27.58	2.77	5.02	7.43	6.01	406.43	1	1.69	1.11	3.06	1.1
Spain	0.33	0.31	0.15	27.31	2.95	15.41	5	9.22	3068.62	0.26	1.32	0.77	3.82	0.96
Finland	0.26	0.22	0.14	25.71	3.92	1.03	6	6.97	2920.68	0.13	2.39	1.77	3.35	0.56
France	0.34	0.29	0.2	28.04	1.79	1.08	10	8.13	2459.02	0.23	1.5	0.88	2.62	0.84
Great Britain	0.29	0.26	0.15	28.2	2.12	0.77	10	5.28	2946.61	0.25	2.09	1.57	3.56	1.3
Ireland	0.13	0.11	0.06	25.64	2.94	0.3	10	4.98	2432.84	0.44	1.81	0.67	2.88	1.02
Italy	0.36	0.31	0.19	27.81	0.97	19.09	7	6.48	2952.72	0.27	0.77	0.53	1.59	0.75
Netherlands	0.27	0.23	0.14	26.81	3.04	6.33	4	3.26	2297.24	0.26	2.27	1.32	2.52	1.32
Norway	0.28	0.25	0.15	26.01	2.3	2.3	7	2.82	2548.05	0.14	2.11	0.4	3.69	0.93
Russia	0.24	0.21	0.13	26.73	7.59	4.53	6	6.46	3487.3	0.26	-0.81	0.33	0.41	0.14
Sweden	0.28	0.23	0.16	26.42	2.71	0.63	6	6.38	2813.55	0.08	2.35	1.13	3.44	0.88
United States	0.4	0.35	0.2	30.09	1.68	0.73	7	4.92	6664.27	0.39	1.77	1.42	3.13	2.05

Table 3.5: *Random Parameter Logit Model Estimation Results*

*The dependent variable takes the value of 1 if the parent company chooses a particular location among a set of alternatives. The choice set varies across companies. Some have 18 and some have 19 alternatives to choose from, depending on whether the domestic acquisition is part of the choice set or not. See data section for further details. All specifications are random parameter logit (RPL) except column (1) which has the results from a simple multinomial logit model. The RPL model allows the effect of host country tax variable to be random across companies. The RPL model was maximised using simulated maximum likelihood with 50 Halton random draws. In addition to the coefficients reported, all models allow intercepts and parent country statutory tax rate effects to vary with the alternatives. Sample size is 2,282 parents that made one location choice during the observation period: end of 2005 to end of 2008. mne2005 is a binary indicator for multi-national enterprises as defined in the base year 2005. cb expansion refers to cross-border expansions and dom refers to domestic expansions, both defined with respect to the country of location of the parent. Parcredit is an indicator for countries which operate a credit system. Standard errors are in parentheses. The asterisks indicate significance: *** (1%), ** (5%), * (10%).*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variable	Basic Specification Multinomial Logit	Basic Specification RP Logit	Large is 4 or more subsidiaries in 2005)	Large is present in 4 or more locations in 2005	Alternative is a New-location choice	Parent Country vs Host Country Taxes	Parent Country vs Host Country Taxes
Interaction of host-country statutory tax rate (τ^*) &:							
cb expansion	-3.886	-12.349**	-11.283**	-11.578**	-12.448***	-12.165***	-12.739***
	(3.064)	(4.857)	(4.817)	(4.729)	(4.796)	(4.604)	(4.862)
cb expansion & mne2005	0.598	5.078**	7.187**	4.409*		5.302**	6.028**
	(1.132)	(2.412)	(2.95)	(2.309)		(2.154)	(2.733)
cb expansion & large-mne2005			-4.054**	0.706			
			(2.064)	(1.746)			
cb expansion & large-Non-mne2005			-4.113				
			(2.802)				
cb expansion & mne2005 & parcredit & ($\tau > \tau^*$)						12.582**	12.160**

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Table 3.5 – continued from previous page

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
						(5.506)	(5.65)
cb expansion & mne2005 & ($\tau < \tau^*$)							-0.532
							(3.637)
cb expansion &Non-mne2005 &						-3.952	-2.992
parcredit & ($\tau > \tau^*$)						(7.301)	(7.595)
cb expansion & Non-mne2005 &							1.496
($\tau < \tau^*$)							(4.028)
Interaction of host-country statutory tax rate (τ^*) &:							
cb expansion & New-Location &					4.616**		
mne2005					(2.291)		
cb expansion & Old-Location &					7.094**		
mne2005					(2.786)		
dom expansion	-3.136	-5.78	-4.951	-5.929*	-5.696	-4.944	-5.266
	(2.388)	(3.693)	(3.726)	(3.582)	(3.682)	(3.748)	(4.311)
dom expansion & mne2005	-5.470***	-5.687***	-2.762	-4.357***	-5.646***	-4.672***	-4.512***
	(1.221)	(1.441)	(2.236)	(1.62)	(1.443)	(1.491)	(1.534)
dom expansion & mne2005 & large			-4.502**	-3.060*			
			(2.085)	(1.709)			
dom expansion & Non-mne2005 & large			-2.268				
			(2.832)				
Control Variables:							
log GDP (constant 2000 USD)	0.569***	1.045***	1.028***	1.034***	1.062***	1.063***	1.068***
	(.105)	(.257)	(.26)	(.254)	(.256)	(.248)	(.249)
GDP growth	-0.042	-0.066	-0.064	-0.075	-0.066	-0.066	-0.066

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Table 3.5 – continued from previous page

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	(.039)	(.051)	(.051)	(.05)	(.051)	(.05)	(.051)
Cost of business start-ups as % of GNI	-0.036***	-0.060***	-0.060***	-0.059***	-0.060***	-0.061***	-0.061***
	(.006)	(.014)	(.014)	(.014)	(.014)	(.013)	(.014)
Business extent of disclosure index	-0.04	-0.010*	-0.102*	-0.102*	-0.100*	-0.109**	-0.107**
	(.03)	(.055)	(.055)	(.054)	(.055)	(.054)	(.054)
Unemployment as a % of labour force	0.060**	0.065*	0.064*	0.067*	0.065*	0.053	0.053
	(.024)	(.037)	(.037)	(.036)	(.037)	(.037)	(.037)
Contiguity of Host and Target	0.492***	0.455***	0.454***	0.454***	0.442**	0.436**	0.437**
Country & cb expansion	(.163)	(.172)	(.172)	(.171)	(.172)	(.172)	(.174)
Common Language & cb expansion	0.342**	0.315*	0.324*	0.334*	0.336*	0.317*	0.315*
	(.17)	(.184)	(.184)	(.183)	(.184)	(.184)	(.185)
Distance btw capitals of Host and	-0.281***	-0.424***	-0.404***	-0.412***	-0.426***	-0.438***	-0.440***
Target Country & cb expansion	(.069)	(.085)	(.085)	(.056)	(.085)	(.083)	(.083)
Common Legal System & cb expansion	0.798***	0.800***	0.802***	0.799***	0.794***	0.801***	0.801***
	(.123)	(.127)	(.127)	(.127)	(.127)	(.127)	(.127)
Average Corruption Score, av.	-0.195	-0.368	-0.403	-0.285	-0.327	-0.467*	-0.469*
1996/2000	(.146)	(.251)	(.252)	(.237)	(.249)	(.255)	(.256)
Ratio of market capitalization to	0.101	0.18	0.164	0.17	0.205	0.168	0.167
GDP, av. 1999/2003	(.166)	(.279)	(.278)	(.268)	(.28)	(.272)	(.274)
ln(No. Domestic Firms pc), av.	0.067	0.074	0.086	0.025	0.027	0.115	0.114
$1999 - 2003$	(.104)	(.176)	(.176)	(.169)	(.177)	(.173)	(.175)
Private credit to GDP, av. $1999 - 2003$	-1.087***	-1.780***	-1.754***	-1.824***	-1.795***	-1.604***	-1.603***
	(.254)	(.496)	(.497)	(.49)	(.495)	(.509)	(.511)
Standard Deviation of the RP on		7.620***	7.547***	7.072***	7.622***	7.380***	7.418***
tax (σ)		(2.238)	(2.288)	(2.165)	(2.185)	(2.065)	(2.073)
Maximised Log Likelihood	-2608.1	-2602.28	-2597.17	-2591.18	-2599.12	-2595.08	-2579.97

Table 3.6: *Extension to Model Column (2) of Table 5*

*This table presents results from some sensitivity checks where the statutory tax variable is replaced by the EATR (column [2]), or where a measure of allowances is also included (columns [3]). The dependent variable takes the value of 1 if the parent company chooses a particular location among a set of alternatives. The choice set varies across companies. Some have 18 and some have 19 alternatives to choose from, depending on whether the domestic acquisition is part of the choice set or not. See data section for further details. All specifications are random parameter logit (RPL) where the effect of host country tax variable is allowed to be random across companies. The RPL model was maximised using simulated maximum likelihood with 50 Halton random draws. In addition to the coefficients reported, all models allow intercepts and parent country statutory tax rate (columns [1] and [3]), EATR (column [2]), and allowances (column[3]) to have effects that vary over the alternatives. Sample size is 2,282 parents that made one location choice during the observation period: end of 2005 to end of 2008. mne2005 is a binary indicator for multi-national enterprises as defined in the base year 2005. cb expansion refers to cross-border expansions and dom refers to domestic expansions, both defined with respect to the country of location of the parent. Standard errors are provided in parentheses. The asterisks indicate significance: *** (1%), ** (5%), * (10%).*

Tax Variable used in the model	Statutory Tax τ	EATR	τ+ allowances
	[1] (Table 5: [2])	[2]	[3]
Interaction of Tax & cb expansion	-12.349**	-10.672**	-9.454*
	(4.857)	(5.344)	(5.156)
Interaction of Tax & cb expansion*mne2005	5.078**	5.217**	5.106**
	(2.412)	(2.34)	(2.424)
Interaction of Allowance & cb expansion			-4.216
			(3.257)
Interaction of Allowance & cb expansion & mne2005			-2.214
			(1.947)
Interaction of Tax & dom expansion	-5.78	-7.706**	-8.688**
	(3.693)	(3.613)	(4.223)
Interaction of Tax & dom expansion & mne2005	-5.687***	-6.132***	-6.296**
	(1.441)	(1.539)	(3.119)
Interaction of Allowance & dom expansion			10.225***
			(2.919)
Interaction of Allowance & dom expansion & mne2005			-2.013
			(2.208)
log GDP (constant 2000 USD)	1.045***	1.155***	1.432***
	(.257)	(.27)	(.318)
GDP growth	-0.066	-0.061	-0.06

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Table 3.6 – continued from previous page

	[1] (Table 5: [2])	[2]	[3]
	(.051)	(.049)	(.053)
Cost of business start-ups as % of GNI	-0.060***	-0.058***	-0.064***
	(.014)	(.013)	(.015)
Business extent of disclosure index	-0.010*	-0.117**	-0.151**
	(.055)	(.055)	(.061)
Unemployment as a % of labour force	0.065*	0.067*	0.071*
	(.037)	(.035)	(.039)
Contiguity of Host and Target	0.455***	0.476***	0.406**
Country & cb expansion	(.172)	(.172)	(.182)
Common Language & cb expansion	0.315*	0.294	0.338*
	(.184)	(.186)	(.19)
Distance btw capitals of Host and	-0.424***	-0.400***	-0.445***
Target Country & cb expansion	(.085)	(.081)	(.089)
Common Legal System & cb expansion	0.800***	0.814***	0.803***
	(.127)	(.131)	(.134)
Average Corruption Score, av.	-0.368	-0.357	-0.242
1996/2000	(.251)	(.244)	(.274)
Ratio of market capitalization to	0.18	-0.026	-0.251
GDP, av. 1999/2003	(.279)	(.269)	(.314)
ln(No. Domestic Firms pc), av.	0.074	0.168	0.222
$1999-2003$	(.176)	(.169)	(.193)
Private credit to GDP, av. $1999-2003$	-1.780***	-1.794***	-2.056***
	(.496)	(.482)	(.537)
Standard Deviation of the RP (σ)	7.620***	7.720***	8.045***
for the tax effect	(2.238)	(2.262)	(2.169)
Maximised Log Likelihood	-2602.28	-2590.81	-2571.47

Table 3.7: *Random Parameter Logit Model Estimation Results*

*The dependent variable takes the value of 1 if the parent company chooses a particular location among a set of alternatives. The choice set varies across companies. Some have 18 and some have 19 alternatives to choose from, depending on whether the domestic acquisition is part of the choice set or not. See data section for further details. All specifications are random parameter logit (RPL) except column (1) which has the results from a simple multinomial logit model. The RPL model allows the effect of host country tax variable to be random across companies. The RPL model was maximised using simulated maximum likelihood with 50 Halton random draws. In addition to the coefficients reported, all models allow intercepts and parent country statutory tax rate effects to vary with the alternatives. Sample size is 2,282 parents that made one location choice during the observation period: end of 2005 to end of 2008. mne2005 is a binary indicator for multi-national enterprises as defined in the base year 2005. cb expansion refers to cross-border expansions and dom refers to domestic expansions, both defined with respect to the country of location of the parent. Parcredit is an indicator for countries which operate a credit system. Standard errors are in parentheses. The asterisks indicate significance: *** (1%), ** (5%), * (10%).*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variable	Basic Specification Multinomial Logit	Basic Specification RP Logit	Large is 4 or more subsidiaries in 2005)	Large is present in 4 or more locations in 2005	Alternative is a New-location choice	Parent Country vs Host Country Taxes	Parent Country vs Host Country Taxes
Interaction of host-country statutory tax rate (τ^*) &							
cb expansion	-0.497	-10.947**	-9.892**	-9.623**	-11.384***	-11.007**	-11.214**
	(2.315)	(4.487)	(4.48)	(4.276)	(4.38)	(4.488)	(4.561)
cb expansion & mne2005	1.392	7.463***	5.955**	4.532**		7.661***	9.556***
	(.874)	(2.328)	(2.486)	(1.964)		(2.25)	(2.747)
cb expansion & large-mne2005			0.581	3.911***			
			(1.577)	(1.383)			
cb expansion & large-Non-mne2005			-3.497*				
			(2.113)				
cb expansion & mne2005 &						8.089	5.963
parcredit & ($\tau > \tau^*$)							

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Table 3.7 – continued from previous page

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
						(5.034)	(5.115)
cb expansion & mne2005 & ($\tau < \tau^*$)							-6.111*
							(3.382)
cb expansion &Non-mne2005 &						-6.044	-3.791
parcredit & ($\tau > \tau^*$)						(6.582)	(6.796)
cb expansion & Non-mne2005 &							0.193
($\tau < \tau^*$)							(3.928)
Interaction of host-country statutory tax rate (τ^*) &							
cb expansion & New-Location &					6.296***		
mne2005					(2.05)		
cb expansion & Old-Location &					11.342***		
mne2005					(2.832)		
dom expansion	-3.976***	-7.786**	-7.307**	-7.572**	-7.441**	-7.659**	-4.959
	(2.021)	(3.441)	(3.457)	(3.263)	(3.444)	(3.641)	(4.211)
dom expansion & mne2005	-4.694***	-4.693***	-4.653***	-4.505***	-4.768***	-4.073***	-3.760***
	(.945)	(1.117)	(1.735)	(1.251)	(1.126)	(1.148)	(1.172)
dom expansion & mne2005 & large			-1.058	-0.737			
			(1.522)	(1.218)			
dom expansion & Non-mne2005 & large			-2.872				
			(2.077)				
Control Variables:							
log GDP (constant 2000 USD)	0.536***	1.098***	1.100***	1.047***	1.136***	1.117***	1.145***
	(.092)	(.242)	(.247)	(.23)	(.238)	(.244)	(.241)
GDP growth	-0.048	-0.063	-0.066	-0.073*	-0.067	-0.063	-0.064

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Table 3.7 – continued from previous page

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	(.033)	(.043)	(.043)	(.042)	(.043)	(.043)	(.043)
Cost of business start-ups as % of GNI	-0.029***	-0.056***	-0.056***	-0.054***	-0.056***	-0.057***	-0.060***
	(.006)	(.013)	(.013)	(.012)	(.013)	(.013)	(.013)
Business extent of disclosure index	-0.039	-0.110**	-0.110**	-0.108**	-0.112**	-0.114**	-0.115**
	(.025)	(.051)	(.051)	(.049)	(.051)	(.052)	(.051)
Unemployment as a % of labour force	0.058***	0.070**	0.072**	0.074**	0.072**	0.063*	0.067*
	(.022)	(.035)	(.035)	(.034)	(.036)	(.036)	(.036)
Contiguity of Host and Target	0.438***	0.378***	0.379***	0.361***	0.338***	0.375***	0.348***
Country & cb expansion	(.123)	(.131)	(.131)	(.131)	(.131)	(.131)	(.132)
Common Language & cb expansion	0.247*	0.250*	0.261*	0.278**	0.290**	0.251*	0.269*
	(.131)	(.141)	(.141)	(.14)	(.141)	(.141)	(.142)
Distance btw capitals of Host and	-0.295***	-0.424***	-0.414***	-0.424***	-0.440***	-0.429***	-0.436***
Target Country & cb expansion	(.053)	(.064)	(.065)	(.065)	(.064)	(.063)	(.063)
Common Legal System & cb expansion	0.686***	0.694***	0.693***	0.696***	0.689***	0.694***	0.695***
	(.096)	(.1)	(.1)	(.01)	(.1)	(.1)	(.1)
Average Corruption Score, av.	-0.198	-0.383*	-0.386*	-0.230	-0.292	-0.444*	-0.438*
1996/2000	(.123)	(.231)	(.231)	(.212)	(.23)	(.239)	(.238)
Ratio of market capitalization to	-0.141	-0.246	-0.238	-0.195	-0.156	-0.250	-0.293
GDP, av. 1999/2003	(.139)	(.256)	(.254)	(.24)	(.259)	(.257)	(.258)
ln(No. Domestic Firms pc), av.	0.100	0.150	0.142	0.039	0.015	0.179	0.136
$1999 - 2003$	(.089)	(.167)	(.166)	(.155)	(.169)	(.168)	(.169)
Private credit to GDP, av. $1999 - 2003$	-0.758***	-1.444***	-1.460***	-1.484***	-1.514***	-1.407***	-1.449
	(.224)	(.455)	(.458)	(.434)	(.456)	(.5)	(.498)
Standard Deviation of the RP on		8.803***	8.683***	7.804***	8.967***	8.838***	8.820***
tax (σ)		(2.173)	(2.224)	(2.008)	(2.076)	(2.203)	(2.098)
Maximised Log Likelihood	-4433.310	-4423.240	-4419.880	-4397.940	-4403.150	-4420.190	-4418.158

Table 3.8: *Elasticity w.r.t. change of X in row choice on Prob[Column Choice] - Table 5 Column [1] Model (no RP)*

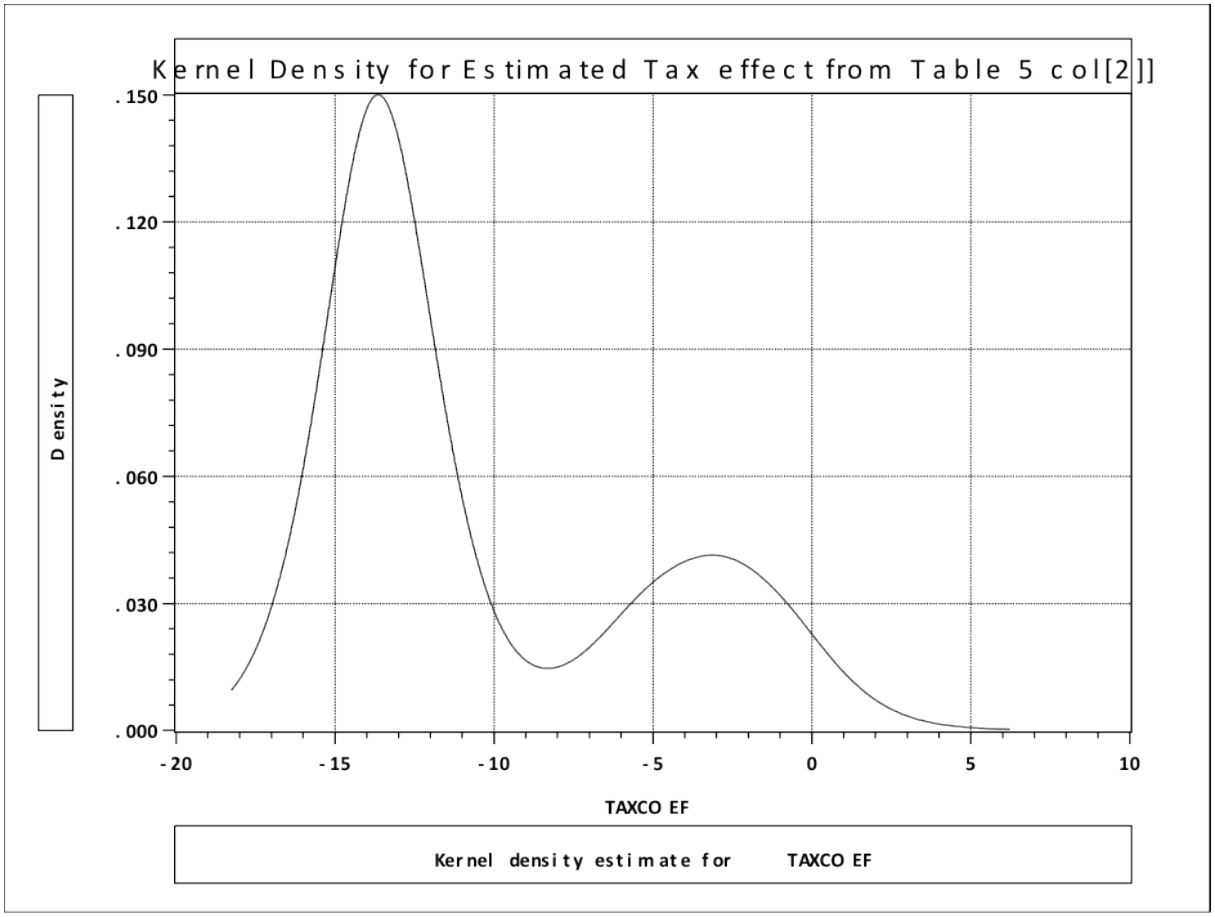
	AT	BE	BR	CA	CH	DE	DK	DOM	ES	FI	FR	GB	IE	IT	NL	NO	RU	SE	US
AT	-0.96	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BE	0.02	-1.27	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
BR	0.01	0.01	-1.3	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
CA	0.01	0.01	0.01	-1.32	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
CH	0	0	0	0	-0.81	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DE	0.03	0.03	0.03	0.03	0.03	-1.34	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
DK	0	0	0	0	0	0	-1.02	0	0	0	0	0	0	0	0	0	0	0	0
DOM	0.68	0.68	0.68	0.68	0.68	0.68	0.68	-0.29	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68
ES	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	-1.18	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
FI	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-0.98	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
FR	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	-1.21	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
GB	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	-0.78	0.07	0.07	0.07	0.07	0.07	0.07	0.07
IE	0	0	0	0	0	0	0	0	0	0	0	0	-0.48	0	0	0	0	0	0
IT	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-1.33	0.01	0.01	0.01	0.01	0.01
NL	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-0.98	0.01	0.01	0.01	0.01
NO	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-1.06	0.01	0.01	0.01
RU	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-0.87	0.01	0.01
SE	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	-0.99	0.02
US	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	-1.28

Table 3.9: *Elasticity w.r.t. change of X in row choice on Prob[Column Choice] - Table 5 Column [2] Model (RP) Parents who made single choice*

	AT	BE	BR	CA	CH	DE	DK	DOM	ES	FI	FR	GB	IE	IT	NL	NO	RU	SE	US
AT	-1.24	0	0	0	0.01	0	0	0.01	0	0	0	0	0.01	0	0	0	0	0	0
BE	0.01	-0.76	0	0	0.02	0	0.01	0.02	0.01	0.01	0.01	0.01	0.02	0	0.02	0.01	0.02	0.01	-0.01
BR	0.01	0	-0.8	0	0.01	0	0.01	0.01	0	0.01	0	0.01	0.01	0	0.01	0.01	0.01	0.01	0
CA	0	-0.01	-0.01	-0.64	0	-0.01	0	0.01	-0.01	0	-0.01	0	0.01	-0.01	0	0	0	0	0
CH	0	0	0	0	-1.28	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DE	0.02	-0.01	-0.01	-0.02	0.03	-0.53	0.02	0.03	0	0.02	0	0.02	0.03	-0.02	0.02	0.01	0.02	0.02	-0.03
DK	0.01	0	0	0	0.01	0	-1.14	0.01	0	0.01	0	0.01	0.01	0	0.01	0.01	0.01	0.01	0
DOM	0.95	0.74	0.73	0.72	1.04	0.69	0.9	-0.31	0.79	0.93	0.76	0.95	1.24	0.71	0.91	0.88	0.98	0.9	0.69
ES	0.02	0	0	0	0.02	0	0.02	0.02	-0.86	0.02	0.02	0.02	0.03	0	0.02	0.01	0.02	0.02	0
FI	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-1.18	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.02	0
FR	0.02	0.01	0	0	0.03	0	0.02	0.02	0.01	0.02	-0.73	0.02	0.03	0	0.02	0.02	0.02	0.02	-0.01
GB	0.09	0.04	0.03	0.03	0.1	0.02	0.08	0.1	0.05	0.08	0.05	-0.76	0.12	0.03	0.09	0.07	0.09	0.08	0.04
IE	0.01	0	0	0	0.01	0	0.01	0.01	0	0.01	0	0.01	-1.1	0	0.01	0.01	0.01	0.01	0
IT	0.01	0	0	0	0.01	-0.01	0.01	0.01	0	0.01	0	0.01	0.01	-0.65	0.01	0	0.01	0.01	-0.01
NL	0.02	0.02	0.01	0.01	0.02	0.01	0.02	0.02	0.01	0.02	0.01	0.02	0.03	0.01	-1.11	0.02	0.02	0.02	0
NO	0.01	0.01	0.01	0.01	0.02	0	0.01	0.02	0.01	0.02	0.01	0.01	0.02	0.01	0.01	-1.11	0.02	0.02	0
RU	0.02	0.01	0.01	0.01	0.02	0.01	0.02	0.02	0.01	0.02	0.01	0.02	0.02	0.01	0.02	0.02	-1.22	0.02	0.01
SE	0.03	0.02	0.02	0.02	0.04	0.01	0.03	0.04	0.02	0.04	0.02	0.03	0.04	0.02	0.03	0.03	0.04	-1.04	0.01
US	0.06	-0.04	-0.05	-0.03	0.08	-0.08	0.05	0.07	-0.01	0.05	-0.03	0.14	0.1	-0.06	0.05	0.03	0.07	0.05	-0.47

Figure 3.1: *The Distribution of Effects of the Host Country Tax Rate across all Acquirers, from Table 5 Column 2*

Mean Value = - 10.48; Std Deviation = 4.98; Skewness = 0.959; Excess Kurtosis -3 = -0.662; Minimum = -17.30; Maximum = 5.28



- Chapter 4 -

Ownership Structure Changes Database

§ 4.1 Introduction

The work presented in this Thesis studies two aspects of firms discrete investment decisions. Parent firms have to choose whether to maintain their *status quo* or rather expand their ownership structure by acquiring the controlling share of other pre-existing firms. If they decide to expand, they have to choose what is the most desirable location for the acquisition targets.

In both papers, the empirical analysis relies upon an attentively built dataset, that follows the pattern of Ownership Structure changes due to all Merger and Acquisition transactions (M&As) undertaken during a fix period of time. The datasets carefully explore two features observed in the initial raw data. First, the high level of heterogeneity among firms, in terms of size, geographic dispersion and structure complexity. The database includes only firms defined as *large* in terms of number of employees or volume of operating profit and total assets. Despite this common feature, the observe firms are very diverse, especially in terms of number of subsidiaries owned and number of countries where these subsidiaries are located. Secondly, the pyramid structure of complex corporations constituted by several firms connected through direct and indirect ownership links. Ignoring the ownership links that connect the observed firms would mean to treat all firms as independent and autonomous entities and all M&A as single transactions between two economic agents. Instead, tracking the ownership chain between the observed firms allows to identify the final headquarter responsible for all decision aspects regarding a M&A project.

Two examples help illustrate the advantages of modelling the data as described here. As a first example, assume a firm located in Italy and called "IT1" qualifies as the direct acquirer of a firm also located in Italy and called "IT2". Assume then that a British

firm called "GB" owns the controlling share of firm "IT1". If the link between "IT1" and "GB" is not acknowledged, the acquisition of "IT2" is recorded as a domestic acquisition. This misrepresents the transaction in two ways: first, the deal should be recorded as a cross-border acquisition, because "IT2", an italian firm, becomes annexed to the structure controlled by "GB", a British firm. Secondly, only aknowledging the pre-existence (with respect to the acquisition) of the link between "GB" and "IT1" allows to record the fact that the observed cross-border acquisition expands the ownership structure controlled by "GB" without stretching its geographical distribution. In other words, firm "GB" is not entering a new (geographic) market. For the second example, assume that "GB" not only controls "IT1", but it also control "FR1", a firm located in France. Then also assume that "FR1" acquires another French firm called "FR2", during the same financial year when "IT1" acquires "IT2". Under these circumstances, to ignore the link between "GB" and its directly controlled subsidiaries ("IT1" and "FR1") has an additional consequence with respect to those described in the previous example. "IT1" and "FR1" would be treated as independent entities, each undergoing an ownership expansion. Instead, it is only one firm, "GB", that has extended both branches of its organization by acquiring new subsidiaries in two of its foreign locations.

The datasets implemented in this Thesis were built starting from raw data extracted from three commercial database, all provided by the Bureau Van Dijk: ORBIS, AMADEUS and ZEPHYR. This Chapter describes key features of the raw data, along with the procedure followed to build the final datasets that allowed the empirical investigation presented in Chapter 2 and Chapter 3. Section 4.2 describes the methodology employed to reconstruct the Ownership Structure of the initial sample of firms, extracted by ORBIS. Section 4.3 describes the main characteristics of the observed M&A deals and it explains how the M&As information extracted by ZEPHYR were used to track all the Ownership changes occurred to the initial sample of firms observed in ORBIS. Finally, Section 4.4 describes the methodology used to merge these two sources and produce the final datasets used to investigate on the determinants of the M&A investment decision.

§ 4.2 Reconstruction of Firms Ownership Structure

The initial sample covered all large[1] firms listed in the May 2004 electronic version of ORBIS database. The database does not have any geographic restriction, which means firms are distributed worldwide. For each firm ORBIS provides the identity of all known

[1]Bureau Van Dijk classifies a firm as "large" if its operating revenue is above 14 mil USD, if its total assets are above 20 mil USD or if its employees are more than 150

shareholders and the size of both direct and indirect ownership links. To guarantee accuracy of the final dataset, only direct links were used to build the ownership structure of the observed firms [2].

The analysis of ownership expansions realised through merger and acquisitions (M&As) requires identification of the firms involved in the deal and of their specific role. One approach is to assume that only the firms legally involved in the deal benefit from its effects, in which case only the direct acquirer is considered to be affected by the ownership transaction realised through the acquisition contract. An alternative approach is to identify all firms that, through a chain of direct and indirect ownership links, are connected to the firms listed in the legal contract defining the terms of the acquisition, and indicate the global ultimate owner of the reconstructed chain as responsible for the deal. As it is often the case, firms have multiple shareholders, so it is not trivial to attribute the responsibility for an ownership change occurred at the subsidiary level. To solve this issue, a simple "controlling share rule" is defined. Accordingly, non-independent firms are placed under the structure of the shareholder owning their controlling share, while parent firms are global ultimate owners with no direct shareholders.[3] This procedure allowed to identify a total of 130,285 parent firms and 129,883 subsidiaries.

A second feature of the ORBIS database regards the definition of a firm's *location*. A variable "country" is provided, which indicates the place where production of a given firm takes place. The variable often includes a string with several countries, listed in alphabetical order. However, there is no instruction on how the countries listed in the string relate to the location of the firm's listed subsidiaries. Having to identify the country under whose jurisdiction a parent firm is taxed, decision was taken to define a firm's *location* on the basis of the *incorporation country*, which is the country where the firm is legally registered.

The parent firms were subsequently classified into three groups. The group of *"standalone"* firms, constituted by all parents controlling no subsidiaries; the group of *"domestic"* firms, constituted by all parents controlling only domestic subsidiaries; and the group of *"multinational"* firms, constituted by all parents controlling at least one subsidiary located in a foreign country. The sample composition corresponds to the 7% of firms (9,148) being multinationals, the 24% of firms (31,556) being domestic and the 69% of firms (89,581) being standalone. This classification constitutes the first source of heterogeneity across firms, a feature largely exploited in the econometric analysis of the work presented in this Thesis. As well known, a large part of the literature on Foreign

[2]Firms have no obligation to provide complete information about their ownership structure and indirect links are partially reconstructed by Bureau Van Dijk on the basis of the available data

[3]Shareholders represented by individuals, associations and public institutions are not considered when reconstructing the chain of ownership links between active firms

Direct Investments (FDI) focuses exclusively on multinational firms. These are certainly relevant, given the scale of their activity and their geographic spread, but they represent only a small portion of the World population of large firms.

The dataset resulting at this first stage is a picture of all ownership structure trees defined by controlling share links that were active by the end of the financial year 2004. Note that the dataset has no record on when or how each link was established. However, according to the compiling rules followed by Bureau Van Dijk, it includes all the ownership changes due to transactions of shares that were completed by the end of 2004.

The "size" of a parent firm can be defined in terms of number of subsidiaries owned at a given point in time. In addition, it is possible to think about any ownership structure as having at least other two dimensions: "depth", given by the lowest dependency level through which subsidiaries are linked to their parent, and "geographic spread", given by the number of countries where these subsidiaries are located. Figure 4.1 shows that the distribution of firm size is positively skewed, and much more so for domestic than for multinational firms. In fact, the largest domestic owns 79 different subsidiaries, while the 99% of domestic parents own 13 of less subsidiaries. Instead, the largest multinational owns 740 subsidiaries, while the 99% of multinational parents own 91 or less subsidiaries. Figure 4.2 shows a structural difference between domestic and multinational firms: the top Graph relates the total number of subsidiaries owned by domestic parents by the end of 2004 with the "depth" of their structure; the bottom Graph does the same for multinational parents. What emerges is that domestic firms that own a large number of subsidiaries do not necessarily have them connected through many levels of dependence, while the contrary is true for multinational firms. Table 4.1 and 4.2 show a complementary aspect of the pyramidal structure of domestic and multinational firms. The tables report the number of subsidiaries owned at each level of dependency. The 99% of domestic firms has no more than 13 subsidiaries within the same dependency level, whereas the 99% of multinational firms have no more than 42. Moreover, according to Table 4.1 only 76 domestic firms (less than the 1% of the total) control more than four subsidiaries within the fourth (or lower) dependency level, whereas, according to Table 4.2, 291 multinational firms (just above the 3% of the total) do. Table 4.3 gives some statistics on the geographic spread of multinational firms. About 65% of multinationals own subsidiaries in only one foreign country, 35% spreads their structure over between two and fifteen different foreign countries, and the largest 1% of multinational firms control subsidiaries in up to thirty foreign countries. Figure 4.3 sheds some light on the relationship between depth an width of multinational firms. The top Graph shows that multinationals that are spread over a large number of foreign countries tend to have subsidiaries linked through maximum four, five or six level of dependency. The bottom Graph shows that the geographical

spread of a multinational firm mostly depends on the location of the subsidiaries owned at the first two levels of dependency, as subsidiaries owned at lower levels of dependency are concentrated in less than three countries. Finally, Table 4.4 shows the distribution of parent firms across countries. The United Kingdom, Russia and Spain are the three countries with the highest number of parent firms, whereas the United States of America, followed by Germany and the United Kingdom are the three countries with the highest number of multinational parent firms.

§ 4.3 M&A activity

Zephyr database includes records of all transactions that involve the exchange or purchase of shares between existing firms. Each transaction involves three firms: the acquirer, who directly purchases the share of another firm, the target, whose shares are directly purchased by the acquirer, and a vendor, who sells the control it has over the target to the acquirer. The transactions are grouped in terms of "deals", and a unique code is associated to each deal. A deal can be thought of as a legal contract between two or more parties, and as such it can be constituted by one or more transactions. For the purpose of the economic questions posed by the papers of this Thesis, interest lies only on the transactions that affect the structure of the parent firms observed in ORBIS and the chain of ownership that links them to their subsidiaries. The data used are limited to the transactions classified as Mergers and Acquisitions and recorded as completed.[4]

The papers presented in this Thesis used two different versions of Zephyr. The paper with title "Corporate Taxes and the Growth of the Firm" uses the 2011 electronic update of Zephyr, whereas the paper with title "Taxes and the Location of Targets" uses the 2009 electronic update of Zephyr. The more recent update includes all deals completed up to the end of 2010, while the earlier update only includes deals completed by the end of 2008. This section presents statistics that describe the main features of the larger sample.

Table 4.5 reports the sample coverage for the years between 2005 and 2010. It shows that 121,057 Mergers and Acquisition (M&A) deals were completed over the six years, for a total of 130,484 ownership transactions. The post-crisis fall of M&As emerges from the table, as the number of deals and transactions completed over 2009 and 2010 dropped on average by 20%. Table 4.6 reports statistics on the composition of the deals, in terms of number of transactions. 99% of completed deals (a total of 120,196 over the six years) include three of less transactions, while the more complex deals include up to over twenty different transactions. This shows how most deals take place between only one acquirer,

[4]Zephyr defines a transaction as "completed" if all its effects on the involved parties have taken place. The database also has information on deals "started" or even just "rumoured".

one target and one vendor. Table 4.7 looks deeper into this matter, by reporting the number of acquirers, targets and vendors involved in each deal. Note that in Zephyr 20% of deals have missing acquirer, 32% have missing target and 71% have missing vendor. In particular, information on the identity of the vendor were not used when merging Zephyr with the Ownership Structure dataset, due to the under-representation of the sample. Table 4.7 shows that on average over the six years the 79% of deals involve only one Acquirer, and the 65% of deals involve only one target, suggesting that it is common to have deals where the same acquirer purchase shares of multiple targets. In fact, according to Table 4.8, 1,613 deals had one acquirer purchasing shares of more than one target, whereas 886 deals had multiple acquirers purchasing shares of the same target. Finally, Table 4.10 reports statistics on the nature of the ownership shares object of the transactions reported in Zephyr. The first three columns show that, on average over the years, just below 2% of the observed transactions resolved with the acquirer owning a minority share of the target. This is especially the case for deals where multiple acquirers purchase shares of the same target. Instead, after completion of the 98% of transactions, the acquirer becomes the majority shareholder of the purchased target, and in 82% of these cases the acquirer becomes the sole shareholder of the target firm. The remainder of the table show descriptive statistics on the size of the share of the target owned by the acquirer before the beginning of the deal. As reported in the bottom row, on average over the years the 21% of transactions involved acquirers that already owned some share of the target, and in half of this cases the share involved covered over 50% of the target's full ownership.

§ 4.4 Changes in the Ownership Structures Induced by completed M&As

To guarantee that a M&A deal has an effect on the ownership chain of the involved firms, as reconstructed through ORBIS, three criteria are established. First, if a deal includes more than one transaction and shares of the same target are being purchased by more than one acquirer, there needs to be exact record of what share is purchased by each acquirer. Unfortunately, in some cases Zephyr reports only the overall share involved in the deal, so it is not possible to reconstruct the effect of the deal on the ownership structure of each firm involved. Second, all transactions where the acquirer owns an initial majority share of the target are treated as redundant, because such transactions cause no effect on the ownership of the firms involved. Third, transactions where the acquirer purchases the minority share of the target have no effect on the ownership structure of the parties involved, because the purchase of a minority share of the target does not shift control over the target from the vendor to the acquirer.

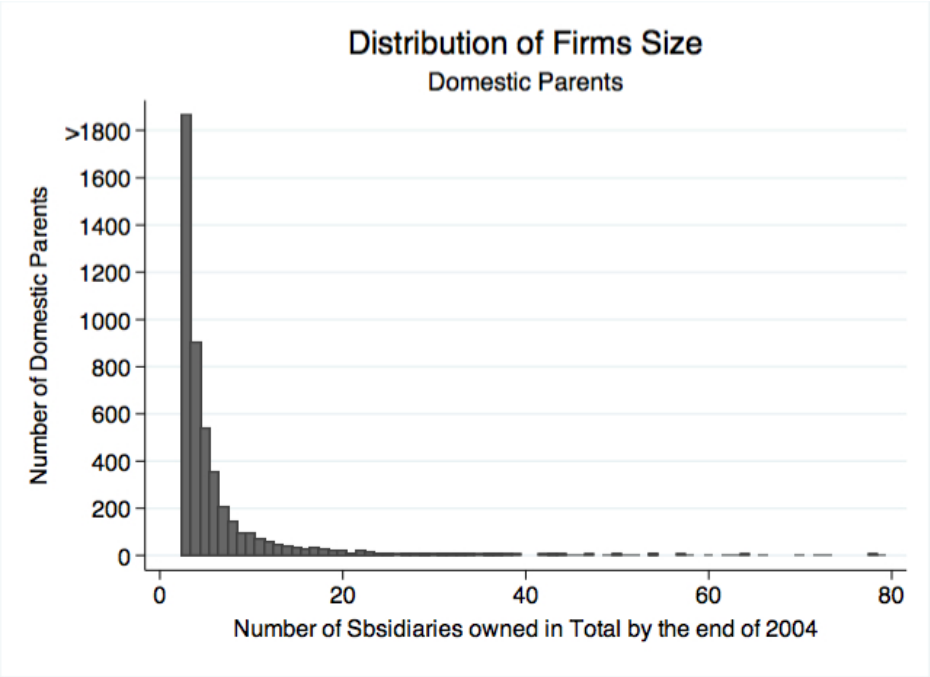
When reconstructing the effect of a completed M&A on the ownership of the involved firms, a specific routine was followed:

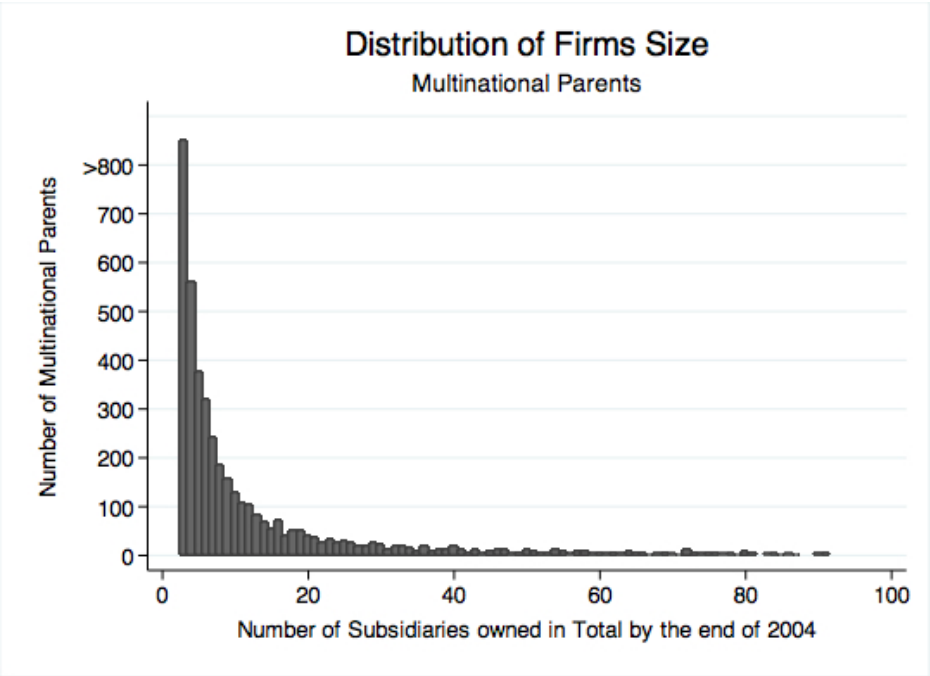
1. verify that the firms involved in a completed deal belong to the 2005 base sample from Orbis, and drop cases where information on the target firm are missing, or where the acquirer is not listed in the base sample
2. identify the GUO of the acquirer, unless the acquirer is itself a GUO
3. add the target firms to the structure of the GUO
4. remove from the structure of the vendor's GUO the firm sold in the deal and all the subsidiaries that this firm directly, or indirectly controlled before the deal

The reduction in the sample size that lead to the datasets finally used for the implementation of the econometric analysis in the two papers of this Thesis is mainly due to changes in the ID code associated to each firm, and of which Bureau Van Dijk does not keep record. Departing from the initial sample of 130,285 parent firms, 106,818 firms were observed in all consecutive years between 2004 and 2010 (of these 80,326 were European), and 35,615 maintained the same ID code. For the three years between 2006 and 2008, 2,623 parent firms located worldwide completed at least one acquisition of the majority share of at least one target located in one of eighteen countries, as discussed in Chapter 3. For the five years between 2006 and 2010, instead, 28,940 parent firms located in Europe were observed to make at least one expansion or to keep their structure unchanged, as discussed in Chapter 2.

§ 4.5 Tables and Figures

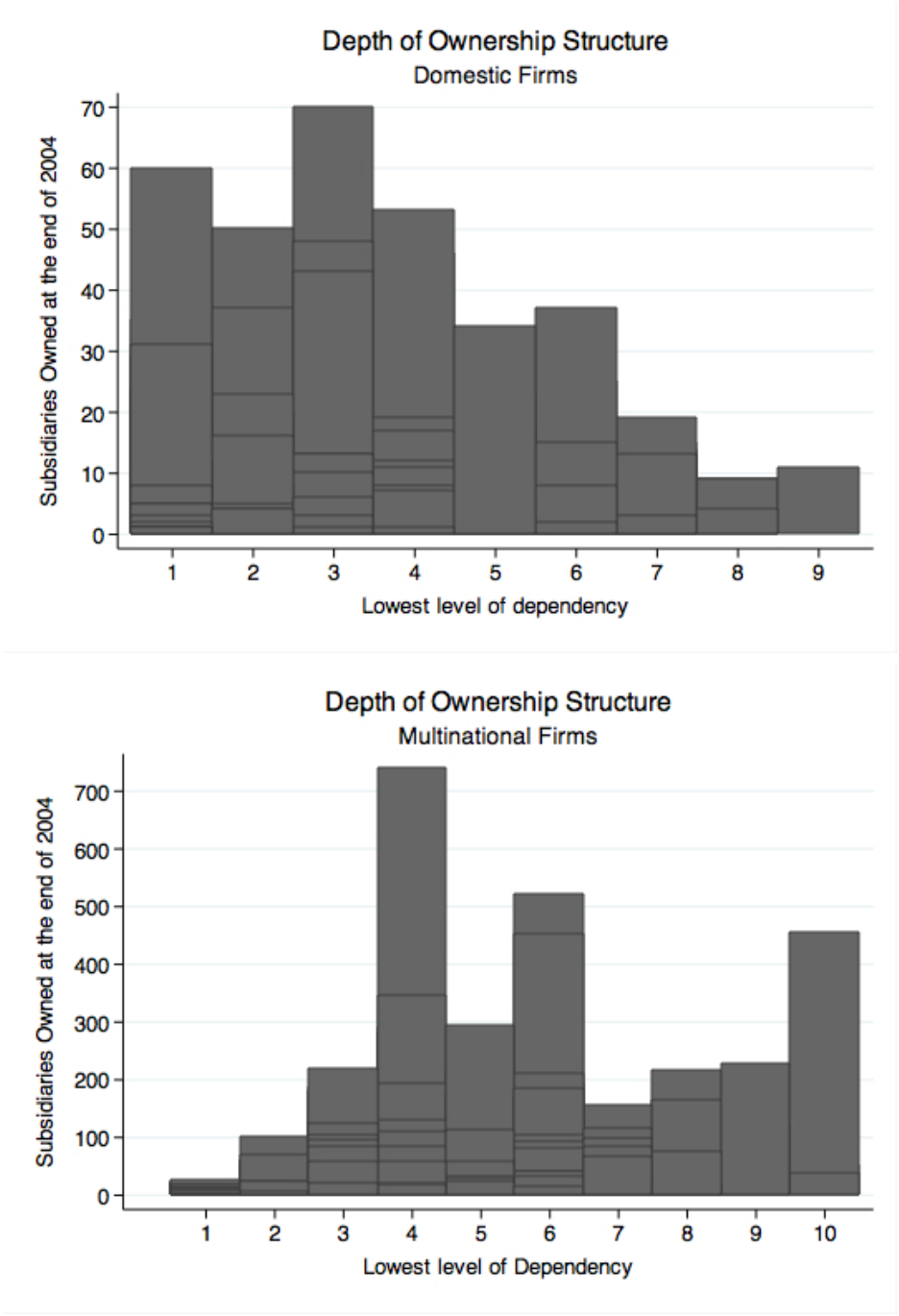
Figure 4.1: *Size of Ownership Structure of Domestic and Multinational Firms*





Note: the size of a parent firm is measured in terms of total number of subsidiaries owned at the end of 2004, regardless of the level of dependency at which each subsidiary is linked to their parent.

Figure 4.2: *"Depth" of Ownership Structure*



Note: the "depth" of an ownership structure is determined by the lowest level of dependency at which the controlled subsidiaries are linked to the parent firm. This is measured as at the end of 2004. The lowest level of dependency traceable through the ORBIS database is the 10th level. The sample represented in the Figure excludes the 89,581 standalone firms that own no subsidiaries, and whose ownership structure "depth" stops at the parent level.

Table 4.1: *Pyramidal Structure of Domestic Firms*

Number of subsidiaries owned at each level of subsidiarity	Number of Domestic Firms owning a specific Number of Subsidiaries at each Level of Dependency by the end of 2004								
	1st Lev.	2nd Lev.	3rd Lev	4th Lev	5th Lev	6th Lev	7th Lev	8th Lev	9th Lev
1	24,469	2,471	469	118	39	14	9	2	0
2	4,011	722	174	47	14	9	4	0	0
3	1,380	330	71	26	7	2	2	0	0
4	621	174	53	16	5	2	0	0	0
5	334	103	33	4	4	1	1	0	0
6	173	72	16	6	4	0	1	1	0
7	113	39	14	9	1	0	0	0	0
8	93	28	5	4	3	0	0	1	0
9	42	25	6	3	3	2	1	1	0
10	38	16	3	5	1	0	0	0	0
11	29	14	9	3	0	1	0	0	1
12	26	11	9	1	1	1	0	0	0
13	19	9	7	1	1	0	0	0	0
> 13	105	58	19	7	1	2	0	0	0

Note: the pyramidal structure of a firm is given by the number of subsidiaries owned at each level of dependency. The sample used in this Table includes all Domestic firms and their ownership structure at the end of 2004. Subsidiaries are controlled through majority links up to the tenth level.

Table 4.2: *Pyramidal Structure of Multinational Firms*

Number of subsidiaries owned at each level of subsidiarity	Number of Domestic Firms owning a specific Number of Subsidiaries at each Level of Dependency by the end of 2004									
	1st Lev.	2nd Lev.	3rd Lev	4th Lev	5th Lev	6th Lev	7th Lev	8th Lev	9th Lev	10th Lev
1	4,752	1,538	589	226	102	58	22	2	2	2
2	1,507	655	276	125	50	22	8	5	1	1
3	698	404	156	71	31	11	1	2	0	0
4	423	225	94	35	17	8	1	4	0	0
5	294	171	85	27	14	4	4	0	1	0
6	205	117	48	24	11	2	0	0	0	0
7	161	98	40	24	6	3	1	1	0	0
8	123	78	29	11	9	0	1	0	2	0
9	101	69	25	18	2	2	2	0	0	0
10	90	37	22	7	1	3	0	0	0	0
11	72	54	20	11	2	1	0	0	0	0
12	54	45	14	5	6	1	1	0	0	0
13	63	29	19	6	4	1	0	0	1	0
14	43	26	17	5	1	1	0	0	0	0
15	45	33	17	5	1	0	0	0	0	0
16	37	18	11	2	1	0	0	0	0	0
17	26	26	9	2	1	0	0	0	0	0
18	26	16	10	3	0	0	0	0	0	0
19	26	20	4	3	2	1	0	0	0	0
20	19	11	7	1	0	0	0	0	0	0
21	27	6	2	4	1	0	0	0	0	0
22	21	12	10	1	1	0	0	0	0	0
23	16	14	1	3	0	1	0	0	0	0
24	13	8	5	0	2	0	0	0	0	0
25	9	11	5	2	1	0	0	0	0	0
26	9	11	5	2	0	0	0	0	0	0
27	13	7	4	3	2	0	0	0	0	0
28	15	8	2	1	1	0	0	0	0	0
29	3	5	0	1	0	0	0	0	0	0
30	8	7	1	0	0	0	0	0	0	0
31	10	5	5	2	0	0	0	0	0	0
32	7	3	3	1	0	0	0	0	0	0
33	6	8	3	1	0	0	0	0	0	0
34	9	3	3	4	1	0	0	0	0	0
35	3	1	3	0	0	0	0	0	0	0
36	4	2	0	0	0	0	0	0	0	0
37	5	6	0	1	0	0	0	0	0	0
38	6	4	2	0	0	0	0	0	0	0
39	3	4	2	0	0	0	0	0	0	0
40	3	0	0	0	1	0	0	0	0	0
41	4	4	3	0	0	0	0	0	0	0
42	3	2	0	0	0	0	0	0	0	0
> 42	65	64	20	6	0	0	0	0	0	0

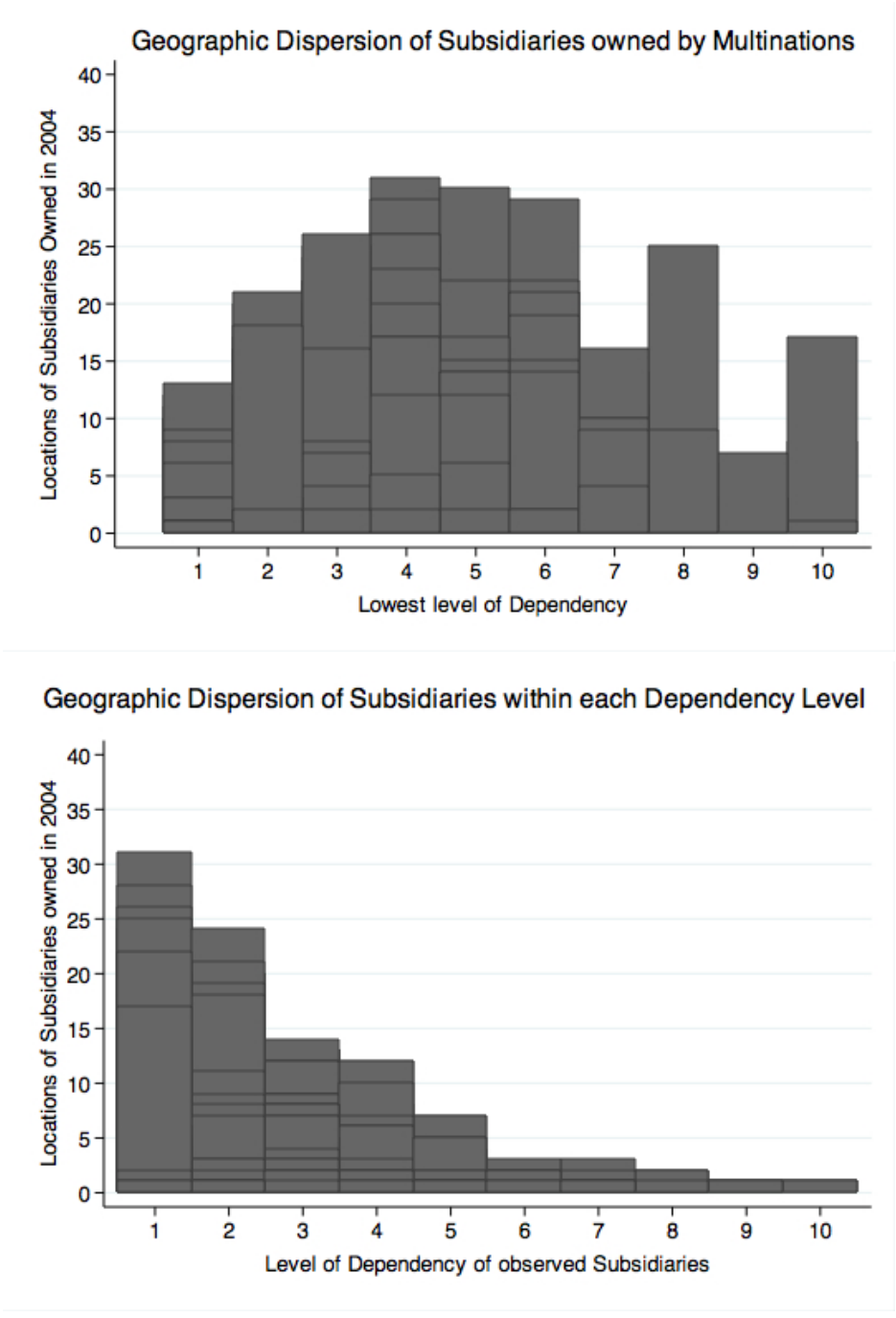
Note: the pyramidal structure of a firm is given by the number of subsidiaries owned at each level of dependency. The sample used in this Table includes all Multinational firms and their ownership structure at the end of 2004. Subsidiaries are controlled through majority links up to the tenth level.

Table 4.3: *Geographic Spread of Multinational Firms*

Number of countries where Subsidiaries are located	Number of MNE Firms	Perc.	Cum.
1	5,930	64.82	64.82
2	1,393	15.23	80.05
3	604	6.60	86.65
4	334	3.65	90.30
5	221	2.42	92.72
6	142	1.55	94.27
7	119	1.30	95.57
8	73	0.80	96.37
9	60	0.66	97.03
10	35	0.38	97.41
11	42	0.46	97.87
12	37	0.40	98.27
13	25	0.27	98.55
14	27	0.30	98.84
15	17	0.19	99.03
16	21	0.23	99.26
17	14	0.15	99.41
18	11	0.12	99.53
19	8	0.09	99.62
20	7	0.08	99.69
21	6	0.07	99.76
22	8	0.09	99.85
23	2	0.02	99.87
24	1	0.01	99.88
25	4	0.04	99.92
26	3	0.03	99.96
29	2	0.02	99.98
30	1	0.01	99.99
31	1	0.01	100.00
Total	9,148	100.00	100.00

Note: the geographic spread of an ownership structure is measured in terms of foreign countries where the subsidiaries owned at the end of 2004 are located, regardless the level of dependency at which they are connected to their parent. The sample includes the 9,148 Multinationals observed at the end of 2004.

Figure 4.3: *Complexity of Ownership Structure of Multinational Firms*



The top Graph relates the total number of countries where the subsidiaries owned by each multinational parent are located to the lowest level of dependency at which these subsidiaries are linked to their parent. The bottom Graph shows the number of countries where the subsidiaries owned within each level of dependency are located. The sample used includes the 9,148 Multinationals observed at the end of 2004.

Table 4.4: *Location of Parent Firms*

Country of Parent Firm	Parent Firm Type			All types
	Domestic	Multinational	Standalone	
United Kingdom	12,117	805	20,486	33,408
Russia	1,514	11	12,108	13,633
Spain	1,433	210	9,954	11,597
France	2,248	439	5,858	8,545
Italy	774	322	4,642	5,738
Denmark	2,760	281	2,555	5,596
Sweden	3,955	493	922	5,370
Korea, Republic of	354	37	4,204	4,595
United States of America	713	2,109	1,364	4,186
Germany	991	920	2,005	3,916
Ireland	663	213	2,701	3,577
Norway	1,066	118	2,200	3,384
Greece	251	38	2,874	3,163
Belgium	533	282	1,967	2,782
Japan	101	471	2,006	2,578
Netherlands	423	810	1,194	2,427
Portugal	211	37	1,767	2,015
Ukraine	169	2	1,753	1,924
Poland	101	9	1,045	1,155
Australia	32	65	588	685
Switzerland	32	412	155	599
Malaysia	27	19	534	580
Canada	54	159	362	575
Romania	86	0	473	559
Finland	113	111	317	541
China	30	5	443	478
Austria	115	135	226	476
Bosnia and Herzegovina	0	0	400	400
India	10	44	338	392
Bulgaria	139	1	247	387
Serbia and Montenegro	7	0	373	380
Singapore	13	35	304	352
Taiwan, Republic of	55	47	190	292
Thailand	9	3	250	262
Bermuda	4	72	180	256
Iceland	5	18	213	236
Estonia	33	6	170	209
Lithuania	18	2	179	199
Croatia	40	2	151	193
Czech Republic	4	2	174	180
Brazil	117	16	46	179
Cayman Islands	1	14	151	166
Luxembourg	6	97	62	165
Indonesia	2	1	160	163
Latvia	8	5	129	142
Peru	8	0	103	111
South Africa	19	42	49	110
Hungary	5	8	74	87
Hong Kong	8	29	49	86
Chile	31	3	51	85
Philippines	8	4	73	85
Argentina	37	1	43	81
Jordan	2	3	57	62
Egypt	18	2	41	61
Israel	0	32	28	60
New Zealand	4	14	41	59
Mexico	19	6	26	51
Oman	4	1	46	51
Other Countries	56	125	480	661
All Countries	31,556	9,148	89,581	130,285

Note: the country of the parent firm corresponds to the country where the firm is legally registered. Th table shows only the countries that have at least 50 parent firms, irrespective of the type. Among "Other Countries", the list of countries where between 50 and 10 parent firms are located is: Bahrain, Bangladesh, British Virgin Island, Colombia, Cyprus, Kenya, Kuwait, Lebanon, Macedonia, Mauritius, Morocco, Nepal, Nigeria, Pakistan, Panama, Saudi Arabia, Slovakia, Slovenia, Tunisia, Turkey, United Arab Emirates and Venezuela.

Table 4.5: *Number of M&A Deals and Transactions*

	M&A Deals		M&A Transactions	
Year of Completion	Number	Percentage of Total	Number	Percentage of Total
2005	20,495	16.93%	21,881	16.77%
2006	20,814	17.19%	22,226	17.03%
2007	23,174	19.14%	24,979	19.14%
2008	22,821	18.85%	24,761	18.98%
2009	19,804	16.36%	21,249	16.28%
2010	13,949	11.52%	15,388	11.79%
Total	121,057	100.00%	130,484	100.00%

Notes: an M&A "deal", as reported in ZEPHYR, is equivalent of a contract, as it can include one or more ownership transactions between existing firms. The 130,484 transactions completed between 2005 and 2010 are grouped under 121,057 deals.

Table 4.6: *Number of Transactions per Deal*

Number of Transactions per M&A deal	Completed Deals per Year						All Years	Percentage of Total
	2005	2006	2007	2008	2009	2010		
1	19,636	19,973	22,137	21,800	18,939	13,114	115,599	95.49%
2	607	573	728	642	586	552	3,688	3.05%
3	131	132	163	186	152	145	909	0.75%
4	59	65	58	82	61	62	387	0.32&
5	31	28	30	39	28	36	192	0.16%
6	9	21	21	22	15	21	109	0.09%
7	11	4	13	12	6	6	52	0.04%
8	2	10	8	14	5	2	41	0.03%
9	2	5	3	11	6	3	30	0.02%
10	3	2	2	2	1	3	13	0.01%
11	1	0	4	3	3	3	14	0.01%
12	1	1	1	5	0	0	8	0.01%
13	1	0	1	0	0	0	2	0.00%
14	0	0	2	0	1	0	3	0.00%
15	0	0	0	0	1	1	2	0.00%
>15	1	0	3	3	0	1	8	0.00%

Notes: each row reports the number of deals completed each year and constituted by the number of transactions indicated but he first column. The three largest deals observed in the sample were completed in 2007 and were constituted by twenty-seven, twenty-eight and thirty-three different transactions, respectively.

Table 4.7: *Number of Firms Involved within each Deal*

	Number of Completed Deals						
	2005	2006	2007	2008	2009	2010	All Years
Number of Acquirers within same Deal							
1 Acquirer	16,620 (81.09%)	17,178 (82.53%)	19,093 (82.39%)	18,045 (79.07%)	14,427 (72.85%)	10,516 (75.39%)	95,879 (79.20%)
2 Acquirers	152 (0.74%	150 (0.72%	199 (0.86%)	183 (0.80%)	182 (0.92%)	114 (0.82%)	980 (0.81%)
$\geq$ 3 Acquirers	33 (0.16%)	44 (0.21%)	42 (0.17%)	56 (0.25%)	59 (0.31%)	35 (0.25%)	269 (0.22 %)
Number of Targets within same Deal							
1 Target	12,363 (60.32%)	13,646 (65.56%)	16,568 (71.49%)	16,045 (70.31%)	12,454 (62.89%)	8,796 (63.06%)	79,872 (65.98%)
2 Target	220 (1.07%)	209 (1%)	275 (1.19%)	236 (1.03%)	186 (0.94%)	257 (1.84%)	1,383 (1.14%)
$\geq$ 3 Targets	48 (0.22%)	85 (0.4%)	96 (0.39%)	107 (0.46%)	70 (0.38%)	90 (0.65%)	496 (0.41%)
Number of Vendors within same Deal							
1 Vendor	5,435 (26.52%)	5,163 (24.81%)	5,715 (24.66%)	5,850 (25.63%)	6,028 (30.44%)	3,988 (28.59%)	32,179 (26.58%)
2 Vendor	256 (1.25%)	240 (1.15%)	292 (1.26%)	259 (1.13%)	240 (1.21%)	200 (1.43%)	1,487 (1.23%)
$\geq$ 3 Vendor	172 (0.81%)	140 (0.68%)	170 (0.73%)	211 (0.91%)	153 (0.8%)	155 (1.11%)	1001 (0.81%)

Notes: each cell reports the number of deals completed in the year indicated in the column that saw one or more acquirers, targets or vendors involved. Numbers in parenthesis give the percentage with respect to the total number of deals completed during the year indicated in the column. The deal with the largest number of acquirers was completed in 2008 and saw the involvement of twelve different acquirers. The deal with the largest number of targets was completed in 2007 and saw the involvement of thirty-three different targets. The two deals with the largest number of vendors were completed in 2005 and 2008 and saw the involvement of sixteen different vendors. On average across years the 20% of deals have missing acquirer, the 32% have missing target and the 71% have missing vendor.

Table 4.8: *Number of Acquirers and Targets involved in the same Deal*

	Number of Acquirers							
Number of Targets	0	1	2	3	4	5	6	≥ 7
0	9,491	29,496	267	36	5	5	3	3
1	14,218	64,770	677	121	56	19	8	3
2	167	1,188	25	3	0	0	0	0
3	35	248	9	2	0	0	0	0
4	7	87	2	1	0	0	0	0
5	3	30	0	0	0	2	0	0
6	2	19	0	0	0	0	1	0
≥ 7	6	41	0	1	0	0	0	0

Notes: each cell reports the number of deals completed between 2005 and 2010 that saw involved a given number of Targets and Acquirers. Rows refer to different numbers of Targets and columns to different numbers of Acquirers. The deals with unknown Target and Acquirer cannot be used to reconstruct changes in the ownership structures of the firms observed in ORBIS. The deals with unknown Acquirer cannot be used to connect the Target to the structure of the new shareholder.

Table 4.9: *Size of Target Shares Involved in M&A Transactions*

	Acquirer's Final Share			Acquirer's Initial Share				
Year of Deal Completion	Minority Final Share	Majority Final Share	Final Share = 100%	Initial Share $\neq 0\%$	Initial Share $< 10\%$	Initial Share 10% to 50%	Initial Share $> 50\%$	Initial Sha $> 90\%$
2005	377 (1.75%)	21,198 (98.25%)	17,797 (83.75%)	3,579 (18.14%)	133 (0.7%)	964 (5.05%)	1,439 (7.52%)	266 (1.39%)
2006	406 (1.84%)	21,654 (98.16%)	18,314 (84.14%)	3,241 (16.15%)	187 (.96%)	943 (4.82%)	1,255 (6.41%)	268 (1.37%)
2007	498 (2.01%)	24,280 (97.99%)	20,190 (82.47%)	3,883 (17.3%)	267 (1.22%)	1,104 (5.03%)	1,654 (7.53%)	444 (2.02%)
2008	458 (1.87%)	24,073 (98.13%)	19,394 (80.24%)	5,066 (22.86%)	290 (1.35%)	1,156 (5.37%)	2,510 (11.64%)	800 (3.72%)
2009	430 (2.05%)	20,545 (97.95%)	16,043 (77.63%)	5,249 (27.42%)	385 (2.11%)	1,060 (5.82%)	2,235 (12.26%)	914 (5.02%)
2010	245 (1.61%)	14,936 (98.39%)	11,985 (79.99%)	3,338 (24.29%)	243 (1.86%)	697 (5.33%)	1,404 (10.75%)	541 (4.15%)
All Years	2,414 (1.87%)	126,686 (98.13%)	103,723 (81.47%)	24,356 (20.77%)	1,505 (1.33%)	5,924 (5.22%)	10,497 (9.25%)	3,233 (2.85%)

Notes: each cell reports the number of transactions (completed during the year indicated in the first column) that involved a particular share of the Target firm. Numbers in parenthesis give the percentage with respect to the total number of deals completed during the year indicated in the first column. The first three columns refer to transactions that resulted in the acquirer owning the minority, majority or full share of the target firm, respectively. Transactions where the acquirer has a minority final share are assumed to be ineffective in terms of ownership structure changes. The last five columns of the table report the number of transactions (completed during the year indicated in the first column) where the acquirer already owned some initial share of the target. Transactions where the acquirer already controlled the majority share of the target are assumed to be ineffective in terms of ownership structure changes.

Table 4.10: *Location of Acquirers and Targets*

Country Name	Target Firms		Acquirer Firms	
tgtcountryname	Number	Percentage of Total	Number	Percentage of Total
United States of America	19,489	24.70	14,501	26.26
United Kingdom	10,187	12.91	6,604	11.96
Russian Federation	6,241	7.91	2,126	3.85
France	3,695	4.68	2,654	4.81
Canada	3,667	4.65	2,556	4.63
Germany	3,409	4.32	2,467	4.47
Netherlands	2,912	3.69	2,417	4.38
Spain	2,378	3.01	1,572	2.85
Sweden	1,765	2.24	1,251	2.27
Finland	1,752	2.22	1,244	2.25
Japan	1,677	2.13	1,488	2.69
Italy	1,483	1.88	956	1.73
Australia	1,361	1.73	1,248	2.26
Norway	1,306	1.66	919	1.66
Belgium	1,089	1.38	694	1.26
Switzerland	948	1.20	862	1.56
Ukraine	906	1.15	276	0.50
Denmark	896	1.14	680	1.23
China	797	1.01	800	1.45
Poland	759	0.96	422	0.76
Brazil	702	0.89	392	0.71
India	662	0.84	766	1.39
Estonia	526	0.67	383	0.69
Austria	519	0.66	472	0.85
Singapore	457	0.58	557	1.01
Malaysia	454	0.58	787	1.43
Czech Republic	436	0.55	175	0.32
Ireland	425	0.54	285	0.52
South Africa	423	0.54	356	0.64
Korea, Republic of	411	0.52	426	0.77
Romania	409	0.52	159	0.29
Portugal	329	0.42	213	0.39
Bulgaria	292	0.37	117	0.21
Greece	282	0.36	205	0.37
Mexico	240	0.30	127	0.23
Argentina	237	0.30	109	0.20
Hungary	228	0.29	97	0.18
Serbia	226	0.29	59	0.11
Chile	212	0.27	141	0.26
Lithuania	177	0.22	85	0.15
Bermuda	175	0.22	154	0.28
Latvia	161	0.20	68	0.12
Colombia	158	0.20	104	0.19
Thailand	153	0.19	108	0.20
New Zealand	150	0.19	139	0.25
Taiwan	140	0.18	239	0.43
Hong Kong	136	0.17	138	0.25
Cayman Islands	134	0.17	128	0.23
Israel	125	0.16	149	0.27
Croatia	121	0.15	69	0.12
Cyprus	107	0.14	151	0.27
Slovakia	105	0.13	45	0.08
Egypt	104	0.13	53	0.10
Turkey	101	0.13	59	0.11
Peru	95	0.12	35	0.06
Luxembourg	93	0.12	129	0.23
Philippines	85	0.11	84	0.15
Nigeria	80	0.10	45	0.08
Indonesia	77	0.10	43	0.08
Iceland	72	0.09	80	0.14
Slovenia	70	0.09	71	0.13
Bosnia and Herzegovina	60	0.08	18	0.03
British Virgin Islands	58	0.07	132	0.24
United Arab Emirates	58	0.07	66	0.12
Other Countries	892	1.13	557	1.01
Unknown Countries	123	0.16	146	0.26
Total	78,889		55,215	

Note: the country of a firm corresponds to the country where the firm is legally registered. Th table shows only the countries that have at least 50 parent firms, irrespective of the type.

ection

Part I

Annexes

- Appendix A -

Chapter 2: Equilibrium Conditions

The Equilibrium of the model presented in the paper is closed by the productivity cutoff $(m_{EA}^k)^{1-\eta}$, the Free Entry Condition, the balance of the Government Budget Constraint and the Price Index.

Free Entry Condition: before drawing their productivity type, firms will have to make a decision on paying the sunk cost (f_s) to discover how productive they will actually be in the domestic and foreign market. To close the model a free entry condition guarantees that firms will enter the market until their expected profit, net of the sunk cost, is zero. This implies

$$\int_0^{\infty} \pi_D \;\; dG(m) + \sum_k \left(\int_{m_{EA}^k}^{\infty} \pi_{k,E} \;\; dG(m) + \int_0^{m_{EA}^k} \pi_{k,A} \;\; dG(m) \right) = f_s \tag{A.1}$$

which, denoting $\int_0^{m_0} m^{1-\eta} dG(m) = V(m_0)$, can be rewritten as

$$(1-t)\frac{A}{\mathrm{w}^{\eta-1}} V(m) + \sum_k \Bigg((1-t)\frac{A_k}{(\mathrm{w}\tau_k)^{\eta-1}} \left(V(m) - V(m_{EA}^j) \right) + (1-t_k-T)\frac{A_k}{\mathrm{w}_k^{\eta-1}} V(m_{EA}^k) - \left((1-t_k-T) f_A^k + (1-t_k)\bar{\pi}_k \right) F_m(m_{EA}^k) \Bigg) = f_s \tag{A.2}$$

Government Budget Constrain: the government of the Home country collects taxes t on profit realised by domestic production of all firms located within its border, and in addition it will collect taxes T from repatriation of the profits realised by the foreign subsidiaries acquired by those domestic firms with productivity above the cutoff level m_{EA}. The total tax revenue is then redistributed to individuals as a public good g, so the Government Budget constrain is

$$g = t\frac{A}{\mathrm{w}}V(m) + \sum_k \left(t\frac{A_k}{\mathrm{w}\tau_k}\left(V(m) - V(m_{EA}^k)\right) + T\left(\frac{A_k}{\mathrm{w}_k}V(m_{EA}^k) - f_A^k F_m(m_{EA}^k)\right)\right) \tag{A.3}$$

under the assumption that individuals have a linear utility from consumption of the public good, $U(g) = g$, the Home country welfare will be given by $W = W(P, w, I) + g$

Prices: the Price Index in the Home country, P, is a weighted average of the price set by all firms that sell the differentiated good, each firm in its own variety. This includes all prices set by firms that serve the domestic demand, and by firms that serve the foreign demand through exports, along with the prices set by the domestic firms that acquire foreign subsidiaries to serve the foreign demand, which is

$$P^{1-\eta} = \int_0^{\infty} p(\omega)^{1-\eta} \ \ dG(m) + \sum_k \left(\int_{m_{EA}^k}^{\infty} p(\omega)^{1-\eta} \ \ dG(m) + \int_0^{m_{EA}^k} p(\omega)^{1-\eta} \ \ dG(m)\right) \tag{A.4}$$

$$P^{1-\eta} = \frac{1}{\mathrm{w}\alpha^{1-\eta}}V(m) + \sum_k \left(\frac{1}{\mathrm{w}\tau_k\alpha^{1-\eta}}\left(V(m) - V(m_{EA}^k)\right) + \frac{1}{\mathrm{w}_k\alpha^{1-\eta}}V(m_{EA}^k)\right)$$

Helpman et al. (2003) show the analytical solution to the equilibrium for the special case where all countries are symmetric, and the labour endowment is not too different across countries. In that case the system of conditions presented here is simplified by the fact that wages are equalised to 1, the transport cost and the acquisition fixed cost are constant across countries, so $\tau_{ij} = \tau$ and $f_A^j = f_A$ and as a consequence the markup adjusted demand, A, and the productivity cutoff level, m_{EA}, are also constant across countries.

- Appendix B -

Chapter 2 - Average Partial Effects (APE) of Dynamic Probit Model

Given

$$y_{i,s} = 1[\gamma y_{i,s-1} + \beta' \mathbf{x}_{i,s} + c_i + \epsilon_{i,s} > 0]$$
$$c_i | y_{i0}, z_i \sim N(\phi_0 + \phi_1 y_{i0} + \phi' z_i; \sigma_a^2)$$
$$\epsilon_{i,s} | x_{i,s}, z_i \sim N(0, \mathbf{I})$$

Wooldridge (2005) propose a simple procedure to estimate the Average Partial Effect (APE) of a given explanatory variable. He suggests to obtain this estimate by starting from the Average Structural Function (ASF), which is the expectation of a mean function w.r.t. the c_i . So defining

$$ASF(y_{i,s-1}, \mathbf{x}_{i,s}) = E_c[\Phi(\gamma y_{i,s-1} + \beta' \mathbf{x}_{i,s} + c_i)] \tag{B.1}$$

and using the distributional assumption made on c_i, can write

$$E_{y_{i0}, z_i}[\Phi(\gamma y_{i,s-1} + \beta' \mathbf{x}_{i,s} + \phi_0 + \phi_1 y_{i0} + \phi' z_i + a_i)] =$$
$$E_{y_{i0}, z_i}\left[\Phi\left(\frac{\gamma y_{i,s-1} + \beta' \mathbf{x}_{i,s} + \phi_0 + \phi_1 y_{i0} + \phi' z_i}{(1 + \sigma_a^2)^{1/2}}\right)\right] \tag{B.2}$$

A consistent estimator for (B.2) is

$$\widehat{ASF}(y_{i,s-1}, \mathbf{x}_{i,s}) = N^{-1} \sum_{i=1}^{N} \Phi\left(\hat{\gamma}_a y_{i,s-1} + \hat{\beta}_a' \mathbf{x}_{i,s} + \hat{\phi}_0 a + \hat{\phi}_{1a} y_{i0} + \hat{\phi}_a' z_i\right) \tag{B.3}$$

(where the subscript a indicates that an estimated parameter has been scaled by $(1 + \hat{\sigma}_a^2)^{-1/2}$). To obtain the APE w.r.t. a continuous variable it is only necessary to take the derivative of (B.3) with respect to the continuous variable of interest. Whereas for the

APE w.r.t. a discrete variable, such as $y_{i,s-1}$ it is necessary to look at the discrete change in Equation (B.3).

In the analysis presented in this paper particular attention is given to modelling the effect of firms heterogeneity on the probability of an expansion. In fact, in the main model specification the continuous corporate tax variable and the lagged dependent variable are interacted with the dummies identifying the original firms "type" (multinational or domestic, with standalone as reference group). This allows the estimated effect of the main variables to have heterogeneous mean. The presence of these interactions has to be taken into account when estimating the APEs. The issue with this particular specification is that to evaluate the function at the sample mean, like in the illustrated general case, corresponds to average also the binary indicators for the firm's type. Which would make interpretation and inference of the derived APEs ambiguous. Instead, the interest lies on deriving the APEs for each specific firm's type. This is not done by forcing the firm's type indicators to 1 and estimating the APE on the full sample of firms, but rather by estimating the APE for the subgroup of firms with common type only.

The APE standard error can be obtained with panel data bootstrap when, like in this case, N is large and T is not. Alternatively, they can be derived using the delta method. Using both procedures, it was found that the results were extremely similar whenever the bootstrap was set on 100 or more draws. The standard error shown in the table are those obtained through the delta method (as estimated by NLOGIT5).

- Appendix C -

Chapter 3 - Marginal Effects and Elasticities in Multinomial and Mixed (Random Parameter) Logit Models

The model specification for the latent surplus derived from a particular choice of a target company in country$j(= 1, \ldots, J)$ by acquirer i is given by

$$S_{ij} = \beta_j^{'} z_i + \gamma x_j + \varepsilon_{ij} \tag{C.1}$$

where z_i is a vector of choice invariant (company) characteristics. For ease of exposition, we assume that there is only one alternative specific variable x, say the target country specific tax rate. The company is assumed to make the choice which gives the largest surplus.

Multinomial Logit Model

Marginal Effect of a change in location j specific variable x_j (the target country j's tax rate), on the probability of a particular choice of a target company in the same country j is

$$\frac{\partial p_{ij}}{\partial x_j} = \frac{\partial}{\partial x_j}\left[\frac{exp\{\beta_j^{'} z_i + \gamma x_j\}}{\sum_{k=1}^{J} exp\{\beta_k^{'} z_i + \gamma x_k\}}\right] = p_{ij}(1 - p_{ij})\gamma \tag{C.2}$$

where,

$$p_{ij} \equiv Prob(j \text{ is chosen }) = \frac{exp\{\beta_j^{'} z_i + \gamma x_j\}}{\sum_{k=1}^{J} exp\{\beta_k^{'} z_i + \gamma x_k\}} \tag{C.3}$$

The corresponding elasticity is given by

$$\frac{\partial \log p_{ij}}{\partial \log x_j} = (1 - p_{ij}) x_j \gamma \tag{C.4}$$

Similarly, it is easy to show that the cross marginal effect with respect to another location m's tax rate is

$$\frac{\partial p_{ij}}{\partial x_m} = \frac{\partial}{\partial x_m}\left[\frac{exp\{\beta_j^{'} z_i + \gamma x_m\}}{\sum_{k=1}^{J} exp\{\beta_k^{'} z_i + \gamma x_k\}}\right] = -p_{ij}p_{im}\gamma \tag{C.5}$$

And the corresponding elasticity is given by

$$\frac{\partial \log p_{ij}}{\partial \log x_m} = -p_{im}x_m\gamma \tag{C.6}$$

Note, the elasticity in (C.6) does not depend on j.
We see from the above that a change in the tax rate at a particular target location will have an effect on not just the probability of choosing that location but the probability of choosing all other locations too.

Random Parameter Logit (RPL) or Mixed Logit Model
Instead of assuming that γ is fixed in (C.1), we now assume that every company in our sample has its own γ and write this as

$$\gamma_i = \gamma' w_i + \sigma u_i \text{ where } u_i \sim \text{ iid } N(0,1) \tag{C.7}$$

i.e. $\gamma_i \sim$ iid $N(\gamma' w_i, \sigma^2)$. This model collapses to the earlier one when $\sigma = 0$.

Substituting (C.7) into (C.1), we get

$$S_{ij} = \beta_j^{'} z_i + (\gamma' w_i + \sigma u_i)x_j + (\sigma x_j u_i + \varepsilon_{ij}) \tag{C.8}$$

Estimation of company specific effect γ_i

u_i in (C.8) is an unobserved company specific random variable. Then, by Bayes theorem, the density of u_i given data

$$f(u_i|data) = \frac{f(u_i|choices) = f(choices|u_i)f(u_i)}{f(choices)}$$

Thus,

$$E(u_i|choices) = \int u f(u|choices)du = \frac{\int u f(choices|u)f(u)du}{f(choices)} \tag{C.9}$$

$f(choices|u)$ is the conditional likelihood which appears in the likelihood function prior to marginalisation, and $f(choices)$ is the marginal likelihood which are obtained during the maximisation. $f(u)$ is the standard normal density by assumption in our model. The estimated $E(u_i|choices)$ is known as the Bayesian shrinkage estimator.

Marginal effects and Elasticities

The conditional marginal effects and elasticities in this model will be given by equations (C.2)-(C.6). In order to obtain the unconditional marginal effects and elasticities, one has to marginalise this with respect to the distribution of the coefficients (i.e the random error u here), which again requires simulations to approximate the integral as discussed above.

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