

TAXES AND THE LOCATION OF TARGETS

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Abstract

This paper 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. We combine financial and ownership data for companies in ORBIS in 2005 with domestic and cross-border acquisitions in ZEPHYR between 2006 and 2008. We estimate a random parameters form of mixed logit model. We find 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.

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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 (2011) 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%.¹

This paper examines one aspect of the determination of mergers and acquisitions: the choice of 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 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.² 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.

¹ A useful description of the pattern of cross-border M&A activity is provided by Brakman et al (2006).

² A common alternative source for mergers and acquisitions is the SDC database, although as noted below, several others have been used.

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 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, 1998). 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 (2009) 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.³ 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 in the country 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, 2009, and Voget, 2011), and in the location of new subsidiaries (Barrios et al, 2008).

Section I presents a brief review of the relevant literature on which we draw. This literature informs the approach in Section II 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 III, we set

³ 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.

out our empirical methodology and describe the data in more detail. In Section IV we present our results. We conclude in Section V.

I. Related Literature

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 organization 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, Liao and Weisbach (2011) 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, Foley and Wurgler (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 year⁴ 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.

Permanent differences in valuation may arise from differences in investor protection across countries. Erel et al (2011) and Rossi and Volpin (2004) both find support for the view that relatively weak investor protection in a country increases the probability of a cross-border acquisition.⁵ Rossi and Volpin examine this in the context of an empirical model

⁴ Though permanent differences could also generate more cross-border M&A (see Froot and Stein, 1991).

⁵ 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.

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, Massimo and Matos (2009), 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.⁶ Ferreira 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.⁷ 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.⁸

A small number of studies have examined macroeconomic factors in the determination of cross-border M&As.⁹ Di Giovanni (2005) and Coeurdacier, De Santis and Aviat (2009) examine the 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

⁶ 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.

⁷ See, for example, Ferrett (2005), Nocke and Yeaple (2007), Neary (2007, 2009), Norbäck and Persson (2007).

⁸ That raises the general question of the optimal tax treatment of inbound and outbound M&A activity, which is addressed by Becker and Fuest (2010) and Norbäck, Persson and Vlachos (2009). 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.

⁹ Seth et al (2002) investigate the sources of gains and losses on cross border M&As, but do not examine the locations.

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, Mucchielli and Zitouna (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 and Maffini (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, 2002). 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 (1998), 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 (1998) 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, Büttner and Ruf (2007), Barrios et al (2008) and Hebous, Ruf and Weichenrieder (2011) 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. Büttner 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.

II. 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.

II.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.¹⁰ 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

¹⁰ 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.

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 acquisition at all.¹¹ 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

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

where $\beta = (1 - \alpha\tau)/(1 - \tau)$ is a measure of the generosity of the definition of the tax base.¹² We do not consider other taxes in this analysis. Expression (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 (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

¹¹ 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.

¹² For example, for a cash flow tax, levied only on economic rent, then $\alpha = \beta = 1$.

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 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.¹³ 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.

(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 recognized 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

¹³ This is assumed by Norbäck, et al (2009), for example.

stream as a result of the acquisition to be ΔY . Then the post-tax surplus generated from the acquisition is

$$\text{Home:} \quad S_i = (1 - \tau_i)\Delta Y_i \quad (2a)$$

$$\text{Foreign:} \quad S_j = (1 - \tau_j^*)\Delta Y_j \quad (2b)$$

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.

(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, organization, 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

$$\text{home:} \quad S_i = (1 - \alpha_i \tau_i)(C_H - C_L) \quad (3a)$$

$$\text{foreign:} \quad S_j = (1 - \alpha_j \tau_j^*)(C_H - C_L) \quad (3b)$$

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

$$\text{foreign:} \quad S_j = (1 - \alpha_i \tau_i)C_H - (1 - \alpha_j \tau_j^*)C_L \quad (3c)$$

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.

(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

$$\text{foreign: } S_j = |(\tau_i - \tau_j^*)|X \geq 0 \quad (4)$$

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.¹⁴ 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:

¹⁴ Other opportunities may arise instead, such as combining profits in one company with losses in another.

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 (4) 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.

(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, 1998, 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

$$\text{Home:} \quad S_i = (1 - T_i)W_i \quad (5a)$$

$$\text{Foreign:} \quad S_j = (1 - T_j^*)W_j \quad (5b)$$

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).

II.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 analyzing 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.

II.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 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 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

III. Empirical Approach

a. 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

$$S_{ij} = \beta_j' z_i + \gamma x_j + \varepsilon_{ij} \quad (6)$$

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 (6) are *iid* Gumbel, which gives the property of IIA (independence of irrelevant alternatives). We relax the IIA property 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

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

i.e. $\gamma_i \sim \text{iid } N(\gamma' w_i, \sigma^2)$. 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 $\sigma=0$.¹⁵

Substituting (7) into (6) gives

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

The company specific error term $\sigma x_j u_i$ induces correlation between alternatives which is not present in the standard multinomial choice model, and which relaxes the IIA property. 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,

¹⁵ 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.

$$\Pr ob(y_{ij} = 1) = \frac{\exp(\beta'_j z_i + \gamma_i x_j)}{\sum_l \exp(\beta'_l z_i + \gamma_i x_l)} \quad (9)$$

where y_{ij} is a dummy variable which takes the value of 1 if company i chooses alternative j .¹⁶ 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,

$$p_{ij} \equiv \Pr ob(j \text{ is chosen}) = \int \frac{\exp\{\beta'_j z_i + (\gamma' w_i) x_j + \sigma x_j u_i\}}{\sum_{l=1}^L \exp\{\beta'_l z_i + (\gamma' w_i) x_l + \sigma x_l u_i\}} \phi(u) du \quad (10)$$

where ϕ denotes the standard Normal density. The log likelihood will consist of terms like in (10). The model is estimated using simulated maximum likelihood using the fact that (10) 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 (10). In our simulations we use 50 Halton draws.^{17, 18}

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).

b. Data

The data for the analysis come from the 2005¹⁹ 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

¹⁶ Equation (8) collapses to the error components multinomial logit model when we allow for a company specific random intercept.

¹⁷ 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.

¹⁸ The model parameters are estimated in NLOGIT 4 (NLOGIT, 2007).

¹⁹ The year 2005 refers to the period 1st April 2005 to 31st March 2006.

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.

Our analysis is based on a cross-section sample of parent companies not defined as 'micro' in European Commission (2003) in 2005.²⁰ 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 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.

²⁰ Selecting non-micro companies involved selecting only companies with at least two subsequent years of recorded total assets greater than €2,000 and at least one employee.

We define the choice set to preserve reasonable cell sizes for the statistical analysis and 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 2. The UK has the largest number of companies undertaking an acquisition, with 674 companies, followed by the USA with 261 and France with 205. Table 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.

c. 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 La Porta et. al (2008). Details are given in Appendix 2. Table 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.

IV. Results

We first present the results from our base model estimation in Table 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 (8). 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 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 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 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 than 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 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 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 (2009) 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 6 we explore *Propositions 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, 1998) has argued that the *effective average tax rate* (EATR) is the relevant measure of taxation for new greenfield investment (evidence from a meta analysis is provided by Feld and Heckemeyer, 2011). 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 5, which is the baseline used in Table 6. 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 depend 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 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 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 7 reproduces the specifications in Table 5, but including these multiple acquisitions. Across the 7 columns, the results are broadly similar to those in Table 5. The coefficient estimates differ to some extent, but they are never significantly different from the estimates in Table 5. Standard errors tend to be slightly smaller, reflecting the larger sample size. The effects of size are slightly different from those in Table 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 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 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 8 and 9 summarise elasticities based on Table 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 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 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 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.

V. 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.

Appendix 1: 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 ($=1, \dots, J$) by acquirer i is given by

$$S_{ij} = \beta_j' z_i + \gamma x_j + \varepsilon_{ij} \quad (1)$$

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

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

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

$$\text{The corresponding elasticity is given by } \frac{\partial \log p_{ij}}{\partial \log x_j} = (1 - p_{ij})x_j\gamma \quad (4)$$

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

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

$$\text{And the corresponding elasticity is given by } \frac{\partial \log p_{ij}}{\partial \log x_m} = -p_{im}x_m\gamma \quad (6)$$

Note, the elasticity in (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 (1), we now assume that every company in our sample has its own γ and write this as

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

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

Substituting (7) into (1), we get

$$S_{ij} = \beta'_j z_i + (\gamma' w_i + \sigma u_i) x_j + \varepsilon_{ij} = \beta'_j z_i + (\gamma' w_i) x_j + (\sigma x_j u_i + \varepsilon_{ij}) \quad (8)$$

Estimation of company specific effect γ_i

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

$$f(u_i | \text{data}) = f(u_i | \text{the choices}) = f(\text{choices} | u_i) f(u_i) / f(\text{choices}).$$

Thus,

$$E(u_i | \text{choices}) = \int u f(u | \text{choices}) du = \frac{\int u f(\text{choices} | u) f(u) du}{f(\text{choices})} \quad (9)$$

$f(\text{choices} | u)$ is the conditional likelihood which appears in the likelihood function prior to marginalisation, and $f(\text{choices})$ is the marginal likelihood which are obtained during the maximisation. $f(u)$ is the standard normal density by assumption in our model. The estimated $E(u_i | \text{choices})$ 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 (2)-(5). 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.

Appendix 2: Data Description

	Variable Description	Source
<i>Tax Variables</i>		
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
<i>Economic Indicators</i>		
ln(GDP)	: ln of GDP (originally measured in constant 2000 US\$)	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
<i>Distance Variables</i>		
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
<i>Institutional Variables</i>		
Corruption Score	: Average corruption score over the period 1996-2000	WDI, 2011
Mkt Capit. To GDP	: Ratio of market capitalization 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

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Table 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 categorized 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	43.0
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	87.0
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 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
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

Parent Country	(1)	(2)	(3)	(4)
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 - 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 a domestic one or a cross-border one. The percentages are calculated for the chosen category.

LOCATION OF TARGETS	Full Sample		Parents Making One Choice		Multinationals	
	(1)	(2)	(3)	(4)	(5)	(6)
<u>Cross-border acquisitions</u>						
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%
<u>Domestic acquisitions</u>	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%
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%

Table 3 - Continued

	Full Sample		Parents Making One Choice		Multi-nationals	
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 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)-(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)-(11) were taken from the World Bank World Development Indicators (WDI) database; Columns (12)-(14) were taken from the GeoDist database (Mayer and Zignago, (2011) and La Porta et. al (2008). Details for each variable are given in Appendix 2.

Alternative	Statutory Tax Rate	Effective Average Tax Rate	Capital Allowance	ln(GDP)	GDP growth	Cost Bus. Start-up	Business Disclosure Index	Unempl.	Distance between the Capitals	Common Legal System	Corruption Score	Ratio of Market Capitalisation to GDP	ln(No. Dom. Firms)	Private Credit 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	3.00	4.34	2625.81	0.10	1.83	0.16	2.49	1.01
Belgium	0.34	0.28	0.20	26.31	2.37	5.44	8.00	7.60	2258.08	0.27	1.21	0.67	2.74	0.78
Brazil	0.34	0.33	0.16	27.43	5.11	9.60	6.00	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	0.80	8.00	6.13	5829.38	0.42	2.27	1.05	4.30	0.96
Switzerland	0.21	0.17	0.13	26.38	3.15	2.13	0.00	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	5.00	8.92	2498.51	0.06	1.85	0.54	2.30	1.16
Denmark	0.27	0.23	0.15	25.92	1.39	0.00	7.00	3.67	2428.62	0.13	2.34	0.57	3.67	1.10
Domestic	0.31	0.27	0.16	27.58	2.77	5.02	7.43	6.01	406.43	1.00	1.69	1.11	3.06	1.10
Spain	0.33	0.31	0.15	27.31	2.95	15.41	5.00	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	6.00	6.97	2920.68	0.13	2.39	1.77	3.35	0.56
France	0.34	0.29	0.20	28.04	1.79	1.08	10.00	8.13	2459.02	0.23	1.50	0.88	2.62	0.84
Great Britain	0.29	0.26	0.15	28.20	2.12	0.77	10.00	5.28	2946.61	0.25	2.09	1.57	3.56	1.30
Ireland	0.13	0.11	0.06	25.64	2.94	0.30	10.00	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	7.00	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	4.00	3.26	2297.24	0.26	2.27	1.32	2.52	1.32
Norway	0.28	0.25	0.15	26.01	2.30	2.30	7.00	2.82	2548.05	0.14	2.11	0.40	3.69	0.93
Russia	0.24	0.21	0.13	26.73	7.59	4.53	6.00	6.46	3487.30	0.26	-0.81	0.33	0.41	0.14
Sweden	0.28	0.23	0.16	26.42	2.71	0.63	6.00	6.38	2813.55	0.08	2.35	1.13	3.44	0.88
United States	0.40	0.35	0.20	30.09	1.68	0.73	7.00	4.92	6664.27	0.39	1.77	1.42	3.13	2.05

Table 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 logits (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 (τ^*) 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 (τ) 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%).

Variable	(1) Basic Specification Multinomial Logit	(2) Basic Specification RP Logit	(3) Large=4 or more subsidiaries in 2005	(4) Large=Presen t in 4 or more locations in 2005	(5) Alternative is a New- location choice	(6) Parent Country vs Host Country Taxes	(7) Parent Country vs Host Country Taxes
Interaction of host-country statutory tax rate (τ^*) &							
cb expansion	-3.886 (3.064)	-12.349** (4.857)	-11.283** (4.817)	-11.578** (4.729)	-12.448*** (4.796)	-12.165*** (4.604)	-12.739*** (4.862)
cb expansion & mne2005	0.598 (1.132)	5.078** (2.412)	7.187** (2.950)	4.409* (2.309)		5.302** (2.154)	6.028** (2.733)
cb expansion & large-mne2005			-4.054** (2.064)	0.706 (1.746)			
cb expansion & large-Non-mne2005			-4.113 (2.802)				
cb expansion & mne2005 & parcredit & ($\tau > \tau^*$)						12.582** (5.506)	12.160** (5.650)
cb expansion & mne2005 & ($\tau < \tau^*$)							-0.532 (3.637)
cb expansion & Non-mne2005 & parcredit & ($\tau > \tau^*$)						-3.952 (7.301)	-2.992 (7.595)
cb expansion & Non-mne2005 & ($\tau < \tau^*$)							1.496 (4.028)

Table 5 Continued

Variable	[1] Basic Specification Multinomial Logit	[2] Basic Specification RP Logit	[3] Large=4 or more subsidiaries in 2005	[4] Large=Presen t in 4 or more locations in 2005	[5] Alternative is a New- location choice	[6] Parent Country vs Host Country Taxes	[7] Parent Country vs Host Country Taxes
Interaction of host-country statutory tax rate (τ^*) & cb expansion & New-Location & mne2005					4.616** (2.291)		
cb expansion & Old-Location & mne2005					7.094** (2.786)		
dom expansion	-3.136 (2.388)	-5.780 (3.693)	-4.951 (3.726)	-5.929* (3.582)	-5.696 (3.682)	-4.944 (3.748)	-5.266 (4.311)
dom expansion & mne2005	-5.470*** (1.221)	-5.687*** (1.441)	-2.762 (2.236)	-4.357*** (1.620)	-5.646*** (1.443)	-4.672*** (1.491)	-4.512*** (1.534)
dom expansion & mne2005 & large			-4.502** (2.085)	-3.060* (1.709)			
dom expansion & Non-mne2005 & large			-2.268 (2.832)				
log GDP (constant 2000 US\$)	0.569*** (0.105)	1.045*** (0.257)	1.028*** (0.260)	1.034*** (0.254)	1.062*** (0.256)	1.063*** (0.248)	1.068*** (0.249)
GDP growth	-0.042 (0.039)	-0.066 (0.051)	-0.064 (0.051)	-0.075 (0.050)	-0.066 (0.051)	-0.066 (0.050)	-0.066 (0.051)
Cost of business start-ups as % of GNI	-0.036*** (0.006)	-0.060*** (0.014)	-0.060*** (0.014)	-0.059*** (0.014)	-0.060*** (0.014)	-0.061*** (0.013)	-0.061*** (0.014)
Business extent of disclosure index	-0.040 (0.030)	-0.010* (0.055)	-0.102* (0.055)	-0.102* (0.054)	-0.100* (0.055)	-0.109** (0.054)	-0.107** (0.054)
Unemployment as a % of labour force	0.060** (0.024)	0.065* (0.037)	0.064* (0.037)	0.067* (0.036)	0.065* (0.037)	0.053 (0.037)	0.053 (0.037)

Table 5 – Continued

Variable	[1]	[2]	[3]	[4]	[5]	[6]	[7]
	Basic Specification Multinomial Logit	Basic Specification RP Logit	Large=4 or more subsidiaries in 2005	Large=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
Contiguity of Host and Target Country & cb expansion	0.492*** (0.163)	0.455*** (0.172)	0.454*** (0.172)	0.454*** (0.171)	0.442** (0.172)	0.436** (0.172)	0.437** (0.174)
Common Language & cb expansion	0.342** (0.170)	0.315* (0.184)	0.324* (0.184)	0.334* (0.183)	0.336* (0.184)	0.317* (0.184)	0.315* (0.185)
Distance btw capitals of Host and Target Country & cb expansion	-0.281*** (0.069)	-0.424*** (0.085)	-0.404*** (0.085)	-0.412*** (0.056)	-0.426*** (0.085)	-0.438*** (0.083)	-0.440*** (0.083)
Common Legal System & cb expansion	0.798*** (0.123)	0.800*** (0.127)	0.802*** (0.127)	0.799*** (0.127)	0.794*** (0.127)	0.801*** (0.127)	0.801*** (0.127)
Average Corruption Score, av. 1996/2000	-0.195 (0.146)	-0.368 (0.251)	-0.403 (0.252)	-0.285 (0.237)	-0.327 (0.249)	-0.467* (0.255)	-0.469* (0.256)
Ratio of market capitalization to GDP, av. 1999/2003	0.101 (0.166)	0.180 (0.279)	0.164 (0.278)	0.170 (0.268)	0.205 (0.280)	0.168 (0.272)	0.167 (0.274)
$\ln(\text{No. Domestic Firms } pc)$, av. 1999-2003	0.067 (0.104)	0.074 (0.176)	0.086 (0.176)	0.025 (0.169)	0.027 (0.177)	0.115 (0.173)	0.114 (0.175)
Private credit to GDP, av. 1999-2003	-1.087*** (0.254)	-1.780*** (0.496)	-1.754*** (0.497)	-1.824*** (0.490)	-1.795*** (0.495)	-1.604*** (0.509)	-1.603*** (0.511)
Standard Deviation of the RP on tax (σ)		7.620*** (2.238)	7.547*** (2.288)	7.072*** (2.165)	7.622*** (2.185)	7.380*** (2.065)	7.418*** (2.073)
Maximised Log Likelihood	-2608.10	-2602.28	-2597.17	-2591.18	-2599.12	-2595.08	-2579.97

Table 6: Extensions to Model Column [2] in Table 5

This table presents results from some sensitivity checks where the statutory tax variable τ 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 logits (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 τ (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 multinational 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** (4.857)	-10.672** (5.344)	-9.454* (5.156)
Interaction of Tax & cb expansion * mne2005	5.078** (2.412)	5.217** (2.340)	5.106** (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	-5.780 (3.693)	-7.706** (3.613)	-8.688** (4.223)
Interaction of Tax & dom expansion & mne2005	-5.687*** (1.441)	-6.132*** (1.539)	-6.296** (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 US\$)	1.045*** (0.257)	1.155*** (0.270)	1.432*** (0.318)
GDP growth	-0.066 (0.051)	-0.061 (0.049)	-0.060 (0.053)
Cost of business start-ups as % of GNI	-0.060*** (0.014)	-0.058*** (0.013)	-0.064*** (0.015)
Business extent of disclosure index	-0.010* (0.055)	-0.117** (0.055)	-0.151** (0.061)
Unemployment as a % of labour force	0.065* (0.037)	0.067* (0.035)	0.071* (0.039)

Table 6 - Continued

Tax Variable used in the model	Statutory Tax τ	EATR	τ + allowances
Variable	[1] (Table 5: [2])	[2]	[3]
Contiguity of Host and Target Country & cb expansion	0.455*** (0.172)	0.476*** (0.172)	0.406** (0.182)
Common Language & cb expansion	0.315* (0.184)	0.294 (0.186)	0.338* (0.190)
Distance btw capitals of Host and Target Country & cb expansion	-0.424*** (0.085)	-0.400*** (0.081)	-0.445*** (0.089)
Common Legal System & cb expansion	0.800*** (0.127)	0.814*** (0.131)	0.803*** (0.134)
Average Corruption Score, av. 1996/2000	-0.368 (0.251)	-0.357 (0.244)	-0.242 (0.274)
Ratio of market capitalization to GDP, av. 1999/2003	0.180 (0.279)	-0.026 (0.269)	-0.251 (0.314)
<i>ln</i> (No. Domestic Firms pc), av. 1999-2003	0.074 (0.176)	0.168 (0.169)	0.222 (0.193)
Private credit to GDP, av. 1999-2003	-1.780*** (0.496)	-1.794*** (0.482)	-2.056*** (0.537)
Standard Deviation of the RP (σ) for the tax effect	7.620*** (2.238)	7.720*** (2.262)	8.045*** (2.169)
Maximised Log Likelihood	-2602.28	-2590.81	-2571.47

Table 7: Table 5 Models Re-estimated Including Parent Making Multiple Acquisitions over the Period 2006-2008

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 logits (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 (τ^*) 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 (τ) effects to vary with the alternatives. Sample size is 3,051 parents making multiple 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 provided in parentheses. The asterisks indicate significance: *** (1%), ** (5%), * (10%).

Variable	[1] Basic Specification Multinomial Logit	[2] Basic Specification RP Logit	[3] Large=4 or more subsidiaries in 2005	[4] Large=Presen t in 4 or more locations in 2005	[5] Alternative is a New- location choice	[6] Parent Country vs Host Country Taxes	[7] Parent Country vs Host Country Taxes
Interaction of host-country statutory tax rate (τ^*) & cb expansion	-0.497 (2.315)	-10.947** (4.487)	-9.892** (4.480)	-9.623** (4.276)	-11.384*** (4.380)	-11.007** (4.488)	-11.214** (4.561)
cb expansion & mne2005	1.392 (0.874)	7.463*** (2.328)	5.955** (2.486)	4.532** (1.964)		7.661*** (2.250)	9.556*** (2.747)
cb expansion & large-mne2005			0.581 (1.577)	3.911*** (1.383)			
cb expansion & large-Non-mne2005			-3.497* (2.113)				
cb expansion & mne2005 & parcredit & ($\tau > \tau^*$)						8.089 (5.034)	5.963 (5.115)
cb expansion & mne2005 & ($\tau < \tau^*$)							-6.111* (3.382)
cb expansion & Non-mne2005 & parcredit & ($\tau > \tau^*$)						-6.044 (6.582)	-3.791 (6.796)
cb expansion & Non-mne2005 & ($\tau < \tau^*$)							0.193 (3.928)

Table 7 Continued

Variable	[1] Basic Specification Multinomial Logit	[2] Basic Specification RP Logit	[3] Large=4 or more subsidiaries in 2005	[4] Large=Presen t in 4 or more locations in 2005	[5] Alternative is a New- location choice	[6] Parent Country vs Host Country Taxes	[7] Parent Country vs Host Country Taxes
Interaction of host-country statutory tax rate (τ^*) & cb expansion & New-Location & mne2005					6.296*** (2.050)		
cb expansion & Old-Location & mne2005					11.342*** (2.832)		
dom expansion	-3.976*** (2.021)	-7.786** (3.441)	-7.307** (3.457)	-7.572** (3.263)	-7.441** (3.444)	-7.659** (3.641)	-4.959 (4.211)
dom expansion & mne2005	-4.694*** (0.945)	-4.693*** (1.117)	-4.653*** (1.735)	-4.505*** (1.251)	-4.768*** (1.126)	-4.073*** (1.148)	-3.760*** (1.172)
dom expansion & mne2005 & large			-1.058 (1.522)	-0.737 (1.218)			
dom expansion & Non-mne2005 & large			-2.872 (2.077)				
log GDP (constant 2000 US\$)	0.536*** (0.092)	1.098*** (0.242)	1.100*** (0.247)	1.047*** (0.230)	1.136*** (0.238)	1.117*** (0.244)	1.145*** (0.241)
GDP growth	-0.048 (0.033)	-0.063 (0.043)	-0.066 (0.043)	-0.073* (0.042)	-0.067 (0.043)	-0.063 (0.043)	-0.064 (0.043)
Cost of business start up as % of GNI	-0.029*** (0.006)	-0.056*** (0.013)	-0.056*** (0.013)	-0.054*** (0.012)	-0.056*** (0.013)	-0.057*** (0.013)	-0.060*** (0.013)
Business extent of disclosure index	-0.039 (0.025)	-0.110** (0.051)	-0.110** (0.051)	-0.108** (0.049)	-0.112** (0.051)	-0.114** (0.052)	-0.115** (0.051)
Unemployment as a % of labour force	0.058*** (0.022)	0.070** (0.035)	0.072** (0.035)	0.074** (0.034)	0.072** (0.036)	0.063* (0.036)	0.067* (0.036)

Table 7 - Continued

Variable	[1] Basic Specification Multinomial Logit	[2] Basic Specification RP Logit	[3] Large=4 or more subsidiaries in 2005	[4] Large=Prese nt in 4 or more locations in 2005	[5] Alternative is a New- location choice	[6] Parent Country vs Host Country Taxes	[7] Parent Country vs Host Country Taxes
Contiguity of Host and Target Country & cb expansion	0.438*** (0.123)	0.378*** (0.131)	0.379*** (0.131)	0.361*** (0.131)	0.338*** (0.131)	0.375*** (0.131)	0.348*** (0.132)
Common Language & cb expansion	0.247* (0.131)	0.250* (0.141)	0.261* (0.141)	0.278** (0.140)	0.290** (0.141)	0.251* (0.141)	0.269* (0.142)
Distance btw capitals of Host and Target Country & cb expansion	-0.295*** (0.053)	-0.424*** (0.064)	-0.414*** (0.065)	-0.424*** (0.065)	-0.440*** (0.064)	-0.429*** (0.063)	-0.436*** (0.063)
Common Legal System & cb expansion	0.686*** (0.096)	0.694*** (0.100)	0.693*** (0.100)	0.696*** (0.010)	0.689*** (0.100)	0.694*** (0.100)	0.695*** (0.100)
Average Corruption Score, av. 1996/2000	-0.198 (0.123)	-0.383* (0.231)	-0.386* (0.231)	-0.230 (0.212)	-0.292 (0.230)	-0.444* (0.239)	-0.438* (0.238)
Ratio of market capitalization to GDP, av. 1999/2003	-0.141 (0.139)	-0.246 (0.256)	-0.238 (0.254)	-0.195 (0.240)	-0.156 (0.259)	-0.250 (0.257)	-0.293 (0.258)
<i>ln</i> (No. Domestic Firms pc), av. 1999-2003	0.100 (0.089)	0.150 (0.167)	0.142 (0.166)	0.039 (0.155)	0.015 (0.169)	0.179 (0.168)	0.136 (0.169)
Private credit to GDP, av. 1999-2003	-0.758*** (0.224)	-1.444*** (0.455)	-1.460*** (0.458)	-1.484*** (0.434)	-1.514*** (0.456)	-1.407*** (0.500)	-1.449 (0.498)
Standard Deviation of the RP (σ) for the tax effect		8.803*** (2.173)	8.683*** (2.224)	7.804*** (2.008)	8.967*** (2.076)	8.838*** (2.203)	8.820*** (2.098)
Maximised Log Likelihood	-4433.31	-4423.24	-4419.88	-4397.94	-4403.15	-4420.19	-4418.158

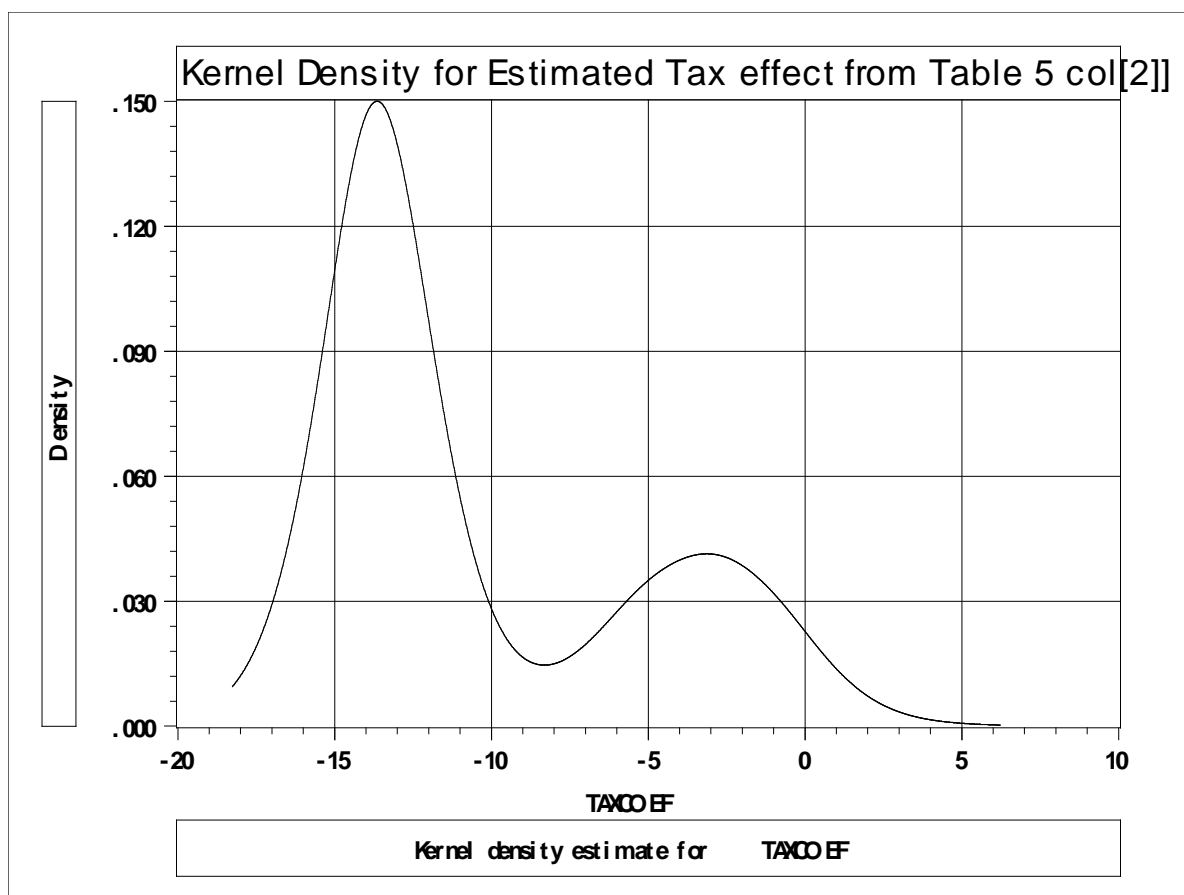
Table 8 - Elasticity wrt change of X in row choice on Prob[column choice] - - Table 5 Column [1] Model (no RP)

	AT	BE	BR	CA	CH	DE	DK	DOM	ES	FI	FR	GB	IE	IT	NL	NO	RU	SE	US
AT	-0.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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	-1.30	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	0.00	0.00	0.00	0.00	-0.81	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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	0.00	0.00	0.00	0.00	0.00	0.00	-1.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.48	0.00	0.00	0.00	0.00	0.00	0.00
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 9- Elasticity wrt 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	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
BE	0.01	-0.76	0.00	0.00	0.02	0.00	0.01	0.02	0.01	0.01	0.01	0.01	0.02	0.00	0.02	0.01	0.02	0.01	-0.01
BR	0.01	0.00	-0.80	0.00	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.00
CA	0.00	-0.01	-0.01	-0.64	0.00	-0.01	0.00	0.01	-0.01	0.00	-0.01	0.00	0.01	-0.01	0.00	0.00	0.00	0.00	0.00
CH	0.00	0.00	0.00	0.00	-1.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DE	0.02	-0.01	-0.01	-0.02	0.03	-0.53	0.02	0.03	0.00	0.02	0.00	0.02	0.03	-0.02	0.02	0.01	0.02	0.02	-0.03
DK	0.01	0.00	0.00	0.00	0.01	0.00	-1.14	0.01	0.00	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.00
DOM	0.95	0.74	0.73	0.72	1.04	0.69	0.90	-0.31	0.79	0.93	0.76	0.95	1.24	0.71	0.91	0.88	0.98	0.90	0.69
ES	0.02	0.00	0.00	0.00	0.02	0.00	0.02	0.02	-0.86	0.02	0.02	0.02	0.03	0.00	0.02	0.01	0.02	0.02	0.00
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	0.00
FR	0.02	0.01	0.00	0.00	0.03	0.00	0.02	0.02	0.01	0.02	-0.73	0.02	0.03	0.00	0.02	0.02	0.02	0.02	-0.01
GB	0.09	0.04	0.03	0.03	0.10	0.02	0.08	0.10	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	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.01	-1.10	0.00	0.01	0.01	0.01	0.01	0.00
IT	0.01	0.00	0.00	0.00	0.01	-0.01	0.01	0.01	0.00	0.01	0.00	0.01	0.01	-0.65	0.01	0.00	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	0.00
NO	0.01	0.01	0.01	0.01	0.02	0.00	0.01	0.02	0.01	0.02	0.01	0.01	0.02	0.01	0.01	-1.11	0.02	0.02	0.00
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	0.10	-0.06	0.05	0.03	0.07	0.05	-0.47

**Figure 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

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