

# Taxes and the Location of Targets\*

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## Abstract

We use firm-level data to investigate the impact of taxes on the international location of targets in M&A, allowing for domestic acquisitions and heterogeneous responses by companies. The statutory tax rate in the target country is found to have a negative impact on the probability of an acquisition in that country. In addition, the estimated size of the effect is found to depend on whether (i) acquirer is a domestic or a multinational enterprise; (ii) the acquisition is domestic or cross-border; and (iii) the acquirer's country has a worldwide or territorial tax system.

**JEL Classification :** G34, H25, H32, C25

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# 1 Introduction

This paper examines the impact of corporate taxation on the choice of the international location of a target company by an acquiring company, including domestic acquisitions. We estimate a form of the random parameters logit model which examines the role of taxation in the location choice - between the home country and a number of foreign countries - conditional on an acquisition taking place, and controlling for other determinants of this choice. Surprisingly, given the importance of cross-border mergers and acquisitions (M&A) in aggregate foreign direct investment (FDI), the impact of taxation on the location of targets in international mergers and acquisitions has not been thoroughly investigated before.

The growth of international cross-border M&A is well documented. The UNCTAD 2017 World Investment Report states that globally, the total value of cross-border M&A sales in 2016 was \$869 billion, representing around 50% of total FDI flows. Both this nominal value and the proportion of total FDI are the highest since just before the financial crisis in 2007, which was an exceptional year.<sup>1</sup>

There is a very large literature on the impact of taxes on FDI. Surveys and meta-analyses include de Mooij and Ederveen (2008), and Feld and Heckemeyer (2011). This literature finds a substantial impact of taxation. For example, the meta analysis of Feld and Heckemeyer estimates that the semi-elasticity of FDI with respect to the tax rate is around -2.5. The flow of FDI from country  $i$  to country  $j$  depends on both extensive and intensive margin decisions. On the extensive margin an investor in  $i$  must choose between greenfield investment and acquiring an existing business, and in the latter case between targets in alternative locations. Conditional on those choices, there may also be intensive margin decisions about how much to invest. In this paper we focus on just one aspect of these decisions: conditional on the decision to acquire an existing business, the impact of taxation on the location of the target business, including the home country as well as alternative foreign countries.

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<sup>1</sup>Another measure of the importance of cross-border M&A is provided by Erel et al. (2012), who report that the volume of cross-border acquisitions grew from 23% of total merger volume in 1998 to 45% in 2007. A useful description of the pattern of cross-border M&A activity prior to the financial crisis is provided by Brakman et al. (2007).

We are not aware of any other paper that focuses specifically on this decision. Some other papers that analyse the location of cross-border M&A control for differences in taxation, but this literature pays little attention to the role of taxation. The closest approach to ours in the existing literature is Bertrand et al. (2007) who estimate a conditional logit model over 400 European cross-border acquisitions in the 1990s, and include tax amongst the explanatory variables. However, they have little discussion of tax effects, which are largely insignificant.<sup>2</sup> Barrios et al. (2012) estimate a conditional logit model which examines the determinants of where a company chooses to have a new subsidiary, and find that a one percentage point increase in the host country tax rate reduces the probability of that location being chosen by 0.63%. But this study identifies a new subsidiary as a company that simply appears in the database for the first time; this does not necessarily identify M&A decisions.

Other papers take different approaches in analyzing cross-border M&As. For example, Di Giovanni (2005) and Coeurdacier et al. (2009) examine the determinants of aggregate M&A flows between bilateral pairs of countries, rather than individual location choices, using data from 1990-1999 and 1985-2004, respectively. Both papers find a significantly negative impact of corporate taxation in the country of the acquired company in the aggregate data. Erel et al. (2012) explore the proportion of the total number of M&A deals in a country that have foreign acquirers, and find a very weak effect of taxation in cross-section analysis.<sup>3</sup> Again, however, they do not directly analyse the location choices of acquirers. In similar vein, Herger et al. (2016) analyse the number of acquisitions taking place between bilateral pairs of countries, and find an elasticity of the number of acquisitions to the international tax rate of around -0.4. Hebous et al. (2011) consider the impact of tax on greenfield FDI and cross-border M&A separately, using data on German parent companies, and find that the elasticity of FDI with respect to taxation is higher for greenfield investment than for M&A. However, they use a logit model, identifying separately for each possible location whether M&A takes place, rather than directly examining the choice between different locations. Hanlon et al

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<sup>2</sup>It is not clear exactly how the tax variable is defined in this study, which uses M&A data from the Kiel Institute for World Economics.

<sup>3</sup>The tax variable is not included in the panel data part of the study.

(2015) examine whether "locked-out" cash, held abroad by US multinationals to avoid taxes on the repatriation of profit, affects whether such firms undertake foreign acquisitions, and find evidence that higher cash held abroad tends to be associated with a higher probability of undertaking foreign acquisitions. This represents a different channel for the effects of taxation than the one studied in this paper. None of these papers directly address the issue studied in this paper - the location choice made by an acquirer, conditional on making an acquisition.

By contrast, we use acquisition-level data on domestic and cross-border acquisitions to directly estimate the effects of taxation on the location choice. We treat the choice of where to acquire a target company as being made by the ultimate parent company, conditional on choosing to make an acquisition. We provide a conceptual framework to show that the effects of taxes on the location of targets can be heterogeneous, depending on the characteristics of the acquirer, target and acquisition. We derive testable predictions which we take to the data. The econometric model we use allows for these heterogeneous effects. Further, we find that our data do not support the assumption of independence of irrelevant alternatives (IIA), inherent in a standard multinomial logit model. We therefore estimate the more general random parameters model which enables us to allow for further heterogeneity in the effects of taxes on location choices

Our conceptual analysis shows that the role of taxes on profits, and hence the probability of choosing a particular target, is not straightforward. A starting point is that an M&A will only occur if it is expected that some surplus is generated. If that surplus is captured wholly by the shareholders of the acquired company, then the acquirer is simply making a zero net present value (NPV) investment. Any difference in tax between possible target locations would be capitalized into the purchase price to keep the NPV equal to zero, but differences in taxes would not affect the choice of target. For tax to affect the choice of target it is therefore necessary for the acquirer to capture at least part of the surplus generated. Assuming this, suppose that the acquirer is able to increase the revenue stream of the target, through improved efficiency, greater knowledge or perhaps simply use of a brand name. The

value of the revenue stream is reduced proportionately by the host country statutory tax rate, and so a higher statutory rate would tend to reduce the probability of a particular target being chosen.<sup>4</sup>

In our empirical work, we combine data from two rich world-wide datasets from Bureau van Dijk, ORBIS and ZEPHYR. We merge data on the M&A activities of companies as recorded in ZEPHYR with their accounting data and ownership data from ORBIS structure, to trace changes of ownership through M&As that occurred between 2008 and the end of 2016. We treat M&As in blocks of three-years waves (2008-2010, 2011-2013 and 2014-2016). Our main analyses are conducted using data for the period 2014-16, but we also provide additional estimations using the earlier waves. Overall, our results suggest that the host country tax rate has a significant negative effect on the probability of a company in that country being acquired. Estimates vary across countries: specifically, the elasticities of the probability of a target in country  $i$  being chosen with respect to the tax rate in country  $i$  range from -0.3 to -2.3. We also estimate cross-elasticities; unsurprisingly these are much lower.

The choice of target may also depend on the tax system in the country of the acquirer. Where that country taxes worldwide profit, with a credit for host country taxation, then the effect of host country taxation may be diminished. This element of the international tax regime was the primary focus of the analysis by Huizinga and Voget (2009) who 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). We also find evidence that the effect of corporate tax of the target's country plays a less significant role when the rate is below that of the acquirer's country, and when the latter operates a worldwide tax system. This is consistent with the acquirer taking into account home country taxation

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<sup>4</sup>In our empirical work, we include both national and local taxes in the overall statutory rate.

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 Voget (2011)), and in the location of new subsidiaries (Barrios et al. (2012)).

We also consider other aspects of the tax regime. 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 in both countries may be a factor in the choice. This consideration moves the analysis closer to the conventional treatment of taxation in the case of cross-border greenfield investment, where a conventional measure of the effective tax rate becomes relevant.<sup>5</sup> 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. An alternative may also be possible: that the acquirer can generate a surplus by cutting costs in the target. In this case, more generous treatment of those costs in the host country tax system would reduce the gain from cutting costs. Perhaps reflecting these alternative possibilities, we do not find a significant role for capital allowances.

As well as investigating heterogeneity across parent countries depending on their tax regimes, we also investigate heterogeneity due to differences in parent company characteristics. For example, it seems plausible that there is some element of fixed costs in undertaking cross-border investments. Such costs are less significant for larger acquisitions; they may also be smaller for companies which already have some foreign activities which may already have paid some or all of such costs. The impact of marginal tax differences between locations may therefore differ between large and small acquirers, between previously purely domestic acquirers and companies that are already multinational, and between locations depending on whether the acquirer already has a presence there. We investigate these sources of heterogeneity. We find that “domestic companies” (companies that did not own any foreign subsidiaries in the base year), are less sensitive to taxation than multinationals in the choice

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<sup>5</sup>See Devereux and Griffith (1998) and Devereux and Griffith (2003) for earlier analyses of these issues with respect to greenfield investment. Recent studies which try to define the effective tax rate (ETR), use assumptions regarding how the parent and the host country tax rates interact with each other. For example, Barrios et al. (2012) as well as Huizinga and Voget (2009), construct an ETR based on the subsidiary’s pre-tax income which is endogenous since this depends on the actual location choice.

of whether to acquire a target domestically or abroad; this may reflect higher fixed costs for domestic companies, relative to the expected surplus. However, domestic companies are found to be more sensitive to taxation when choosing between different cross-border locations. This may reflect the possibility that larger companies, especially those that are already multinational, have more experience of tax planning, making them more able to shift profits between countries and hence making them less sensitive to differences in the statutory tax system in choosing between alternative target companies.

Of course, in attempting to identify the impact of taxes we need to control for many other factors that are relevant for domestic and cross-border mergers. Cross border M&As induced by differences in the valuation of the target and the acquirer have been the focus of much recent empirical literature. Examples of reasons for differences in valuation explored include: the imperfect integration of capital markets (Erel et al. (2012)); arbitrage generated through mispriced securities (Baker et al. (2009))<sup>6</sup>; weak investor protection and accounting standards (Erel et al. (2012), Rossi and Volpin (2004)); the size of foreign portfolio ownership of target companies (Ferreira et al. (2010)); and the quality of the structure of governance in countries (Ellis et al. (2011), Col and Errunza (2015)). We attempt to control for such effects in our empirical analysis.

Section 2 presents the conceptual framework to explore the role of taxes. In Section 3, we set out our empirical methodology and describe the data in more detail. In Section 4 we present our results. We conclude in Section 5.

## 2 The role of tax in the choice of location of targets

There have been many theoretical contributions on the role of M&As in the development of multinational companies.<sup>7</sup> Very broadly, these tend to distinguish two motives: an efficiency

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<sup>6</sup>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)).

<sup>7</sup>See, for example, Ferrett (2005), Nocke and Yeaple (2007) and Nocke and Yeaple (2008), Neary (2007) and Neary (2009), Norback and Persson (2007), Hijzen et al. (2008), Raff et al. (2009), Stähler (2014).

motive where gains arise through economies of scale, internal technology transfer or coordination of decision making, and a strategic motive, where firms seek to enter foreign markets to reduce competition within their 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.<sup>8</sup> We do not set out a complete model of acquisitions, but draw from this literature to consider a simple conceptual framework which allows us to explore some testable hypotheses regarding the effects of corporation tax on the choice of a target company by an acquirer.

We assume that the acquiring company is resident in country  $h$ , and seeks to acquire a target company in country  $j$ . The target may be in a foreign country,  $j \neq h$ , or in the domestic country,  $j = h$ . Throughout we assume that the targets represent mutually exclusive investment opportunities, which implies that the decision to be made by the acquirer is the choice of a single target. This could be justified on a number of grounds: for example, that there may be a need for a specific investment in some elements of a supply chain, or that the acquirer may be unable to raise enough funds to undertake more than one acquisition. In this case, the acquirer will choose a target in country  $k$ , instead of any other country  $j$ , if

$$S_k > S_j, \quad \forall j \neq k. \tag{1}$$

where  $S_j$  is the post-tax surplus (or economic rent) captured by the acquirer from acquiring a target in  $j$ . In the empirical work below, we condition on an acquisition taking place.

Acquisitions occur when merging two corporations is expected to increase private value. Any changes in value must ultimately be reflected in changes in revenue and/or costs. We consider changes in revenue and costs separately in order to identify the impact of taxation on the choice of the target company by the acquirer. We focus on effects in the target company; a direct impact on the acquirer that is common across potential targets would not affect the

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<sup>8</sup>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, see Dinc and Erel (2013), and Bertrand et al. (2012). We do not explicitly consider greenfield investment choices in this study.



choice of target. The central question posed here is whether, and how, tax may affect the choice of where to acquire a target. To begin, we define the post-tax surplus accruing to the acquirer from acquiring target  $j$  as:

$$S_j = \delta_j \{S_j^* - T_j\} \quad (2)$$

where  $\delta_j$  is the share of the overall surplus generated by the acquisition that is captured by the acquirer, which depends on the acquirer's bargaining strength and possibly competition from other potential acquirers;  $S_j^*$  is the total pre-tax surplus generated from the acquisition;  $T_j$  is the change in the total tax liability associated with the surplus generated from acquiring target  $j$ .

The pre-tax surplus is defined as

$$S_j^* = \Delta Y_j - \Delta C_j - F_j \quad (3)$$

where  $\Delta Y_j$  is the present value of the increase in revenue generated in target  $j$ , relative to target  $j$ 's revenue if the acquisition did not take place;  $\Delta C_j$  is the present value of the change in costs in the target, relative to target  $j$ 's costs if the acquisition did not take place; and  $F_j$  is a fixed cost associated with acquiring the target. The values  $\Delta Y_j$  and  $\Delta C_j$  depend on discount factors, which may in principle differ between potential acquirers and between an acquirer and the current owners of the target. We do not focus on such differences here, since we are primarily concerned with the choice of target by a specific acquirer. Note that in the case in which discount factors are common between two or more potential acquirers, if they seek to outbid each other by raising the price of the target, then this will tend to reduce  $\delta_j$ . As in Bertrand competition, this may potentially reduce  $\delta_j$  to zero, hence reducing the surplus to the potential acquirers to zero, and leaving the current owners of the target to benefit from the whole surplus created by an acquisition by either acquirer. In this (extreme) case, the acquisition would represent a zero net present value investment by an acquirer. If this were true across all potential targets, then tax would not affect the choice of target. In

what follows, we assume that  $\delta_j > 0$ . Ceteris paribus, a higher  $\delta_j$  makes an acquisition of target  $j$  more likely.

The tax liability on the surplus generated by acquiring target  $j$  is:

$$T_j = \tau_{hj} \{ \Delta Y_j - \theta_j \Delta C_j - \eta_{hj} F_j \} \quad (4)$$

Statutory tax rates are  $\tau_h$  in the acquirer's country and  $\tau_j$  in the target's country. However, the overall tax rate may include both corporation tax on profit generated in the target (in the empirical analysis we allow for both national and local taxes), withholding taxes levied in the target country on income remitted to the acquirer, and any residual tax levied in country  $h$ . We denote the overall tax rate applied to income generated in country  $j$ , but accruing to the acquirer in country  $h$ , as  $\tau_{hj}$ . It is possible that only a proportion of the present value of costs can be set against tax - for example, capital expenditure is typically depreciated over time, reducing the present value of deductions. The proportion applied to costs  $C$  in country  $j$  is  $\theta_j$ ; the proportion of fixed costs allowable against tax is  $\eta_{hj}$ . In practice the tax base typically exceeds the pre-tax surplus, with  $\theta_j < 1$  and  $\eta_{hj} < 1$ , so that  $T_j > \tau_{hj} S_j^*$ .

From (4) it is immediately clear that, as long as the tax base is positive, then a rise in  $\tau_{hj}$  increases the tax liability associated with target  $j$ . Abstracting from the extreme case in which a rise in the host country statutory tax rate  $\tau_j$  does not raise  $\tau_{hj}$  (which we discuss further below), this implies from (1) and (2) that, conditional on  $S_j^*$ :

**Proposition 1.** *The probability of acquiring a target in a particular country falls as the overall statutory tax rate for an acquisition in that country rises.*

This is the central proposition tested in this paper. However, there may be heterogeneity in responses to taxation, which we now examine.

First, the impact of taxation may depend on the size of the differential in the pre-tax surplus between the best outcome and the second-best outcome. Suppose that in the absence of tax the highest surplus is generated from target  $k$ , and the second highest surplus from target  $m$ , with the difference given by  $A_{km}^* = S_k^* - S_m^* > 0$ . The acquirer would choose  $m$

only if  $S_k < S_m$ . Abstracting from possibly different bargaining strengths, and tax allowance rates, in the target countries this would require  $\tau_{hk} > \tau_{hm}$ . The higher is  $A_{km}^*$ , the greater the difference in tax rates  $\tau_{hk} - \tau_{hm}$  that would be required for the acquirer to choose  $m$ . Or, to put it another way, differences in tax rates are less likely to affect the choice of target if  $A_{km}^*$  is large. This may be the case, for example, of the position of a purely domestic company seeking to acquire abroad for the first time, implying high fixed costs from a cross-border acquisition, and hence that the surplus from acquiring a domestic target (in this case, country  $k$ ) could be much higher than the surplus from acquiring a foreign target. So in this case the choice of target may be less sensitive to differences in taxation between domestic and foreign locations. The opposite may be true for very large companies, for whom fixed costs are relatively small, and who are able to collect detailed information from a greater range of the available targets, and so are more likely to find a comparison between the two best outcomes yields a relatively low value of  $A_{km}^*$ . In such cases, taxes may therefore be relatively more likely to affect the choice of target. In general:

**Proposition 2.** *The choice of a target is less sensitive to taxation when differences in the pre-tax surplus between targets are greater.*

We investigate Proposition 2 empirically by allowing the impact of taxation to differ between: (a) acquirers that are domestic or multinational prior to the acquisition; (b) small and large acquirers; (c) domestic and foreign acquisitions; and (d) acquisitions in countries where the acquirer already has a presence and those in which it does not.

Second, the impact of taxation on the choice of target may also be lower if the acquirer is a multinational company with the experience and capability of shifting taxable profit to low tax jurisdictions to reduce its overall tax liability.<sup>9</sup> Suppose for example, that the acquirer is able to shift a proportion  $\psi$  of its tax in any jurisdiction to a tax haven, and thereby escape tax on that proportion of its profit. Then (simplifying for expositional purposes by setting

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<sup>9</sup>For empirical evidence on this topic, see Egger et al. (2010) and Egger et al. (2014), who use German data, and Dharmapala and Riedel (2013), who trace the effect of positive earnings shocks at the parent level on the profit of low-tax subsidiaries. See Dharmapala (2014) for a recent review of the vast literature on the effect of taxes on profit shifting.

$\delta_k = \delta_m$ ) it is possible that:

$$T_k - T_m > S_k^* - S_m^* > (1 - \psi) \{T_k - T_m\} \quad (5)$$

That is, it is possible that in the absence of profit shifting the difference in statutory tax liabilities  $T_k - T_m$  may outweigh the difference in pre-tax surpluses (so that the acquirer would choose target  $m$ ), but that this is reversed when profit shifting is taken into account. A high tax rate in country  $k$  is therefore less likely to affect the choice of target in the presence of profit shifting. This is intuitive: tax is less likely to affect the choice of target company when the acquirer has more opportunities to avoid taxes. This effect may be more pronounced if  $\psi$  differs between potential target countries. Hence:

**Proposition 3.** *The impact of the statutory tax rate in the country of the target is weaker when the acquirer is more able to shift income to low-tax jurisdictions.*

In our empirical work, we investigate this proposition by allowing the effects of taxation to depend on two factors, which may reflect the ability to shift profit: (a) whether or not a company is a multinational prior to the acquisition, and (b) the size of the acquirer.

Third, the impact of the statutory tax rate in the country of the target may depend on the tax system in the country of the acquirer. In the simplest case, in which there are no withholding taxes on dividends, and in which the home country  $h$  does not tax income generated in country  $k$ , then  $\tau_{hk} = \tau_k$  and hence  $\partial\tau_{hk}/\partial\tau_k = 1$ . However, suppose country  $h$  seeks to tax worldwide income, with a credit for any tax paid in  $k$  (as was, for example, the case for the USA until 2017, and the UK until 2009). If country  $k$  is the home country ( $h = k$ ) then  $\tau_{hk} = \tau_k$  since (in the absence of withholding taxes) there is generally no additional tax on dividends paid within the home country. But if  $k$  is a foreign country, then in the extreme case in which there is no deferral of the repatriation of profit, then  $\tau_{hk} = \max\{\tau_h, \tau_k\}$ . In this extreme case, if  $\tau_h > \tau_k$ , then  $\partial\tau_{hk}/\partial\tau_k = 0$ : a marginal rise in the tax rate in  $k$  would have no effect on the cut-off value  $\tau_{hk}$ . In practice, country  $h$  tax can be deferred until the profit is repatriated, and hence the present value of the country  $h$  tax is reduced. But as long as

there is still some residual country  $h$  tax, then  $\partial\tau_{hk}/\partial\tau_k < 1$ . That is, the sensitivity of the overall tax rate to changes in the statutory tax rate in country  $k$  is lower, and a rise in the statutory rate in  $k$  is less likely to move the overall tax rate across the cut-off threshold,  $\tau_{hk}^*$ .

In sum:

**Proposition 4.** *The impact of the statutory tax rate in the country of the target is weaker when the country of the acquirer taxes the worldwide income of its resident companies with a credit for tax paid abroad, and the tax rate in the country of the target is lower than the tax rate in the country of the acquirer.*

In our empirical work, we investigate this proposition by allowing the effects of taxation to be different in the case described in this proposition.<sup>10</sup>

Next, we consider the impact of allowances in the target country. There are two possibilities here. The first is that the acquirer expects to earn a surplus by cutting costs in the target, so that  $\Delta C_j < 0$ . The net gain from cutting costs is  $S_j = -\delta_j(1 - \theta_j\tau_{hj})\Delta C_j > 0$ ; since  $\Delta C_j < 0$ , a higher allowance rate implies a smaller impact on the surplus.<sup>11</sup> Intuitively, a more generous allowance rate reduces net costs in the target; so the gains from cutting costs in this case are smaller. An acquirer seeking to reduce costs in the target would therefore prefer a lower allowance rate. The acquirer would prefer a lower tax rate,  $\tau_{hj}$ , for the same reason: a higher tax rate reduces the gains from reducing costs. The second possibility is that the acquirer plans to expand production in the target post-acquisition. This is akin to an acquisition creating the opportunity for additional new greenfield investment, which would increase the income stream as well as increasing costs. In this case  $\Delta C_j > 0$ , and a higher allowance reduces the net cost of the new investment and hence creates a smaller reduction in the surplus. An acquirer seeking to increase costs in the target would therefore prefer a higher allowance rate. In this case a higher tax rate would increase the value of allowances, but assuming that the overall surplus is positive, this effect would be outweighed by the tax

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<sup>10</sup>We abstract from other tax consequences that may arise in the acquirer's country. For example, the acquirer may receive additional tax relief for interest paid on borrowing to acquire a target. As long as this does not vary between potential targets, then this would not directly affect the choice of target. Our focus is on the impact of differential taxes between targets.

<sup>11</sup>It is straightforward to see that in this case  $\partial S_j/\partial\theta_j = \delta_j\tau_{hj}\Delta C_j < 0$ .

on the higher revenue generated. A more general approach in the case of additional greenfield investment is to consider the effective average tax rate (EATR), which reflects both the effect of the statutory tax rate on the income stream,  $\Delta Y_j$ , and the impact of the statutory rate and the allowance on the net cost of an investment,  $\Delta C_j$ . This has previously been shown to be significant for firm location decisions and for flows of foreign direct investment (see, for example, Devereux and Griffith, 1998, and De Mooij and Ederveen, 2008). Hence we have:

**Proposition 5.** *If the acquirer intends to reduce costs in the target, then a higher rate of tax allowance in the target country reduces the probability that a target is acquired in that country. But if the acquirer intends to undertake additional investment in the target, then a higher rate of tax allowance in the target country increases the probability that a target is acquired in that country; in this case, a higher effective average tax rate reduces the probability that a target is acquired in that country.*

We therefore have opposite predictions for the allowance rate, depending on the intention of the acquirer to increase or reduce costs. In our empirical work, we do not observe the intention of the acquirer. We can therefore find only an overall effect of the rate of allowance on the probability of a target being chosen.

## 3 Empirical Approach

### 3.1 Methodology

Our econometric model is informed by our discussions in Section 2. To capture variation across similar types of firms we allow each parent company to have a different tax effect with the mean effect dependent on company characteristics.

An acquiring company, indexed by  $i$ , is assumed to acquire a target in country  $j$  ( $j = 0, \dots, J$ ) which provides the largest expected surplus over all countries, where the latent surplus associated with the target in country  $j$  is given by

$$S_{ij} = \beta'_j z_i + \gamma_i \tau_j + \alpha_i + \varepsilon_{ij}. \quad (6)$$

$z_i$  is a vector of choice invariant characteristics and are allowed to have effects that are choice specific. This includes parent country taxes and other base year characteristics of the company.  $\alpha_i$  is an unobservable company-specific heterogeneity term that may be correlated with included regressors. Since our model conditions on an acquisition taking place, we can think of this term  $\alpha_i$  as capturing company specific selection effects. For ease of exposition, we assume that there is only one alternative specific variable  $\tau$ , say the target country specific tax rate. In the estimated model we include other host country variables - see sub-section 3.2. We allow the parameter  $\gamma_i$  to be randomly distributed across the companies but the mean effect to be dependent on some observable characteristics of the parent. That is, we assume that every company in our sample has its own  $\gamma_i$  which is known to the company but unknown to the econometrician, and write this as

$$\gamma_i = \gamma'_0 w_i + \sigma u_i \text{ where } u_i \sim iidN(0, 1) \quad (7)$$

i.e.  $\gamma_i \sim iidN(\gamma'_0 w_i, \sigma^2)$ .  $w_i$  are company specific variables that are assumed to shift the mean effect of  $\gamma_i$ . This model collapses to the standard multinomial choice model when  $\sigma = 0$ .<sup>12</sup> Substituting (7) into (6) gives

$$S_{ij} = \beta'_j z_i + (\gamma'_0 w_i + \sigma u_i) \tau_j + \alpha_i + \varepsilon_{ij} = \beta'_j z_i + (\gamma'_0 w_i) \tau_j + \alpha_i + (\sigma \tau_j u_i + \varepsilon_{ij}). \quad (8)$$

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

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<sup>12</sup>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.

$\gamma_i$ ) that alternative  $j$  is chosen will be of the form of the multinomial logit probability,<sup>13</sup>

$$Prob(y_{ij} = 1|\gamma_i) = \frac{\exp(\beta'_j z_i + \gamma_i \tau_j)}{\sum_l \exp(\beta'_l z_i + \gamma_i \tau_l)} \quad (9)$$

where  $y_{ij}$  is a dummy variable which takes the value of 1 if company  $i$  chooses alternative  $j$ .<sup>14</sup> This model is known as random parameter logit model (RPL) with normal heterogeneity since we have assumed the random parameter on the tax variable to be distributed as normal. The new composite error term  $v_{ij} = \sigma \tau_j u_i + \varepsilon_{ij}$  will be a mixture of normal and Gumbel distributions. Since  $\gamma_i$  is not known, we have to integrate out the  $u$  from the conditional choice probabilities to obtain the unconditional choice probabilities,

$$p_{ij} = Prob(j \text{ is chosen}) = Prob(y_{ij} = 1) = \int \frac{\exp(\beta'_j z_i + (\gamma'_0 w_i) \tau_j + \sigma \tau_j u_i)}{\sum_l \exp(\beta'_l z_i + (\gamma'_0 w_i) \tau_l + \sigma \tau_l u_i)} \phi(u) du \quad (10)$$

where  $\phi$  denotes the standard Normal density. The log likelihood will consist of terms like that 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.<sup>15</sup>

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

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<sup>13</sup>For notational ease, we do not explicitly state that the probability statements are all conditioned on the observed data.

<sup>14</sup>Equation (8) collapses to the error components multinomial logit model when we only allow for a company specific random intercept. Also note that all company specific covariates that have constant effects across choices including the company specific unobservables  $\alpha_i$ , drop out of the equation.

<sup>15</sup>Although there are different ways of drawing random numbers from a particular distribution, the Halton draws have been proven to be very effective; see Train (2009). The results were very similar with 50 and 100 draws.



(Train (2009)).<sup>16</sup>

A few remarks are in order regarding the model specification and estimation.

(i) Although we have  $J + 1$  alternatives, we only have  $J$  independent choice probabilities (see equation 9). We treat the United States,  $j = 0$ , as the reference country and estimate all parameters respect to this base case.

(ii) Our model allows for the possibility of domestic expansion. We allow some of the variables to have different effects based on whether the expansion is domestic or cross-border. Hence our model can be thought of as a form of a nested logit model (NLM) that allows for random parameters.<sup>17</sup>

(iii) Alternative-invariant variables will not enter the choice probabilities unless they have alternative-specific effects. One such variable that will drop out of the equation is the parent country specific dummy. However, we do include the parent country tax rate interacted with these country dummies. The latter is equivalent to allowing the parent country tax rate to have alternative specific effects.

(iv) the main set of estimations allow for only the host-country tax rate effect to be random, as the standard deviation of the domestic tax rate random parameter was insignificant.

## 3.2 Data & Sample Selection

The main data for our analysis come from the database ORBIS, compiled by the Bureau van Dijk (BvD). This commercial world-wide dataset provides company-level accounting information, and data on the company's ownership structure in the form of a full list of recorded shareholders. We use the ownership data in the years 2007 and 2013 to construct a chain of majority-owned subsidiaries for each company, down to the 10th level of depen-

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<sup>16</sup>The model parameters are estimated in NLOGIT 5 (NLOGIT, 2012) using simulated maximum likelihood method.

<sup>17</sup>NLM relaxes the assumption of IIA inherent in the standard multinomial model by allowing for IIA property to hold within each nest but not across nests. Allowing for random parameters within nests, as we have specified, relaxes this IIA property within each nest too.

dency.<sup>18,19</sup> M&A activities are recorded in another commercially available dataset from BvD, ZEPHYR. These were merged with the ORBIS data to trace the changes in the firms' ownership structure through M&A. We select parent companies that are not defined as 'micro' by the European Commission (2003).<sup>20</sup>

Our full M&A dataset covers the period 2008 to 2016 which not only includes the financial crises years, but also saw very large changes to cross-border acquisitions. To account for these, we do not assume a stable relationship over time, but instead undertake our analysis separately for blocks of time periods: 2008-2010, 2011-2013 and 2014-2016. Our main focus is on the most recent period, but we also provide estimates using the earlier blocks of data to assess the changes of the tax effects over time from 2008 to 2016. Note that the samples do not contain the same companies in every block of years.

We select, for each block of years, a sample of parent companies that made at least one acquisition during that block of years regardless of whether they already owned a subsidiary in the new country or not. The ultimate parent of the group is treated as being responsible for the expansions made directly and indirectly by its majority-owned subsidiaries. We use ownership information to identify companies in the same domestic or multinational group in our sample. For each block of years, the year prior to that block is used as a base year to construct the initial organizational form of the parent. A company is classified as a multinational company if it was connected by an ownership link - i.e. either owned by, or owning - of at least 50 per cent of the capital to at least one other company located in a different country in that prior year. The rest are classified as domestic companies, which also include 'standalone' companies not connected to any group. We also use the prior year as

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<sup>18</sup>Each year refers to the period 1st April of that year to 31st March of the following year.

<sup>19</sup>Our analysis was conducted in two phases. The original version of this paper used M&A activity observed between 2006 and 2008, along with the ownership structure links observed up to 2005, all of which was collected from an older version of the database. This older version was no longer available to us at the time the paper was updated with the new results. All samples used in the current version are instead built on a recent version of the database, made available in 2017. This new version had data going back to 2008 and hence the first and the second block of samples have 2008/09 year in common. Note, the sample of companies appearing in this common year is not the same in the two blocks due to the way the ownership links have been created.

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

the base year to condition on other characteristics of the parent company. The final dataset contains, for each parent company, a list of the location of all majority-owned subsidiaries in each year between the beginning and end of each block of years. This identification of all ownership changes due to M&A deals allows us to observe all majority-owned acquisitions.

The main model and the variations of this model are first estimated using the most recent data from 2014 to the end of 2016. Thus, the main dependent variable of interest in our model is the choice of the location of a target during the period 2014-2016. If a parent acquires more than one target in a single country in the same year, this parent is recorded as having made one location choice. We restrict the sample to those companies that made only one location choice during the three year period to avoid treating multiple acquisitions by a single company as independent; we also provide some sensitivity analysis to relaxing this assumption. We also restrict our main analysis to 18 potential locations where nearly 99% of the targets of acquisitions were located during 2014-2016. In order to make our analysis comparable across different blocks of time periods, and also to ensure that we had enough observations in each of the locations considered, we restrict all of our samples to the same 18 potential locations.

Some summary statistics for the main sample (2014-2016) are provided in Table 1, which shows that the full sample consists of 10,469 acquirers, of which 7,902 made only one acquisition in that period. Considering also the parent companies making multiple acquisitions, we observe a total of 15,014 acquisitions during this sample period.<sup>21</sup> The rest of the table refers only to the companies making a single acquisition in that period. 86% of the acquisitions by these companies were expansions in the same country as the parent, and so we include the alternative ‘domestic’ in the choice set. For a parent company located in one of the 18 countries, the choice set consists of 17 alternatives plus the “domestic” option. Table 1 also shows that 31% of the companies making single acquisitions during 2014-16 were multinational in 2013. The geographic distribution of the target and acquirer locations for the 7,902 acquisitions are shown in Table 2. The top two highest target locations overall were the UK

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<sup>21</sup>The results from extending the sample to include multiple acquisitions is provided in Table 7.

and Spain and the least common choice was Ireland. However, the UK and the US were most popular for cross-border acquisitions. All targets in Switzerland were acquired by companies located elsewhere. Companies expanding into a new location represent 10% of the total in our sample. The UK had the highest number of acquirers, followed by Spain.

### **3.3 Variables**

We use a number of variables informed by previous literature and the theoretical framework, to examine the determinants of M&A activity. We use three different measures of the corporation tax system in each country: (i) the statutory tax rate (STR) is the headline corporation tax rate in the host country, including typical local tax rates; (ii) the measure of allowances reflects the present value of allowances for a unit of new investment, based on a range of different assets; (iii) the effective average tax rate (EATR) broadly measures the proportion of the net present value of an investment taken in tax. The tax variables used in our analyses were obtained from a combination of data from the Oxford University Centre for Business Taxation (CBT) Tax Database and from the KPMG Corporate Tax Reports. The measure of allowances and the EATR are 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 discussed above, we include a number of control variables from various sources. We use data from the World Bank World Development Indicators (WDI) on GDP, GDP growth, the cost of doing business, the business disclosure index, the unemployment rate, the number of listed domestic firms and the extent of private access to credit. These macroeconomic indicators are averaged over the three years preceding (2011-2013) our estimation sample (2014-2016). We take a similar approach for the earlier blocks of years. We use the CEPII GeoDistance database (Mayer and Zignago (2011)) from Porta et al. (2008) to collect bilateral time-invariant variables between acquirer and target countries, such as contiguity, common official language, simple distance between capitals, and common legal

system. The details of the variables and their construction and sources are provided in Appendix B. Descriptive statistics for each variable for each of the 18 potential target countries for the period 2014-2016 are shown in Table 3. The average STR, including typical local taxes, across the countries chosen for expansions, ranged from a low of 12.5% in Ireland to a high of 40.4% in the US.

## 4 Results

We begin our presentation of results in Table 4 by estimating the RPL model, using the sample from 2014-2016. We begin with restricted versions of our model in Columns [1]-[2]. In Column [1], we constrain the effect of the host country tax rate to be the same for domestic and cross-border acquisitions and for all types of acquirer. In Column [2] we allow the effects of the host country tax rate to differ between domestic and cross-border acquisition decisions. And in Column [3], to allow for the possibility that multinational enterprises (MNEs) might for example be in a better position to avoid taxes by shifting income to lower-tax jurisdiction (see Proposition 3), we also allow the impact of the host country tax rate to be different between MNEs and domestic companies. This is done by including an interaction between tax variable and a binary indicator variable for whether the acquirer was a multinational enterprise in our base year of 2013 (indicated by “MNE”). This means that in Column [3] we estimate 4 separate coefficients on the host country tax variable. All models also 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). As discussed in Section 3.3, we also additionally include eleven alternative-specific control variables in all specifications. The ‘distance’ measures are only allowed to affect the cross-border choices. We report the coefficients of these control variables, but in order to keep the presentation manageable, we do not report the choice-specific intercepts or coefficients of the parent country tax rate.

The host country statutory tax rate has a negative and significant in Column [1]. It is also negative and significant for both domestic and cross-border acquisition decisions when

we allow for different effects in Column [2]. In Column [3] this tax rate has a significant effect for all four types of expansion. The first line can be interpreted as the effect of the host country tax rate for cross-border acquisitions for acquirers that were purely domestic in 2013; this has a negative and highly significant effect. The significant positive coefficient reported in the second line indicates that multinational companies respond less to the host country tax rate in cross-border expansion than domestic companies. There is also a negative effect of the host country tax rate for domestic acquisitions for domestic acquirers; in this case, this effect is stronger for MNEs. All 11 of the control variables are highly significant, with plausible signs. In these and other columns we allow every parent company to have its own tax coefficient for the cross-border choice, and we assume them to be drawn from a normal distribution. The estimated standard deviation of this random parameters (RP) term is also highly significant in every column. Since Column [3] indicates that there is significant heterogeneity between domestic companies and multinationals - and between domestic and cross-border acquisitions, when allowing for differential effects between these two types of firms - in the impact of taxation, we consider Columns [1] and [2] to be misspecified. The significance of the standard deviation term indicate that this random components model should be preferred over the constant coefficient specifications. We also experimented with allowing for a random tax effect for the domestic expansion choice but the results were qualitatively similar and also the estimated standard deviation of the tax effect for domestic expansion choice was insignificant.<sup>22</sup> We therefore present results in which the tax effects are random only for the cross-border expansions. We use Column [3] as our base model for exploring various other forms of heterogeneity in responses to taxation in the remainder of the Table.

Prior to discussing the other columns in this Table, we comment in more detail on the different effects of the tax rate for the different types of company, and for the different options in Column [3], and relate the results to the predictions in Propositions 1, 2 and 3. Consistent with Proposition 1, we find a negative effect of the tax rate in the country of the target for

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<sup>22</sup>The effects of doing so in the Column [3] specification are set out in the note to Table 4.

all cross-border and domestic acquisitions. Consistent with Proposition 2, we find a smaller effect of taxation on domestic acquisitions by non-MNEs, perhaps reflecting a higher fixed cost of making a first cross-border acquisition. We further explore aspects of Proposition 2 below. Consistent with Proposition 3, the results indicate that MNEs are less sensitive to tax in choosing between cross-border acquisitions, perhaps, as noted above, because they face lower costs in shifting profit to lower-taxed jurisdictions. This is consistent with the findings from Egger et al. (2014) that host-country profit taxes have an insignificant effect on companies which are able to avoid profit taxes.

In Column [4] we explore Proposition 4, which indicates that the effect of the host country tax rate may be smaller when the acquirer is resident in a country that taxes worldwide income, with a credit for foreign taxes paid, and where the host country has a lower statutory tax rate. This only applies to cross-border acquisitions, and in this period, most notably for acquirers resident in the USA. We investigate this by allowing the coefficient on the host country tax variable to differ in such circumstances. We find a striking effect for both MNE and non-MNE acquirers, with a positive and significant effect, which partly cancels out the overall tax effect on cross-border acquisitions. This is 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 acquirers 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 Columns [5] and [6], we explore Proposition 5 which relates to capital expenditure. These consider the 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, the 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 investments. To the extent to which it is intended to expand the target company post-acquisition, then the EATR would be relevant to the choice of target.

Column [5] uses the baseline of Column [3], but 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 effects of each measure. Including both tends to raise standard errors, with few of the coefficients remaining significant. Including only the EATR, as we do in Column [5], indicates a similar effect of the EATR to the statutory rate, though with a slightly higher coefficient for cross-border expansions.

Column [6] instead adds to the statutory tax rate 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 an MNE or not. The effects of the statutory rates are very similar to our base specification in Column [3]. In contrast, allowances do not play a significant role in either cross-border or domestic acquisitions. This is consistent with Proposition 5 in that the sign of the coefficient on the allowance could be positive or negative, depending on whether the intention is to increase or reduce capital expenditure. If both types of acquirer are present, then these effects may cancel out on average.

In Columns [7] and [8] we explore other possible implications of Propositions 2 and 3. In Column [7], we investigate whether the effects of taxation differ according to the size of companies, as well as differentiating between MNEs and non-MNEs. One element of the discussion of Proposition 2 is that large acquirers may face smaller differences in pre-tax surpluses between potential targets - because their fixed costs are relatively small, and because they may have the resources to investigate alternative options in more depth (and are hence less likely to miss potential opportunities). Both of these factors would make larger acquirers more sensitive to the host country tax rate. Offsetting this, larger MNEs especially may be more able to shift profits to lower-taxed jurisdictions; which would make them still less sensitive to the host country tax rate. We test these propositions in Column [7]. We identify



a “large” company as one that owned at least 4 subsidiaries (domestic or foreign) in 2013. We have experimented by choosing different numbers of subsidiaries and report the results with the highest maximized value of the log likelihood. The results of Column [7] are mixed. For domestic expansions, the impact of host country taxes is not significantly different between large and small MNEs, perhaps reflecting a trade-off between these two factors. But large non-MNEs are more sensitive to host country tax for cross-border acquisitions, consistent with them facing relatively low fixed costs compared to smaller non-MNEs.

In Column [8] we examine whether the effects of the host country tax rate depends on whether an MNE acquirer already has a subsidiary in the target location in 2013. We find evidence that the smaller effect on cross border acquisitions by MNEs is to a large extent driven by this factor. For new locations, the host country tax rate now has a broadly similar effect for MNEs as for non-MNEs. But the host country tax rate has no significant overall impact on the decision by an MNE to acquire a new target company in a location in which it already operates. This is consistent with Proposition 2 to the extent that there are substantial gains from expanding in the same location, thereby reducing the marginal impact of taxation. These results are also consistent with gains from profit shifting by MNEs being focused primarily in countries in which they already have some presence, and hence expertise of the tax system.

Given a random parameter model for the tax effects, we can also use Bayesian shrinkage estimator (empirical Bayes) to estimate this ‘random tax effect’ for each company in our sample using our base model in Column [3].<sup>23</sup> The model was estimated under the prior assumption that the unobserved company specific tax effects were drawn from a normal distribution. We then recover the posterior estimate as the shrinkage estimate, which is plotted in Figure 1. Only 93 companies out of 7,902 had an estimated effect that was positive.

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<sup>23</sup>The prior distribution of the random parameters is assumed to be Normal. i.e. This is the distribution in the population. However, given the data and the estimated coefficients of the model, one can estimate the distribution for the sample of companies (Train (2009)). This is known as the Bayesian shrinkage estimator or Empirical Bayes estimator. Note, the method used is maximum likelihood estimation and the Bayesian shrinkage estimator is used estimate the parameters at the end of the likelihood maximisation. See Appendix A, equation (A.9).

We now consider the magnitude of the effects of taxes on the probability of location acquisition choices. Table 5 reports detailed elasticities for the base case results in Column [3]. Appendix A sets out how these elasticities are calculated; essentially they are an average across all of the 7,902 acquirers. The diagonal ( $ii^{th}$ ) shows the own-elasticity: the effects of a 1 percent change in country  $i$ 's tax rate on the probability that an acquirer will choose a target in country  $i$ . Note that the acquirer can be from any country. The off-diagonals show the cross-elasticities: the  $ij^{th}$  element shows the effects of a 1 percent change in country  $i$ 's tax rate on probability that an acquirer will choose a target in country  $j$ . Note also that in a standard multinational logit model, the off-diagonal elasticities would be the same within each row by assumption; that is, a change in the tax rate in, say, Austria has the same effect on the probability of a target choice in all other countries. This assumption is relaxed in our RPL model.

Own-elasticities are generally quite large. They range from -0.31 in France and -0.34 in the USA to -2.31 in Switzerland and Russia. Typically, smaller countries have higher elasticities: Austria, Denmark, Finland, Ireland and Sweden also have elasticities greater than -2. The unweighted mean own elasticity is -1.67. At this elasticity, for a typical country in our dataset, with a tax rate of around 25%, a reduction to 22.5%, for example, would increase the probability that an acquirer chooses that country by nearly 17%. Using the estimated elasticity for the USA, the 2017 US tax reform which reduced the federal tax rate from 35% to 21% - representing a reduction of around 35% in the combined federal and state tax rate - would have increased the probability of a US target being chosen by just under 12%. Not surprisingly, the cross-elasticities are much smaller, although there are interesting differences between countries; in particular changes in the US tax rate would tend to have a large effect on the probability of choosing a target in other countries.

We next turn to the estimated effects of our control variables. All of the control variables are almost always significant in all of the specifications in Table 4 and the estimates are robust across different model specifications. They also generally have the expected signs. Although GDP has a negative effect, the effect coming from the growth of GDP is positive and higher

than the coefficient estimate on log GDP. Unravelling the two effects implies positive effects of current and previous period's GDP. That is, the size of the economy, measured by GDP, has a significant positive effect on the probability of acquiring a target in a given country. Also, as expected, targets are more likely to be in countries that are contiguous with the country of the acquirer, that share a common language and a legal system and are closer to each other. The cost of business start-ups and greater disclosure requirements have negative effects on the probability of choosing a particular location. These variables may proxy for a number of aspects of the regulatory framework in the choice country. The size of domestic credit provided to the private sector has a positive effect. Conditional on these effects, unemployment has a positive effect, which may reflect the relative availability of workers.

#### 4.1 Variation over time

We now turn to the variation of tax effects over time. Table 6 contains the results from estimating the base case RPL specification in Column [3] of Table 4 using the earlier two blocks of data over the period, 2008-10 and 2011-13. For ease of comparison, the results for the period 2014-2016 are also reproduced in Column [3]. For conciseness, only the tax variables are shown in the table; however all of the controls and other variables are also included in all specifications, as in Column [3] of Table 4.<sup>24</sup>

The results are qualitatively similar over the three time periods. For the cross-border acquisitions, the size of the coefficients are also broadly similar in the last two periods. For the period starting with the financial crisis in 2008, the coefficients (and the standard errors) are higher. This may signal extra sensitivity to taxation during and just after the crisis, although the jump in the standard errors also suggests that the role of tax was less well identified during this period. For domestic acquisitions, the role played by taxation for domestic firms seems to have strengthened over time. There is no significant effect in the first two periods, but the effect has gradually become much more significant. However, the impact of taxation on domestic acquisitions by MNEs has remained fairly consistent over

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<sup>24</sup>The detailed results can be obtained from the authors upon request.

time.

The results from pooling the three samples and re-estimating the model, are provided in Column [4]. This model imposes the restriction that all parameters are the same across the three samples. The LR test for this null hypothesis gives a test statistic value of 786 (with degrees of freedom=102) and a p-value  $<.00001$ , clearly rejecting the null, which is not surprising given the differences in the coefficient estimates across the three samples.

## 4.2 Some sensitivity checks

In Table 7 we report a number of extensions to the model and sensitivity checks, using the initial 2014-16 block of data. As in Table 6, only the effects of tax variables are shown. Again, however, the specification is the same as in Column [3] of Table 4. Column [1] of the table reproduces this baseline result for the purposes of comparison.

Column [2] presents the same model, but with ‘robust standard’ errors which are calculated from the sandwich estimator of the covariance matrix.<sup>25</sup> Unsurprisingly, the new standard errors are larger than the usual ones and hence the p-values are increased. However, the coefficients remain strongly significant.

Column [3] presents the same model, but as a standard multinomial model with fixed coefficients, without allowing for random variation in the effects of the host country tax on cross-border acquisitions. As discussed above, these models suffer from the restriction of IIA. The results are qualitatively similar to the RPL estimation. However, there is a difference in the significance of the estimated effect of the host country tax rate on cross-border acquisitions by domestic companies. This, together with the significance of the standard deviation of the random parameter in Column [1] (and in the other columns), indicates the need to relax the

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<sup>25</sup>Our model allows for random coefficients within the nested logit model specification, and hence accommodates a particular form of clustering (see equations (8) and (9)). Also note, the maximum likelihood procedure requires the specification of the probability density and the cumulative distribution functions. This fixes all moments of the distributions and hence adjusting the standard errors for clustering is not statistically correct (Wooldridge (2010), page 569). However, we report the sandwich estimator of the variance that is sometimes used when one needs to allow for some mis-specification of the likelihood function. These are provided when one works with pseudo MLE. Under this scenario, MLE is consistent for a different set of parameters and hence providing standard errors for these ‘parameters’ does not make sense (Greene (2007) Section 16.8; Cameron and Trivedi Section 24.5.6; Wooldridge (2010) Section 15.4).

IIA assumption.

Our approach has been to include both national and local taxes in host countries where there are local taxes on profit. This involves some measurement error, since there is typically variation in local tax rates within host countries. To examine the importance of this in Column [4] we also estimate the model using only national tax rates, ignoring local taxes. The results are again qualitatively similar, although the size of the tax effect on cross-border acquisitions is rather smaller.

We next restrict our analysis in Column [5] to only cross-border acquisitions - as is common in the literature. This involves dropping 86% of the sample. In this case we find a smaller effect of tax on cross-border expansions, and no significant difference between MNEs and non-MNEs. This has important implications for studies that ignore the domestic option when considering the location of M&A.

In Table 4 our analysis was restricted to acquirers that made acquisitions in only one country during the time period 2014-2016. This induces a potential selection bias, since companies undertaking acquisitions in more than one country may be more or less responsive to taxation than those making acquisitions in only one country. As a further sensitivity check, we take two alternative approaches. First, we include all expansions that took place during the sample period - the results are presented in Column [6]. To make this analysis feasible, we treat each location choice as being independent - in effect treating each of them as if they were being undertaken by a separate company. An acquirer that has made acquisitions in, say, 3 countries will therefore appear in the data 3 times. This increases the number of acquisitions from 7,902 to 15,014. In our second analysis, in Column [7], we include only the first acquisition made by multiple acquirers. This increases the number of acquisitions from 7,902 to 10,469. Clearly, both approaches also have econometric problems in that we treat the error terms ( $u_i$  in (7)) as being independent. However, if the selection is based on company specific characteristics that are time invariant, treating each observation as random will not affect the bias in the estimator as these unobservables will cancel out. The nature of the errors in each of these approaches is different from our previous approach, and we can

gauge how important these problems are by following these approaches.

The results are shown in Columns [6] and [7] are qualitatively similar to our earlier baseline estimates. The impact of the host country tax rate on cross-border acquisitions are now higher compared to Column [1], both for MNEs and non-MNEs. The results for domestic acquisitions are very similar to Column [1] both for MNEs and non-MNEs.

Table 8 continues to explore the sensitivity of our results, and Column [1] again reproduces the base case from Table 4. Column [2] includes a term which interacts a US multinational acquirer dummy variable with a domestic acquisition dummy variable. The idea here is to address the issue explored by Hanlon et al (2015), that US multinationals have "locked-out" cash held abroad for tax reasons, which may be used for foreign - but not domestic - acquisitions. The interaction term tests whether, conditional on making an acquisition (and on all the other variables) a US MNE is more likely than other acquirers to undertake a cross-border, as opposed to domestic, acquisition. We do not find a significant effect of the interaction term. However, we do not have data on cash holdings of US MNEs, and so we are not able to differentiate between US multinationals with different levels of cash holdings.

In Column [3] we test for the effects of allowing the effects of the dummy identifying a domestic acquisition to vary with the country of the acquirer.<sup>26</sup> The coefficients on the tax variables for cross-border acquisitions are qualitatively similar to the base case results. The effect of the tax variable on domestic acquisitions by domestic companies becomes insignificant. This is not surprising; since each block of the data is close to being a cross-section, including the interacted dummy removes the effect of all cross-section variation in the tax variable – all that is left is some small time series variation within each time block.

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<sup>26</sup>We cannot include all countries, since some have zero, or a very small number of acquisitions. Instead we choose countries which account for 90% of domestic acquisitions in our dataset: these are the UK, Spain, France, Germany, Sweden, Russia, the Netherlands, Finland and Canada. The US is the reference group.

## 5 Conclusions

This paper investigates the impact of corporation taxes on the location choice decisions of companies expanding through M&A. We provide a conceptual framework that identifies heterogeneous effects of taxation, depending on the characteristics of the acquirer, target and the reason for the acquisition. We derive testable predictions where we show that, in principle, a higher tax rate in a country could reduce or leave unchanged the probability that its corporations are the subject of an acquisition. We consider aspects of the tax regime in both the target’s country and acquirer’s country, and also consider the role of allowances. We use a random parameter logit model to allow for heterogeneous responses to tax rates.<sup>27</sup>

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. The estimated average own-country elasticities range from -1.2 to -1.7. So a 10% reduction in the corporation tax rate of a country increases the probability of an acquirer choosing that country, conditional on making an acquisition, by between 12% and 17%. These estimates are generally higher than comparable estimates in the existing literature. However, the bulk of the previous literature has addressed slightly different questions. Specifically, it has generally investigated the extent to which the number of acquisitions in a country, or the proportion of domestic targets that are acquired by foreign companies, respond to host country taxation. Implicitly these approaches depend not only on the location choice, but also whether an acquisition is made. By contrast our results are conditional on an acquisition taking place. This difference in approach may explain the higher elasticities found in our study.

The elasticities estimated in this paper differ according to the characteristics of the acquirer and whether the acquisition is domestic or cross-border. More specifically, we find weaker evidence of an effect of taxation on the domestic expansion choices of domestic com-

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<sup>27</sup>A recent paper by Feld et al (2016) is not directly comparable to ours and the models are not nested within each other’s models. As shown in Table 6, the restriction that the effects of the covariates are the same over the sample period considered is clearly rejected in our case. Feld et al (2016) estimate the model using cross-border acquisitions only and treat each acquisition by the same company as being independent. As discussed in section 3.1 and also the footnote 16, our model can be thought of as a nested logit model with random parameters where the tax parameter is allowed to be random.

panies, although their cross-border choices are sensitive to tax in the country of the target company. 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 plays a smaller 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 the acquirer taking account of home country taxation on future dividends from the newly-acquired target company. Finally, we do not find a significant effect of host country allowances, possibly because the sign of the effect would be expected to differ depending on whether the acquirer plans to undertake additional new investment, or to reduce planned future investment; in effect we estimate only the average of these opposite effects of allowances in these two cases.



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# Appendices

## A 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

$$S_{ij} = \beta'_j z_i + \gamma x_j + \alpha_i + \varepsilon_{ij} \quad (\text{A.1})$$

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

$$\frac{\partial p_{ij}}{\partial x_j} = \frac{\partial}{\partial x_j} \left[ \frac{\exp\{\beta'_j z_i + \gamma x_j\}}{\sum_{k=1}^J \exp\{\beta'_k z_i + \gamma x_k\}} \right] = p_{ij}(1 - p_{ij})\gamma \quad (\text{A.2})$$

where,

$$p_{ij} \equiv \text{Prob}(j \text{ is chosen}) = \frac{\exp\{\beta'_j z_i + \gamma x_j\}}{\sum_{k=1}^J \exp\{\beta'_k z_i + \gamma x_k\}} \quad (\text{A.3})$$

The corresponding elasticity is given by

$$\frac{\partial \log p_{ij}}{\partial \log x_j} = (1 - p_{ij})x_j\gamma \quad (\text{A.4})$$

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

$$\frac{\partial p_{ij}}{\partial x_m} = \frac{\partial}{\partial x_m} \left[ \frac{\exp\{\beta'_j z_i + \gamma x_m\}}{\sum_{k=1}^J \exp\{\beta'_k z_i + \gamma x_k\}} \right] = -p_{ij} p_{im} \gamma \quad (\text{A.5})$$

And the corresponding elasticity is given by

$$\frac{\partial \log p_{ij}}{\partial \log x_m} = -p_{im} x_m \gamma \quad (\text{A.6})$$

Note, the elasticity in (A.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  $\gamma$  is fixed in (A.1), we now assume that every company in our sample has its own  $\gamma$  and write this as

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

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

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

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

Estimation of company specific effect  $\gamma_i$

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

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

Thus,

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

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

#### Marginal effects and Elasticities

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

## B Variable Source

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



## Tables and Figures

Table 1: Characteristics of Parent Companies

	Companies	
	Number	%
Total	10,469	
Expanding Only Once	7,902	75.48
Multinational (a)	2,466	31.21
Domestic	5,436	68.79
Large (b)	4,921	62.28
Non-Large	2,981	37.72
Expanding Cross-Border	1,136	14.38
Expanding Domestically	6,766	85.62
Expanding to a New Location (c)	791	10.01
Expanding to an Old Location	7,111	89.99

Note: The table refers to all acquirers that completed one expansion between 2014 and 2016. (a) Multinational and domestic status is defined according to the ownership structure observed in 2013, percentages are with respect to the sample of companies expanding only once; (b) Size is defined according to whether the parents controlled 4 or more subsidiaries before 2014; (c) New Location expansion include all expansions made cross-border by domestic companies, and all expansions made cross-border by multinational companies to a location where they did not previously own any other subsidiaries.

Table 2: Distribution of Acquisitions

A) Target Companies			B) Acquiring Companies		
Target Location	Number	% Cross-Border	Acquirers Location	Number	% Multinational
Austria	83	32.5	Austria	100	60.0
Belgium	177	35.0	Belgium	182	44.0
Brazil	123	33.3	Brazil	83	6.0
Canada	244	26.2	Canada	180	53.9
Denmark	182	18.1	Denmark	149	32.2
Finland	219	10.5	Finland	196	31.1
France	605	8.6	France	743	42.0
Germany	652	19.2	Germany	735	39.7
Ireland	39	48.7	Ireland	55	54.6
Italy	67	91.0	Italy	6	0.0
Netherlands	404	21.8	Netherlands	422	30.1
Norway	187	11.8	Norway	208	31.7
Russia	351	4.0	Russia	342	10.8
Spain	1,493	4.1	Spain	1,483	17.0
Sweden	382	10.2	Sweden	343	28.6
Switzerland	45	100.0	Switzerland	0	0
United Kingdom	1,666	10.6	United Kingdom	1,701	20.6
United States	983	18.7	United States	974	56.6
<i>Total</i>	<i>7,902</i>	<i>14.4</i>	<i>Total</i>	<i>7,902</i>	<i>31.2</i>

Note. Listed countries are chosen as expansion locations, in the sample of 7,902 expansions completed during the years 2014-2016. These are the countries where the 99% of cross-border acquisitions take place over our observational period.

Table 3: Corporate Tax Rates and Explanatory Variables by Expansion Location Alternative

	AT	BE	BR	CA	CH	DE	DK	ES	FI	FR	GB	IE	IT	NL	NO	RU	SE	US	Domestic
<b>Host Country tax rates:</b>																			
Statutory rate ( national rate only)	0.25	0.33	0.34	0.15	0.09	0.15	0.23	0.28	0.20	0.33	0.22	0.13	0.28	0.25	0.26	0.20	0.22	0.35	
Statutory rate (local taxes included)	0.25	0.34	0.34	0.27	0.21	0.31	0.23	0.33	0.20	0.38	0.22	0.13	0.30	0.25	0.26	0.20	0.22	0.40	
Effective average tax rate	0.22	0.28	0.31	0.23	0.17	0.27	0.21	0.31	0.18	0.32	0.20	0.11	0.24	0.19	0.24	0.17	0.19	0.35	
<b>Parent Country tax rates:</b>																			
Statutory rate	0.26	0.25	0.25	0.26	0.26	0.27	0.26	0.25	0.26	0.25	0.27	0.26	0.26	0.26	0.25	0.26	0.26	0.24	0.26
Statutory rate (local taxes included)	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.28	0.30	0.28	0.31	0.29	0.29	0.30	0.29	0.30	0.30	0.28	0.29
Effective average tax rate	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.25	0.26	0.25	0.28	0.26	0.26	0.26	0.26	0.27	0.26	0.25	0.26
Value of Allowances	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.35	0.34	0.33	0.36	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34
ln(GDP)	26.7	26.9	28.4	28.1	27.1	28.9	26.5	28.0	26.2	28.6	28.5	26.1	28.4	27.5	26.8	28.1	26.9	30.4	28.3
GDP Growth	0.36	0.46	3.26	1.50	1.09	0.62	-0.11	-1.84	-0.98	0.37	0.46	-0.52	-1.55	-0.39	0.74	1.15	0.88	1.05	0.07
Cost of Doing Business	5.04	5.48	6.06	0.40	2.34	4.94	0.08	8.96	1.02	0.90	0.62	0.34	17.24	5.42	1.76	1.98	0.60	1.22	3.33
Business Disclosure Index	5.00	8.00	5.00	8.00	0.00	5.00	7.00	5.00	6.00	8.00	10.00	10.00	7.00	3.40	7.00	6.00	7.00	7.08	6.97
Unemployment Rate	4.98	7.86	8.10	7.66	4.25	6.23	7.11	22.00	8.06	9.57	7.75	13.64	9.45	5.18	3.28	6.62	8.16	8.66	10.63
ln(Number of Domestic Firms)	-7.35	-6.83	-5.93	-3.57	-6.33	-5.32	-6.62	-3.73	-6.90	-5.46	-4.23	-7.97	-6.14	-6.90	-6.60	-5.62	-6.18	-3.48	-1.51
Domestic Credit to Private Sector (% of GDP)	96.3	56.2	57.0	145.7	163.1	87.2	188.1	162.5	90.2	96.0	175.3	126.5	92.3	116.6	126.1	44.8	127.8	185.7	140.3
Contiguity	0.63	0.76	0.00	0.55	0.62	0.53	0.21	0.36	0.13	0.42	0.11	0.37	0.30	0.48	0.00	0.00	0.18	0.00	1.00
Common Language	0.67	0.77	0.00	0.88	0.69	0.21	0.00	0.00	0.00	0.19	0.39	0.68	0.00	0.26	0.00	0.00	0.00	0.48	1.00
ln(Distance Among Capitals)	6.77	6.01	9.06	7.52	6.73	7.04	6.59	7.34	7.33	6.76	7.00	7.17	7.29	6.33	7.06	7.71	7.11	8.72	0.00
Common Legal System	0.63	0.58	0.49	0.69	0.44	0.15	0.27	0.46	0.13	0.37	0.39	0.68	0.41	0.45	0.00	0.43	0.18	0.48	1.00

Note. The Table reports the means for the variables used in the regression analysis. The tax data (1st to 5th row) were provided by the Oxford University Centre for Business Taxation database. Host country taxes list the rate in the target country, averaged over the years 2014, 2015 and 2016. Parent country taxes, instead, list the average rates faced by the acquirers expanding into each alternative location. Alternative specific variables (6th to 12th row) were taken from the World Bank World Development Indicators (WDI) dataset, and they are averages over the period 2011-13; bilateral variables (13th to 16th row) were taken from the GEODIST database (Mayer and Signago, (2011)) and La Porta et al. (2008).

Table 4: Random Parameter Logit (RPL) Model Estimates

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
	Common tax effect	Tax effect by type of expansion	Baseline Specification	Parent vs Host Country Taxes	Effective Average Tax Rate	Statutory Tax Rate & Allowances	Large & Small Acquirers	New & Old Expansion Location
<b>Cross Border expansions:</b>								
Host-country Statutory Tax Rate ( $t_j$ )	-16.688*** (2.267)	-25.235*** (6.040)	-31.895*** (6.397)	-34.418*** (6.731)	-32.427*** (6.628)	-29.890*** (6.242)	-16.142*** (5.963)	
$t_j$ * MNE dummy			13.757*** (2.160)	15.258*** (2.488)	13.304*** (2.325)	13.880*** (3.497)	3.349*** (1.302)	
$t_j$ * large non-MNE dummy						-5.665*** (1.942)		
$t_j$ * large MNE dummy						-2.381 (3.023)		
$t_j$ * dummy = 1 for MNE expanding in a old location								
$t_j$ * non-MNE dummy * dummy = 1 for credit system and $th > t_j$				6.495** (2.653)				
$t_j$ * MNE dummy * dummy = 1 for credit system and $th > t_j$				8.177** (3.368)				
Host Country Effective Average Tax Rate (EATR <sub>j</sub> )					-50.351*** (8.169)			
EATR <sub>j</sub> * MNE dummy					20.878*** (2.967)			
Host Country Tax Allowances						-2.277 (3.163)		
Host Country Tax Allowances * MNE dummy						0.410 (1.147)		
<b>Domestic expansions:</b>								
Domestic Statutory Tax Rate ( $th = t_j$ )	-16.688*** (2.267)	-22.338*** (3.583)	-11.738*** (2.884)	-10.464*** (3.154)	-10.783*** (3.549)	-11.321*** (2.974)	-6.059*** (2.170)	
$th$ * MNE dummy			-3.660*** (1.082)	-4.153*** (1.229)	-1.472 (2.653)	-1.134 (2.710)	-3.755*** (0.898)	
$th$ * large non-MNE dummy						-1.210 (1.655)		
$th$ * large MNE dummy						-2.990 (2.570)		
Domestic Effective Average Tax Rate (EATR <sub>h</sub> =EATR <sub>j</sub> )					-8.523** (3.696)			
EATR <sub>h</sub> * MNE dummy					-4.359*** (1.351)			
Domestic Country Tax Allowances						-2.554 (3.870)		
Domestic Country Tax Allowances * MNE dummy						-1.713 (2.323)		

Table 4, Continued

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
	Common tax effect	Tax effect by type of expansion	Baseline Specification	Parent vs Host Country Taxes	Effective Average Tax Rate	Statutory Tax Rate & Allowances	Large & Small Acquirers	New & Old Location
<b>Control Variables:</b>								
log GDP (constant 2000 USD)	-0.431*** (0.069)	-0.772*** (0.153)	-0.997*** (0.166)	-1.023*** (0.176)	-1.187*** (0.190)	-1.100*** (0.210)	-1.019*** (0.168)	-0.592*** (0.121)
GDP growth	0.919*** (0.126)	2.213*** (0.362)	2.633*** (0.381)	2.928*** (0.424)	2.874*** (0.402)	2.659*** (0.397)	2.637*** (0.382)	1.382*** (0.275)
Cost of doing business	-0.195*** (0.033)	-0.338*** (0.063)	-0.421*** (0.065)	-0.475*** (0.072)	-0.461*** (0.076)	-0.455*** (0.082)	-0.418*** (0.067)	-0.253*** (0.055)
Business Disclosure Index	-0.249*** (0.040)	-0.667*** (0.107)	-0.821*** (0.110)	-0.943*** (0.125)	-0.875*** (0.114)	-0.851*** (0.126)	-0.816*** (0.110)	-0.454*** (0.093)
Unemployment as a % of labour force	0.301*** (0.023)	0.661*** (0.082)	0.677*** (0.075)	0.723*** (0.079)	0.739*** (0.077)	0.680*** (0.078)	0.678*** (0.075)	0.373*** (0.065)
ln(Number of Domestic Firms)	-0.059 (0.042)	-0.750*** (0.163)	-0.827*** (0.149)	-0.966*** (0.164)	-1.055*** (0.165)	-0.833*** (0.158)	-0.841*** (0.151)	-0.199 (0.121)
Domestic Credit to Private Sector (% of GDP)	0.005*** (0.001)	0.024*** (0.005)	0.029*** (0.005)	0.038*** (0.007)	0.038*** (0.006)	0.027*** (0.005)	0.030*** (0.005)	0.012*** (0.004)
<b>Control Variables specific to CB expansions:</b>								
Contiguity of Host and Target Country	0.272** (0.133)	0.288** (0.136)	0.285** (0.137)	0.178 (0.142)	0.303** (0.136)	0.285** (0.137)	0.283** (0.137)	0.222* (0.133)
Common Language	0.907*** (0.145)	1.061*** (0.157)	0.999*** (0.158)	0.978*** (0.159)	0.931*** (0.156)	0.988*** (0.158)	0.993*** (0.158)	0.898*** (0.152)
ln(Distance between capitals of Host and Target)	-0.267*** (0.067)	-0.193*** (0.074)	-0.208*** (0.074)	-0.293*** (0.082)	-0.182** (0.077)	-0.210*** (0.074)	-0.207*** (0.074)	-0.273*** (0.070)
Common Legal System	0.449*** (0.105)	0.513*** (0.112)	0.547*** (0.113)	0.489*** (0.116)	0.530*** (0.112)	0.547*** (0.112)	0.555*** (0.113)	0.523*** (0.109)
Standard Deviation of the RP on tax (t <sub>i</sub> )	9.631*** (1.405)	15.961*** (2.817)	16.408*** (2.499)	18.591*** (2.839)	24.106*** (3.332)	16.302*** (2.616)	16.582*** (2.494)	7.226*** (2.242)
Maximised Log Likelihood	-5,644.82	-5,646.21	-5,302.58	-5,298.51	-5,300.28	-5,301.58	-5,290.26	-5,073.44

Notes: The dependent variable takes the value of 1 if the parent company chooses a particular location among a set of alternatives. The choice set consists of 18 alternatives, which corresponds to the countries where 99% of all cross-border acquisitions take place between the years 2014 and 2016. All specifications are random parameter logit (RPL). The RPL model allows the effect of host country tax variable ( $t_i$ ) to be random across companies. The RPL model was maximised using simulated maximum likelihood with 50 Halton random draws. When the baseline model in column [3] was estimated allowing also the parent country tax variable ( $t_h$ ) to be random across companies, we found that the mean effect was -12.498 (2.958) with an estimated standard deviation of 0.532 (1.006) for the RP. All models include intercepts and parent country tax rate ( $t_p$ ), the effects of which vary with the alternative choices. Sample size corresponds to the 7,902 parents that completed only one expansion during the three years period 2014-2016. "MNE" is a binary indicator for multinational enterprises as defined in the base year 2013. "Credit System" is an indicator for home countries which operate a credit system. "Large" is an indicator for parent companies that controlled more than 4 subsidiaries in the year 2013. Standard errors are in parentheses. The asterisks \* \* \*, \*\*, \* indicate that p-values are < 0.01, 0.05 and 0.10 respectively.

Table 5: Elasticities with respect to the host country tax rate

	AT	BE	BR	CA	CH	DE	DK	DOM	ES	FI	FR	GB	IE	IT	NL	NO	RU	SE	US
AT	<b>-2.10</b>	0.02	0.02	0.03	0.03	0.02	0.03	0.01	0.02	0.03	0.01	0.03	0.02	0.02	0.03	0.03	0.03	0.03	0.01
BE	0.05	<b>-1.01</b>	0.02	0.05	0.05	0.04	0.05	0.01	0.04	0.05	0.01	0.05	0.04	0.04	0.06	0.05	0.05	0.05	-0.01
BR	0.03	0.00	<b>-1.14</b>	0.02	0.03	0.01	0.03	0.01	0.02	0.03	-0.02	0.03	0.03	0.01	0.03	0.02	0.03	0.03	-0.01
CA	0.06	0.03	0.03	<b>-1.92</b>	0.06	0.04	0.06	0.02	0.04	0.06	0.02	0.06	0.05	0.05	0.06	0.06	0.06	0.06	0.05
CH	0.04	0.03	0.03	0.04	<b>-2.31</b>	0.03	0.04	0.02	0.03	0.04	0.02	0.04	0.04	0.03	0.04	0.04	0.04	0.04	0.01
DE	0.11	0.05	0.05	0.10	0.12	<b>-1.22</b>	0.12	0.03	0.08	0.12	0.02	0.12	0.09	0.08	0.11	0.11	0.12	0.12	0.01
DK	0.03	0.02	0.02	0.03	0.03	0.03	<b>-2.20</b>	0.01	0.02	0.03	0.01	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.01
ES	0.05	0.02	0.02	0.05	0.06	0.04	0.06	0.01	-1.31	0.06	0.01	0.06	0.04	0.04	0.06	0.05	0.06	0.06	0.01
FI	0.02	0.01	0.01	0.02	0.02	0.01	0.02	0.01	0.01	<b>-2.28</b>	0.01	0.02	0.02	0.01	0.02	0.02	0.02	0.02	0.01
FR	0.01	-0.05	-0.06	0.00	0.02	-0.02	0.01	0.01	0.00	0.02	<b>-0.31</b>	0.02	0.02	-0.02	0.01	0.00	0.02	0.02	-0.08
GB	0.15	0.09	0.09	0.14	0.16	0.11	0.15	0.06	0.10	0.16	0.06	<b>-1.61</b>	0.15	0.12	0.15	0.14	0.16	0.16	0.06
IE	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	<b>-2.21</b>	0.01	0.01	0.01	0.01	0.01	0.00
IT	0.05	0.03	0.03	0.05	0.06	0.04	0.06	0.01	0.05	0.06	0.01	0.06	0.05	<b>-1.64</b>	0.06	0.05	0.06	0.06	0.01
NL	0.09	0.06	0.06	0.09	0.09	0.07	0.09	0.03	0.07	0.09	0.04	0.09	0.08	0.08	<b>-1.92</b>	0.09	0.10	0.10	0.03
NO	0.02	0.01	0.01	0.02	0.02	0.02	0.02	0.01	0.02	0.02	0.01	0.02	0.02	0.02	0.02	<b>-1.96</b>	0.02	0.02	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	<b>-2.31</b>	0.01	0.00
SE	0.04	0.02	0.02	0.04	0.04	0.03	0.04	0.02	0.03	0.04	0.02	0.04	0.04	0.03	0.04	0.04	0.04	<b>-2.25</b>	0.01
US	0.06	-0.14	-0.14	0.05	0.09	-0.02	0.08	0.02	0.01	0.10	-0.26	0.15	0.08	-0.03	0.07	0.05	0.10	0.10	<b>-0.34</b>

Note: These elasticities are based on the Random Parameter Logit Model estimates, col. [3] of Table 4. They are based on the basic results for host and home tax rates, which therefore apply to domestic acquirers. Each cross-elasticity refers to the impact of the host country tax rate in row country on the probability of an acquirer choosing a target in the column country. The diagonals are the own-country elasticities. All elasticities are significantly different from zero with  $p < 0.01$ .

Table 6: Random parameter logit model coefficient estimates from alternative samples

	Sample 2008-2010 [1]	Sample 2011-2013 [2]	Sample 2014-2016 [3]	Pooled Sample 2008-2016 [4]
<b>Cross Border expansions:</b>				
Host-country Statutory Tax Rate ( $t_j$ )	-67.719*** (9.950)	-39.691*** (6.028)	-31.895*** (6.397)	-7.256** (3.380)
tj * MNE dummy	38.018*** (4.438)	18.565*** (2.436)	13.757*** (2.160)	6.280*** (1.520)
<b>Domestic expansions:</b>				
Domestic Statutory Tax Rate ( $t_h = t_j$ )	9.161 (10.130)	8.662* (4.610)	-11.738*** (2.884)	-2.287* (1.238)
th * MNE dummy	-8.304*** (1.943)	-4.977*** (1.416)	-3.660*** (1.082)	-2.235*** (1.237)
<b>Standard Deviation of the RP on tax (<math>t_j</math>)</b>	48.470*** (4.740)	24.766*** (1.416)	16.408*** (2.499)	6.2150*** (1.989)
<b>Maximised Log Likelihood</b>	-4,712.93	-4,869.41	-5,303.93	-15279.18
Number of Cross-Border Expansions	1,020	1,036	1,136	3,192
Number of Domestic Expansions	5,318	6,760	6,766	18,844
Number of Multinational Acquirers	2,005	2,313	2,466	6,784
Number of Domestic Acquirers	4,333	5,483	5,436	15,252
Total Number of Expansions	6,338	7,796	7,902	22,036

Notes: The dependent variable takes the value of 1 if the parent company chooses a particular location among a set of alternatives. The choice set consists of 18 alternatives, which corresponds to the countries where 99% of all cross-border acquisitions take place. The effect of host country tax variable ( $t_j$ ) is allowed to be random across companies. Maximisation uses simulated maximum likelihood with 50 Halton random draws. Control variables are as in Table 4, but results omitted for simplicity of exposition. Sample size varies over time, but always corresponds to the parents that completed only one expansion during the three years interval. "MNE" is a binary indicator for multinational enterprises as defined one year before the beginning of the three years interval. Standard errors are in parentheses. The asterisks \*\*\*, \*\*, \* indicate that p-values are < 0.01, 0.05 and 0.10 respectively.

Table 7: Sensitivity analysis 1

	Baseline Specification, RP Logit (Tab. 4 Col. 3)	Baseline Specification, RP Logit Robust Std errors	Baseline Specification, Multinomial Logit	Baseline Specification, no Local Taxes	Baseline Specification, no Domestic Expansions	Baseline Specification, all expansions	Baseline Specification, all first expansions
	[1]	[2]	[3]	[4]	[5]	[6]	[7]
<b>Cross Border expansions</b>							
Host-country Statutory Tax Rate ( $t_j$ )	-31.895*** (6.397)	-31.895*** (7.600)	-8.303* (4.335)	-16.439*** (6.115)	-16.685*** (2.285)	-49.280*** (3.967)	-38.744*** (5.182)
$t_j$ * MNE dummy	13.757*** (2.160)	13.757*** (2.725)	3.991*** (0.671)	6.377*** (1.671)	-0.007 (0.741)	20.525*** (1.441)	16.310*** (1.741)
<b>Domestic expansions</b>							
Domestic Statutory Tax Rate ( $t_h = t_j$ )	-11.738*** (2.884)	-11.738*** (3.103)	-5.724*** (1.653)	-4.754*** (1.794)		-15.767*** (2.243)	-14.509*** (2.597)
$t_h$ * MNE dummy	-3.660*** (1.082)	-3.660*** (1.181)	-2.189*** (0.669)	-4.654*** (0.774)		-3.385*** (0.814)	-3.564*** (0.940)
<b>Standard Deviation of the RP on tax (<math>t_j</math>)</b>							
	16.408*** (2.499)	16.408*** (3.554)		7.850*** (2.045)	9.631*** (1.405)	21.603*** (1.391)	18.675*** (1.847)
<b>Maximised Log Likelihood</b>	-5,302.58	-5,302.58	-5,321.51	-5,318.28	-5,644.82	-12,254.5	-7,643.18
Number of Cross-Border Expansions	1,136	1,136	1,136	1,136	1,136	2,811	1,686
Number of Domestic Expansions	6,766	6,766	6,766	6,766	6,766	12,203	8,783
Number of Multinational Acquirers	2,466	2,466	2,466	2,466	2,466	6,672	3,841
Number of Domestic Acquirers	5,436	5,436	5,436	5,436	5,436	8,342	6,628
Total Number of Expansions	7,902	7,902	7,902	7,902	7,902	15,014	10,469

Notes: See notes to Table 6. In addition, Column [1] is the same as Column [3] from Table 4. The robust standard errors provided in Column [2] is based on the sandwich estimator of the Covariance matrix.

Table 8: Sensitivity analysis 2

	Baseline Specification: RP Logit [1]	Adding US MNE intercept shift [2]	Adding country-specific "domestic" intercepts [3]
<b>Cross Border expansions:</b>			
Host-country Statutory Tax Rate ( $t_j$ )	-31.895*** (6.397)	-31.781*** (6.570)	-37.509*** (5.500)
$t_j$ * MNE dummy	13.757*** (2.160)	13.701*** (2.286)	21.963*** (1.813)
<b>Domestic expansions:</b>			
Domestic Statutory Tax Rate ( $t_h = t_j$ )	-11.738*** (2.884)	-11.765*** (2.902)	33.786** (15.560)
$t_h$ * MNE dummy	-3.660*** (1.082)	-3.677*** (1.105)	-4.715*** (1.278)
US MNE Acquirer Intercept		0.037 (0.486)	
<b>Standard Deviation of the RP on tax (<math>t_j</math>)</b>	16.408*** (2.499)	16.345*** (2.633)	27.623*** (1.493)
<b>Maximised Log Likelihood</b>	-5,302.58	-5,302.58	-5,015.70

Notes: See notes to Table 4. In column [3] we augment the baseline model with country-specific intercepts for domestic acquisitions. We do this for the countries covering 90% of domestic acquisitions, which are the UK, Spain, France, Germany, Sweden, Russia, the Netherlands, Finland and Canada.



Figure 1: Distribution across Acquirers of the Effect of the Host Country Statutory Tax Rate

