The Effect of Tax Treaties on Market Based Finance: Evidence using Firm-Level Data*

Ronald B. Davies, University College Dublin
Neill Killeen, Central Bank of Ireland

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October 2018

Abstract

Tax arbitrage is often cited as a potential motive for the substantial growth and complexity of market based finance. Tax treaties are an important feature of the international tax system and can be used to reduce the tax burden on cross-border capital flows. Using an EU firm-level dataset and a number of alternative tax treaty measures, this paper investigates the importance of tax treaties on the investment decisions of a large sample of non-bank financial institutions. The novel dataset includes conduits such as special purpose entities which are often used to channel cross-border investments. Our results show that tax treaties influence the extensive margin of non-bank financial FDI with conduit related investments particularly sensitive to international taxation.

JEL classification: F23, F65, G23, G32
Keywords: Tax treaties, market-based finance, shadow banking system, conditional logit model, mixed logit model, nested logit model.

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†University College Dublin; ronbdavies@gmail.com
‡Central Bank of Ireland and PhD student at University College Dublin; neill.killeen@gmail.com

1   Introduction

Since the 2008 global financial crisis there has been an increased focus on monitoring developments within the market-based finance sector (also sometimes referred to as the shadow banking system). The FSB define shadow banking as *"credit intermediation involving entities and activities outside the regular banking system"* or non-bank credit intermediation in short (FSB, 2013).[1] Credit intermediation through the shadow banking system can, as the financial crisis revealed, lead to the build-up of vulnerabilities within the financial system and contribute to an increase in systemic risk.

However, from a public finance perspective, the shadow banking system remains largely unexplored with very little empirical evidence on this large and growing component of the financial system (de Mooj, 2015). While a growing literature has highlighted the importance of international taxation on banking foreign direct investment (FDI) (see, for example Huizinga, Voget and Wagner, 2014, Merz and Overesch, 2016 and Merz, Overesch and Wamser, 2017), we are not aware of a study which has focused on the effects of tax treaties in the market based finance sector in Europe.[2] Furthermore, the role of international tax policy and its interaction with financial regulation has not been examined in the empirical literature.

Tax arbitrage is often cited as a potential motive for the substantial growth and complexity of market based finance and shadow banking. For example, Adrian, Ashcraft and Cetorelli (2013) suggest that *"...one clear motivation for intermediation outside of the traditional banking system is for private actors to evade regulation and taxes."* Moreover, they note that *"... financial activity which has been re-structured to avoid taxes, disclosure, and/or capital requirements is referred to as arbitrage activity."*

One mechanism to restructure financial activities is through the establishment of non-bank financial institutions which can in turn be used to channel cross-border capital flows. A number of studies such as Godfrey, Killeen and Moloney (2015), Barrett,

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[1]Adrian (2017) provides a conceptual framework when considering shadow banking and market-based finance. Claessens and Ratnovski (2014) define shadow banking as *"all financial activities, except traditional banking, which require a private or public backstop to operate.*

[2]Following Davies (2004), we use the term tax treaties when referring to double taxation agreements, capital tax treaties and treaties covering the taxation of investment and income.

Godfrey and Golden (2016), Grillet-Aubert et al. (2016) and ESRB (2017) note that some non-bank financial institutions such as special purpose entities (SPEs) may be set up for fiscal or tax purposes, to attract external funding and to facilitate intra-group transactions. Similarly, Gorton and Souleles (2005) highlight the importance of tax in the design of non-bank financial institutions such as SPEs. They note that tax arbitrage related transactions can be an important factor in the structuring of these types of vehicles. These studies highlight that jurisdictions with a large network of tax treaties are attractive jurisdictions for the establishment of some types of non-bank financial institutions such as SPEs. However, none of these studies econometrically examine the impact of tax treaties on this sector. That is the purpose of the current study.

In relation to the existing financial FDI literature, Merz, Overesch and Wamser (2017) posit that the network of double taxation treaties may facilitate cross-border capital flows of dividends, interest and royalties when examining the location of German outbound financial FDI. In contrast to their study which includes multinational banks, our analysis focuses on the location decisions of non-bank financial institutions which would be categorised within the market based finance sector. Moreover, our dataset allows us to examine location decisions across a large number of EU alternatives from globally domiciled investors.

Against this background, we analyse the effects of tax treaties on the evolution of market based finance in Europe over the period 2004-2012. The main contribution of this paper is therefore to provide a first link between the well-established public finance literature on international tax policy and tax treaties and the growing literature which has developed in assessing the market based finance sector and the shadow banking system in Europe. In order to disentangle the importance of international taxation in influencing investment decisions in this sector, we employ a number of tax treaty measures. In addition to including the number of tax treaties signed by the host country (NO. DTTs) and a dummy variable equal to one if the home and host country have signed a double taxation treaty (SIGNED), we include a network centrality measure of treaty shopping developed by van 't Riet and Lejour (2017) which

captures the importance of host conduit locations in the tax treaty network (TREATY SHOPPING).

We employ a large sample of newly incorporated non-bank financial institutions which includes SPEs and holding companies which can be used to channel capital through countries. Therefore, our dataset allows us to shed light on the importance of tax treaties and potential treaty shopping behaviour on the investment decisions of non-bank financial institutions. In line with Davies (2004), treaty shopping refers to a practice whereby rather than investing directly in a host location, a firm channels its investment through a third country to take advantage of treaty provisions not found in the treaty agreement between the home and host.

In addition to our tax treaty measures, we also control for a number of other host characteristics including corporate taxation, the stringency of the financial regulatory regime and its interaction with international tax policy, agglomeration economies (measured by the presence of an international financial centre in the host location), along with standard gravity variables that capture financial frictions which have been found to impact financial FDI (see, for example, Claessens and van Horen (2014) and Davies and Killeen (2018)). The richness of our firm-level dataset enables us to match the incorporation of new non-bank financial institutions to a NUTS2 regional level in Europe and thereby allows us to control for within country heterogeneity and a number of regional specific factors which may impact firms' investment decisions. In total, we have data for 7,426 non-bank financial institutions incorporated in over 200 NUTS2 regions. Therefore, the use of granular NUTS2 data allow for a clearer identification and also allow us to examine agglomeration economies such as the presence of an international financial centre at a more disaggregated level.

On the whole, our results suggest that tax treaties influence the investment decisions of non-bank financial institutions. For example, non-bank financial institutions are attracted to jurisdictions with a large network of tax treaties even after controlling for a host of other factors such as corporate taxation and financial regulation. Our analysis of sub-samples of data suggest that conduits are particularly sensitive to tax

treaties. Further, applying the treaty shopping measure developed by van 't Riet and Lejour (2017), we find a positive relationship between tax treaty shopping and the extensive margin of non-bank financial FDI. These findings highlight the role of tax arbitrage and the complex interaction between international taxation and market based finance.

The remainder of the paper is structured as follows. The next section provides an overview of the related literature on tax treaties and treaty shopping. Section 3 describes the data used in our empirical analysis. Section 4 introduces the empirical approach while Section 5 presents the main results and extensions. Section 6 concludes.

2 Related Literature

A large number of studies have examined the effect of tax treaties on FDI. For example, Blonigen and Davies (2004) provide an overview of tax treaties. They note that tax treaties affect the taxation of firms by reducing withholding tax and by providing tax certainty. Nevertheless, tax treaties can also be associated with increased transfer pricing regulations and anti-treaty shopping provisions. Davies (2004) analyses the formation of tax treaties and provides a summary of the theoretical and empirical literature on their effects on FDI.

Overall, the empirical literature yields mixed results on the effects of tax treaties on FDI. For example, Egger et al. (2009) find a negative effect of tax treaties on FDI while Blonigen and Davies (2004), using data on US FDI, find little evidence that tax treaties affect FDI at all. By contrast, using data on Swedish multinationals, Davies et al. (2009) find that tax treaties increase the probability of having an affiliate in a given country. Similarly, Barrios et al. (2012) find that international double taxation is important in explaining location decisions of new foreign subsidiaries. Given the lack of consensus in the general FDI literature, it is worthwhile therefore to focus on specific sectors when examining the role of tax treaties on FDI. For instance, tax treaties may be a more important determinant for FDI in the financial sector, which is generally

considered to be more mobile than other sectors. In line with this hypothesis, Overesch and Wamser (2009) and Lawless et al. (2015) find that financial services firms are most sensitive to changes in corporation tax regimes.

A growing literature has examined the impact of tax on financial sector FDI.[3] However, the majority of studies to date have examined the role of taxation on FDI within the banking sector (Huizinga, 2004; Albertazzi and Gambacorta, 2010; Heckemeyer and de Mooj 2013; Huizinga, Voget and Wagner, 2014; Merz and Overesch, 2016 and Merz, Overesch and Wamser, 2017). Of these studies, Huizinga, Voget and Wagner (2014) focus specifically on the role of tax treaties and show that international double taxation acts as a deterrent to banking-sector FDI as measured by banking assets.

Given that many non-bank financial institutions can form part of complex multi-vehicle structures, they can potentially be employed as conduit entities in the round-tripping of capital across countries. As noted by Zucman (2014), the establishment of thousands of bilateral tax treaties has created a web of inconsistent rules. Multinational firms can therefore potentially exploit these inconsistencies to engage in tax arbitrage through treaty shopping by carefully choosing the location of their affiliates. Such foreign affiliates are often structured as conduit non-bank financial institutions.

Some country level studies have examined the role of tax treaties and treaty shopping on non-bank financial institutions. For example, Weyzig (2013) examines the importance of tax treaties for FDI routed through the Netherlands. He finds that FDI diversion is higher when both the home and host country have a tax treaty signed with the Netherlands and lower when the home and host have a bilateral tax treaty. Similarly, using data on German financial FDI, Merz, Overesch and Wamser (2017) find that a high number of double taxation treaties increases the attractiveness for financial sector FDI.

While there is a lack of empirical evidence on the link between international taxation and the market-based finance sector, many studies highlight the link as a possible

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[3]A number of academic papers also consider the importance of double taxation treaties in determining cross-border portfolio investments. See, for example, Lane (2006) and Lane and Milesi-Ferretti (2008).

motivation for bank-like activity migrating to parts of the non-bank financial sector. For example, Adrian and Ashcraft (2012) and Adrian, Ashcraft and Cetorelli (2013) note the incentives of financial institutions to avoid taxes, accounting rules and capital requirements. Adrian (2014) refers to regulatory and tax arbitrage as key determinants for the development of credit intermediation outside the regular banking system. Indeed, as highlighted by Godfrey, Killeen and Moloney (2015), Barrett, Godfrey and Golden (2016), Grillet-Aubert et al. (2016) and ESRB (2017), some non-bank financial institutions such as SPEs may be set up for tax purposes. These studies highlight that jurisdictions with a large network of treaties are attractive jurisdictions for the establishment of some types of non-bank financial institutions such as SPEs. However, none of these studies provide empirical evidence on the importance of tax treaties in influencing the geography of the market-based finance sector in Europe.

Regarding the literature on treaty shopping, Davies (2004) notes that there is significant heterogeneity in both definitions and withholding taxes of tax treaties. Such variation can give rise to treaty shopping behaviour whereby investors seek to reduce their tax liabilities by channelling their investments through particular locations. A small number of studies have empirically examined the role of treaty shopping (see, for example, Weyzig (2013), Hong (2016) and van 't Riet and Lejour (2017)). However, to the best of our knowledge no study has examined the interaction between treaty shopping and market based finance.

3   Data and Descriptive Statistics

The market-based finance sector is heterogeneous and includes a large number of different types of non-bank financial institutions.[4] Lane and Moloney (2018) suggest that "market-based finance refers to the raising of equity or debt through the financial markets rather than through the banking system." Moreover, there are important conceptual differences between the shadow banking system and market-based finance

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[4]See, for example, ESRB (2016) and Grillet-Aubert et al. (2016) for an overview of the different types of institutions considered within the EU market-based finance sector.

(see, for example, Adrian, 2017). Figure 1 presents a stylised overview of some of the non-bank financial institutions which would be considered shadow banking entities and those which are more relevant to market-based finance. It is important to note that some of the non-bank financial institutions in this paper are less relevant from a shadow banking perspective but would still fall within the market-based finance categorisation (for example, intra-group funding vehicles and vehicles linked to non-financial corporations (NFCs)).

To date, data limitations have hindered empirical investigations of the EU market-based finance sector. While regulatory and supervisory data has improved since the global financial crisis, both at the global and European level, many of these new data sources do not allow for an empirical investigation owing to the lack of historical observations.[5] In addition, large data gaps remain for parts of the non-bank financial sector as granular data are currently not available for over half of the other financial institutions (OFI) sector in Europe (i.e. the so-called "OFI residual" (ESRB 2016, Grillet-Aubert et al. (2016)), ESRB (2017)).

These data availability issues motivate our use of firm-level data when examining the role of tax treaties in the market based finance sector in the EU. Moreover, the use of firm-level data in our analysis allow us to empirically examine the investment decisions of a large number of different types of non-bank financial institutions, including conduit entities and those entities which would fall within the OFI residual category in aggregate data collections.

The firm-level data on newly incorporated non-bank financial institutions are taken from Bureau van Dijk's Orbis Europe database. This data source provides financial and ownership information based on standardised financial statements for institutions across Europe. We collect information on a number of firm-level characteristics from unconsolidated financial statements including the date and location of incorporation, number of employees, the location of the foreign investor and the firm's sector classification. Our sample include 7,426 non-bank financial institutions operating in 214

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[5]As many of these new data sources were introduced following the 2008 financial crisis, they do not capture the structure of the EU market-based finance sector in the pre-financial crisis period.

NUTS2 regions and covers the period 2004-2012. Our dataset also shows significant variation in the home country of investment. For example, foreign investments originate from over 55 home countries in our final dataset. A firm is defined as foreign-owned if the firm has one foreign shareholder who holds at least 10 per cent equity capital. A foreign affiliate is defined as new in its year of incorporation.

We merge these firm-level data with country-specific and regional (NUTS2)-specific data which control for geographical, institutional and macroeconomic characteristics. Regarding our main control variables of interest, we include the number of tax treaties signed by the host country which are taken from UNCTAD and supplemented with information manually collected from national sources (NO. DTTs).[6] As noted by Merz, Overesch and Wamser (2017), countries with a large network of double taxation treaties may attract non-bank financial institutions to locate in that country owing to their ability to facilitate cross-border capital flows of dividends and interest. As an alternative proxy, we also gather information and create a dummy variable equal to one if the home and host country have signed a bilateral tax treaty (SIGNED).

A number of other country level variables are included to proxy for financial frictions which are found to influence FDI. For instance, country-level data taken from CEPII capture institutional features of the host country and include dummy variables on whether the home and host country share a common language and common legal system. Moreover, we include the statutory corporation tax rate taken from KPMG. Distance, measured by kilometres between home and host capital cities, is used to proxy for factors which may hinder FDI between countries, such as information costs or time differences. Moreover, we control for the size and economic development of the host country by including the log of GDP and GDP per capita.

In addition, we control for the financial regulatory regime in place in the host country in order to disentangle the effects of international taxation from host country financial regulatory requirements. Data on banking regulations are taken from Barth, Caprio, and Levine (2001). These data combine information from World Bank surveys

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[6]Since the UNCTAD dataset on the number of double taxation treaties goes only until 2011, we use data for that year for observations for 2011-2012.

exploring different aspects of financial regulation in 180 countries for the period 1999 to 2011. Following Houston et al. (2012) and Fratzscher et al. (2016), we assign the information on bank regulations published by Barth, Caprio and Levine (2013) for 2006 and 2011 to specific time periods in our sample. For example, the indicators published in 2006 are assigned to the period 2004-2008, and the last survey from 2011 delivers the values for the regulatory variables for 2009-2012.

The Orbis Europe data provide detailed geographical information that allows us to map the European non-bank financial institutions in our sample to a NUTS2 region. We add further control variables which proxy for the macroeconomic and financial development at the NUTS2 regional level. Regional GDP and Regional GDP per capita at a NUTS2 region data are taken from Eurostat and capture the macroeconomic and financial development of particular regions.

We also gather information on the top 50 international financial centres from the Global Financial Centres Index produced by Z \Yen Group. Non-bank financial institutions may be attracted to locate in particular locations if there is an international financial centre nearby to benefit from agglomeration effects. Such agglomeration effects potentially include ancillary services such as corporate service providers and legal services which may be important for the establishment of non-bank financial institutions. A small but growing literature has focused on their role in influencing the structure of the global financial system. For example, Lane and Milesi-Ferretti (2011) examine the role played by small international financial centres. They posit that financial centres can play an important role in FDI transactions used by multinational firms and can act as an intermediary in a host of transactions related to mergers and acquisitions, treasuries and other specific transactions which may be channelled through SPEs. In an earlier study, Warnock and Cleaver (2003) examine the role of international financial centres in explaining the geographical mismatch in portfolio flows data while Garcia-Bernardo et al. (2017) introduce a data driven methodology for identifying offshore financial centres based on the global corporate ownership network. Table 1 summarises the definitions and sources of the variables used in our empirical analysis.

We proceed by first describing the main features of our dataset. A graphical illustration of the location of new non-bank financial institutions over the period 2004-2012 is shown in Figure 2. It is evident that there is significant heterogeneity in the number of non-bank financial institutions incorporated across NUTS2 regions over the sample period. For example, as shown in Table 2, five regions including North Holland, Inner London, Southern and Eastern Ireland, South Holland and Ill de France attracted over 50 per cent of the total number of new non-bank financial institutions over the whole sample. It is noteworthy that four of these five regions have large international financial centres in their respective regions including Amsterdam, the City of London, Dublin and Paris.

Turning to the source of investments over our sample period, we find that, consistent with the extant FDI literature, countries such as the US, Luxembourg, the UK, Germany, Cyprus and Switzerland are the top home countries of FDI (Table 2). Regarding the sectoral classifications of the firms included in our dataset, we find that almost 70 per cent of the firms are classified as activities of holding companies (Figure 3) which is consistent with the earlier study of Davies and Killeen (2018) on this sector in Europe. Moreover, this points to the importance of SPEs and brass plate investments in this sector. Table 3 presents descriptive statistics of all the variables used in our analysis while Table 4 shows a correlation matrix for these variables. Of note is the strong positive correlation (0.710) between the number of double taxation treaties a country has signed and its size (as measured by GDP).

4 Empirical Methodology

In this section, we describe our empirical strategy which employs a range of estimators used in the existing literature. In particular, we employ conditional, mixed and nested logit models when investigating the importance of tax treaties in determining the extensive margin of non-bank financial investment decisions. For all estimations, our dependent variable is a binary indicator which takes the value one if a firm locates in

a particular NUTS2 region over our sample period and zero otherwise. Our empirical analysis employs a series of covariates including our variables of interest, the number of tax treaties signed by the host country and whether the home and host has signed a tax treaty. In our extended specifications, we include the measure of treaty shopping in place of the number of treaties signed by the host. As described above, the other covariates in our model include a number of standard gravity variables which have been found to impact FDI in the extensive margin literature while we also control for the stringency of the financial regulatory regime in place in the host country.

4.1 Conditional logit model

Conditional logit models as proposed by McFadden (1973) have been employed in a number of empirical studies in the discrete choice literature (Head, Ries and Swenson 1995; Head and Mayer 2004; Barrios *et al.* 2012; Siedschlag *et al.* 2013a; 2013b; Nefussi and Schwellnus, 2014; Lawless *et al.* 2015, Davies and Killeen, 2018). The firm chooses its location to maximise profits, where Π_{ijt} is the profit of firm i when locating in region j at time t. The empirical strategy assumes that firms choose location j which maximises their expected profits. Since the expected profit is not observed in advance of the initial location decision, the probability that firm i chooses location j depends on the likelihood conditional on the location characteristics of j, including, for example, the network of tax treaties of j.

$$\Pi_{ijt} = X_{ijt}\beta + \varepsilon_{ijt} \tag{1}$$

However, a widely recognised limitation of the conditional logit model is the assumption of independence of irrelevant alternatives (IIA). Under this assumption, adding a new alternative cannot effect the relationship between a pair of existing alternatives. Therefore, we also employ two additional estimators which relax this assumption, namely the mixed and nested logit models.

4.2 Mixed logit model

As noted by Hole (2013), the mixed logit model extends the conditional logit model by allowing one or more of the parameters to be randomly distributed. Therefore, the IIA property inherent in the conditional logit model no longer holds. Train (2009) provides an overview of the mixed logit model. The model can be presented as follows:

$$\Pi_{ijt} = Y_{ijt}\beta + Z_{ijt}\alpha + \varepsilon_{ijt} \tag{2}$$

In this empirical set-up, Y_{ijt} and Z_{ijt} denote country and NUTS2 level characteristics while β and α represent fixed coefficients and random terms respectively. By allowing the coefficients to vary implies that the empirical set up in mixed logit models allow for the fact that different firms may have different preferences when making their investment decisions (Hole, 2013). Gazaniol (2014) notes that one of the main advantages of mixed logit models is the ability to control for random preferences which might vary across firms when they are making their investment decisions. For example, some firms may place more weight on the size of the potential new market while other may focus put more emphasis on tax or regulatory requirements across host alternatives. Moreover, as noted by Merz, Overesch and Wamser (2017), mixed logit models allows for correlation in unobserved factors across alternatives. A key decision in the set up of mixed logit models is the choice of the random terms. Following Merz, Overesch and Wamser (2017) who employ a mixed logit model on German financial FDI data, we set our taxation and financial regulation control variables to vary randomly.

Mixed logit models have been employed by a number of studies in the location decision literature. For example, Basile, Castellani and Zanfei (2008) fit mixed logit models using data on over 5,500 subsidiaries incorporated in 50 regions across eight EU countries. The focus of their study is to examine the role of EU Cohesion Policy in attracting foreign investors. Gazaniol (2014) also employs mixed logit models to investigate the importance of past internationalisation experience and group affiliation in determining the investment decisions of multinational firms. Merz, Overesch and

Wamser (2017) also use the mixed logit model to examine the importance of taxation and regulation in determining the location decisions of financial FDI from Germany.

4.3 Nested logit model

In addition to the conditional and mixed logit estimators, we also employ a nested logit model to examine the importance of tax treaties on the extensive margin of non-bank financial FDI. The nested logit model, as proposed by McFadden (1984) relaxes the assumptions of i.i.d inherent in conditional logit models and allows for the clustering of similar alternatives into nests. As summarised by Davies, Siedschlag and Studnicka (2016), investors therefore make their location decisions in a two step process. The first step is the choice of similar locations or nests and conditional upon this decision, the location decision within nests. The location probability can hence be written as:

$$P_j^n = P_n * P_{j/n} \tag{3}$$

In this equation, P_j^n refers to the location probability of nest n to be chosen amongst the full choice set of P_n and the probability of location j to be chosen given that nest n has been chosen $P_{j/n}$. A key decision in the empirical set up of nested logit model is the grouping of similar alternatives into nests. As noted by Nefussi and Schwellnus (2010), the selection of alternatives into nests is somewhat arbitrary. We are guided by the extant literature which employ nested logit models when grouping similar alternatives into nests. For the empirical analysis that follows, we show three different nesting structures having tested a large number of alternative structures.[7]

Another important consideration in the implementation of nested logit estimators is the inclusive value (IV) parameter. As noted by Basile, Castellani and Zanfei (2009), the IV parameter measures the profit that firms can expect to earn from locating in any region in nest n. In this way the estimated parameter can be viewed as the degree of dissimilarity among unobserved profit among the location alternatives with nest

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[7]In total, we tested over thirty alternative nested structures but in almost all cases one or more of the estimated IV parameters were inconsistent with random utility maximisation (RUM).

n. If the location alternatives within a nest are perfectly dissimilar, the IV parameter is equal to one. In such a scenario, a nested logit model is not necessary and a conditional logit model can be estimated. Low values of a dissimilarity parameter point to high similarity among locational alternatives within nest *n* while a dissimilarity parameter of greater than one suggests that alternatives are most similar across than within nests (Basile, Castellani and Zanfei, 2009). As highlighted by Crozet, Mayer and Mucchielli (2004) and Davies, Siedschlag and Studnicka (2016), values of a dissimilarity parameter between zero and one reflect consistency of the nested structure with profit maximising behaviour.

5   Results

5.1   Initial specifications

Table 5 presents the conditional logit model estimates of the effects of tax treaties on non-bank financial institutions' investment decisions. Column (1) is our base specification which includes our full sample of firms and examines the importance of international taxation by including the number of double taxation treaties signed by the host country (NO. DTTs). Moreover, we also control for the statutory corporation tax rate of the host country and whether there is an international financial centre in the NUTS2 region. In column (2), we replace the number of double taxation treaties signed by the host country with a dummy variable equal to one if the source country of foreign investment and the host EU host country have signed a bilateral tax treaty (SIGNED). In column (3), we include both measures of international taxation in our specification.

   Considering all three specifications, of note is the statistically positive effect of the number of double taxation treaties signed by the host country. However, the dummy whether the source and host country have signed a tax treaty is negative (albeit only statistically significant at the 10 per cent level in column (3)). Of the other controls included, we find that corporation tax is negative and statistically significant in specifications (1) and (3) but not when we include the signed variable on its own in column

(2). The distance between the home and host country is negative and statistically significant in all specifications and therefore suggests that information cost proxies are important factors in explaining investment decisions in the financial sector which is consistent with some of the existing studies in the literature (see, for example, Portes and Rey, 2005; Buch, 2005 and Davies and Killeen, 2018). Regarding the other country level variables, we find that the GDP of the host country is negative and statistically significant while GDP per capita is positive and statistically significant in all three specifications. This suggests that non-bank financial institutions are attracted to smaller but more developed countries. Similarly, we find consistent results when looking at GDP and GDP per capita at a regional NUTS2 level. Therefore, even within a country the size of the location alternative matters. Moreover, the international financial centre dummy is positive and statistically significant in all specifications pointing to the importance of agglomeration economies.

In column (4)-(6), we repeat our specifications from column (1)-(3) but now also control for bilateral country characteristics and financial frictions that might influence the investment decisions of non-bank financial institutions. These include dummy variables equal to one on whether the source country of investment and the host EU country have a common legal system and share a common language. Concerning our main regressors of interest, we see that the sign and significance of the number of double taxation treaties variable remains positive and statistically significant at the one per cent level. Moreover, our bilateral dummy on whether the home and host country have signed a tax treaty agreement remains negative. Our gravity related variables capturing bilateral financial frictions enter with different signs. For example, whether country pairs share a common legal system increases the likelihood of investment, while, somewhat surprisingly, the common language dummy is negative and statistically significant at the one per cent level across the three specifications. The signs and significance of the other country-level and regional-level coefficients are unchanged from the base specifications.

In column (7), we control for the stringency of the financial regulatory regime of

the host EU country using data from Barth, Caprio and Levine (2001). While this regulatory control enters negative and statistically significant at the 5 per cent level, the control variable of interest on tax treaties remain unchanged from our earlier base specifications. This suggests that investments by non-bank financial institutions can be deterred by the stringency of the financial regulatory regime in place in the host country even after controlling for international taxation. In column (8) and (9) we include additional interaction variables. Columns (8) and (9) includes the interaction variable (DTT*Signed) between the number of double taxation treaties signed by the host country and whether the home and host country have signed a bilateral taxation treaty agreement. This variable enters significantly negative in both specifications. Finally, in column (9) we also include an interaction variable (DTT*Signed*IFC) which enters positive and statistically significant. This indicates that investments are possibly influenced by agglomeration economies or herding behaviour which can influence non-bank financial investments.

As noted in the previous section, conditional logit models impose strict assumptions while mixed logit estimators are more flexible for modeling investment decisions. Table 6 therefore presents our base specifications but now using a mixed logit estimator in place of the conditional logit estimator. On the whole our main findings from the conditional logit model hold when we employ this modeling technique. In particular, our variable of interest, is unchanged with host countries with a large number of double taxation treaties more likely to attract investments.[8]

In a further extension of our modeling framework, we employ a nested logit model to examine the influence of tax treaties on non-bank financial institutions' investment decisions. Guided by the extant empirical literature, we test a number of nesting structures. Table 7 reports the nested logit estimates. In columns (1)-(4), we repeat our base specifications using two alternative nesting structures and our full sample of firms. In columns (1) and (3) we employ a two-nest structure with nest one including all NUTS2

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[8]As a robustness check, we include host country fixed effects for our base conditional logit model specifications in Table 8. However, in this specification the number of tax treaties signed by the host country is positive but insignificant across all specifications.

regions within mainland Europe and nest two including all NUTS2 regions in the UK and Ireland. Columns (2) and (4) employ the same specifications but vary by nesting structures. In these specifications we partition our alternatives into nine separate nests. The nine nested structures are broken into the following categorisations: South (Bulgaria, Cyprus, Italy, Malta, Portugal, Spain), Ireland and UK, North (Finland, Netherlands and Sweden), Core (Austria, Germany and France) and East (Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland and Romania).[9] Next, the first four categorisations are further split into eight different nests based on these geographic breakdowns and whether the NUTS2 region currently hosts an international financial centre. Despite experimenting with a large number of nesting structures (over 30), in almost all cases the dissimilarity parameters did not lie between zero and one suggesting inconsistency with random utility maximisation. This can be seen from the inclusive values for columns (1)-(4) where some or all fall outside this range.

Regarding our control variable of interest, we find that the number of tax treaties signed by the host country is positive and statistically significant in columns (1) and (3) but is negative and statistically significant in column (2) and positive and insignificant in column (4). It is important to note that these results appear to be driven by the choice of nesting structure which differ in columns (1) and (2). Moreover, given that none of the nesting structures are consistent with random utility maximisation, caution is warranted when interpreting the results from the nested logit model. By contrast, the conditional and mixed logit model are not subject to the choice of nested structure. The evidence on the dummy variable indicating whether the home and host country have signed a tax treaty is also mixed; its negative and statistically significant in column (1), insignificant in column (2) but is positive and statistically significant in columns (3) and (4).

Given the large number of financial holding companies within our sample, we experiment further with these nesting structures using a sub-sample of firms. As noted

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[9]Owing to missing data for the key control variables of interest, Belgium, Croatia, Greece, Luxembourg, Slovakia and Slovenia are excluded as possible host locations in our analysis. However, the number of investments made in these countries in our initial sample is small and therefore are overall sample is not significantly affected by their exclusion.

by Davies and Killeen (2018), financial holding companies are often associated with low or no fixed assets and few or no employees. Given that these investments are rather mobile compared to more traditional foreign investments, we exclude these firms from our sample in columns (5)-(7). We employ our two-nest structure in columns (5) and (6) and, in contrast to our earlier estimates, the inclusive parameters now fall within the 0-1 range. The number of double taxation treaties signed by the host country is negative and statistically significant in both specifications while the dummy variable on whether the home and host country have signed a double taxation treaty is positive but statistically significant at the 5 per cent level in column (6) only. Finally, in column (7), we experiment with the nine nesting structure on the sub-sample of firms excluding financial holding companies. Again, not all of the nests in the structures are bounded between 0-1 while our estimates are broadly unchanged.

5.2 Robustness checks based on sub-samples

In Tables 9-13, we exploit the richness of our firm-level dataset both over time and by firm business model to examine differences across sub-samples of data using different modeling techniques. In Table 9 where we use the conditional logit estimator, we repeat our base specifications for the full sample of firms in column (1). We split the time period of the investment decisions to pre-crisis samples (2004-2007) and post-crisis samples (2010-2012) in columns (2) and (3). Moreover, we account for different types of investments in columns (4) and (5) by only considering those investments that do not relate to financial holding companies in column (4) and only those investments of have five or more employees in column (5). Table 10 includes the same five specifications but presents mixed logit models instead of the conditional logit estimates shown in Table 9. Considering both tables together we see that our main variable of interest, (NO. DTTs) is positive and statistically significant in almost all specifications in both tables. Moreover, we find that the dummy variable for whether the home and host country have signed a double taxation treaty (SIGNED) also enters positive and statistically significant in all specifications. However, when we exclude conduit enti-

ties such as SPEs which fall within the financial holding companies categorisation, it is noteworthy that the NO. DTTs is now negative and statistically significant in both tables. This suggest that conduit investments are attracted to locations with a larger network of tax treaties.

Tables 11, 12 and 13 re-run these specifications based on sub-samples of data but now employ the nested logit estimator. Each table uses an alternative nesting structure with the two-nest structure of mainland Europe and UK-Ireland used in Table 11. By contrast, Table 12 employs the nine nest structure described above while as a final robustness check, Table 13 show the results from a three nest structure. The final nesting structure is partitioned as follows: nest one includes all NUTS2 regions in the euro area, nest 2 includes all NUTS2 regions in Ireland and the UK while nest 3 includes all NUTS2 regions in the remaining non-euro area non-UK EU countries. Such a nesting structure may be particularly relevant from a post-Brexit perspective. Taken together, we again find that many of the IV parameters lie outside that 0-1 range. Regarding our explanatory variables of interest, the evidence on the international taxation variables using a nested logit estimator is mixed. The dummy variable SIGNED is positive and statistically significant across all specifications while the number of double taxation treaties (NO. DTTs) is positive and statistically significant in all specifications in Table 11 and 13 with the exception of column (4) in both tables which excludes financial holding companies. As before, this result suggests that financial holding companies that are often set up as conduits may be particularly sensitive to the international taxation and tax treaty frameworks in the host country. However, it is clear from our various robustness checks that our results are also sensitive with respect to nesting structure employed in the nested logit models.

Taken together, the results of our analysis suggests that tax treaties influence the extensive margin of non-bank financial FDI. For example, we find that the number of tax treaties signed by the host country and whether the home and host have signed a tax treaty exerts a positive influence on the probability of investment in the market based finance sector. These findings appears to be particularly driven by conduits

such as SPEs within our sample and thereby highlights the role of tax treaties and international taxation within the sector. However, it is important to highlight that our results from the nested logit model are inconsistent with random utility maximisation and therefore caution is warranted when interpreting the results from the nested logit estimator.

5.3 Extensions based on treaty shopping measure

As highlighted in Section 2, the network of tax treaties is often cited in the extant literature as an important factor in determining the location of non-bank financial institutions. However, many of the empirical studies to date, including our estimates presented above, look at the full network of treaties signed by the host country without accounting for the tax treaty network of the home country of the investment. As many non-bank financial institutions are often set up as conduit entities such as SPEs which form part of a larger network of financial intermediation chains or multi-vehicle structures, it is even more important to account for these features when looking at investment decisions in this part of the financial sector. The existence of thousands of tax treaties between countries also increases the likelihood that complex structures can be employed to take advance of inconsistencies to benefit from tax arbitrage (see, for example, Zucman (2014)). Moreover, the findings of Arena and Roper (2010) suggests that the framework of international taxation is an important factor in international corporate debt location decisions. Given the presence of SPEs engaged in debt issuance coupled with their significant linkages to sponsors internationally, the issue of treaty shopping and international taxation may be particularly relevant to our sample of firms.

In order to test this hypothesis, this section empirically examines the effects of treaty shopping in the market based finance sector using two alternative measures. The first measure we employ is constructed by van 't Riet and Lejour (2017). The control variable (TREATY SHOPPING), measures if a country has a high potential for use as a conduit for diverting FDI. A higher value reflects the share of tax minimising routes on

which the country is present as a conduit using a betweenness centrality measure from network analysis techniques. In a related study, Hong (2016) also employs network analysis techniques to develop measures of treaty shopping.

Table 14 shows the results when we include this control variable in place of the number of tax treaties signed by the host country. Column (1) shows the baseline results from the conditional logit model while column (2) presents the estimates from the specification when we replace the number of tax treaties with the treaty shopping measure. In line with van 't Riet and Lejour (2017), we find that the treaty shopping measures increases the probability of investment. This suggests that treaty shopping may an important factor in determining the geographical structure of the market-based finance sector even after controlling for the impact of financial centres, financial regulation and statutory corporate taxation. Comparing columns (1) and (2), we see that the estimates of the other regressors in the specification are broadly unchanged with the exception of statutory corporate taxation which changes from negative and statistically significant in column (1) to positive and statistically significant in column (2). Similarly in columns (3) and (4) we obtain similar results from columns (1) and (2) when we repeat these specifications using a mixed logit estimator. Finally, in columns (5) and (6) we use the nested logit model on the same specifications and obtain similar results although the dissimilarity parameters again lie outside the 0-1 range in both specifications and therefore caution in interpreting the nested logit model estimations is warranted.

6 Conclusions

This paper empirically examines the effects of tax treaties on the investment decisions of a large sample of non-bank financial institutions. The significant growth of market based finance and shadow banking in Europe, coupled with its opaqueness, has led to increased focus on this part of the financial sector. An often cited motive for the increased growth and complexity of market based finance is the potential to circumvent

tax which may be achieved through treaty shopping via non-bank financial affiliates. However, few studies to date have empirically examined the importance of tax treaties and the use of treaty shopping whilst controlling for the importance of other factors such as the financial regulatory requirements of the host location.

Our analysis therefore provides a first link between the public finance literature on international taxation and the growing literature on market-based finance. On the whole, we find evidence that tax treaties influences the extensive margin of non-bank financial FDI. Our results, in general, show that the number of tax treaties signed by the host location is an important factor in determining non-bank financial FDI while the measure of treaty shopping developed by van 't Riet and Lejour (2017) also positively impacts the location of foreign non-bank financial institutions. Moreover, our analysis of sub-samples of data suggest that conduit related investments are particularly sensitive to tax treaties. Beyond these control variables of interest, our analysis also confirms the role of bilateral financial frictions in determining the investment decisions of non-bank financial institutions.

In terms of policy implications, our findings point to the importance of considering both tax treaties and financial regulation when considering the complexity of market based finance. The interaction of tax policy with financial regulation and their effects on global financial stability is an important policy issue which to date has received little attention in the empirical literature. Moreover, in light of Brexit, understanding the role of international taxation in attracting financial FDI is of increasing importance to policymakers and researchers.

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TABLE 1. Variable Definitions and Data Sources

Variable	Description	Data Source
Location	Dummy variable equal to 1 if new foreign affiliate is located in a NUTS2 region and 0 otherwise	Orbis Europe
Comleg	Dummy variable equal to 1 if home and host share a common legal system and 0 otherwise	CEPII
Comlang	Dummy variable equal to 1 if home and host share a common language	CEPII
Corp. Tax	Statutory corporation tax rate, per cent	KPMG
Distance	Log of distance, measured by km between host and home country capital cities, weighted by population	CEPII
IFC	Dummy variable equal to 1 if international financial centre (based on Global Financial Centres Index) present in NUTS2 region and 0 otherwise	Z \Yen Group
GDP	Log of GDP at host country level, constant 2005 prices US Dollars	Eurostat
Regional GDP	Log of GDP at NUTS2 level, constant 2005 prices US Dollars	Eurostat
GDP per capita	Log of GDP per capita at host country level, constant 2005 prices US Dollars	Eurostat
Regional GDP per capita	Log of GDP per capita at NUTS2 level, constant 2005 prices US Dollars	Eurostat
Fin. Regulation	Capital stringency index (0-9), higher values indicating more stringent capital regulation	Barth, Caprio and Levine (2013)
No. of DTTs	Number of double taxation treaties signed by the host country	UNCTAD
Signed	Dummy variable equal to 1 if home and host country have signed a bilateral tax treaty and 0 otherwise	various sources
Treaty shopping	Betweenn ess centrality measure which reflects if a country is often used as a conduit for diverting FDI. Higher values reflect the share of tax minimising routes on which the country is present as a conduit	van 't Riet and Lejour (2017)

FIGURE 1. **Relationship between shadow banking and market-based finance**

Shadow Banking

e.g. Private placements funded by
non-consolidated
shadow banking entities;
sponsor credit / liquidity support provided
to non-consolidated shadow banking entities

**e.g. Broker-dealers;
Finance companies;
securitisations
placed in market
(ABCP conduits);
SIVs; Hedge funds;
PE funds; loan
originating funds,
CNAV MMFs**

Market-Based Finance

e.g. Entities prudentially consolidated in banking
groups (SPEs, finance companies etc);
intra-group funding vehicles;
Holding companies;
Retained securitisations;
Funding vehicles linked to NFCs.

Risk characteristics of shadow banking: Credit intermediation outside
regular banking system; liquidity transformation; maturity transformation;
high leverage; strong interconnectedness with banking system (recipient
and provider of funding)

Notes: The FSB define shadow banking as "credit intermediation involving entities and activities outside the regular banking system" or non-bank credit intermediation in short (FSB, 2013). Adrian (2017) provides a conceptual framework when considering shadow banking and market-based finance. In October 2017, the US Treasury published a report which recommended that the FSB transition away from the use of the term "shadow banking" and to instead use "market-based finance" (US Treasury, 2017). A number of alternative definitions of shadow banking have been applied in the academic literature. For instance, Claessens and Ratnovski (2014) define shadow banking as "*all financial activities, except traditional banking, which require a private or public backstop to operate.*"

FIGURE 2. **Location of New Non-Bank Financial Institutions by NUTS2 regions, 2004-2012**
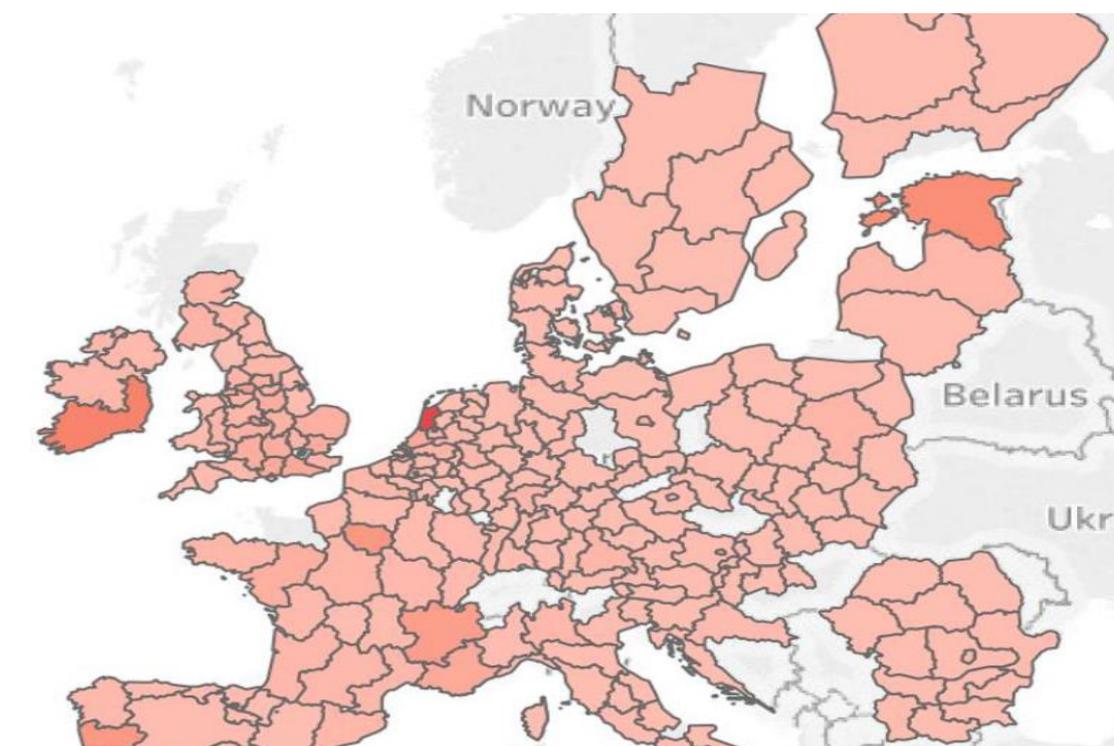
Notes: The figure shows the location of non-bank financial institutions by NUTS2 regions over the period 2004-2012. Dark red indicates regions where a high number of non-bank financial institutions have been incorporated while light red indicates regions where fewer non-bank financial institutions have been incorporated.

TABLE 2. Summary statistics of new non-bank financial institutions

Top 10 Host NUTS2 regions	N	%	Top 10 Home Countries	N	%
North Holland (NL32)	2,257	30.0	United States	1,736	23.4
Inner London (UKI1)	668	9.0	Luxembourg	783	10.5
Southern and Eastern (IE02)	495	6.7	United Kingdom	574	7.7
South Holland (NL33)	371	5.0	Germany	433	5.8
Ille de France (FR10)	273	3.7	Cyprus	331	4.5
North Brabant (NL41)	205	2.8	Switzerland	325	4.4
Darmstadt (DE71)	170	2.2	Netherlands	290	3.9
Berlin (DE30)	144	1.9	Belgium	225	3.0
Wien (AT13)	135	1.8	France	209	2.8
Oberbayern (DE21)	117	1.6	Japan	157	2.1
Total	7,426		**Total**	7,426	

Source: *Authors calculations.*

FIGURE 3. **NACE Rev.2 Sector Classifications**
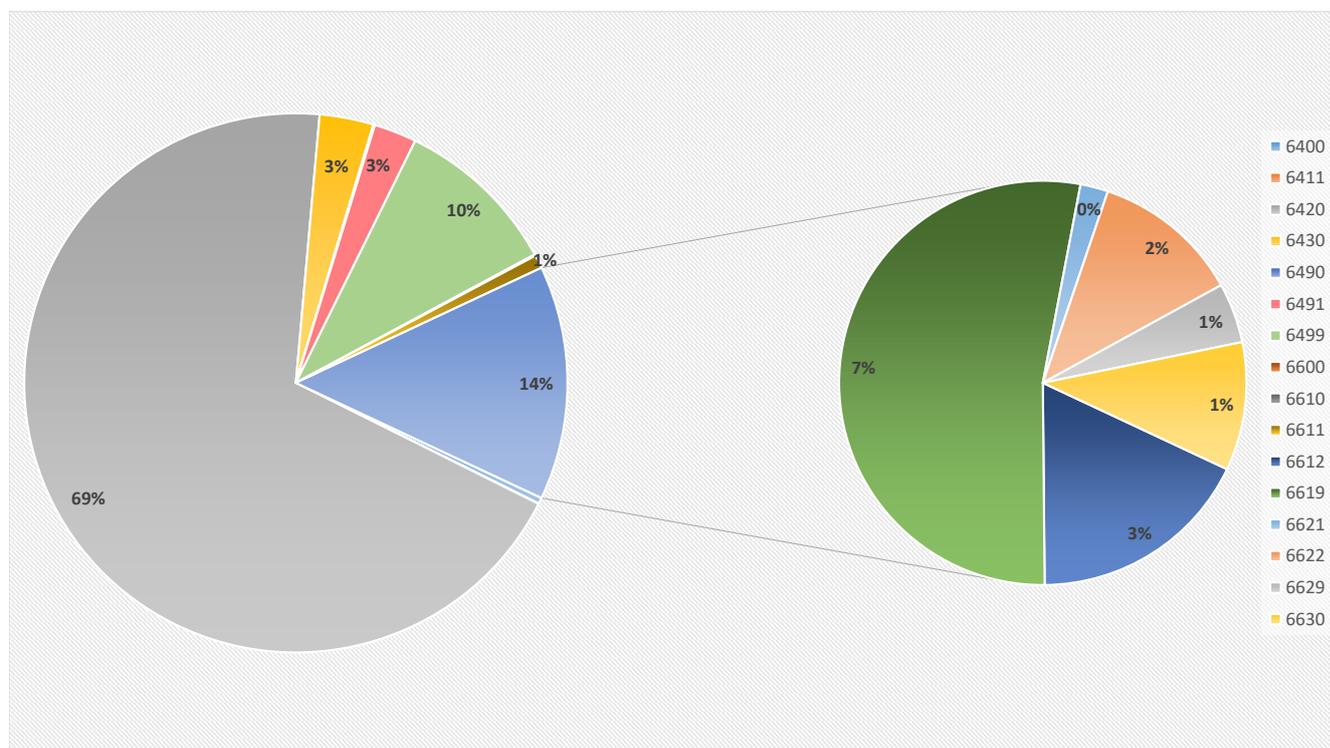
Notes: NACE 6411 refers to central banking; NACE 6419 refers to other monetary intermediation; NACE 6420 refers to activities of holding companies; NACE 6430 refers to trusts, funds and similar entities; NACE 6491 refers to financial leasing; NACE 6492 refers to other credit granting; NACE 6499 refers to other financial services activities except insurance and pension funding; NACE 6611 refers to administration of financial markets; NACE 6612 refers to security and commodity contracts brokerage; NACE 6619 refers to other activities auxiliary to financial services except insurance and pension funding; NACE 6621 refers to risk and damage evaluation; NACE 6622 refers to the activities of insurance agents and brokers; NACE 6629 refers to other activities auxiliary to insurance and pension funding and NACE 6630 refers to fund management activities. Banks and insurance company accounts are not available on the *Amadeus* database. Therefore entities relating to NACE Rev. 2 65 *insurance, reinsurance and pension funding, except compulsory social security* are not covered in our sample.

TABLE 3. Summary statistics

Variable	N	Mean	Std. Dev	Min.	Max.
No. of DTTs	1435200	86.8	18.0	31.0	119.0
Signed	1435200	0.9	0.3	0	1
GDP	1435200	27.4	1.4	22.5	28.8
Regional GDP	1435200	10.7	1.1	7.6	13.3
GDP per capita	1435200	10.1	0.6	8.2	10.8
Regional GDP per capita	1435200	9.9	0.7	7.4	12.3
IFC	1435200	0.1	0.3	0	1
Distance	1435200	7.8	1.1	5.1	9.9
Corporation tax	1435200	28.4	7.0	10.0	39.58
Fin. Regulation	1417716	4.5	1.7	1.0	7.0
Comleg	1435200	0.2	0.4	0	1
Comlang	1435200	0.1	0.4	0	1
DTT*Signed	1435200	79.4	30.3	0	119.0
DTT*Signed*IFC	1435200	7.3	23.8	0	119.0
Treaty shopping	1435200	4.0	4.4	0.8	13.4

TABLE 4. Correlation matrix

Variables	No. DTTs	Signed	GDP	GDP capita	Regional GDP	Regional GDP per capita	IFC	Corp. Tax	Distance	Comleg	Comlang	Fin. Regulation	DTT* Signed	DTT* Signed*IFC	Treaty Shopping
No. of DTTs	1.000														
Signed	0.095	1.000													
GDP	0.710	0.057	1.000												
GDP per capita	0.542	0.043	0.73	1.000											
Regional GDP	0.412	0.041	0.540	0.551	1.000										
Regional GDP per capita	0.463	0.038	0.649	0.916	0.585	1.000									
IFC	-0.182	-0.025	-0.206	-0.017	0.075	0.179	1.000								
Corp Tax	0.370	0.005	0.759	0.683	0.443	0.601	-0.098	1.000							
Distance	-0.077	-0.136	-0.094	-0.088	-0.055	-0.077	0.018	-0.067	1.000						
Comleg	0.199	0.077	0.159	0.190	0.105	0.171	0.014	0.114	-0.089	1.000					
Comlang	0.249	0.071	0.226	0.238	0.121	0.206	0.001	0.140	-0.152	0.478	1.000				
Fin Regulation	0.095	-0.045	0.250	0.240	0.134	0.243	-0.045	0.220	-0.001	0.101	0.103	1.000			
DTT*Signed	0.605	0.829	0.413	0.317	0.246	0.270	-0.109	0.193	-0.143	0.169	0.191	0.015	1.000		
DTT*Signed*IFC	-0.025	0.097	-0.062	0.037	0.148	0.227	0.895	-0.029	-0.011	0.028	0.021	-0.035	0.060	1.000	
Treaty shopping	0.547	-0.010	0.185	0.314	0.121	0.273	0.038	-0.03	-0.019	0.233	0.232	0.180	0.286	0.067	1.000

TABLE 5. Initial Estimates from Conditional Logit Model Regressions

	(1) Full Sample	(2) Full Sample	(3) Full Sample	(4) Full Sample	(5) Full Sample	(6) Full Sample	(7) Sample from (4)	(8) Sample from (4)	(9) Sample from (4)
No. DTTs$_{t-1}$(?)	0.0136***		0.0138***	0.0122***		0.0123***	0.0123***	0.0279***	0.0272***
	(0.00102)		(0.00102)	(0.00104)		(0.00105)	(0.00104)	(0.00224)	(0.00225)
GDP$_{t-1}$(+)	-0.340***	-0.241***	-0.341***	-0.320***	-0.229***	-0.321***	-0.345***	-0.358***	-0.362***
	(0.0158)	(0.0147)	(0.0159)	(0.0164)	(0.0155)	(0.0165)	(0.0167)	(0.0167)	(0.0167)
GDP per capita$_{t-1}$(+)	0.941***	0.943***	0.949***	0.935***	0.944***	0.942***	0.969***	0.954***	0.962***
	(0.0564)	(0.0615)	(0.0574)	(0.0580)	(0.0628)	(0.0589)	(0.0613)	(0.0601)	(0.0590)
Regional GDP$_{t-1}$(+)	-0.103***	-0.0823***	-0.102***	-0.0978***	-0.0782***	-0.0972***	-0.0719***	-0.0687***	-0.0709***
	(0.0173)	(0.0164)	(0.0173)	(0.0173)	(0.0164)	(0.0174)	(0.0172)	(0.0172)	(0.0171)
Regional GDP per capita$_{t-1}$(+)	0.852***	0.946***	0.850***	0.868***	0.951***	0.866***	0.862***	0.859***	0.846***
	(0.0240)	(0.0248)	(0.0240)	(0.0239)	(0.0250)	(0.0240)	(0.0239)	(0.0240)	(0.0238)
IFC(+)	2.408***	2.343***	2.408***	2.400***	2.342***	2.400***	2.389***	2.389***	2.063***
	(0.0334)	(0.0329)	(0.0334)	(0.0332)	(0.0324)	(0.0332)	(0.0330)	(0.0329)	(0.0691)
Corp Tax$_{t-1}$(-)	-0.00799***	0.000366	-0.00811***	-0.00612**	0.00113	-0.00621**	-0.00489*	-0.00460*	-0.00548**
	(0.00248)	(0.00242)	(0.00248)	(0.00268)	(0.00263)	(0.00268)	(0.00267)	(0.00265)	(0.00266)
Distance(-)	-1.662***	-1.667***	-1.662***	-1.620***	-1.637***	-1.617***	-1.613***	-1.644***	-1.642***
	(0.0346)	(0.0344)	(0.0347)	(0.0362)	(0.0363)	(0.0364)	(0.0364)	(0.0359)	(0.0359)
Signed$_{t-1}$(?)		-0.0654	-0.117*		-0.0637	-0.110*	-0.106*	1.277***	1.224***
		(0.0600)	(0.0600)		(0.0615)	(0.0613)	(0.0616)	(0.171)	(0.174)
Comleg(+)				0.454***	0.479***	0.457***	0.445***	0.443***	0.447***
				(0.0330)	(0.0321)	(0.0330)	(0.0330)	(0.0329)	(0.0330)
Comlang(+)				-0.493***	-0.529***	-0.489***	-0.497***	-0.497***	-0.491***
				(0.0395)	(0.0395)	(0.0397)	(0.0395)	(0.0394)	(0.0394)
Fin. Regulation$_{t-1}$(-)							-0.0159**	-0.0157**	-0.0146**
							(0.00692)	(0.00691)	(0.00692)
DTT*Signed˙t-1(?)								-0.0170***	-0.0189***
								(0.00202)	(0.00207)
DTT*Signed*IFC$_{t-1}$(?)									0.00400***
									(0.000750)
N	1435200	1435200	1435200	1435200	1435200	1435200	1416221	1416221	1416221
Log pseudolikelihood	−28832.468	−28925.708	−28830.222	−28716.87	−28788.9	−28714.9	−28537.8	−28496.1	−28483.6
Firms	7426	7426	7426	7426	7426	7426	7418	7418	7418

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: The dependent variable *Location* equals 1 if a foreign affiliate is located in a NUTS2 region and 0 otherwise. Standard errors are robust to heteroskedasticity and clustered at the firm level.

TABLE 6. Initial Estimates from Mixed Logit Model Regressions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Full Sample	Full Sample	Full Sample	Full Sample	Full Sample	Full Sample	Sample from (4)	Sample from (4)	Sample from (4)
No. DTTs$_{t-1}$(?)	0.0136***		0.0137***	0.0122***		0.0122***	0.0122***	0.0315***	0.0306***
	(0.00102)		(0.00103)	(0.00104)		(0.00106)	(0.00105)	(0.00273)	(0.00273)
GDP$_{t-1}$(+)	-0.340***	-0.241***	-0.342***	-0.320***	-0.228***	-0.319***	-0.345***	-0.357***	-0.360***
	(0.0158)	(0.0149)	(0.0159)	(0.0164)	(0.0158)	(0.0168)	(0.0171)	(0.0171)	(0.0171)
GDP per capita$_{t-1}$(+)	0.941***	0.944***	0.950***	0.935***	0.944***	0.942***	0.970***	0.950***	0.958***
	(0.0564)	(0.0614)	(0.0574)	(0.0580)	(0.0627)	(0.0590)	(0.0614)	(0.0601)	(0.0592)
Regional GDP$_{t-1}$(+)	-0.103***	-0.0821***	-0.102***	-0.0978***	-0.0784***	-0.0972***	-0.0719***	-0.0691***	-0.0711***
	(0.0173)	(0.0164)	(0.0174)	(0.0173)	(0.0164)	(0.0174)	(0.0172)	(0.0172)	(0.0171)
Regional GDP per capita$_{t-1}$(+)	0.852***	0.950***	0.855***	0.868***	0.959***	0.874***	0.870***	0.870***	0.857***
	(0.0240)	(0.0249)	(0.0241)	(0.0239)	(0.0251)	(0.0242)	(0.0240)	(0.0242)	(0.0240)
IFC(+)	2.408***	2.344***	2.408***	2.400***	2.343***	2.400***	2.390***	2.390***	2.111***
	(0.0334)	(0.0328)	(0.0334)	(0.0332)	(0.0323)	(0.0330)	(0.0330)	(0.0329)	(0.0688)
Distance(-)	-1.662***	-1.706***	-1.696***	-1.620***	-1.682***	-1.657***	-1.653***	-1.675***	-1.671***
	(0.0346)	(0.0363)	(0.0365)	(0.0362)	(0.0374)	(0.0375)	(0.0376)	(0.0370)	(0.0370)
Corp Tax$_{t-1}$(-)	-0.00799***	-0.000367	-0.00859***	-0.00612**	0.000384	-0.00695**	-0.00560**	-0.00562**	-0.00632**
	(0.00248)	(0.00245)	(0.00251)	(0.00268)	(0.00269)	(0.00274)	(0.00272)	(0.00271)	(0.00272)
Signed$_{t-1}$(?)		0.285***	0.204**		0.400***	0.311***	0.311***	2.052***	1.946***
		(0.101)	(0.0982)		(0.108)	(0.105)	(0.107)	(0.244)	(0.244)
Comleg(+)				0.454***	0.501***	0.477***	0.464***	0.465***	0.467***
				(0.0330)	(0.0330)	(0.0339)	(0.0338)	(0.0338)	(0.0338)
Comlang(+)				-0.493***	-0.562***	-0.520***	-0.527***	-0.532***	-0.525***
				(0.0395)	(0.0408)	(0.0409)	(0.0407)	(0.0407)	(0.0407)
Fin. Regulation$_{t-1}$(-)							-0.0143**	-0.0134*	-0.0127*
							(0.00698)	(0.00698)	(0.00698)
DTT*Signed$_{t-1}$(?)								-0.0206***	-0.0220***
								(0.00254)	(0.00255)
DTT*Signed*IFC$_{t-1}$(?)									0.00344***
									(0.000751)
SD									
No. DTTs$_{t-1}$(?)	0.00000387		0.0000294	0.00000160		0.0000263	0.0000162	0.00000286	0.0000350
	(0.0000797)		(0.0000888)	(0.0000819)		(0.0000933)	(0.0000853)	(0.0000928)	(0.0000990)
Corp Tax$_{t-1}$(-)	-0.0000750	0.0000375	-0.000188	-0.0000883	0.0000443	-0.000212	-0.0000256	0.000294	-0.000109
	(0.000555)	(0.000289)	(0.000556)	(0.000595)	(0.000321)	(0.000578)	(0.000531)	(0.000628)	(0.000637)
Signed$_{t-1}$(?)		1.240***	-1.185***		1.447***	-1.372***	-1.360***	1.559***	-1.494***
		(0.114)	(0.112)		(0.111)	(0.108)	(0.114)	(0.118)	(0.120)
Fin. Regulation$_{t-1}$(-)							-0.000128	-0.00103	-0.000133
							(0.00117)	(0.00119)	(0.00117)
Firms	7426	7426	7426	7426	7426	7426	7418	7418	7418

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: The dependent variable *Location* equals 1 if a foreign affiliate is located in a NUTS2 region and 0 otherwise. Standard errors are robust to heteroskedasticity and clustered at the firm level.

TABLE 7. Initial Estimates from Nested Logit Model Regressions

	(1) Full Sample	(2) Full Sample	(3) Full Sample	(4) Full Sample	(5) Excl. Financial Holding Cos.	(6) Excl. Financial Holding Cos.	(7) Excl. Financial Holding Cos.
No. DTTs$_{t-1}$(?)	0.0383***	-0.00181**	0.0602***	0.00136	-0.0123***	-0.0106***	-0.0268***
	(0.00224)	(0.000791)	(0.00388)	(0.00135)	(0.00155)	(0.00172)	(0.00379)
Signed$_{t-1}$(?)	-0.333***	-0.0443	1.728***	0.221**	0.0610	0.224**	0.446*
	(0.0834)	(0.0425)	(0.285)	(0.102)	(0.0535)	(0.106)	(0.254)
GDP$_{t-1}$(+)	-0.319***	-0.00455	-0.365***	-0.00745	0.178***	0.181***	0.353***
	(0.0328)	(0.0153)	(0.0339)	(0.0151)	(0.0270)	(0.0271)	(0.0439)
GDP per capita$_{t-1}$(+)	1.604***	0.149	1.583***	0.0681	-0.477***	-0.488***	-1.108***
	(0.0922)	(0.135)	(0.0915)	(0.111)	(0.0586)	(0.0599)	(0.150)
Regional GDP$_{t-1}$(+)	-0.262***	0.0291***	-0.259***	0.0280***	0.0114	0.0142	0.0582*
	(0.0308)	(0.0109)	(0.0311)	(0.0104)	(0.0148)	(0.0151)	(0.0310)
Regional GDP per capita$_{t-1}$(+)	1.435***	0.542***	1.455***	0.563***	0.574***	0.586***	1.484***
	(0.0773)	(0.0320)	(0.0789)	(0.0297)	(0.0761)	(0.0775)	(0.0827)
IFC(+)	3.952***	0.913***	3.617***	0.887***	0.858***	0.959***	1.750***
	(0.151)	(0.120)	(0.181)	(0.0991)	(0.0873)	(0.114)	(0.177)
Corp Tax$_{t-1}$(-)	-0.0947***	-0.0182***	-0.0934***	-0.0172***	-0.0328***	-0.0332***	-0.0453***
	(0.00703)	(0.00302)	(0.00696)	(0.00291)	(0.00498)	(0.00501)	(0.00694)
Distance(-)	-2.111***	-0.887***	-2.190***	-0.884***	-0.585***	-0.592***	-1.050***
	(0.0779)	(0.0382)	(0.0807)	(0.0385)	(0.0584)	(0.0591)	(0.0690)
Comleg(+)	0.687***	0.338***	0.699***	0.337***	0.270***	0.272***	0.469***
	(0.0518)	(0.0266)	(0.0525)	(0.0265)	(0.0388)	(0.0390)	(0.0612)
Comlang(+)	-0.311***	0.299***	-0.321***	0.296***	0.491***	0.494***	0.720***
	(0.0590)	(0.0392)	(0.0599)	(0.0389)	(0.0609)	(0.0611)	(0.0799)
Fin. Regulation$_{t-1}$(-)	0.0276**	0.00405	0.0303**	0.00372	-0.0274***	-0.0285***	-0.0782***
	(0.0121)	(0.00504)	(0.0124)	(0.00503)	(0.00752)	(0.00763)	(0.0147)
DTT*Signed˙t-1(?)			-0.0272***	-0.00315**		-0.00132	-0.00183
			(0.00326)	(0.00126)		(0.00137)	(0.00330)
DTT*Signed*IFC$_{t-1}$(?)			0.00481***	-0.000643		-0.00124	-0.00569***
			(0.00134)	(0.000686)		(0.000804)	(0.00181)
Nest - mainland EU	1.743***		1.769***		0.482***	0.486***	
	(0.0604)		(0.0615)		(0.0454)	(0.0458)	
Nest - UK and Ireland	1.304***		1.346***		0.388***	0.393***	
	(0.0569)		(0.0589)		(0.0462)	(0.0467)	
South - Fin. Centre		0.520***		0.505***			0.759***
		(0.0390)		(0.0364)			(0.0735)
South - No Fin. Centre		0.447***		0.424***			0.748***
		(0.0437)		(0.0375)			(0.0720)
IE and UK - Fin. Centre		0.429***		0.458***			1.246***
		(0.0371)		(0.0339)			(0.0855)
IE and UK - No Fin. Centre		0.244***		0.225***			0.779***
		(0.0280)		(0.0277)			(0.0798)
East		0.642***		0.612***			1.023***
		(0.0631)		(0.0523)			(0.0794)
Core - No Fin. Centre		0.508***		0.494***			0.855***
		(0.0305)		(0.0273)			(0.0549)
Core - Fin. Centre		0.411***		0.424***			0.845***
		(0.0318)		(0.0326)			(0.0790)
North - Fin. Centre		2.769***		2.803***			1.806***
		(0.0796)		(0.0758)			(0.235)
North - No Fin. Centre		0.694***		0.674***			0.866***
		(0.0378)		(0.0345)			(0.0958)
N	1056478	1056478	1056478	1056478	326503	326503	326503

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

TABLE 8. Estimates from Conditional Logit Model Regressions (with Host Country Fixed Effects)

	(1) Full Sample	(2) Full Sample	(3) Full Sample	(4) Full Sample	(5) Full Sample	(6) Full Sample	(7) Full Sample	(8) Full Sample	(9) Full Sample	(10) Full Sample
No. DTTs$_{t-1}$(?)	0.00849		0.00851	0.0102*		0.0104*	0.00170	0.00598	0.00606	0.00606
	(0.00593)		(0.00593)	(0.00598)		(0.00598)	(0.00623)	(0.00675)	(0.00675)	(0.0116)
GDP$_{t-1}$(+)	-3.892***	-3.581***	-3.897***	-3.719***	-3.380**	-3.755***	-4.588***	-4.516***	-4.510***	-4.510*
	(1.325)	(1.306)	(1.325)	(1.346)	(1.328)	(1.345)	(1.347)	(1.347)	(1.347)	(2.577)
GDP per capita$_{t-1}$(+)	-1.933*	-2.417**	-1.928*	-2.041*	-2.590**	-2.007*	-1.370	-1.472	-1.487	-1.487
	(1.125)	(1.077)	(1.125)	(1.137)	(1.092)	(1.136)	(1.133)	(1.133)	(1.133)	(2.151)
Regional GDP$_{t-1}$(+)	0.0196	0.0194	0.0196	0.0194	0.0193	0.0194	0.0203	0.0202	0.0205	0.0205
	(0.0181)	(0.0181)	(0.0181)	(0.0181)	(0.0181)	(0.0181)	(0.0181)	(0.0181)	(0.0181)	(0.0498)
Regional GDP per capita$_{t-1}$(+)	1.559***	1.557***	1.559***	1.559***	1.557***	1.559***	1.558***	1.557***	1.559***	1.559***
	(0.0451)	(0.0450)	(0.0451)	(0.0452)	(0.0450)	(0.0452)	(0.0451)	(0.0451)	(0.0452)	(0.187)
IFC(+)	2.307***	2.307***	2.307***	2.307***	2.308***	2.307***	2.307***	2.308***	2.350***	2.350***
	(0.0304)	(0.0304)	(0.0304)	(0.0304)	(0.0304)	(0.0304)	(0.0304)	(0.0304)	(0.0775)	(0.404)
Corp Tax$_{t-1}$(-)	-0.0832***	-0.0842***	-0.0833***	-0.0826***	-0.0838***	-0.0827***	-0.0798***	-0.0801***	-0.0800***	-0.0800***
	(0.00774)	(0.00770)	(0.00774)	(0.00776)	(0.00771)	(0.00776)	(0.00781)	(0.00780)	(0.00780)	(0.0209)
Distance(-)	-0.880***	-0.881***	-0.881***	-0.516***	-0.521***	-0.520***	-0.518***	-0.530***	-0.530***	-0.530**
	(0.0472)	(0.0472)	(0.0471)	(0.0521)	(0.0521)	(0.0520)	(0.0522)	(0.0529)	(0.0529)	(0.243)
Signed$_{t-1}$(?)		-0.0132	-0.0147		-0.119*	-0.120**	-0.129**	0.320	0.319	0.319
		(0.0600)	(0.0601)		(0.0607)	(0.0608)	(0.0609)	(0.224)	(0.224)	(0.808)
Comleg(+)				0.373***	0.378***	0.379***	0.379***	0.378***	0.378***	0.378***
				(0.0363)	(0.0366)	(0.0366)	(0.0366)	(0.0366)	(0.0366)	(0.103)
Comlang(+)				0.689***	0.690***	0.690***	0.690***	0.690***	0.690***	0.690***
				(0.0484)	(0.0485)	(0.0484)	(0.0484)	(0.0484)	(0.0484)	(0.111)
Fin. Regulation$_{t-1}$(-)							-0.0680***	-0.0692***	-0.0694***	-0.0694***
							(0.0114)	(0.0114)	(0.0114)	(0.0207)
DTT*Signed`t-1(?)								-0.00530**	-0.00495*	-0.00495
								(0.00259)	(0.00268)	(0.0100)
DTT*Signed*IFC$_{t-1}$(?)									-0.000521	-0.000521
									(0.000870)	(0.00185)
N	1435200	1435200	1435200	1435200	1435200	1435200	1416221	1416221	1416221	1416221
Log pseudolikelihood	−25587.4	−25588.5	−25587.4	−25302.5	−25302.0	−25300.5	−25222.8	−25220.1	−25219.9	−25219.9
Firms	7426	7426	7426	7426	7426	7426	7418	7418	7418	7418
Host Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: The dependent variable *Location* equals 1 if a foreign affiliate is located in a country and 0 otherwise. Standard errors are robust to heteroskedasticity and clustered at the firm level for columns 1-9 and clustered at the host country level in column 10. All regressions include host country fixed effects.

TABLE 9. Estimates from Conditional Logit Model Regressions based on Sub-Samples

	(1) Full Sample	(2) Pre Crisis	(3) Post Crisis	(4) Excl. Financial Holding Cos.	(5) Employees >=5
No. DTTs$_{t-1}$(?)	0.0272***	0.0317***	0.0375***	-0.0231***	0.0303***
	(0.00225)	(0.00354)	(0.00456)	(0.00328)	(0.00691)
Signed$_{t-1}$(?)	1.224***	1.378***	2.311***	0.476**	1.870***
	(0.174)	(0.268)	(0.348)	(0.234)	(0.581)
GDP$_{t-1}$(+)	-0.362***	-0.458***	-0.363***	0.354***	-0.176***
	(0.0167)	(0.0242)	(0.0296)	(0.0427)	(0.0670)
GDP per capita$_{t-1}$(+)	0.962***	0.725***	1.072***	-1.016***	-0.747***
	(0.0590)	(0.0914)	(0.106)	(0.0817)	(0.140)
Regional GDP$_{t-1}$(+)	-0.0709***	-0.0822***	-0.0571*	0.0299	-0.0227
	(0.0171)	(0.0264)	(0.0292)	(0.0310)	(0.0623)
Regional GDP per capita$_{t-1}$(+)	0.846***	0.920***	1.040***	1.541***	1.217***
	(0.0238)	(0.0403)	(0.0396)	(0.0538)	(0.0789)
IFC(+)	2.063***	2.066***	1.971***	2.218***	1.247***
	(0.0691)	(0.0989)	(0.151)	(0.130)	(0.237)
Corp Tax$_{t-1}$(-)	-0.00548**	0.0243***	-0.0236***	-0.0687***	-0.0426***
	(0.00266)	(0.00392)	(0.00494)	(0.00581)	(0.00909)
Distance(-)	-1.642***	-1.585***	-1.659***	-1.138***	-1.251***
	(0.0359)	(0.0518)	(0.0658)	(0.0660)	(0.126)
Comleg(+)	0.447***	0.581***	0.288***	0.416***	0.670***
	(0.0330)	(0.0488)	(0.0581)	(0.0594)	(0.126)
Comlang(+)	-0.491***	-0.393***	-0.411***	0.728***	-0.249
	(0.0394)	(0.0596)	(0.0657)	(0.0745)	(0.160)
Fin. Regulation$_{t-1}$(-)	-0.0146**	-0.128***	0.118***	-0.0824***	0.0190
	(0.00692)	(0.0108)	(0.0122)	(0.0127)	(0.0231)
DTT*Signed·t-1(?)	-0.0189***	-0.0211***	-0.0297***	-0.00324	-0.0232***
	(0.00207)	(0.00329)	(0.00418)	(0.00313)	(0.00634)
DTT*Signed*IFC$_{t-1}$(?)	0.00400***	0.00428***	0.00332**	-0.00368**	0.0107***
	(0.000750)	(0.00112)	(0.00158)	(0.00155)	(0.00256)
N	1416221	623570	468021	438471	129564

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

TABLE 10. Estimates from Mixed Logit Model Regressions based on Sub-Samples

	(1)	(2)	(3)	(4)	(5)
	Full	Pre	Post	Excl. Financial	Employees
	Sample	Crisis	Crisis	Holding Cos.	$>=5$
No. DTTs$_{t-1}$(?)	0.0306***	0.0467***	0.0429***	-0.00928**	0.0321***
	(0.00273)	(0.00487)	(0.00557)	(0.00417)	(0.00834)
Signed$_{t-1}$(?)	1.965***	2.168***	3.146***	1.174***	2.171**
	(0.244)	(0.386)	(0.506)	(0.315)	(0.943)
GDP$_{t-1}$(+)	-0.360***	-0.586***	-0.354***	0.276***	-0.177***
	(0.0171)	(0.0303)	(0.0300)	(0.0443)	(0.0671)
GDP per capita$_{t-1}$(+)	0.958***	0.699***	1.063***	-1.086***	-0.750***
	(0.0592)	(0.0919)	(0.107)	(0.0820)	(0.140)
Regional GDP$_{t-1}$(+)	-0.0711***	-0.0827***	-0.0578**	0.0268	-0.0229
	(0.0171)	(0.0266)	(0.0293)	(0.0311)	(0.0624)
Regional GDP per capita$_{t-1}$(+)	0.857***	0.948***	1.048***	1.576***	1.219***
	(0.0240)	(0.0410)	(0.0401)	(0.0545)	(0.0793)
IFC(+)	2.111***	2.016***	2.040***	2.230***	1.254***
	(0.0688)	(0.101)	(0.150)	(0.131)	(0.240)
Distance(-)	-1.672***	-1.691***	-1.688***	-1.350***	-1.252***
	(0.0370)	(0.0593)	(0.0678)	(0.0765)	(0.126)
Comleg(+)	0.468***	0.624***	0.303***	0.461***	0.674***
	(0.0338)	(0.0509)	(0.0591)	(0.0651)	(0.127)
Comlang(+)	-0.526***	-0.444***	-0.443***	0.795***	-0.254
	(0.0407)	(0.0623)	(0.0671)	(0.0802)	(0.161)
DTT*Signed˙t-1(?)	-0.0220***	-0.0262***	-0.0352***	-0.00941**	-0.0248***
	(0.00256)	(0.00385)	(0.00533)	(0.00373)	(0.00774)
DTT*Signed*IFC$_{t-1}$(?)	0.00343***	0.00469***	0.00260	-0.00401**	0.0106***
	(0.000751)	(0.00113)	(0.00158)	(0.00156)	(0.00260)
Corp Tax$_{t-1}$(-)	-0.00634**	0.0469***	-0.0238***	-0.0595***	-0.0423***
	(0.00272)	(0.00520)	(0.00504)	(0.00659)	(0.00909)
Fin. Regulation$_{t-1}$(-)	-0.0127*	-0.114***	0.116***	-0.0938***	0.0194
	(0.00698)	(0.0115)	(0.0123)	(0.0131)	(0.0232)
SD					
Corp Tax$_{t-1}$(-)	0.000579	0.0911***	0.000178	0.116***	0.0138
	(0.000597)	(0.00921)	(0.000339)	(0.00900)	(0.0151)
Fin. Regulation$_{t-1}$(-)	-0.00114	0.00223	-0.000397	0.000657	0.00695
	(0.00119)	(0.00205)	(0.00237)	(0.00609)	(0.00489)
No. DTTs$_{t-1}$(?)	0.0000463	-0.000229	0.0000514	-0.000761	0.0000114
	(0.000119)	(0.000402)	(0.000111)	(0.00494)	(0.000277)
Signed$_{t-1}$(?)	-1.512***	1.288***	1.626***	-0.511	-0.738
	(0.121)	(0.255)	(0.204)	(0.450)	(0.834)
N	1416221	623570	468021	438471	129564

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

TABLE 11. Estimates from Nested Logit Model Regressions based on Sub-Samples

	(1)	(2)	(3)	(4)	(5)
	Full	Pre	Post	Excl. Financial	Employees
	Sample	Crisis	Crisis	Holding Cos.	>=5
No. DTTs$_{t-1}$(?)	0.0602***	0.0516***	0.113***	-0.0106***	0.0616***
	(0.00388)	(0.00516)	(0.0113)	(0.00172)	(0.0130)
Signed$_{t-1}$(?)	1.728***	2.041***	4.018***	0.224**	3.065***
	(0.285)	(0.379)	(0.821)	(0.106)	(0.993)
GDP$_{t-1}$(+)	-0.365***	-0.513***	-0.482***	0.181***	-0.0879
	(0.0339)	(0.0455)	(0.0829)	(0.0271)	(0.0989)
GDP per capita$_{t-1}$(+)	1.583***	1.028***	2.300***	-0.488***	-0.820***
	(0.0915)	(0.115)	(0.224)	(0.0599)	(0.190)
Regional GDP$_{t-1}$(+)	-0.259***	-0.188***	-0.212***	0.0142	-0.115
	(0.0311)	(0.0399)	(0.0691)	(0.0151)	(0.0843)
Regional GDP per capita$_{t-1}$(+)	1.455***	1.336***	1.993***	0.586***	1.568***
	(0.0789)	(0.117)	(0.184)	(0.0775)	(0.237)
IFC(+)	3.617***	2.955***	5.244***	0.959***	1.652***
	(0.181)	(0.231)	(0.500)	(0.114)	(0.374)
Corp Tax$_{t-1}$(-)	-0.0934***	-0.0123*	-0.242***	-0.0332***	-0.122***
	(0.00696)	(0.00676)	(0.0267)	(0.00501)	(0.0225)
Distance(-)	-2.190***	-2.057***	-2.553***	-0.592***	-1.428***
	(0.0807)	(0.121)	(0.166)	(0.0591)	(0.205)
Comleg(+)	0.699***	0.797***	0.505***	0.272***	0.859***
	(0.0525)	(0.0753)	(0.101)	(0.0390)	(0.165)
Comlang(+)	-0.321***	-0.337***	-0.277**	0.494***	-0.00450
	(0.0599)	(0.0836)	(0.120)	(0.0611)	(0.189)
Fin. Regulation$_{t-1}$(-)	0.0303**	-0.0774***	0.185***	-0.0285***	0.0705**
	(0.0124)	(0.0208)	(0.0272)	(0.00763)	(0.0342)
DTT*Signed˙t-1(?)	-0.0272***	-0.0316***	-0.0390***	-0.00132	-0.0400***
	(0.00326)	(0.00451)	(0.00880)	(0.00137)	(0.0114)
DTT*Signed*IFC$_{t-1}$(?)	0.00481***	0.00601***	-0.00118	-0.00124	0.0147***
	(0.00134)	(0.00171)	(0.00383)	(0.000804)	(0.00395)
Nest - mainland EU	1.769***	1.504***	2.334***	0.486***	1.482***
	(0.0615)	(0.0842)	(0.150)	(0.0458)	(0.168)
Nest - UK and Ireland	1.346***	1.296***	1.692***	0.393***	1.136***
	(0.0589)	(0.0901)	(0.127)	(0.0467)	(0.150)
N	1056478	465653	349054	326503	96851

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

TABLE 12. Estimates from Nested Logit Model Regressions based on Sub-Samples

	(1)	(2)	(3)	(4)	(5)
	Full	Pre	Post	Excl. Financial	Employees
	Sample	Crisis	Crisis	Holding Cos.	>=5
No. DTTs$_{t-1}$(?)	0.00136	0.000318	0.0157***	-0.0268***	0.00522
	(0.00135)	(0.00273)	(0.00333)	(0.00379)	(0.00586)
Signed$_{t-1}$(?)	0.221**	0.538***	0.821***	0.446*	0.768*
	(0.102)	(0.199)	(0.236)	(0.254)	(0.463)
GDP$_{t-1}$(+)	-0.00745	-0.0246	-0.0896***	0.353***	0.216***
	(0.0151)	(0.0253)	(0.0279)	(0.0439)	(0.0581)
GDP per capita$_{t-1}$(+)	0.0681	-0.926***	1.461***	-1.108***	-1.195***
	(0.111)	(0.0822)	(0.199)	(0.150)	(0.141)
Regional GDP$_{t-1}$(+)	0.0280***	0.0754***	0.0545***	0.0582*	0.0733**
	(0.0104)	(0.0177)	(0.0197)	(0.0310)	(0.0326)
Regional GDP per capita$_{t-1}$(+)	0.563***	0.823***	0.429***	1.484***	0.841***
	(0.0297)	(0.0553)	(0.0490)	(0.0827)	(0.0818)
IFC(+)	0.887***	0.566***	1.832***	1.750***	0.318*
	(0.0991)	(0.0927)	(0.185)	(0.177)	(0.184)
Corp Tax$_{t-1}$(-)	-0.0172***	0.00532	-0.0300***	-0.0453***	-0.0446***
	(0.00291)	(0.00377)	(0.00789)	(0.00694)	(0.00936)
Distance(-)	-0.884***	-0.817***	-0.975***	-1.050***	-0.564***
	(0.0385)	(0.0561)	(0.0643)	(0.0690)	(0.104)
Comleg(+)	0.337***	0.543***	0.227***	0.469***	0.379***
	(0.0265)	(0.0475)	(0.0437)	(0.0612)	(0.0913)
Comlang(+)	0.296***	0.415***	0.0498	0.720***	0.651***
	(0.0389)	(0.0606)	(0.0660)	(0.0799)	(0.133)
Fin. Regulation$_{t-1}$(-)	0.00372	-0.0390***	0.0104	-0.0782***	0.0355**
	(0.00503)	(0.0111)	(0.00722)	(0.0147)	(0.0179)
DTT*Signed$_{t-1}$(?)	-0.00315**	-0.00723***	-0.00658**	-0.00183	-0.00928
	(0.00126)	(0.00261)	(0.00303)	(0.00330)	(0.00582)
DTT*Signed*IFC$_{t-1}$(?)	-0.000643	-0.00146	-0.00344**	-0.00569***	0.00318
	(0.000686)	(0.00106)	(0.00172)	(0.00181)	(0.00201)
South - Fin. Centre	0.505***	0.511***	0.614***	0.759***	0.692***
	(0.0364)	(0.0578)	(0.0639)	(0.0735)	(0.135)
South - No Fin. Centre	0.424***	0.365***	0.644***	0.748***	0.364***
	(0.0375)	(0.0339)	(0.0583)	(0.0720)	(0.0639)
IE and UK - Fin. Centre	0.458***	0.910***	0.291***	1.246***	0.653***
	(0.0339)	(0.0604)	(0.0321)	(0.0855)	(0.0731)
IE and UK - No Fin. Centre	0.225***	0.324***	0.253***	0.779***	0.203***
	(0.0277)	(0.0433)	(0.0505)	(0.0798)	(0.0447)
East	0.612***	0.516***	1.060***	1.023***	0.520***
	(0.0523)	(0.0380)	(0.116)	(0.0794)	(0.0584)
Core - No Fin. Centre	0.494***	0.533***	0.593***	0.855***	0.412***
	(0.0273)	(0.0317)	(0.0464)	(0.0549)	(0.0601)
Core - Fin. Centre	0.424***	0.771***	0.342***	0.845***	0.273***
	(0.0326)	(0.0716)	(0.0324)	(0.0790)	(0.0701)
North - Fin. Centre	2.803***	3.870***	1.476***	1.806***	3.230***
	(0.0758)	(0.135)	(0.136)	(0.235)	(0.271)
North - No Fin. Centre	0.674***	0.827***	0.649***	0.866***	0.713***
	(0.0345)	(0.0472)	(0.0644)	(0.0958)	(0.101)
N	1056478	465653	349054	326503	96851

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

TABLE 13. Estimates from Nested Logit Model Regressions based on Sub-Samples

	(1) Full Sample	(2) Pre Crisis	(3) Post Crisis	(4) Excl. Financial Holding Cos.	(5) Employees >=5
No. DTTs$_{t-1}$(?)	0.0914***	0.0964***	0.114***	-0.0151***	0.0685***
	(0.00451)	(0.00702)	(0.0106)	(0.00396)	(0.0129)
Signed$_{t-1}$(?)	2.137***	2.787***	3.447***	0.541**	2.843***
	(0.298)	(0.449)	(0.673)	(0.261)	(0.914)
GDP$_{t-1}$(+)	-0.573***	-0.927***	-0.447***	0.468***	-0.170*
	(0.0385)	(0.0714)	(0.0667)	(0.0510)	(0.0891)
GDP per capita$_{t-1}$(+)	0.595***	0.702***	0.315*	-1.380***	-1.203***
	(0.0958)	(0.174)	(0.171)	(0.135)	(0.240)
Regional GDP$_{t-1}$(+)	-0.276***	-0.222***	-0.240***	-0.00619	-0.117
	(0.0328)	(0.0529)	(0.0586)	(0.0368)	(0.0733)
Regional GDP per capita$_{t-1}$(+)	1.560***	1.899***	1.546***	1.692***	1.316***
	(0.0709)	(0.139)	(0.128)	(0.122)	(0.188)
IFC(+)	3.734***	3.949***	4.043***	2.409***	1.417***
	(0.166)	(0.269)	(0.369)	(0.210)	(0.323)
Corp Tax$_{t-1}$(-)	-0.0932***	-0.0222***	-0.182***	-0.107***	-0.0986***
	(0.00658)	(0.00858)	(0.0200)	(0.00929)	(0.0176)
Distance(-)	-2.241***	-2.297***	-2.365***	-1.208***	-1.283***
	(0.0677)	(0.103)	(0.133)	(0.0852)	(0.168)
Comleg(+)	0.641***	0.783***	0.476***	0.446***	0.729***
	(0.0538)	(0.0843)	(0.0933)	(0.0708)	(0.141)
Comlang(+)	-0.319***	-0.321***	-0.292***	0.891***	0.0260
	(0.0647)	(0.103)	(0.111)	(0.0935)	(0.174)
Fin. Regulation$_{t-1}$(-)	0.00284	-0.0951***	0.102***	-0.0848***	0.0714**
	(0.0126)	(0.0315)	(0.0186)	(0.0160)	(0.0321)
DTT*Signed`t-1(?)	-0.0322***	-0.0425***	-0.0356***	-0.00427	-0.0364***
	(0.00341)	(0.00532)	(0.00740)	(0.00343)	(0.0104)
DTT*Signed*IFC$_{t-1}$(?)	0.00808***	0.0112***	0.00178	-0.00337*	0.0131***
	(0.00145)	(0.00232)	(0.00321)	(0.00197)	(0.00339)
Euro area	1.965***	2.121***	1.953***	1.207***	1.340***
	(0.0534)	(0.0938)	(0.110)	(0.0604)	(0.143)
UK	1.378***	1.682***	1.315***	1.026***	0.903***
	(0.0491)	(0.0969)	(0.0864)	(0.0671)	(0.115)
Non-EA, non-UK EU	1.996***	2.246***	1.981***	1.129***	1.218***
	(0.0763)	(0.136)	(0.148)	(0.0799)	(0.165)
N	1056478	465653	349054	326503	96851

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

TABLE 14. Estimates Using Treaty Shopping Measure

	(1) Conditional	(2) Conditional	(3) Mixed	(4) Mixed	(5) Nested	(6) Nested
No. DTTs$_{t-1}$(?)	0.0272***		0.0306***		0.0914***	
	(0.00225)		(0.00273)		(0.00451)	
Signed$_{t-1}$(?)	1.224***	0.393***	1.965***	1.1741***	2.137***	0.637***
	(0.174)	(0.0810)	(0.244)	(0.1454)	(0.298)	(0.142)
GDP$_{t-1}$(+)	-0.362***	-0.280***	-0.360***	-0.278***	-0.573***	-0.0247
	(0.0167)	(0.0160)	(0.017)	(0.0163)	(0.0385)	(0.0393)
GDP per capita$_{t-1}$(+)	0.962***	1.051***	0.957***	1.048***	0.595***	1.045***
	(0.0590)	(0.0650)	(0.0590)	(0.0650)	(0.0958)	(0.118)
Regional GDP$_{t-1}$(+)	-0.0709***	-0.0290*	-0.0711***	-0.0311*	-0.276***	-0.151***
	(0.0171)	(0.0165)	(0.0171)	(0.0165)	(0.0328)	(0.0367)
Regional GDP per capita$_{t-1}$(+)	0.846***	0.799***	0.857***	0.813***	1.560***	1.141***
	(0.0238)	(0.0232)	(0.024)	(0.0235)	(0.0709)	(0.0612)
IFC(+)	2.063***	2.156***	2.111***	2.164***	3.734***	5.392***
	(0.0691)	(0.0383)	(0.0688)	(0.0382)	(0.166)	(0.186)
Corp Tax$_{t-1}$(-)	-0.00548**	0.00751***	-0.0063**	0.0064**	-0.0932***	-0.00741
	(0.00266)	(0.00271)	(0.0027)	(0.00278)	(0.00658)	(0.00592)
Distance(-)	-1.642***	-1.652***	-1.672***	-1.702***	-2.241***	-2.257***
	(0.0359)	(0.0360)	(0.0370)	(0.0369)	(0.0677)	(0.0724)
Comleg(+)	0.447***	0.454***	0.467***	0.481***	0.641***	0.558***
	(0.0330)	(0.0325)	(0.0338)	(0.0334)	(0.0538)	(0.0580)
Comlang(+)	-0.491***	-0.563***	-0.526***	-0.6109***	-0.319***	-0.238***
	(0.0394)	(0.0398)	(0.0394)	(0.0414)	(0.0647)	(0.0722)
Fin. Regulation$_{t-1}$(-)	-0.0146**	-0.0363***	-0.0127**	-0.0340***	0.00284	-0.0919***
	(0.00692)	(0.00716)	(0.00698)	(0.00722)	(0.0126)	(0.0130)
DTT*Signed˙t-1(?)	-0.0189***		-0.022sym***		-0.0322***	
	(0.00207)		(0.0025)		(0.00341)	
DTT*Signed*IFC$_{t-1}$(?)	0.00400***		0.00343***		0.00808***	
	(0.000750)		(0.000751)		(0.00145)	
Treaty shoppingt-1(?)		0.0915***		0.1208***		0.378***
		(0.00829)		(0.0103)		(0.0179)
Treaty shopping*Signed(?)		-0.104***		-0.1344***		0.0512***
		(0.00906)		(0.01097)		(0.0194)
Treaty shopping*Signed*IFC(?)		0.0458***		0.0447***		-0.149***
		(0.00500)		(0.00504)		(0.0147)
Corp Tax$_{t-1}$(-)			0.00058	0.00017		
			(0.00059)	(0.00036)		
Fin. Regulation$_{t-1}$(-)			-0.0011	-0.0011		
			(0.0011)	(0.0014)		
No. DTTs$_{t-1}$(?)			0.00005			
			(0.00012)			
Signed$_{t-1}$(?)			-1.512***	1.7068***		
			(0.1212)	(0.1167)		
Treaty shoppingt-1(?)				0.00034		
				(0.0004)		
Euro area					1.965***	2.242***
					(0.0534)	(0.0668)
UK					1.378***	1.086***
					(0.0491)	(0.0446)
Non-EA, non-UK EU					1.996***	2.801***
					(0.0763)	(0.110)
N	1416221	1416221	1416221	1416221	1056478	1056478

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