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WITH WHICH COUNTRIES
DO TAX HAVENS SHARE INFORMATION?

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Abstract

In recent years tax havens and offshore financial centres have come under increasing political pressure to cooperate with other countries in matters of taxation and efforts to crowd back tax evasion and avoidance. As a result many tax havens have signed tax information exchange agreements (TIEAs). In order to comply with OECD standards tax havens are obliged to sign at least 12 TIEAs with other countries. This paper investigates how tax havens have chosen their partner countries. We ask whether they have signed TIEAs with countries to which they have strong economic links or whether they have systematically avoided doing this, so that information exchange remains ineffective. We analyse 555 TIEAs signed by tax havens in the years 2008-2011 and find that on average tax havens have signed more TIEAs with countries to which they have stronger economic links. Our analysis thus suggests that tax havens do not systematically undermine tax information exchange by signing TIEAs with irrelevant countries. However, this does not mean that they exchange information with all important partner countries.

Keywords

1. Introduction*

In recent years, tax havens have been put under increasing political pressure to cooperate with high tax countries in efforts to reduce tax evasion and tax avoidance. One particular area of concern is the exchange of information for tax purposes. A recent example for this trend is a statement made by the G20 at its London summit in April 2009:

> "We call on countries to adopt the international standard for information exchange...
>
> We stand ready to take agreed action against those jurisdictions which do not meet international standards in relation to tax transparency." G20 (2009), p.4

The fact that the G20 has put the issue of tax havens and offshore financial centres to the top of the international political agenda is the result of various developments. Firstly, the G20 initiative reflects that the financial crisis and the worldwide recession which started in 2008 has placed a huge burden on government finances, so that efforts to crowd back tax evasion and collect revenue are necessary. At the same time, tax havens and offshore financial centres are seen to have contributed to the crisis by allowing financial institutions to escape financial regulation and supervision. Transparency in taxation and regulation are widely considered as mutually reinforcing.

Secondly, there is an ongoing debate about the implications of international tax competition for government finances. Starting with a report launched in 1998, the OECD has argued that certain forms of tax competition are harmful for the world economy as a whole because they undermine government finances.[1] Cases where countries seem to attract investors by offering bank secrecy and protection against information exchange in tax matters are seen as one important form of harmful tax competition. The reason is that this practice allows investors residing in high tax countries to evade taxes.[2] In order to encourage the exchange of tax information between countries the OECD has created the 'Global Forum on Transparency and Exchange of Information for Tax Purposes'. The Forum includes both OECD member countries and non OECD countries. Its role is to provide a framework for international cooperation in the area of exchange of tax information.[3]

Many tax havens[4] have reacted to this political pressure by changing their policies with regard to bank secrecy and information exchange. Between 2000 and 2002 most of them made formal commitments to comply with the standards developed by the OECD. In 2002 the OECD published a

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[1] The EU has also launched an initiative against tax practices which are seen as harmful, which has led to a 'code of conduct' in business taxation, see Council of the European Union (1999). The focus of this code of conduct is on special tax regimes offered to multinational firms. For a critique of this approach see Keen (2001).

[2] Along similar lines the EU has taken initiative for more effective enforcement of taxes on capital income by introducing automatic information exchange for tax purposes and source taxes within the European Union through its directive for the taxation of savings (Council Directive 2003/48/EC). For assessments of the impact of the directive see Hemmelgarn and Nicodème (2009), Johannesen (2010) and Klautke and Weichenrieder (2010).

[3] There are at least two additional important factors driving the move towards more information exchange. Firstly, after the terrorist attacks on the United States on September 11, 2001, the US started to take action against offshore financial centres in order to make sure that these centres implement effective measures against terrorism financing and money laundering. Secondly, various spectacular cases of tax evasion were detected because employees of banks stole data from their employers and passed it on to tax authorities in various countries. This has drawn the attention of the public to the issue of bank secrecy and tax evasion.

[4] When we refer to 'tax havens' in this paper we do so based on the list of countries classified as tax havens by the OECD, to which we add Switzerland, Luxemburg, Hong Kong and Singapore. The list we use is provided in appendix A.

'black list' of seven jurisdictions which refused to make these commitments[5]. Since then all of these jurisdictions have agreed to comply with the standards. As part of these standards countries are expected to sign tax information exchange agreements (TIEAs) with other countries. TIEAs are particularly important in cases where no double taxation agreements exists because double taxation agreements often include arrangements for information exchange. Currently tax havens are required to sign a minimum of 12 TIEAs in order to avoid being put on the list of uncooperative jurisdictions. Figure 1 illustrates the expansion in the number of TIEAs since the year 2000. The total number of TIEAs signed in this period was 590.[6] Among these agreements, 555 are cases where at least one of the two partners is a tax haven.

Figure 1. Cumulative number of all TIEAs, 2000 - 2011.
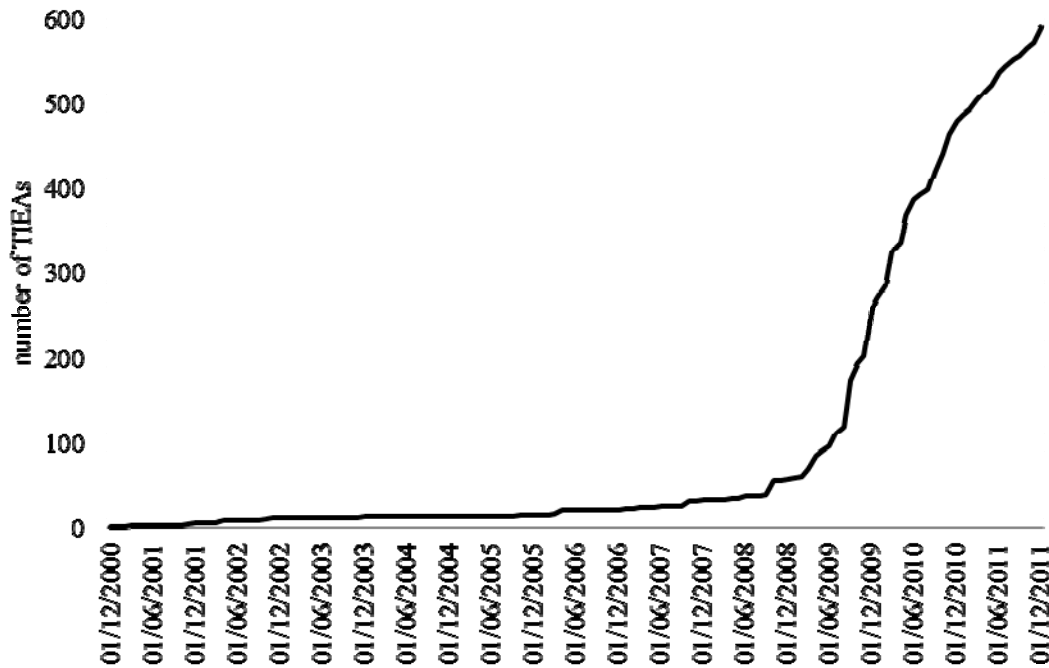
The large number of TIEAs suggests that the OECD initiative to foster tax information exchange is a big success. However, it cannot be excluded that tax havens formally comply with the requirement to have 12 TIEAs but choose partner countries other than those where tax evaders are likely to reside. A rather blunt way of doing so would be to choose other tax havens as partners. However, our database only includes 33 agreements where both partners are tax havens. A more subtle way of strategically choosing countries as partners would be to focus on countries which are not tax havens but which are unlikely to be residence countries of relevant investors in a tax haven.

This paper focuses on the question of how tax havens choose their partners for the signing of TIEAs and, as a consequence, whether the network of TIEAs develops so that it can be effective in fighting tax evasion. The effectiveness of TIEAs in addressing tax evasion depends on whether TIEAs are signed in cases where they are actually relevant. With whom should we expect tax havens to sign TIEAs? Two hypotheses come to mind. Firstly, if tax havens host investments from residents of a particular set of countries, and if the tax haven wanted to avoid providing information about these investors to their residence countries, it could systematically avoid these countries as partners in

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[5]   These included Andorra, Liechtenstein, Liberia, the Republic of the Marshall Islands, Monaco, the Republic of Nauru and the Republic of Vanuatu.

[6]   This information is based on data on TIEA provided by the OECD. More information on our dataset is provided in section 5 of this paper.

TIEAs (hypothesis 1). Secondly, if a residence country knows that its residents favour a particular tax haven, it will try to achieve TIEAs precisely with this tax haven, rather than with other tax havens (hypothesis 2). Hypothesis 1 would imply that tax havens can actually decide freely whether or not they want to sign a TIEA with another country. Hypothesis 2, in contrast, would suggest that residence countries can effectively impose TIEAs on tax havens even if tax havens would prefer not to sign the agreement. It is our objective to investigate empirically whether hypothesis 1 or hypothesis 2 holds.

This raises various issues. We are interested in cases where residents try to conceal their assets from the tax authorities in their countries of residence. Unsurprisingly, no data is available to observe these asset holdings directly. Instead, we use a number of observable indicators for economic links which are likely to be related to these asset holdings. We focus on three indicators: foreign direct investment, foreign portfolio investment, and trade. These indicators are far from being ideally suited for our purposes, but they are the best available. The underlying assumption is that stocks of observable foreign investment and trade flows will be positively correlated to activities involving tax evasion. We will discuss this issue further below.

Our main findings are as follows. On average stronger economic links increase the likelihood of signing agreements. This effect is quite robust regarding foreign direct investment and trade. It is not very large, though. The average predicted probability of a tax haven signing a TIEA with a non-US country is 38%, while for the US it is 47% Given that FDI is used as a proxy for economic links between country pairs. Quantitatively, an extra $US 1 billion of FDI into a tax haven from a given country increases the likelihood of an agreement between the pair by 0.56%; the effect for trade is stronger and equal to 1.73%. When it comes to portfolio investment data we find a coefficient which is positive but not significant.[7] If we focus on the 5 partner countries which are most important in terms of economic links in the form of foreign direct investment for each haven, we find that on average tax havens have agreements on information exchange, either in the form of TIEAs or enshrined in double taxation agreements (DTAs), with 2.36 of those five countries. Moreover, only 21 (31) tax havens have concluded TIEA (TIEAs+DTAs) with their most important economic partner country. These results suggest that tax havens do not systematically avoid signing TIEAs with countries to which they have strong economic links. But the fact that, on average, tax havens only have agreements with roughly half of the five most important partner countries illustrates that not all important and potentially relevant countries are covered. Moreover, our analysis suggests that the threshold of 12 TIEAs might play a role. It seems that the activity of signing TIEAs slows down after countries have signed 12 of them. However, it is not clear how robust this finding is because TIEAs are a rather recent phenomenon, so that studying dynamic aspects of their signing is difficult.[8]

The rest of the paper is organized as follows. Section 2 summarizes the key principles and standards for international exchange of tax information suggested by the OECD as well as the content of the OECD model treaty for exchange of tax information. In section 3 we briefly review the relevant literature. In section 4 we discuss the main hypotheses which guide our empirical analysis. In section 5 we describe and take a first look at the data. Section 6 includes our regression analysis, a discussion of the results, and robustness checks. In section 7 we discuss whether the threshold of 12 TIEAs plays a role. Section 8 concludes.

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[7]   One should note that the available portfolio investment data does not report portfolio investment of residents of one country in another country. It reports holdings of securities by residents of one country which are issued in another country. As we will discuss further below it is not clear how relevant this type of economic link is to our analysis.

[8]   For this and other reasons our regression analysis does not capture dynamic effects.

2. The OECD principles for information exchange and the content of TIEAs

As an important part of its initiative to promote international exchange of information for purposes of taxation the OECD has launched a model 'arrangement on exchange of information on tax matters (OECD, 2002).[9] This model treaty aims at establishing information exchange which is guided by the following principles:[10]

1. Information is exchanged upon request, not automatically.

2. Information is provided if this information is 'foreseeably relevant' to the administration and enforcement of the tax laws of the requesting country.

3. Bank secrecy laws or domestic tax interest requirements should not restrict exchange of information for tax matters.

4. Countries should make sure that their administration has the power to obtain information and that the information acquired is reliable.

5. Taxpayer's rights should be respected. This implies in particular that information exchanged is strictly confidential.

These principles have been broken down into 10 'essential elements' of tax information exchange, which address the implementation of information exchange. Of these 10 elements, three apply to the availability of information, two are about access to information and five are related to the exchange of information.[11] Based on these elements, the Global Forum has established a review process to make sure that all jurisdictions do provide tax information in a way which is compatible with the principles and standards described above. [12]

The taxes covered by the OECD model treaty include taxes on income and profits, taxes on capital, taxes on net wealth and, finally, estate, inheritance and gift taxes (Article 3,1.). The model treaty also foresees the possibility to extend the coverage of the agreement to indirect taxes (Article 3.2). Furthermore, the OECD model treaty includes rules regarding more detailed aspects of the information exchange (Article 5), specifies conditions under which a request for information may be denied (Article 7) and foresees an arrangement about the sharing of the cost of providing information (Article 9).

The OECD model treaty for tax information exchange is not binding for OECD countries or other countries. It has the purpose to set standards for the exchange of tax information, so that countries designing and negotiating TIEAs have a benchmark to which they can refer. Most TIEAs that have been signed between countries since 2002 are very similar to the OECD model treaty. One should note that provisions for the exchange of tax information are also included in many double taxation agreements (DTAs). The OECD model double taxation treaty foresees arrangements for the exchange of tax information (Article 26) based on the same principles as those which apply to TIEAs.[13] This implies that separate TIEAs are particularly relevant for cases where no double taxation treaties exist, where these treaties do not include provisions for information exchange or where the information exchange provisions fail to comply with OECD standards.

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[9] Information exchange for tax matters is also foreseen by article 26 of the OECD model double taxation convention (OECD, 1977) as well as article 26 of the United Nations double taxation convention (United Nations, 2001).

[10] See OECD (2011), The Global Forum on transparency and exchange of information for tax purposes, Information Brief, 15 December 2011, p.7.

[11] The elements can be found in OECD (2011) p.7-8

[12] For more detailed information on the peer review process see OECD (2011), Annex V, pp 17-19.

[13] A similar article is included in the United Nations Model taxation treaty, see United Nations (2001), Article 26.

3. The Literature

This paper is related to a small but growing theoretical and empirical literature which explores various aspects of the exchange of information for tax purposes.[14] The studies most closely related to our paper are Ligthart and Voget (2008) and Johannesen and Zucman (2012). Ligthart and Voget (2008) analyse the empirical determinants of information sharing for income taxation between the Netherlands and other countries. The paper uses data on cases of tax information sharing between the Dutch government and other countries. These cases include requests from other countries to the Dutch government and vice versa, in the time span between 1992 and 2005. The authors find that the level of the domestic income tax rate, the size of the marginal cost of public funds, and the share of a country's interest-bearing deposits held abroad increase a country's willingness to engage in information sharing. Foreign non-resident withholding taxes do not seem to affect the amount of information that is provided to the Netherlands. The authors also find that size and distance are correlated with the information provision by partner countries, which is in line with a basic gravity pattern. In addition, reciprocity turns out to be important; if the Dutch authorities supply more information to a foreign government, the likelihood that the foreign government will also provide information increases.

The present paper differs from Ligthart and Voget (2008) in various respects. Most importantly, we look at what determines the signature of tax information exchange agreements, not the number of information requests. Moreover, we focus on agreements between tax havens and non-haven countries.

Johannesen and Zucman (2012) investigate the impact of TIEAs on bank deposits in tax havens. Using confidential data about bank deposits in tax havens provided by the Bank for International Settlements (BIS), they find that the signing of TIEAs has led to a modest relocation of bank deposits between tax havens but no significant repatriation of funds. The difference to our paper is that we focus on the determinants of TIEAs, not on the impact of TIEAs on bank deposits.

There are various other empirical studies which are related to our analysis. Huizinga and Nicodème (2004) investigate the impact of tax policy on international depositing. They find that international patterns of bank deposits across 19 industrialized countries in 1999 were significantly affected by tax rates. But they find little evidence that international information exchange (for 1999 data) has an impact on bilateral depositing. This is relevant for our investigation in so far as it suggests that there is no reverse causality problem between information exchange and portfolio investment or bank deposits.

Our paper is also related to the literature on the empirical determinants of double taxation agreements. In a recent paper Ligthart et al. (2011) analyse the determinants of double tax treaty formation. Our paper is complementary to their work. They find that countries enter into bilateral tax treaties primarily to reduce the double taxation of income and to provide legal instrument for the exchange of taxpayer specific information between national tax authorities. More specifically, personal tax rates, non-resident withholding tax rates (on dividends and interest), and stocks of foreign direct investment positively affect the probability of DTA formation. Country pairs with a more asymmetric allocation of foreign direct investment are less likely to conclude a DTA, whereas a common language makes it more likely to enter into a DTA.

Their study uses a sample of 189 countries, of which only 15 are tax havens. It considers information exchange agreements as one of the determinants of double tax treaties formation. We do exactly the reverse of that, by including a double tax treaties dummy as one our explanatory variables. The empirical method they use is a dynamic probit approach which controls for unobserved regional

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[14] Keen and Ligthart (2006a) offer an introduction to the key issues in the debate on information exchange.

heterogeneity.[15] The data used by Ligthart et al. (2011) spans a long time period. TIEAs, in contrast, are a recent development. This is why we do not use the same dynamic panel approach in our paper.

Another strand of the empirical literature related to our topic focuses on the analysis of the EU Savings Taxation Directive. For example, Hemmelgarn and Nicodème (2009) review the economic effects of the directive using confidential data on bilateral international bank deposits and find that the directive had no significant effects on international savings or on the development of different investments that fall under the scope of the Directive. Klautke and Weichenrieder (2010) investigate the impact of the directive by comparing the returns on bonds which are exempt from the directive to bonds which are not exempt. They find no significant difference and conclude that, due the existing loopholes, the impact of the directive is negligible. Johannesen (2010) investigates the effects of the directive by comparing Swiss bank deposits of residents from EU countries to deposits of residents from non-EU countries and finds that deposits from EU residents have declined, which suggests that the directive has had an effect.

The theoretical literature mostly investigates whether countries competing for international investors have incentives to provide information for tax matters to other governments (see Bachetta and Espinosa (1995, 2000), Eggert and Kolmar (2002), Huizinga and Nielsen (2003), Keen and Ligthart (2006b) and Konrad and Elsayyad (forthcoming)). Bachetta and Espinosa (1995) consider a two stage model where the degree of information sharing is set at stage 1 and tax rate are determined at stage 2. This approach leads to the result that incentives for countries to voluntarily transmit information to other countries may arise if this information provision mitigates tax rate competition. But it may very well be that countries do not share information. In this framework small countries are more likely to provide information than large countries. Bachetta and Espinosa (2000) look at repeated interaction between countries and analyse the role of tax information exchange clauses in double taxation treaties. Among other things, they find that small countries are less likely to cooperate in tax information exchange than large countries. The reason is that small countries worry less about being able to tax their own residents and are more interested in attracting foreign investors, either because this generates rents for domestic banks or because they levy a source based tax.

Eggert and Kolmar (2002) analyse the incentives of tax authorities to voluntarily provide information. Specifically, they show that voluntary information exchange is an equilibrium in a standard small-country model of tax competition, whereas it may not be an equilibrium when the size of the financial sector has positive impact on the wage structure of an economy.

Huizinga and Nielsen (2003) analyse the sustainability of information exchange and source taxes in a model with repeated interaction. They derive conditions under which information exchange can be sustained as a cooperative equilibrium. Keen and Ligthart (2006b) build on the approach by Huizinga and Nielsen (2003) and add revenue sharing to the model. They emphasize that revenue sharing between the host and the residence country may intensify tax rate competition, but revenue sharing may be required to induce the source countries to agree to information exchange. Finally, Konrad and Elsayyad (forthcoming) develop a model with multiple tax havens. They compare a process where tax havens are drawn into cooperation for tax purposes sequentially to a big bang solution, where all tax havens decide whether or not to participate in a cooperation agreement. The analysis leads to the result that the sequential solution is more costly than the big bang solution and less likely to succeed. The reason is that, as the number of uncooperative tax havens declines, competition between tax havens becomes less intense, so that the benefit from being a tax haven increases.

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[15]   As they note, the empirical approach is similar to Baier and Bergstrand (2004) and Egger and Larch (2008). These papers investigate why a pair of countries enters into a bilateral preferential trade agreement.

4. The hypotheses guiding our empirical analysis

For purposes of our paper the most important hypothesis emerging from the theoretical literature is that small countries with low residence based taxes on capital income have few incentives to engage in information exchange.

An aspect less well explored in the theoretical literature is whether large countries with high residence based taxes can exert pressure on tax havens, either indirectly through institutions such as the OECD and its 'naming and shaming' of jurisdictions which deny information exchange, or directly, for instance by threatening to disrupt economic relations. One example for the latter would the threat of the United States to effectively ban Swiss banks from operating in the US if they do not provide information on bank accounts of US residents.

In the following we will take into account this aspect as well and focus on two rather simple hypotheses. This first hypothesis states that tax havens will avoid signing TIEAs with countries if they think that they attract a lot of investment from these countries that escapes taxation in the residence country and is therefore sensitive to the exchange of tax information. The second hypothesis is that, to the contrary, tax havens are more likely to sign TIEAs with the residence countries of the investors the tax havens attract. This is because residence countries will have a strong interest to sign TIEAs exactly with those tax havens where domestic residents are most likely to locate investment which escapes residence based taxation. If the residence countries cannot force tax havens to sign TIEAs if they do not want to, the first hypothesis is likely to hold. In contrast, if the residence countries can put enough pressure on tax havens, they may be able to impose TIEAs on them, which would mean that the second hypothesis is supported.

For obvious reasons it is impossible to directly observe investment which escapes residence based taxation. Many international investments are fully disclosed to the residence countries of the investors, so that they should be unaffected by information exchange. In our empirical analysis we will focus on three variables as proxies for the volume of economic activity which is likely to escape residence based taxation without information exchange: foreign direct investment, trade, and foreign portfolio investment.

We will consider the following two hypotheses:

Hypotheses: The likelihood that a TIEA between a tax haven i and a country j exists is decreasing (hypothesis 1) or increasing (hypothesis 2) in the volume of relevant economic links between i and j.

Relevant economic links are measured by the following three variables: the stock of FDI country j holds in tax haven i, the volume of exports from country j to tax haven i, and the flow of portfolio investment from country j to tax haven i. The data we use will be described in greater detail in the next section.

5. Data and descriptive analysis

5.1 Data

We use data from various sources. Our dependent variable, the existence of bilateral TIEAs, is taken from the information on TIEAs provided by the OECD, on its website on tax information exchange (http://www.eoi-tax.org/). We have taken into account all TIEAs reported in this database and signed before January 1st, 2012. In our analysis we also take into account cases where double taxation agreements exist and include provisions for information exchange. The OECD has established a review process which checks whether double taxation agreements comply with the OECD standards for information exchange. The results are publicly available, and we use them in our analysis as specified further below.

Our key explanatory variables are foreign direct investment, trade and foreign portfolio investment. FDI data comes from two sources: OECD and Eurostat. The OECD compiles a dataset on bilateral observations of foreign direct investment stocks from OECD countries into tax havens and vice versa. Eurostat compiles a very similar dataset to the OECD one. We use it as a complement to the OECD database, as it spans slightly different set of countries - European Union. Thus we merge the two datasets and convert the amounts into $US dollars.

The portfolio investment data comes from the Coordinated Portfolio Investment Survey (CPIS), which is conducted on an annual basis since 2001 by IMF. The first pilot survey data was collected in 1997 and the latest available data is for 2010. As defined on the IMF website the purpose of the CPIS is to "collect information on the stock of cross-border holdings of securities-equity securities and long- and short-term debt securities-valued at market prices prevailing at end-December of the reference year".

Portfolio investment is defined as the purchase of stocks or bonds by foreigners for the purpose of realizing a financial return, which does not result in active foreign ownership. The CPIS data we use is broken down by the economy of residence of the issuer of the securities. There are around 75 countries reporting their portfolio investment positions into the full subset of tax havens; the reporting countries also include 13 tax havens.

It is important to emphasize that the portfolio investment holdings in this dataset do not measure investments where residents of one country necessarily hold bank accounts in other countries. Rather, portfolio investments of country A in country B mean that residents of country A hold securities *issued* in country B. For instance, if a resident of the Netherlands holds a bond issued in Cayman Islands in his brokerage account in the Netherlands, this will be classified as a portfolio investment going from the Netherlands to the Cayman Islands. Therefore the portfolio investment data cannot be used to directly measure portfolio investment in bank accounts located in tax havens and held by residents of other countries. Given, this, one could argue that FPI is probably the least relevant indicator for economic links in the context of our paper. The fact that residents of a high tax country buy securities issued in a tax haven does not necessarily imply that they ever go to that tax haven, know anyone there or have a bank account there.

Finally, trade data comes from the OECD and IMF databases. Both report bilateral exports and imports from reporting countries into tax havens.

5.2 Descriptive Analysis

Before the OECD model treaty for information exchange in tax matters was launched in 2002, separate bilateral agreements for tax information exchange were the exception. Usually information

exchange was regulated by double taxation agreements. As illustrated by Figure 1 in the introduction, the spreading of TIEAs started rather slowly in the early 2000s and accelerated drastically in the years 2009 and 2010.

Given that the motivation for introducing TIEAs is to prevent tax evasion by residents of high tax countries, we are particularly interested in the TIEAs where tax havens are at least one of the partners. This applies to 555 out of 590 TIEAs in our database. Figure 2 shows how the TIEAs signed by tax havens on at least one side are distributed across groups of partner countries. We distinguish between tax havens, OECD countries, and non-OECD-countries. The figure shows that most agreements with tax havens on one side have been signed by OECD countries on the other side.

Figure 2. Cumulative number of TIEAs signed by tax havens on at least one side, 2008 – 2011.
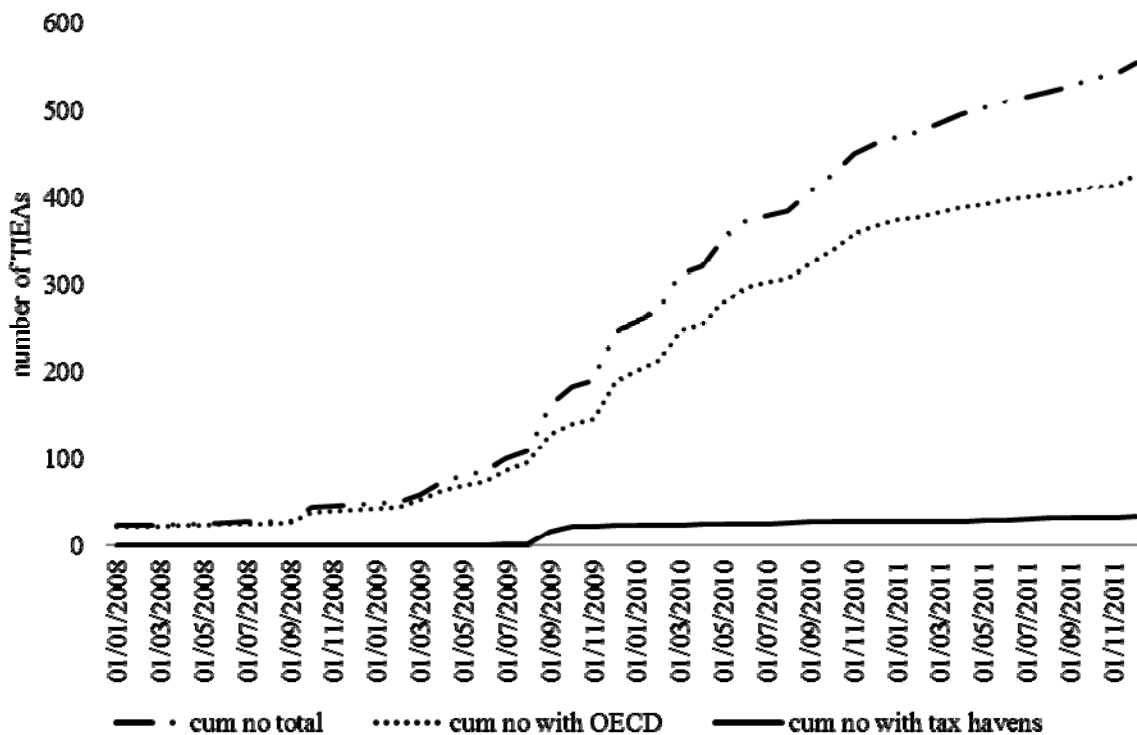
Among the 44 tax havens in our sample, 34 have signed at least one TIEA. 6 tax havens have not signed TIEAs because they have information exchange clauses in their DTAs. 4 tax havens (Maldives, Tonga, Niue and Nauru) have not signed any TIEAs yet but have committed to doing so. Figure 3 illustrates the number of TIEAs signed by the individual tax havens and the structure of partner countries for each tax haven. The tax havens in our sample have signed TIEAs with OECD- as well as non-OECD-countries. 19 tax havens have also signed TIEAs with other tax havens.

Figure 3. Number of TIEAs signed by each tax haven, ranked by number of TIEAs with other tax havens.

■ TIEAs with tax havens　▣ TIEAs with OECD countries　◿ TIEAs with non-OECD countries
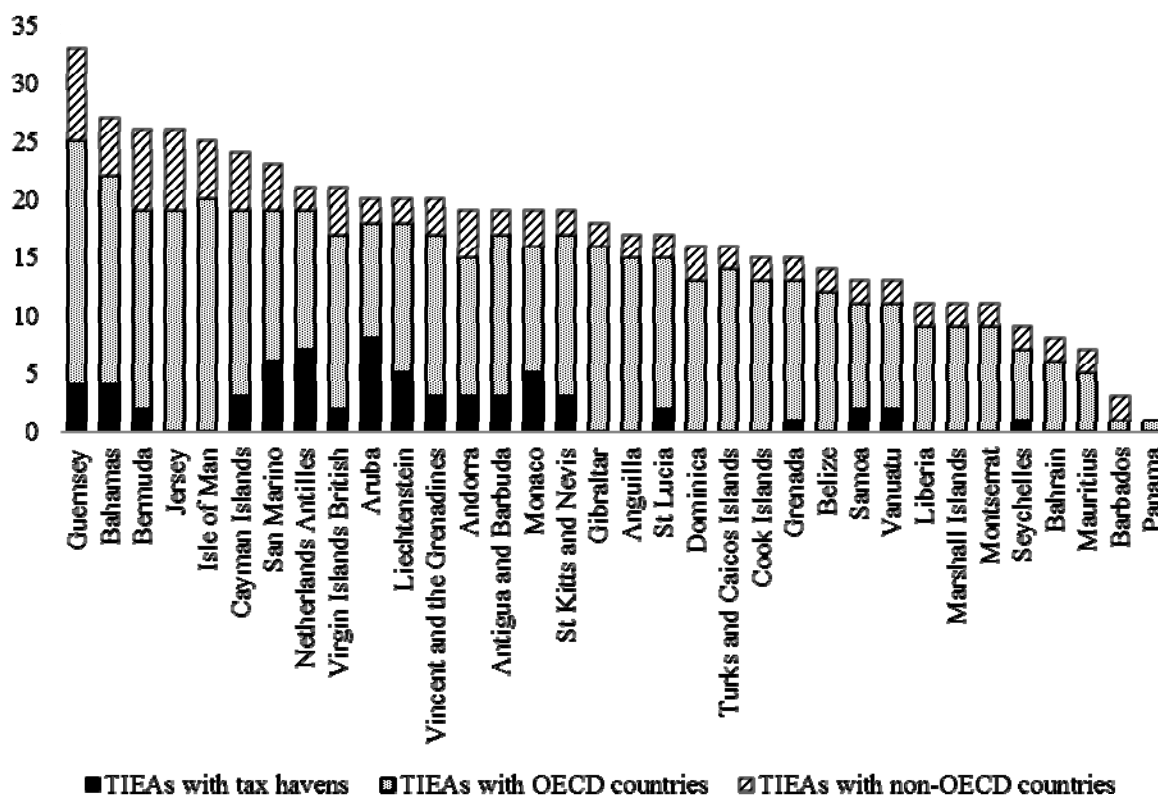
A closer look at the countries which have signed TIEAs with tax havens reveals a striking pattern. Table 1 shows the number of TIEAs signed by tax havens, per partner country. We find that seven of the ten countries with the largest number of agreements are Nordic countries: they include Greenland, The Faroe Islands, Norway, Sweden, Iceland, Finland and Denmark. It seems natural to suggest that Greenland and The Faroe Islands are cases where tax havens try to sign TIEAs with small countries of limited relevance while the other Nordic countries are countries with high taxes and strong institutions for tax enforcement and therefore have a strong interest to get access to tax information.

However, the reason for the presence of these countries at the top of the list is probably simpler. In 2006 and in response to the OECD effort to curb tax evasion, the Nordic Council of Ministers decided to start a project of Nordic co-operation in the area of tax enforcement. The objective of that co-operation is to coordinate the Nordic approach for entering into TIEAs with tax havens. The Nordic countries also expected that the cooperation will strengthen their negotiation position and keep costs down.[16] The co-operation is scheduled to last until 2012, resulting in more agreements in 2012. As a result all Nordic countries sign the same TIEAs. This explains why Greenland and Faeroe Islands have such a large number of agreements.

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[16]　For details on how the procedure looks see: http://www.norden.org/en/nordic-council-of-ministers/councils-of-ministers/council-of-ministers-for-finance-mr-finans/tax-information-exchange-agreements

Table 1: Number of TIEAs each country signed with tax havens

OECD country	TIEAs	tax haven	TIEAs	non OECD non tax haven	TIEAs
Denmark	34	Aruba	8	Faroe Islands	34
Finland	33	Netherlands Antilles	7	Greenland	34
Iceland	33	San Marino	6	Argentina	8
Australia	32	Liechtenstein	5	China	6
Norway	32	Monaco	5	India	6
Sweden	31	Bahamas	4	South Africa	6
Netherlands	27	Guernsey	4	Indonesia	4
France	24	Andorra	3	Romania	1
Germany	21	Antigua and Barbuda	3		
United Kingdom	21	Cayman Islands	3		
Ireland	19	St Kitts and Nevis	3		
New Zealand	18	St Vincent and the Grenadines	3		
Portugal	16	Bermuda	2		
Belgium	14	Samoa	2		
Canada	14	St Lucia	2		
United States	13	Vanuatu	2		
Mexico	8	Virgin Islands British	2		
Czech Republic	6	Grenada	1		
Japan	6	Seychelles	1		
Spain	5				
Austria	4				
Korea	2				
Poland	2				
Slovenia	2				
Greece	1				
Italy	1				
Turkey	1				
Luxembourg	0				
Switzerland	0				
Chile	0				
Estonia	0				
Hungary	0				
Israel	0				
Slovak Republic	0				

Our main interest is to investigate whether tax havens have signed TIEAs with countries to which they have strong economic links. To give a first impression, we have checked whether tax havens have signed TIEAs with the five countries to which they have the strongest economic links, measured by inward foreign direct investment into the tax haven from this country, inward foreign portfolio investment, and exports to the tax haven from the partner country. In the following, we refer to these countries, which may differ for each individual tax haven, as the top 5 FDI, FPI and trade countries, respectively. Figures 4a-c illustrate the results for foreign direct investment, foreign portfolio investment and trade. One important issue in this context is that some tax havens have DTAs that include information exchange provisions, rather than TIEAs. Therefore we report TIEAs with the top 5 partners as well as TIEAs plus DTAs.[17] Figure 4a focuses on the top 5 FDI countries.[18] No tax haven has signed TIEAs with all 5 countries. But some tax havens which use DTAs do cover all five partner countries. The same applies to the top 5 FPI and trade countries. 38 out of 44 tax havens in the sample

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[17] It is important to distinguish between ordinary DTAs and the ones that OECD lists as meeting the standards of information exchange. Here we only include DTAs that meet the standards set by the OECD.

[18] These are all OECD member countries because our FDI data is restricted to the OECD.

have signed a TIEA or a double taxation agreement with at least one of the top 5 FDI ountries. On average, tax havens have signed agreements (TIEAs or DTAs) with 2.36 of the top 5 FDI countries. This is significant but maybe less than one might expect. For the top 5 FPI partners the coverage is slightly lower with an average of 1.91 TIEAs, while for trade slightly higher: 2.5.

Moreover, we find that tax havens not always sign the TIEA with their most important economic partner. In case of FDI only 21 (31) tax havens have signed TIEAs (TIEAs+DTAs) with their most important economic partner. The numbers are even smaller for FPI and trade.

Figure 4a. Number of TIEAs and TIEAs+DTAs with the top 5 FDI importers - OECD countries
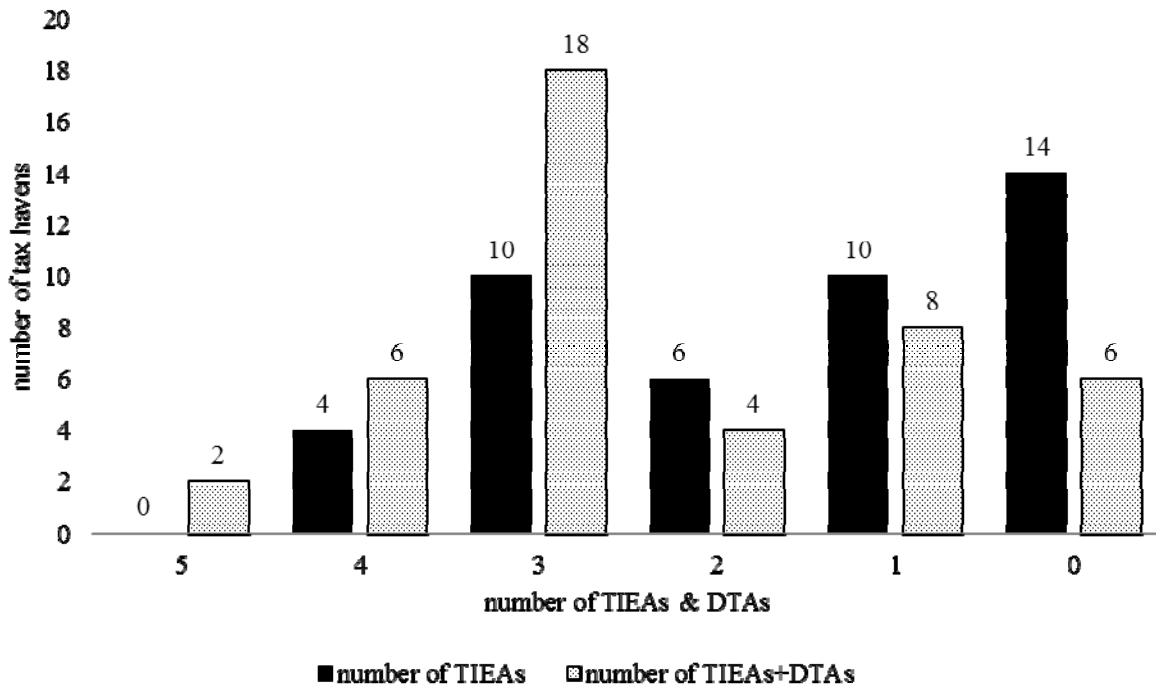
Figure 4b. Number of TIEAs and TIEAs+DTAs with the top 5 FPI importers.

number of TIEAs & DTAs

■ number of TIEAs   ▨ number of TIEAs+DTAs
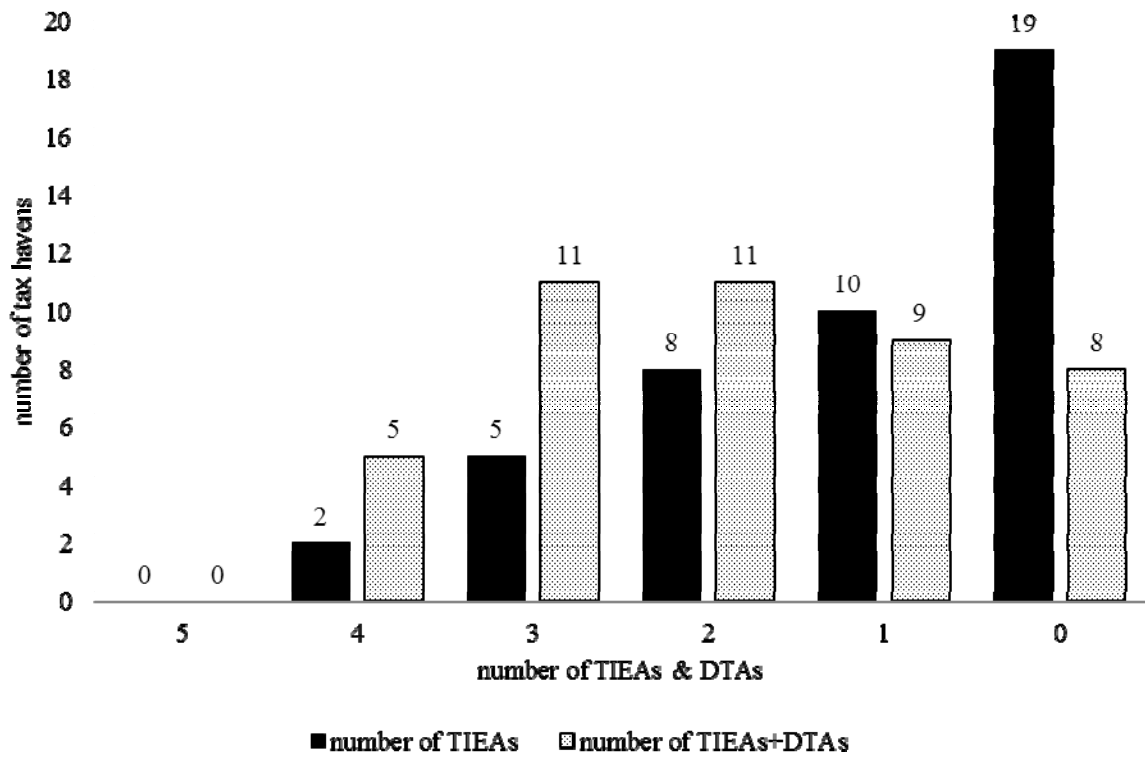
Figure 4c. Number of TIEAs and TIEAs+DTAs with the top 5 trade importers.
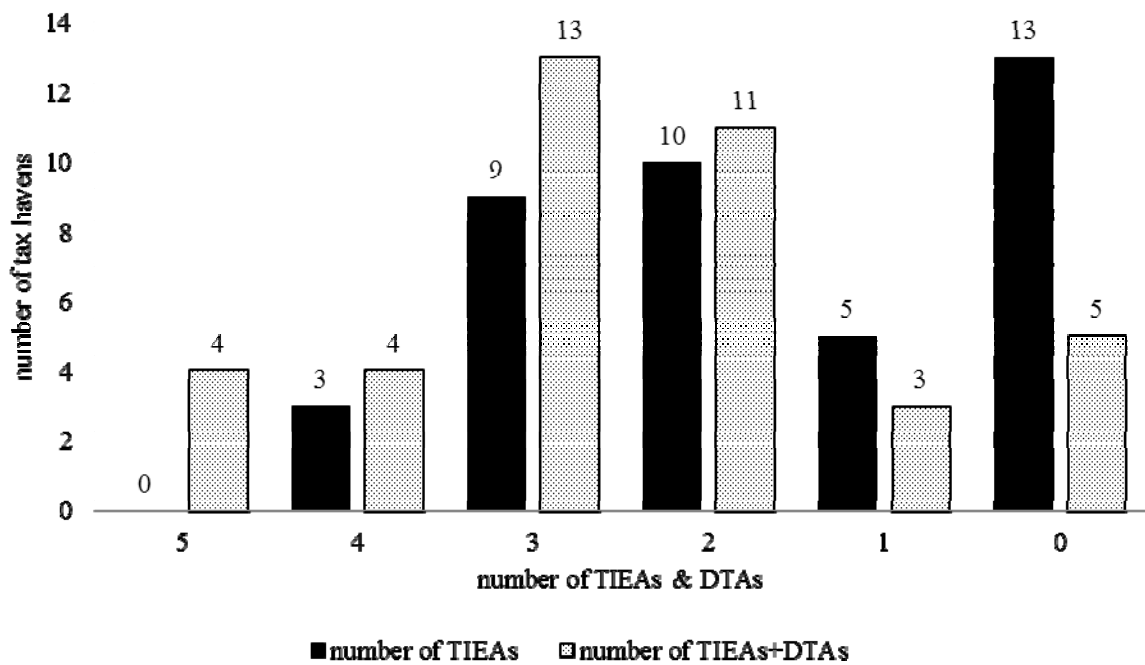
number of TIEAs & DTAs

■ number of TIEAs   ▨ number of TIEAs+DTAs

Note: Jersey, Isle of Man, Guernsey and Monaco are excluded from this figure. We do not have any trade data for those countries.

These findings suggest that tax havens do not seem to face an overwhelming pressure to sign TIEAs with the countries to which they have the strongest economic links. Does this imply that the tax havens focus on signing agreements with countries to which they have no or negligible economic links? Figure 5 illustrates the number of TIEAs tax havens have with the bottom 5 trade countries. The results for the bottom FDI and FPI countries are given in the appendix. Here we find that no tax haven has signed TIEAs with more than three out of five bottom trade partners.

Figure 5. Number of TIEAs and TIEAs+DTAs with the bottom 5 trade importers.
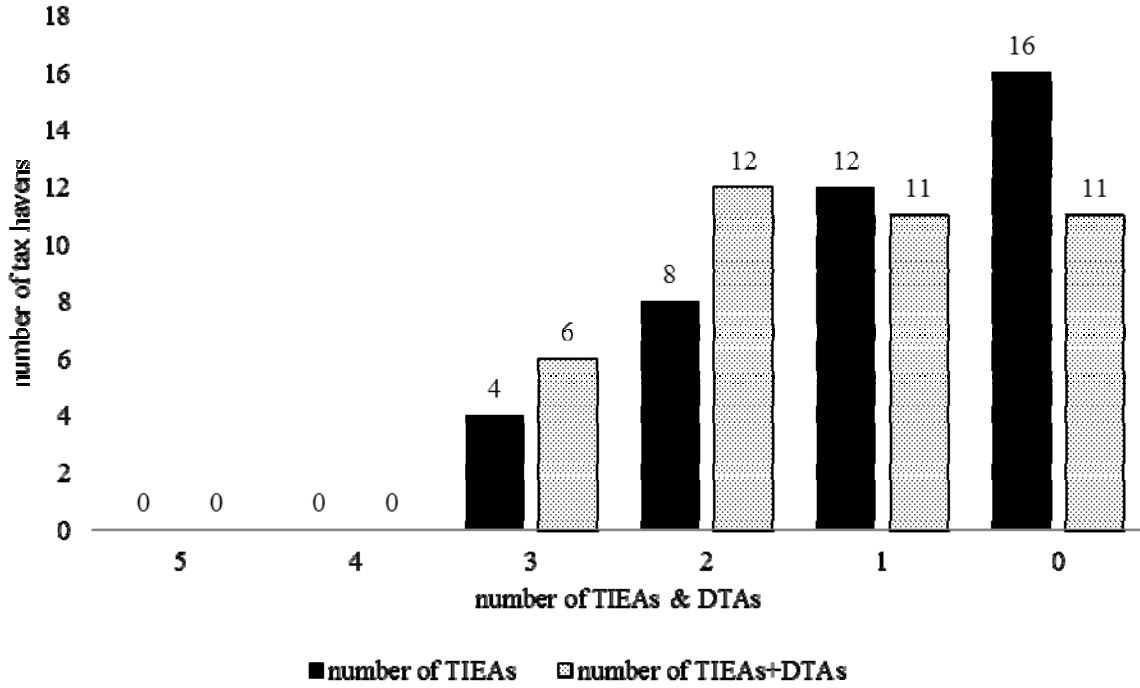
Note: Jersey, Isle of Man, Guernsey and Monaco are excluded from this figure. We do not have any trade data on those countries.

6. Regression results and robustness checks

6.1 The model

To test the hypothesis described above we estimate a model where dependent variable is a dummy which takes value 1 if there is a TIEA between tax haven i and reporting country j, and 0 otherwise. A pair of counties i and j adopts a TIEA if and only if:

$$TIEA_{ij} = \begin{cases} 1 \ if \ TIEA^*_{ij} > 0 \\ 0 \ if \ TIEA^*_{ij} < 0 \end{cases}$$

where $TIEA^*_{ij}$ denotes a latent variable:

$$TIEA^*_{ij} = \alpha + \beta F_{ij} + \gamma \bar{X}_i + \delta \bar{X}_j + \theta \bar{X}_{ij} + \epsilon_{ij} \qquad (1)$$

Here F_{ij} describes the economic link between tax haven i and reporting country j, $\bar{X}_i$ the matrix of tax haven characteristics, $\bar{X}_j$ is a matrix of reporting country characteristics, $\bar{X}_{ij}$ is a matrix of country pair

characteristics and ϵ_{ij} is normally distributed error term. The parameter β describes the effect of economic link on the probability of TIEA, whereas γ, δ, θ are the vectors of coefficients of country and country pairs characteristics. This simple binary choice model is estimated using a probit model.

In our baseline regression we use TIEAs signed after 1st January 2007 as the dependent variable. To evaluate the impact of economic links, we use stocks of FDI and FPI at the end of 2007 as well as the sum of exports from *j* to *i* in the period from 2001 to 2007. We use year 2007 for two reasons: Firstly, most of the agreements were signed in 2009-2010. Leaving a lag of two years from the signature to the start of negotiations seems plausible. Secondly, 2007 is the last year before the financial crisis, so that the economic link variable we use is not affected by the crisis.

The result tables include 5 specifications. Each of these uses a different variable to proxy for the economic links between country pairs:

1. *FDI_OECD*: bilateral FDI from reporting country (OECD country only) into tax haven

2. *FDI_total*: bilateral FDI from reporting country (OECD+EU only) into tax haven

3. *OECD_trade*: exports from reporting country (OECD country only) into tax haven

4. *IMF_trade*: exports from reporting country into tax haven

5. *portf_inv*: portfolio investment defined as purchase of shares and bonds issued by tax haven by reporting country residents

Due to data limitations, we only have OECD countries in the reporting countries group for *FDI_OECD* and *OECD_trade*. Therefore the conclusions drawn for those two variables apply only to the formation of TIEAs with OECD countries. For the other three regressions the sample is larger and includes European Union countries for *FDI_total* and the whole world for *IMF_trade* and *portf_inv*.

Each of these specifications includes a US dummy and an interaction variable between the economic link proxy and US dummy to control for a differing impact of links to the US for the likelihood of treaty formation.

Importantly, to account for the lack of many non-OECD countries in some of the samples, each regression includes the total number of non-OECD TIEAs each tax haven has and interacts this variable with the economic link proxy. The idea behind that is that the larger the number of non-OECD TIEAs, either existing or under negotiation, the smaller the pressure on a tax haven to sign a TIEA. This would suggest that there is a simple substitution effect between TIEAs with OECD and non-OECD countries.

In turn, the interaction term accounts for the fact that as the number of non-OECD TIEAs grows, the importance of the economic links variable might decline. Again, this is because pressure from OECD countries with strong economic links may be less effective if a tax haven has a number of TIEAs with other countries or is in the process of negotiating them.

Additionally, since some of the tax havens on the OECD list have not signed any TIEAs, we drop those from the sample and use only the ones that have at least 1 TIEA signed. This means we do not include Cyprus, Hong Kong, Luxembourg, Maldives, Malta, Nauru, Niue, Singapore, Switzerland, Tonga and the U.S. Virgin Islands. Moreover, since we are using only post 2007 TIEAs, we drop the country pairs that signed an agreement before 2007. Otherwise they would show as observations with large flows and no treaty and distort our results. As a result country pairs such as US and Cayman Islands or UK and Bermuda are not considered here. Finally, we exclude TIEAs signed before 2000 such as the one between US and Marshall Islands.[19]

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[19] Clearly, all this implies that we drop important tax havens from our sample. In the robustness checks we therefore run our regressions with data from 2000 and for all agreements after 2000. The results are similar.

6.1.1 Control variables

We use a number of control variables suggested as determinants of the information exchange agreements in the theoretical literature discussed above. As such, we include gravity equation measure for the distance between countries and country size measures approximated by the population sizes and GDPs. We expect distance to be negatively related to the likelihood of the TIEA signature and population size and GDP to be positively related to the analyzed probability. We also have GDP per capita as a control variable.

We also include an OECD membership dummy for reporting countries. We expect it to positively impact the probability of signing a TIEA. Intuitively, since harmful tax practices was an OECD initiative we would expect that the probability of signing TIEA with an OECD country is higher than with a non-OECD country. This is clearly in line with the summary statistics presented in Figure 2.

The presence of a common colonial origin is likely to have a positive impact on the analysed probability. The presence of a double taxation agreement that meets OECD standards of information exchange is supposed to negatively affect the probability of an agreement. Those DTAs include an information sharing clause. Therefore they are a substitute for TIEAs.

We also take into account corporate and personal tax rate differences. The higher the corporate or personal tax rate difference between a reporting country and a tax haven, the larger the scope for tax evasion and avoidance. Whether a larger difference makes a TIEA more or less likely depends on whether the interests of the high tax country or the tax haven dominate.

We also include an institutional measure which is supposed to control for the institutional quality of the partner and reporting countries. As suggested by Dharmapala and Hines (2009) evidence from US firms shows that low tax rates offer much more powerful inducements to foreign investment in well-governed countries than do low tax rates elsewhere. Here, we use the control of corruption measure assembled by the World Bank.

Moreover, we control for non-resident withholding tax rates on interest.[20] More precisely, we include the difference between the top tax rate on interest income of residents and the withholding tax on interest income of non-residents. The literature refers to this measure as the 'tax gap'. If this tax gap is large, a country will be interested in exchanging information for tax purposes and vice versa (Bachetta and Espinosa (2000), Huizinga (2003)). The measure is also used by Lighart (2011).[21] The tax gap is included for both reporting and partner countries.

Finally, we include the total number of tax information exchange agreement signed by tax haven as well as reporting country.

6.2 Regression results
6.2.1 Baseline regression

In our baseline regression we find that economic links have a positive impact on the likelihood of tax information exchange treaty formation (see Table 2). The effect is strong and positive for FDI and trade. For FDI an average marginal effect is 0.56% for non US investment and 1.56% for US investment.[22] For OECD trade the average marginal effect is much stronger - namely 1.73% - for non-

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[20] From 2008 the EU Savings Directive applied in some countries, but the withholding taxes applicable under this rate have not been taken into the account, since we include the information for the 2007 year only. The data on withholding taxes comes from E&Y Worldwide Corporate Tax Report 2007.

[21] Intuitively, the additional revenue a country collects from the foreign savings of its own residents (which are brought into tax due to tax information sharing) exceeds the loss of revenue from non-resident savings (which will be relocated to 'information free' places).

[22] This means that extra $US 1 billion of investment increases the likelihood of an agreement by 0.56%; the standard deviation for FDI is $US 13 billion and for trade is $US 7.8 billion.

US investment and insignificant for US investment. The effect of FPI is not significant. The average predicted probability of tax haven signing TIEA with non-US country is 38%, while for US it is 47% when FDI is used to proxy for economic links between country pairs.

This is in line with the results from Figures 4a-c, which show that on average tax havens sign the largest proportion of TIEAs with their top 5 trade importers, followed by FDI and then FPI importers.

Table 2. Results of basic Probit models with non-OECD treaties; post 2007 TIEAs

	portf_inv	FDI_OECD	FDI_total	OECD_trade	IMF_trade
info_ex_agreement_post_2007					
portfolio_inv_billions	-4.20760				
	(-0.91)				
portf_inv_non_OECD_TIEA	0.46817				
	(0.91)				
US_portf_inv	5.80320				
	(0.14)				
fdi_postn_outof_repc_bln		0.21544***			
		(3.07)			
FDI_postn_outof_repc_non_OECD_TIEA		-0.04158***			
		(-3.04)			
FDI_OECD_US		0.14836*			
		(1.73)			
FDI_total			0.22033***		
			(3.14)		
FDI_total_non_OECD_TIEA			-0.04135***		
			(-3.04)		
FDI_total_US			0.14171*		
			(1.67)		
sum_trade_exports_repc_OECD_bln				0.19453***	
				(4.07)	
sum_trade_exports_OECD_US				1.55574	
				(0.03)	
sum_trade_exports_repc_bln					0.15625***
					(3.67)
sum_trade_exports_repc_US					1.18803
					(0.03)
USdummy	-36.41363	0.55703	0.65071	-7.35645	-8.55838
	(-0.05)	(0.23)	(0.27)	(-0.02)	(-0.03)
total_non_OCED_TIEA	-0.4986***	-0.02245	-0.05437	-0.41413**	-0.40301**
	(-2.65)	(-0.10)	(-0.25)	(-2.14)	(-2.51)
N	648	310	363	459	1088
pseudo R-sq	0.747	0.752	0.774	0.748	0.817

z statistics in parentheses

* p<0.10, ** p<0.05, *** p<0.01

Our hypothesis that the likelihood of the treaty formation declines with the number of non-OECD TIEAs is confirmed. More importantly, the impact of economic links is weaker, the larger the number of non-OECD TIEAs signed, turning negative at large values of these. This is especially true for FDI, while for trade the number of non-OCED TIEAs does not change the result. For example, the positive impact of economic links on the likelihood of an OECD treaty formation turns negative at more than 5 non-OECD TIEAs for FDI (see Figure 6).

However, at the mean value of non-OECD TIEAs (3.6), the effect is positive – 0.7% – and comparable to the average marginal effect.

Figure 6. Marginal effect of FDI at different values of non-OECD TIEAs
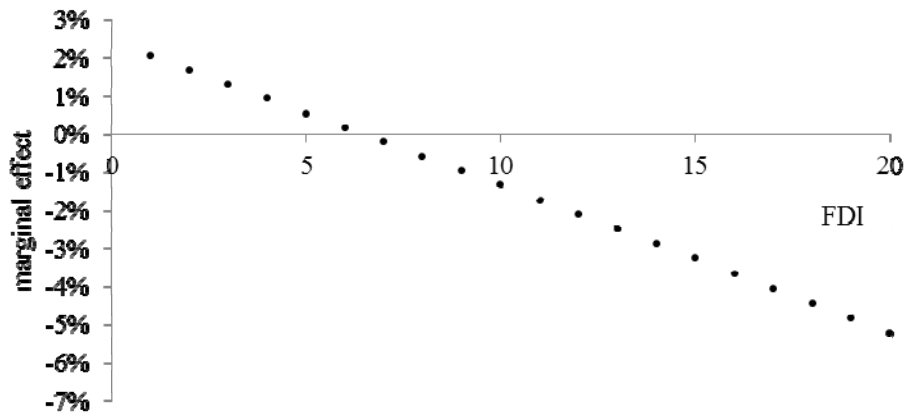
It is important to note that the results presented here are robust to the inclusion of the US dummy and US investment. Thus, we are confident that these results are not driven by the relationship between the US and tax havens.

6.2.2 Shares regression

So far we have used absolute values for the economic link variables. In this section we use shares, rather than absolute values. For instance, for the Cayman Islands we sum all the incoming investment and calculate what proportion comes from each reporting country. This gives us a share variable for each country pair. The reason for considering shares is that shares may reflect the relative importance of a reporting country as an economic partner of a tax haven. Therefore shares might be interpreted as an indicator of leverage a reporting country has, relative to a particular tax haven. This method also controls for the differences between tax havens that receive large values of investment (such as Cayman Islands) and the ones that receive small values of investment (e.g. Vanuatu). In the absolute values specification, Cayman Islands-US pair is more likely to sign the TIEA than Vanuatu-US because the value of investment from US to Cayman Islands is much larger than the one to Vanuatu. However, when considering shares, it may well be that the share of investment into Vanuatu coming from US is much larger than the one coming to Cayman Islands, which might cause the former to be more likely to conclude an agreement.

Table 3: Results of basic Probit models with non-OECD treaties, using shares; post 2007 TIEAs.

	portf_inv	FDI	FDI_total	OECD_trade	trade
info_ex_agreement_post_2007					
portfolio_inv_shares	7.28074**				
	(2.50)				
portfolio_inv_shares_non_OECD_TIEA	-2.37187***				
	(-2.96)				
portfolio_inv_shares_US	1.52427				
	(0.50)				
fdi_position_shares		5.76532**			
		(2.22)			
fdi_position_shares_non_OECD_TIEA		-1.11763**			
		(-2.11)			
fdi_position_shares_US		4.92607			
		(0.37)			
FDI_total_shares			5.44037**		
			(2.17)		
FDI_total_shares_non_OECD_TIEA			-1.07723**		
			(-2.07)		
FDI_total_shares_US			4.18318		
			(0.81)		
sum_oecd_trade_repc_shares				4.17975**	
				(2.42)	
sum_oecd_trade_repc_shares_US				-8.92767***	
				(-2.70)	
sum_trade_repc_exports_shares					6.33921***
					(2.60)
sum_trade_repc_exports_shares_US					-16.17267**
					(-2.26)
USdummy	-2.38631	-2.82278	-1.14973	2.81668	2.46656
	(-1.06)	(-0.30)	(-0.28)	(1.56)	(1.41)
total_non_OCED_TIEA	-0.50824***	0.01484	-0.06766	-0.33069*	-0.37905**
	(-2.60)	(0.07)	(-0.31)	(-1.89)	(-2.47)
N	617	310	363	459	1088
pseudo R-sq	0.732	0.759	0.784	0.704	0.789

z statistics in parentheses

* $p<0.10$, ** $p<0.05$, *** $p<0.01$

In Table 3 we regress the shares of investment described above on our dependent variable in a similar fashion to the baseline regression. We find that the shares regression results confirm our baseline

specifications. Again the effect of economic links is positive, with the average marginal effect of FDI being 15.3% for non US investment and insignificant US investment.[23]

Similar to the baseline regression, the effect of economic links weakens as tax havens have more non-OECD TIEAs and turns negative at larger values of these. The variation in marginal effects of FDI at different values of non-OECD TIEAs is very similar to the baseline regression case, as the marginal effect again turns negative at 5 non-OECD TIEAs (the range of marginal effects goes from 50% at zero non-OECD TIEAs to -129% at 20 non-OECD TIEAs). The results again are the strongest for FDI and trade, while much weaker for FPI (in terms of marginal effects).

In case of trade the effect again does not vary with the number of non-OECD TIEAs, however here the US exports are significant in their own right – the average marginal effect of trade is significantly negative for US share of exports and significantly positive for other countries investment. The reason for that is that US doesn't have a post 2007 TIEA with any of its top 15 largest trade partners (in terms of shares of exports as a percentage of total exports into a tax haven); even for all TIEAs it doesn't have an agreement with any of its top 9 partners. That wasn't the case for the absolute values of investment.

6.3 Robustness checks

Most importantly we check whether the results presented above are robust to the inclusion of double tax agreements that contain information exchange provisions. To do so, we construct a new dependent variable that is equal to 1 if there is a TIEA or DTA that meets OECD standards between a pair of countries. Using this new dependent variable we run the same regressions as in Tables 2 and 3. The results presented in Tables 4 and 5 confirm our baseline regression. In the case of absolute values the effect of FDI and FPI on the likelihood of an agreement containing information exchange provisions is much stronger than in case of only TIEAs – the average marginal effect for FDI is almost 6% here. The same is true for the shares regressions.

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[23] This means that 100% increase in shares of investment in tax haven increases the likelihood of TIEA formation by 15.3%; standard deviation is 17%.

Table 4: Results of basic Probit models with non-OECD treaties; post 2007 TIEAs and DTAs meeting information exchange standards.

	portf_inv	FDI_OECD	FDI_total	OECD_trade	IMF_trade
TIEA_and_DTA					
portfolio_inv_billions	0.28758*				
	(1.86)				
portf_inv_non_OECD_TIEA	-0.03159*				
	(-1.84)				
US_portf_inv	-0.01300				
	(-0.30)				
fdi_postn_outof_repc_bln		0.74608***			
		(2.58)			
FDI_postn_outof_repc_non_OECD_TIEA		-0.08424***			
		(-2.68)			
FDI_OECD_US		-0.01017			
		(-0.13)			
FDI_total			0.71008**		
			(2.56)		
FDI_total_non_OECD_TIEA			-0.07923***		
			(-2.64)		
FDI_total_US			-0.02047		
			(-0.27)		
sum_trade_exports_repc_OECD_bln				0.11473***	
				(3.12)	
sum_trade_exports_OECD_US				1.72548	
				(0.03)	
sum_trade_exports_repc_bln					0.09181***
					(3.13)
sum_trade_exports_repc_US					1.27738
					(0.05)
USdummy	-2.36765	0.05172	0.10545	-11.55792	-12.13887
	(-0.61)	(0.03)	(0.05)	(-0.03)	(-0.05)
total_non_OCED_TIEA	-0.25129**	0.04296	-0.02841	-0.14367	-0.11163
	(-2.04)	(0.25)	(-0.18)	(-1.06)	(-1.02)
N	697	310	457	459	1088
pseudo R-sq	0.605	0.649	0.716	0.581	0.682

z statistics in parentheses

* p<0.10, ** p<0.05, *** p<0.01

Table 5. Results of basic Probit models with non-OECD treaties using shares; post 2007 TIEAs and DTAs meeting information exchange standards.

	portf_inv	FDI	FDI_total	OECD_trade	trade
TIEA_and_DTA					
portfolio_inv_shares	3.92805*				
	(1.95)				
portfolio_inv_shares_non_OECD_TIEA	-1.24765**				
	(-2.32)				
portfolio_inv_shares_US	2.48875				
	(0.77)				
fdi_position_shares		4.51329***			
		(2.74)			
fdi_position_shares_non_OECD_TIEA		-0.79528***			
		(-2.70)			
fdi_position_shares_US		2.30916			
		(0.46)			
FDI_total_shares			4.17333***		
			(2.79)		
FDI_total_shares_non_OECD_TIEA			-0.77847***		
			(-2.80)		
FDI_total_shares_US			2.43560		
			(0.62)		
sum_oecd_trade_repc_shares				1.93626	
				(1.59)	
sum_oecd_trade_repc_shares_US				-7.77195	
				(-1.35)	
sum_trade_repc_exports_shares					2.24065
					(1.10)
sum_trade_repc_exports_shares_US					-13.17456
					(-0.92)
USdummy	-2.08757	-1.23905	-1.14334	1.56509	0.88533
	(-0.89)	(-0.33)	(-0.37)	(1.00)	(0.48)
total_non_OCED_TIEA	-0.24170*	0.09977	0.01180	-0.12494	-0.09730
	(-1.89)	(0.59)	(0.07)	(-0.96)	(-0.93)
N	666	310	457	459	1088
pseudo R-sq	0.591	0.639	0.709	0.544	0.655

z statistics in parentheses

* p<0.10, ** p<0.05, *** p<0.01

We check for the effects of investment out of tax havens into reporting countries (see Table 6). The results are far less significant than for the investment coming into tax havens.

We also test the hypothesis proposed by Ligthart et al (2011), according to which country pairs with a more asymmetric allocation of FDI are less likely to conclude a double taxation agreement. In the case of TIEAs a similar reasoning might apply, although what one would expect is likely to depend

again on assumptions about which side of the agreement has more leverage. In Table 7 we report the findings, which indicate that in case of TIEAs the relationship is, interestingly, reverse. The more asymmetric the allocation of investment, the more likely it is that the countries will conclude a TIEA. This might be interpreted as reflecting the pressure of reporting countries on tax havens to sign agreements. However, the result might also arise because in case where economic link variables are larger the absolute values of asymmetries will also be larger.

The results from the baseline regression are robust to the inclusion of all the TIEAs (see Table 8). To test for that, we use 2001 data to approximate for the economic relationship between countries that signed a TIEA before 2007, leaving the post 2007 data unchanged.

The results are also robust to the use of 2005 data with very similar magnitude of coefficients for FDI and FPI (see Table 9). The trade coefficients have the same sign but slightly different magnitudes as instead of the sum of all exports for 2001- 2007 we use only one year worth of observations.

Table 6: Results of Probit models with non-OECD treaties; post 2007 TIEAs; investment out of tax havens.

	FPI	FDI_OECD	OECD_trade
info_ex_agreement_post_2007			
portfolio_investment_out_bln	-7.42457		
	(-1.59)		
portfolio_investment_out_bln_non_OECD_TIEA	0.82828		
	(1.60)		
portfolio_investment_out_bln_US	-351.86978		
	(-0.02)		
fdi_position_into_repc_bln		0.93782**	
		(2.23)	
fdi_position_into_repc_bln_non_OECD_TIEA		-0.11460**	
		(-2.22)	
fdi_position_into_repc_bln_US		0.30484	
		(0.80)	
sum_trade_imports_repc_OECD_bln			0.21811
			(0.50)
sum_trade_imports_repc_OECD_bln_US			2.18118***
			(2.90)
USdummy	834.52639	0.59336	-0.83528
	(0.02)	(0.25)	(-0.44)
total_non_OCED_TIEA	-1.16352	0.13133	-0.22709
	(-0.00)	(0.56)	(-1.42)
N	248	322	537
pseudo R-sq	0.845	0.765	0.718

z statistics in parentheses

* p<0.10, ** p<0.05, *** p<0.01

Table 7: Results Probit models with non-OECD treaties; post 2007 TIEAs; investment assymetries.

	portf_inv	FDI_OECD	OECD_trade
info_ex_agreement_post_2007			
FPI_diff	1.24255**		
	(2.40)		
FPI_diff_non_OECD_TIEA	-0.13725**		
	(-2.40)		
FDI_diff		0.34949***	
		(3.13)	
FDI_diff_non_OECD_TIEA		-0.08356***	
		(-3.20)	
FDI_diff_US		0.36986**	
		(2.51)	
OECD_trade_diff			0.19283***
			(4.01)
OECD_trade_US			2.01587
			(0.04)
o.USdummy	0.00000	-3.03418	-8.32509
	(.)	(-0.88)	(-0.03)
o.total_non_OCED_TIEA	0.00000	0.49299	-0.40370**
	(.)	(1.46)	(-2.10)
N	175	282	457
pseudo R-sq	0.778	0.806	0.747

z statistics in parentheses

* p<0.10, ** p<0.05, *** p<0.01

Table 8: Robustness checks: results of Probit models with non-OECD treaties all TIEAs.

	portf_inv	FDI_OECD	FDI_total	OECD_trade	IMF_trade
info_ex_agreement					
portfolio_inv_billions	-4.20904				
	(-0.91)				
portf_inv_non_OECD_TIEA	0.46833				
	(0.91)				
US_portf_inv	5.79951				
	(0.16)				
fdi_postn_outof_repc_bln		0.20963***			
		(2.97)			
FDI_postn_outof_repc_non_OECD_TIEA		-0.03996***			
		(-2.91)			
FDI_OECD_US		0.13720			
		(1.60)			
FDI_total			0.21480***		
			(3.04)		
FDI_total_non_OECD_TIEA			-0.03993***		
			(-2.92)		
FDI_total_US			0.13222		
			(1.56)		
sum_trade_exports_repc_OECD_bln				0.18911***	
				(4.00)	
sum_trade_exports_OECD_US				0.50864***	
				(2.71)	
sum_trade_exports_repc_bln					0.15094***
					(3.57)
sum_trade_exports_repc_US					0.37510***
					(2.77)
USdummy	-36.46416	0.92947	1.02507	0.61842	-0.37558
	(-0.04)	(0.38)	(0.43)	(0.34)	(-0.22)
total_non_OCED_TIEA	-0.49859***	-0.00888	-0.04062	-0.39773**	-0.39339**
	(-2.65)	(-0.04)	(-0.19)	(-2.08)	(-2.47)
N	652	313	365	464	1093
pseudo R-sq	0.752	0.747	0.768	0.738	0.810

z statistics in parentheses

* p<0.10, ** p<0.05, *** p<0.01

Table 9: Robustness check: results of basic Probit models with non-OECD treaties; post 2007 TIEAs 2005 data.

|	portf_inv	FDI_OECD	FDI_total	OECD_trade	IMF_trade
info_ex_agreement_post_2007					
portfolio_investment_2005_bln	0.43985				
	(1.35)				
portf_inv_2005_non_OECD_TIEA	-0.04583				
	(-1.27)				
US_portf_inv_2005	-0.02541				
	(-0.28)				
FDI_out_of_repc_2005_bln		1.97019			
		(0.62)			
FDI_postn_outof_repc_2005_non_OECD_TIEA		-0.18925			
		(-0.53)			
FDI_OECD_2005_US		1.39109			
		(0.00)			
FDI_total_2005			2.99369		
			(0.93)		
FDI_total_2005_non_OECD_TIEA			-0.29618		
			(-0.81)		
FDI_total_2005_US			0.40246		
			(0.00)		
oecd_trade_exports_repc_2005_bln				0.91107***	
				(4.05)	
oecd_trade_exports_repc_2005_US				7.84182	
				(0.03)	
trade_repc_exports_2005_bln					0.97628***
					(3.65)
trade_repc_exports_2005_US					8.32663
					(0.03)
USdummy	-2.30116	-2.23828	-0.86235	-6.89134	-8.84061
	(-0.36)	(-0.01)	(-0.00)	(-0.02)	(-0.03)
total_non_OCED_TIEA	-0.3194**	-0.33583	-0.32446	-0.29442*	-0.41078**
	(-2.26)	(-1.11)	(-1.17)	(-1.74)	(-2.56)
N	1168	276	338	513	1087
pseudo R-sq	0.776	0.803	0.811	0.738	0.817

z statistics in parentheses

* p<0.10, ** p<0.05, *** p<0.01

7. The 12 TIEAs threshold

It is interesting to ask whether tax havens become more reluctant to sign additional TIEAs after they have signed the 12 agreements necessary to comply with the threshold defined by the OECD. Investigating this empirically is problematic because the signing of TIEAs started just a few years ago. In order to gain some preliminary insight we have compiled data about the number of days between TIEAs signed by each tax haven. The idea is to check whether the expansion of the treaty network slows down after a country has reached the threshold of 12 countries set by the OECD. Figure y illustrates the relationship between the number of days required to reach an additional agreement and the number of existing agreements. The graph suggests that, indeed, the process of signing additional TIEAs slows down above the threshold.

Figure 8: Average number of days required to reach an nth TIEA.
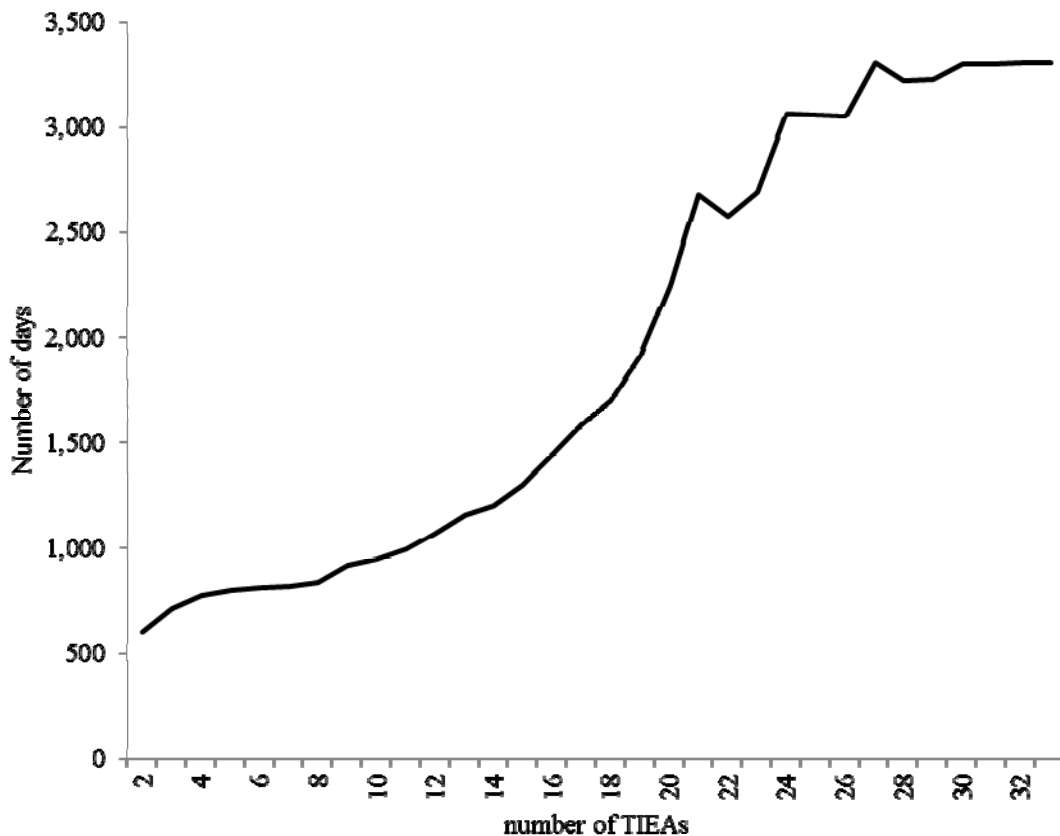
Using this data we have also carried out a simple regression analysis. We regress the number of days required to reach an nth TIEA on the number of TIEAs already concluded at the time of this nth agreement and on the dummy called below_12 threshold. The dummy is 1 when the average of TIEAs a tax haven has is below 12 and 0 otherwise. We also interact those two variables.

We find that being below 12 TIEAs threshold decreases the number of days required to reach the nth agreement. In addition the number of TIEAs signed before has a positive impact on the number of days required to reach an nth agreement. In other words the larger the number of TIEAs tax havens have already concluded, the slower is the pace of concluding further agreements. Finally, the impact of

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the number of existing TIEAs is much larger after the 12 TIEAs were signed than below this threshold.

8. Conclusions

This paper investigates whether tax havens have signed TIEAs with countries to which they have strong and important economic links, or whether they have signed agreements with less relevant countries, possibly in order to avoid tax information exchange in cases where it is relevant. The main finding of this paper is that the former seems to hold. The countries classified as tax havens have systematically signed more TIEAs with countries to which they have stronger economic links in the form of foreign direct investment and trade. The results for foreign portfolio investment are weaker, but as we have explained in the paper the portfolio investment data we use is probably less suited for our purposes than the FDI and the trade data, mainly because it does not measure investment *located* in tax havens. However, an important caveat is that this does not mean treaties for information exchange cover all relevant countries. On average tax havens only have treaties with roughly half of their five most important economic partner countries. In so far the network of treaties for information exchange is far from complete.

These results suggests that the OECD initiative for more information exchange in tax matters is successful in that it has induced tax havens, on average, to sign TIEAs with the right countries. Pit differently, we find no support for the view that tax havens try to undermine tax information exchange by systematically signing TIEAs with irrelevant countries, where information exchange is unlikely to matter because economic relationships are negligible. However, if the objective is to have information exchange among all countries with significant economic links, there is still some way to go. Another issue raised by our analysis is whether the process of signing TIEAs slows down after the threshold of 12 agreements has been reached. Our findings suggest that this may indeed be the case, but more time has to pass before we can see how robust this result really is.

Of course, the spreading of TIEAs will only lead to effective information exchange if countries also set up the administrative and legal infrastructure required to make this exchange practicable. Also, one would expect taxpayers who try to evade taxes in their countries of residence to react to the spreading of TIEAs. In particular in the case of highly mobile portfolio investment one can expect that taxpayers who evade taxes might move their assets to tax havens without TIEAs with their residence countries. Thus, even if it is true, as we have suggested, that investment which evades residence based taxation is currently located in tax havens with economic links to the residence country, that correlation may become weaker as taxpayers react to TIEAs. However, the growing network of TIEAs is likely to make tax evasion more difficult and more costly. Moreover, as the number of TIEAs continues to grow, this relocation of assets may reach its limits.

Appendix A:

Table 1A. List of tax havens together with the total number of Tax Information Exchange Agreements and Double Tax Agreements signed by each.

tax haven	number of TIEAs	number of DTAs
Andorra	19	0
Anguilla	17	0
Antigua and Barbuda	19	9
Aruba	20	2
Bahamas	27	0
Bahrain	8	21
Barbados	3	28
Belize	14	9
Bermuda	26	2
Cayman Islands	24	1
Cook Islands	15	0
Cyprus	0	34
Dominica	16	8
Gibraltar	18	0
Grenada	15	9
Guernsey	33	2
Hong Kong	0	19
Isle of Man	25	5
Jersey	26	4
Liberia	11	1
Liechtenstein	20	6
Luxembourg	0	54
Maldives	0	0
Malta	0	48
Marshall Islands	11	0
Mauritius	7	19
Monaco	19	4
Montserrat	11	1
Nauru	0	0
Netherlands Antilles	21	3
Niue	0	0
Panama	1	10
Samoa	13	0
San Marino	23	12
Seychelles	9	11
Singapore	0	51
St Kitts and Nevis	19	11
St Lucia	17	8
St Vincent and the Grenadines	20	8
Switzerland	0	61
Tonga	0	0
Turks and Caicos Islands	16	0
Vanuatu	13	0
Virgin Islands, U.S.	0	0
Virgin Islands British	21	1

Note: 41 countries listed here were considered non-cooperative by the OECD and listed in their 2000 Progress report as those. Later 3 of them were decided to be excluded (Barbados, Maldives and Tonga) since they were established to comply with the required regulations. We add further 4 countries considered tax havens to the sample (Switzerland, Luxembourg, Singapore and Hong Kong).

Table 2.A. Number of TIEAs tax havens signed with bottom FDI and FPI partner countries.

reporting country	bottom FDI partners, TIEAs		bottom 5 FPI partners, TIEAs	
	zero FDI obs	number of TIEAs	zero FPI obs or bottom 5	number of TIEAs
Andorra	13	4	26	10
Anguilla	16	9	27	9
Antigua and Barbuda	15	8	19	3
Aruba	15	5	19	4
Bahamas	5	2	5	1
Bahrain	7	3	13	0
Barbados	10	0	17	1
Belize	14	7	16	4
Bermuda	5	2	5 (3 zero obs)	1
British Virgin Islands	2	0	5 (4 zero obs)	0
Cayman Islands	2	0	5 (1 zero obs)	0
Cook Islands	14	7	31	6
Dominica	13	7	28	8
Gibraltar	9	5	13	1
Grenada	16	9	25	6
Guernsey	7	4	7	2
Isle of Man	6	3	19	5
Jersey	6	4	5	2
Liberia	8	3	15	2
Liechtenstein	9	5	16	2
Marshall Islands	13	6	13	1
Monaco	-	-	27	6
Montserrat	18	7	31	6
Netherland Antilles	8	3	5 (3 zero obs)	0
Panama	6	0	5	0
Samoa	15	7	33	5
San Marino	18	9	31	9
Seychelles	15	4	23	3
St Kitts and Nevis	14	6	29	8
St Lucia	15	8	27	8
St Vincent and Grenadines	11	6	29	8
Turks and Caicos	16	9	30	9
Vanuatu	16	7	30	3

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