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Dirty money coming home: Capital flows into and out of tax havens

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Dirty money coming home: Capital flows into and out of tax havens

Lukas Menkhoff and Jakob Miethe

Abstract

We use recently released bilateral locational banking statistics of the Bank for International Settlements to show the full circle of international tax evasion via tax havens. Surprisingly, also white-washed money from tax havens is withdrawn from banks in non-havens if an information treaty is signed between both countries. This complements the stylized fact of such a reaction on outbound flows into tax havens. We find different time lags and other structures in these reactions which are economically plausible. However, it is puzzling that the effect of treaties on capital flows, and thus dirty money, seem to fade out recently.

JEL-Classification: F 38 (int'l financial policy), G 21 (banks), H 26 (tax evasion)

Keywords: International capital flows; international information exchange treaties; bank deposits; tax evasion

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1 Introduction

Tax havens have a long history. Since open borders allow for the international transfer of capital, an incentive exists to shift capital and earnings on this capital to places where taxes are relatively low and secrecy is high. While these shifts are to some extent legal, to some extent they are not. Illegal shifts of capital are of great concern to policy makers for at least three reasons: first, they reduce tax income, second, they reduce effective taxation of the rich, and, third, the majority may lose trust in the tax system and in state institutions in general.

Therefore, the fight against tax evasion is high on the international agenda. Whistleblowers and leaks of large datasets document that tax evasion is a relevant problem eroding the tax basis in both advanced and emerging economies. A major channel by which tax evasion takes place is via the use of tax havens, i.e. jurisdictions with high secrecy laws but low corporate and private tax rates. Capital is shifted into such tax havens where ownership of funds is hidden. In a sense the formerly evaded ‘dirty’ money is white-washed. While funds can be invested into capital markets and generate capital gains from havens, they need to be invested in non-havens at some point, because there are not enough relevant investment opportunities in typically tiny tax havens. This creates capital flows from non-havens into tax havens and back again. Although these channels are well known in principle, there is hardly any direct evidence about evaded capital flows.

While a few studies inform about some of these capital flows (which we report later), this research is the first to show the full circle of outbound and inbound flows, here based on data of bank deposits. Importantly, the Bank for International Settlements released in October 2016 a significant portion of its bilateral locational banking statistics which allows us to empirically establish the circle of capital flows into and out of tax havens. This newly released dataset provides bilateral deposit data with which we can analyze inbound as well as outbound evasion in the same dataset for the first time in the literature. We show that deposits in both directions react to information agreements between non-havens and tax havens, and conclude that these flows include relevant shares of evaded capital.

Previous research has revealed that flows into tax haven bank accounts react to international information agreements (Johannesen and Zucman, 2014). We complete this

picture by showing that also flows back into non-haven banks react to these same agreements. This reaction may seem surprising, given the fact that the money is white-washed in tax havens so that the “true” owners in non-havens cannot be identified anymore and thus potentially making them indifferent to international information exchange. Still, available reports from leaked data indicate that the organizers of such tax evasion flows are highly concerned regarding backwards flows. The vital piece of information which evaders are trying to hide is their ownership of evaded capital and therefore the ownership structure of their sham corporations, private foundations, or trusts as well as the connected bank accounts. Tax authorities in home countries therefore have a second angle to tackle tax evasion. They can take the occurrence of such backwards flows to investigate this ownership and look for evidence about earlier outbound flows (which could be illegal). Our analysis strongly supports this reasoning although we also show that this effect is diminishing over time.

The main focus of our analysis addresses inbound banking flows, i.e. the change in banking deposits that counterparties from tax havens hold in non-havens. This is interesting for two reasons: first, there is a gap in the literature documenting the existence of such international flows and their sensitivity to tax agreements. Only Hanlon et al. (2015) provide a glimpse into the effect of 4 agreements on foreign portfolio investments in the U.S in a sample ending with 2008. We use several hundred agreements in a current sample with a large bilateral dimension including both tax-havens and non-haven countries. Second, these flows provide a missing link to show the full circle of tax evasion.

In order to show this circle of capital flows, we also analyze outbound flows from non-havens into tax havens and thus extend the analysis in Johannesen and Zucman (2014). Their study is the first to analyze bilateral flows from home countries into tax havens by also considering the impact of tax agreements. They had private access to the BIS data which are now largely public. We confirm for a similar group of countries that despite twice as many tax agreements existing today, effects have not changed qualitatively. However, we do find a gradual decline of this effect suggesting that either tax evasion decreases or has been channeled differently.

In this paper, we provide novel evidence on the full circle of capital flows into and out of tax havens and we show that tax evasion motivates some of these flows. While this is new in the literature, due to recently available data, it builds on two earlier studies. Hanlon et al. (2015) have shown a “round tripping” for portfolio investments from four tax havens in the

U.S. In relation to that data we can provide much more comprehensive information from banking flows of 46 tax havens into 10 home countries. Regarding banking flows from home countries into tax havens, Johannesen and Zucman (2014) analyze the first two years of enforced tax agreements until mid-2011.

This research proceeds in four more sections: Section 2 sets out the identification via tax agreements and documents the institutional background. Section 3 introduces the empirical approach, including data, while main results are presented in Section 4. Robustness checks are presented in Section 5 and Section 6 provides conclusions.

2 Identification: The long journey of dirty money

In this section, we describe our identification of international tax evasion via tax havens, in line with conventional procedures. Section 2.1 lays out the principal flows of this ‘dirty’ money, Section 2.2 discusses the definition of the first target of such flows, i.e. tax havens. Finally, Section 2.3 introduces into the international information exchange agreements which serve as our tool of identifying flows of dirty money.

2.1 The return journey of dirty money

Transferring capital to a tax haven is a relatively simple matter for evaders. Setting up a sham corporation with a bank account offshore can be done online for a small fee (see Sharman, 2010, for some real-life examples). The most common way to transfer funds to that account is an invoice for ‘consulting services’ carried out by the evader (see Zucman, 2013, 2014 for examples). Qualitative evidence, for example in the recent football leaks, shows how simple such arrangements are in practice: the evader simply sells his imaging rights to such a sham corporation he owns via some intermediaries and never declares the income on those rights.¹ Getting the money abroad does not seem to be a great cause of concern for evaders.

What is more problematic is the ownership structure of those funds which might be exposed when the sham corporation re-invests funds in non-haven countries. Indeed, Sharman (2010) shows that it is increasingly difficult, although possible, to establish an evasion setup without providing identification at some point to the service provider in the tax haven. When

¹ See Spiegel, 09.12.2016: *Ronaldo, Mourinho and the Paper Trail to the Caribbean*: <http://www.spiegel.de/international/business/ronaldo-mourinho-and-shell-companies-for-marketing-revenues-a-1124167.html>

tax evaders do get convicted, it happens by tying ownership of bank accounts or sham corporations to them or close relatives. Therefore, layers of secrecy are added between the outbound and inbound investments. Also, investment in capital markets can take place, funds can be shifted and invested in other tax havens, and some luxury consumption is possible. However, at some point, at least parts of the funds or the capital gains thereof will move back from some tax-haven to some non-haven.

Three considerations motivate this return move: First, the most relevant investment opportunities for tax evaders, such as luxury items or real estate in OECD capitals, are to be found in non-havens. There is no point in accumulating funds via tax evasion if not at least part of it raises the standard of living of the evader or her family. Second, evaded funds show up in bank accounts of non-havens in order to pay bribes to facilitate further evasion in corrupt countries as has been modelled by Hebous and Lipatov (2014). Third, the established home bias of international capital flows is visible for tax evaders too as established by Hanlon et al. (2015). If home bias is present in tax evasion, funds even end up in the original non-haven from which the evaded capital originated simply because evaders prefer investments where they know conditions. Again, not all investment from tax havens has to be connected to evasion but could constitute legitimate tax planning by foreign investors (Dharmapala and Hines, 2009). Evasion is part of the story though, as we will show.

Repatriating funds does not need to take place via illegal means. An offshore trust holding evaded capital could open an entirely legal bank account in a non-haven to finance consumption and this trust could be held by people close to the evader, potentially family members. Or an offshore sham corporation could open bank accounts in non-havens with funds available to finance legitimate real estate investment, for example. Examples of such arrangements are abundant and topical.² If the final investment of an evader takes place in the original home country, however, it can be an evasion move in itself. The original identity of the evader is hidden by the sham corporation and foreign investors are exempted from capital gains taxes in many countries (Hanlon et al., 2015). We provide the first study which shows results consistent with round-tripping behavior in bank deposits.

In all of these cases, however, the funds are repatriated and registered in a bank account of a non-haven bank office as a liability against a tax haven counterparty which holds the

² The US Internal Revenue Service provides yearly examples of abusive tax schemes as well as the harsh penalties incurred when they are discovered. The list includes examples in line with sham corporations in tax havens with bank accounts in non-havens which we use for identification: <https://www.irs.gov/uac/examples-of-abusive-tax-schemes-fiscal-year-2015>

account. This bank office has to report to the respective central bank which in turn reports to the Bank for International Settlements, our data source.

--- Figure 1 about here ---

Figure 1 provides a schematic visualization of the circle of tax evasion. In step 1, funds are moved into the tax haven where ownership is disguised via sham corporations. Transfers between tax havens can take place, layers of secrecy can be added with a network of sham corporations and the funds can generate capital gains. At some point, (a fraction of) the funds have to be repatriated to a non-haven if they are to be used for consumption or investment in non-haven countries (step 2). This return journey is our main focus. It can take place via very different funding schemes and from more than one tax haven, not necessarily the original one.

Once the funds are back in a non-haven, the evasion scheme is complete. However, and this is crucial for our identification, at some point in the journey evasion takes place. The original funds could be evaded capital, the funds in the sham corporation could produce undeclared income, or investment in the evaders home country could take place under false identity. In all of these cases, a threat of detection remains. It is the ownership structure of the sham corporation as well as the ultimate beneficiary of capital gains from the funds it holds which can – and does as convictions show – give away the evasion scheme and expose the evader. The consequences range from relatively benign repayment obligations to severe criminal charges. Before we test for these effects empirically, we shortly provide information on the tax havens we include in the analysis as well as the information exchange agreements which we use to identify evasion.

2.2 Tax havens

There is consensus of defining a tax haven as a jurisdiction with low or zero tax rates on some income types but most definitions go further and restrict ‘tax havens’ to countries with high bank secrecy rules and low transparency regulations. Tax havens also score high on governance indicators, have relatively sophisticated communication infrastructure and few natural resources (Dharmapala, 2008; Dharmapala and Hines, 2009). Being classified as a tax

haven, however, is fiercely disputed by jurisdictions thus labeled and there are cases of political intervention to influence official tax haven lists (Gravelle, 2015).

The empirical literature commonly employs relatively unrestricted lists since for most research questions excluding a tax haven causes more damage than including a non-haven. We follow this convention and use, as our baseline, a large list of tax havens by combining the list of tax havens by Gravelle (2015), which already collects different sources, with the one by Johannesen and Zucman (2014). Since we rely on an identification strategy that isolates reactions of illegal activities to regulatory changes, the classification of too many countries as tax havens would, if anything, lead to a quantitative underestimation of our results. The tax haven classification is altered in robustness checks, but results are unaffected. To give an idea of this definition, Table 1 summarizes key information on some tax havens on this list for which we have a lot of information in the BIS data. A complete list of the more than 50 tax-havens is provided in the Appendix.

--- Table 1 about here ---

As the first column shows, the stereotypical small pacific island is still pervasive in the tax haven list. However, the list includes much larger countries such as Ireland, Austria or Malaysia. As shown in column 3, colonial ties are important with the majority of tax havens either part of the British Overseas Territories and Crown Dependencies (where the British queen still appoints a governor) or part of the Commonwealth of Nations, which, while a loose coordination body, can and does collectively evict countries that fail to meet certain requirements such as the rule of law. Others are affiliated with the Netherlands, New Zealand and the USA.

Column 4 shows the number of international treaties including information exchange provisions signed by the haven, outlined in more detail below. Column 5 shows the availability of data on deposits in the haven itself as used by Johannesen and Zucman (2014) and in our analysis of outbound deposits. Most importantly, column 6 shows the number of countries which report deposit data on that specific tax haven. Additionally to being the first study able to analyze positions in both directions, we are thus also the first to exploit the broad dimension of BIS deposit data against tax haven counterparties. To give an example of how to read the table: Guernsey, a British Crown Dependency with less than seventy thousand

inhabitants provides bilateral deposit data with the rest of the world itself starting in 2001. 26 other reporting countries report bilateral deposits against Guernsey. When we reduce the data to a balanced panel, still 9 of these are left. Guernsey has also signed 34 treaties with non-haven countries which we explain in detail below.

2.3 Information exchange agreements

Since tax evasion is by definition the illegal withholding of tax liabilities, international regulation attempts are mainly focused on detecting the delinquent by exchanging information between tax authorities. The most comprehensive attempt, aimed at increasing the likelihood of detection, was launched by the OECD which in 1998 explicitly addressed harmful tax practices and in 2000 published a list identifying countries they considered to be tax havens (OECD 1998; OECD 2000). Such treaties became popular after April 2009 when the G20 decided to sanction tax havens if they would not sign at least 12 treaties each (G20, 2009).

Since the provision of services to facilitate tax evasion has benefits, at least in the forms of service fees, tax havens have an incentive to maintain secrecy regimes. Cooperation cannot be expected to function voluntarily but has to be enforced by the threat of economic sanctions which puts tax-havens at the dilemma of choosing between compliance and secrecy. Konrad and Stolper (2016) model this dilemma for tax havens by framing it as a coordination game between investors and tax havens where the haven abolishes a secrecy regime only if political costs are high enough or coordination with investors cannot be ensured. They also predict a negative signaling effect if a tax haven shows compliance of some sort, a point we return to later. In an environment of political pressure, more than 3,000 of such treaties have been signed by the time of writing. Bilicka and Fuest (2014) document that fears that tax havens would simply sign with 12 other havens or economically meaningless countries do not materialize: on average treaties are signed between havens and non-havens with strong economic ties.

The provisions in these short treaties establish a procedure of bilateral information exchange upon request. There are several caveats: information has to be ‘foreseeably relevant’ (changed from the stronger ‘necessary’ prior to 2005) which implies knowledge of the identity of the evader; there can be refusal for public policy reasons (such as a request being ‘at variance’ with laws of the counterparty); and requests cannot be aimed at information which the requesting country can obtain itself (Christensen II and Tirard, 2016). TIEAs

therefore do not have very serious implications for evaders in reality: information requests are rare in practice and necessitate a level of detail of information in the non-haven about the evader that would most likely imply trouble for her even without information exchange. Nevertheless, a threat of detection is created and since setting up shell companies in another jurisdiction is cheap and simple, evaders have an incentive to react.

The fact that reactions to TIEAs are observable is due to their bilateral nature. Roughly 230 self-governing jurisdictions on the planet would require more than 26,000 bilateral treaties for a complete network so loopholes are abundant. It is possible for an evader to set up the evasion scheme in such a way that she is not faced with a threat of detection via TIEAs. Also, significant differences in the number of signed treaties do exist as Table 1 documents. Johannesen and Zucman (2014) as well as Hanlon et al. (2015) find, that TIEAs do decrease capital positions connected to tax evasion despite the low threat of detection. Assuming that tax evaders – or their financial service providers – are well informed and well-behaved, they will react even to marginal threats and shift their capital elsewhere or cease evasion activities. Since not all economic activity in tax havens is illegal, the fact that a genuine investor should be entirely unaffected by such treaties makes them an ideal strategy to identify tax evasion.

--- Figure 2 about here ---

The OECD keeps updating its database on bilateral TIEAs and Double Taxation Conventions (DTCs). There are a number of judgements included in selecting which TIEA to accept as a credible threat and which data sources to trust. We stick to the OECD list of treaties, also used by Bilicka and Fuest (2014), as it provides a publicly accessible, reasonably frequently updated and comparable standard of what constitutes a tax and information exchange treaty. Figure 2 confirms the earlier notion that most of the signed TIEAs are indeed treaties between haven and non-haven countries while DTCs are more common between non-havens. The peak of new signatures takes place in 2010 but signatures remain high thereafter. By 2015, new signatures have levelled out which makes us confident that we capture the bulk of the OECD initiative. Identifying tax evasion via such information exchange treaties is especially fruitful, since double taxation agreements have differentiated but generally positive effects on international investments (Bloningen et al., 2014). The negative reactions of

bilateral deposits to TIEAs we find are therefore either strong enough to dominate the positive DTC effect, or is driven by countrypairs between which no significant genuine investment takes place.

Due to our large time dimension, we pick up a significantly larger portion of such treaties than Johannesen and Zucman (2014) who, however, use a broader classification of information exchange treaties and include amendments to domestic law. Our main target is not to evaluate these treaties but to establish where exactly evasion dynamics are visible. Therefore, a focus on publicly available, announced, and government sponsored treaties most closely reflects our interpretation of a threat of detection clearly perceivable to the evader. We relax this definition in a robustness check.

3 Capital flow data

Information about tax havens is rather rare in general, in particular regarding disaggregated capital flow statistics. Due to the small size of many tax havens even basic macroeconomic data are often unavailable and notoriously unreliable. Data on hidden positions are unavailable by definition. In the capital flow literature that is not specifically targeted at illicit capital flows, common practice is to drop tax havens from the sample (as in Broner et al., 2013) or control for them with a designated dummy (as in Lane and Milesi-Feretti, 2008). With the important role that tax havens play in the international financial system, this status quo is not satisfactory. Identifying or measuring tax evasion empirically is challenging but progress has been made as Slemrod (2015) summarizes. Two approaches have emerged in the empirical literature to fill the data gap and study tax evasion.

The first line of research is aimed at filling it directly with data reported by financial institutions in tax havens as well as leaked data. These contributions use direct bank claims data reported by tax havens via the Bank for International Settlements (see Johannesen and Zucman, 2014; Johannesen, 2014a) or leaked datasets (Caruana-Galizia and Caruana-Galizia, 2016; O'Donovan et al., 2016). The second line of research targets the problem by using indirect identification strategies and data reported by non-havens. Hanlon et al. (2015) use bilateral foreign portfolio investment data of the US which are compiled vis-à-vis a long list of counterparties, including tax havens. The advantage of such an approach is that it does not rely on tax havens as a source of data. For the first time in the literature, we are able to combine these two approaches. Our study provides results based on both data from havens

(outbound) and non-havens (inbound) taken from the same dataset. The large international dimension also supports our identification strategy where Hanlon et al. (2015) were only able to analyze 4 TIEAs we use around 300, depending on the specification.

A total of 46 national central banks report claims and liabilities³ of their banks in the BIS locational banking statistics (LBS) including 19 jurisdictions on our tax haven list. A significant subset of these bilateral locational banking statistics (LBS) has recently been released. The release includes both the reports from tax-havens as well as from non-havens which allows us to analyze deposits of non-banks both to and from tax havens using the same data source. Johannesen and Zucman (2014) as well as Johannesen (2014a) are the only two sources in the tax evasion literature which have used this data. However, they could only rely on data from tax havens: our outbound direction.

These LBS ‘by residence of counterparty’ are compiled according to balance of payments conventions⁴ via the immediate counterparty, not the ultimate guarantor or beneficiary of deposits (see IMF, 2013; BIS, 2013, 2014). In our context this implies that we can observe aggregated deposits in tax havens even when they are later transferred (back) to a non-haven. As an intuitive example, take an Italian resident who evades taxes and deposits funds in a bank account on Antigua and Barbuda. Say the family of this Italian lives in Spain. In order to finance their consumption, the evader creates a sham corporation on the British Virgin Islands which opens an account with a Spanish bank. She then transfers (some of) the funds via this sham corporation (and potentially more bank accounts inside the tax haven cloud) from the bank account on Antigua and Barbuda to that Spanish bank account held by the corporation in the British Virgin Islands. As we mentioned above: transferring funds between countries is simple.

The Spanish bank records these funds as deposits of a counterparty on the British Virgin Islands where the sham corporation opening the account is registered. These are deposits of a tax haven counterparty in a non-haven. The bank on Antigua and Barbuda records them as bank deposits of an Italian counterparty. These are deposits of a non-haven counterparty in a tax haven. If the evader is well informed, she will adjust her evasion scheme to an increase in

³ Reporting institutions to BIS statistics are: ‘commercial banks, savings banks, savings and loan associations, credit unions, cooperative credit banks, building societies, post office giro institutions, other government controlled savings banks and other institutions if they take deposits or issue close substitutes for deposits’ (BIS, 2013, p. 8).

⁴ Some discrepancies remain; liabilities of on account of shares of money market funds for example would be included as deposits in BPM6 but not in the BIS data. However, the geographic breakdown of counterparties is consistent.

the threat of detection *both* between Italy and Antigua and Barbuda and between the British Virgin Islands and Spain as both could expose the evasion scheme, assuming non-havens cooperate. This allows us to employ the BIS data to test for effects of TIEAs in both directions as we have motivated above. A complete disaggregation of deposits with respect to the depositor is not available but we can distinguish non-banks from intra bank deposits. For several reasons, this data is ideal for the exercise at hand.

Using data reported by non-havens on top of data reported by tax havens has several advantages. First, we do not need to know the type of the depositor in the non-haven: the broad non-bank category fits our purposes perfectly as funds can be deposited both by a firm or by an individual. We do not know which structure is most prevalent nor do we need to. The reaction of the aggregate to information exchange agreements captures all of the financing arrangements discussed so far.

Another reason for including firm deposits into the analysis is, that recent research suggests a much weaker delineation between tax evasion and tax avoidance than previously thought. As O'Donovan et al. (2016) show in a recent working paper, the Panama Papers for example exposed a large number of firm's secret offshore vehicles operated by firms hitherto expected to only engage in avoidance. A surge of tax evasion investigations followed (*ibid*). Hebus and Johannesen (2016) show that German multinational firms engage in transfer pricing to evade taxes on a routine basis, legally a grey area at least. These results undermine the common assumption that the bulk of tax evasion is done by private households. The broad 'non-banks' category for deposits is therefore exactly what is needed to carry out our analysis. Transparent avoidance strategies as discussed in Johannesen (2014b), Gumbert et al (2016) or OECD (2014) will not influence the results as they should not react to the threat of information exchange. We reduce our data to a balanced panel from 2013q1 to 2016q1 and have information on a large number of non-haven–haven countrypairs (170 in our balanced panel) as well as haven–non-haven countrypairs (555). We can also employ two control groups: haven–haven countrypairs (191) and non-haven–non haven countrypairs (479).

4 Results

We present results in four steps. First, we show in an event study approach how capital flows (of non-banks' bank deposits) change around the signature of a tax agreement (Section 4.1). This graphical approach is then estimated and extended in panel analyses, covering inbound capital flow from tax havens (Section 4.2) and, to complete the picture, also the outbound capital flow into tax havens (Section 4.3). Finally, we bring both sides together and analyze how outbound and inbound flows may be related to each other (Section 4.5) and how the evasion effects we identify change over time (Section 4.5).

4.1 Capital flows around the signature of an information exchange treaty

Here we use a graphical presentation to show the effect of treaties on the level of non-banks' deposits at banks. Using aggregate data has the disadvantage of mixing legal with evaded deposits but even in this aggregated data evasion behavior becomes visible. Figure 3 presents the development of deposits between four countrypair groups before and after information exchange treaties. Deposit data for countrypairs which have signed a treaty at some point in time after 2003 and for which we have data in both directions is summed within these groups. We do not expect an effect due to treaties between countries in the same category: the haven–haven and non-haven–non-haven deposits which are shown in solid lines. Deposits in tax-havens by non-haven counterparties (the outbound flows) are shown in the dotted line while deposits in non-havens by haven counterparties (the inbound flows) are represented by the dashed line. We plot this in windows of 15 quarters around an information exchange treaty. Further information is provided in the notes. Visual inspection shows that haven–haven deposits as well non-haven–non-haven deposits continue their pre-treaty trends after signature and are not affected by treaties, as expected.

--- Figure 3 about here ---

The haven–non-haven line confirms the results of Johannesen and Zucman (2014). The fact that deposits drop shortly before treaties become effective indicates anticipation effects as predicted by Konrad and Stolper (2016). While Johannesen and Zucman (2014) find lagged reactions, we show that tax evaders (or rather: their financial service providers) behave like

well-informed rational agents who do anticipate treaties and react accordingly. The main new piece of information, however, is the mirrored movement of this line after treaties by the dashed line, which shows deposits in non-havens by tax-haven counterparties. These deposits decline after treaties, just as the deposits in tax havens. Why would citizens or companies of zero tax jurisdictions reduce deposits in non-haven banks after an information exchange treaty? And why is the absolute size of these positions so similar to the positions in the other direction? In order to understand what is going on, we need to trace the journey of evaded capital and combine the pioneering work of Johannesen and Zucman (2014) with the findings in Hanlon et al. (2015).

4.2 The reaction of non-bank deposits in non-haven countries

We now turn to an empirical investigation of the return journey of dirty money. In this section, we are able to fully exploit the bilateral dimension of the newly released locational banking statistics and to test four hypotheses about the behavior of non-bank deposits from tax havens in non-haven countries.

Empirical approach. Since we are able to rely on non-haven data as well, this allows us to calculate reactions in deposits from 46 different tax-haven jurisdictions. In order to test for signs of tax evasion in the journey of capital from tax havens, we analyze the reaction of bank deposits by haven counterparties in non-haven countries to new information exchange treaties. We thus estimate the following model:

$$\log(\text{deposits}_{ijtc}) = \alpha_{ij} + \gamma_t + \sum_{k=0}^K \beta_k (\text{signed}_{ijt-k}) + \delta X_{it} + \epsilon_{ijt} \quad (1)$$

Here subscripts ij denote the countrypair, t the respective quarter, k the lag variations of the signature timing we introduce below, and c the country-counterparty category. In this section the categories are: deposits of all counterparties in non-haven, non-haven–non-haven deposits and deposits of haven counterparties in non-havens. Bank liabilities against nonbank counterparties are used to approximate deposits of which we take logs for interpretation purposes. As outlined above, we expect significant negative results to treaties only in deposits from tax-havens. We introduce the growth rate of GDP per capita as well as traditional

openness measure, (exports+imports)/GDP, to control for non-haven characteristics in X_{it} and include countrypair and year-month fixed effects.

Baseline result. Our first and main hypothesis is that there is a reaction of inbound deposits to treaties. Baseline results are presented in Table 2. The identification strategy is supported by the fact that information exchange treaties are neither statistically nor economically significant when all data reported by non-havens are analyzed (column 1). When we reduce the sample to non-haven–haven countrypairs, this changes dramatically (column 2). After a treaty is signed, deposits by tax haven counterparties in non-haven countries are 36% lower, quantitatively in line with the effect reported by Hanlon et al. (2015) for US portfolio liabilities. At first glance, this result looks as if residents in tax havens use non-haven countries to evade taxes and are afraid that their government will use the availability of information exchange to detect just that. Of course, there is no reason to evade taxes when they are at 0% and since we have defined tax havens as countries with strong secrecy rules, their governments are unlikely to ask for information themselves to expose evaders. The result becomes meaningful as soon as we see it in the context of the findings in Johannesen and Zucman (2014) and Hanlon et al. (2015). The capital which is deposited by haven counterparties does not constitute capital from citizens of these jurisdictions but by foreign depositors originally residents of non-havens.

--- Table 2 about here ---

Lagged reactions. There is reason to believe that reactions in the return journey happen with some lag. Funds are invested and re-arranging their structure takes time. Indeed, we find no significant results before the fourth lag (column 3). After one year, deposits remain consistently lower which is in line with an interpretation of a treaty as a signal effect on the side of the tax haven which is commonly assumed in the literature: Once a tax haven is branded as compliant with non-haven authorities, its reputation as a ‘good haven’ is tarnished (Konrad and Stolper, 2016).

Macro controls. Establishing these effects with data from non-havens allows us to include some macroeconomic controls impossible to find for small tax havens. On top of the treaty data from the OECD and deposits by nonbanks from the BIS, we use the growth rate of

GDP per capita as a business cycle measure and the degree of openness (exports+imports over GDP) as a measure of openness and exposure to international business cycles. Since such data is not available for tax havens, we can only use it on a non-haven level. In column 4 we include GDP per capita to control for business cycle effects, in column 5 a measure of openness (exports plus imports over GDP) is added. These inclusions have no qualitative effect on reactions of deposits which makes us confident that identification via information exchange treaties indeed establishes a causal effect.

To reiterate, not all of this capital is connected to evasion. However, legitimate capital should not react at all to information exchange agreements. A genuine investor or capital holder has nothing to fear from exchange of information. Inversely, we argue that any act of illegal evasion at any stage of the long journey of capital will lead to reactions to information exchange. Since relocation of the evasion scheme to a tax haven which did not sign is so simple, the threat of detection operates almost marginally. The original funds placed in the haven could be evaded capital, the profits made with legitimate capital in the haven might not have been declared as income in a country where foreign earnings or wealth would be taxed, or the return journey might be part of an evasion scheme. If tax evaders are rational, they will react to the threat of detection in all of these cases. This is where the above mentioned advantage of aggregate positions of firms and households comes in. We do not need to know the exact configuration of the evasion scheme to detect evasion here.

Disaggregating treaties. So far, we have lumped together tax and information exchange agreements with double taxation conventions since both entail information exchange clauses. Table 3 shows results for differentiated treaties. Column 1 repeats the result of treaties between non-havens and havens. Column 2 now differentiates the two treaty types. Interestingly, the significance of the effect is driven by TIEAs, not by DTCs which are not significant. This is in line with the aims of these treaty types. While TIEAs are explicitly aimed at information exchange to curb tax evasion, DTCs are more complicated treaties covering a range of double taxation issues with information exchange one amongst many clauses. Also, as Figure 2 has shown, non-haven–haven countrypairs mostly signed TIEAs.

--- Table 3 about here ---

Interestingly, this result is reversed entirely when we focus on treaties between non-havens where we do not expect tax evasion. Column 3 shows results for deposits between non-haven countries which confirm this expectation. Column 4 shows in more detail that information exchange between non-havens is associated with an *increase* of bilateral deposits and that this effect is only significant and economically meaningful for DTCs. Clearly, countries which are integrating more with each other will have both increasing deposits and a higher incentive to sign double taxation conventions. While we do not aim at establishing causality here, there is evidence that bilateral tax treaties do have a positive effect on capital inflows (Bloningen et al., 2014). It is therefore meaningful to interpret the findings in column 4 as the ‘normal’ case in which tax evasion does not drive the results. Again, non-haven countries do sign more DTCs than TIEAs amongst each other and it is reasonable to assume that such double taxation conventions increase bilateral confidence of investors and thus financial integration.

We take the results in this section as evidence, that funds deposited by tax haven counterparties in non-haven countries include dirty money which has at some point in its journey been evaded. While we cannot determine at which point in the evasion process illegal action takes place, we expect that the dirty money is coming home. In order to fully establish this circle of evasion, we now turn to the outbound journey of tax evaded flows and analyze deposits in tax havens in the following section.

4.3 The reaction of non-bank deposits in tax havens

This section serves two purposes: First we compare the results of the last section with reactions of deposits by non-haven counterparties in tax-havens. This allows us, for the first time in the literature, to analyze the whole journey of evaded capital based on a single data source with identical treatment variables in both directions. Second, we can investigate whether the findings of Johannesen and Zucman (2014) still hold in a much longer sample and now that treaty signatures have levelled out. Overall we test three hypotheses in this context.

Baseline result. Only a limited number of tax havens report bilateral deposits to the BIS and that data are rarely released which is why empirical studies of evasion are so few. However, the countries which do report to the BIS, both tax havens and non-havens, report against a large bilateral dimension of more than 200 counterparties which we exploit here.

The countrypair categories therefore change to: deposits of all counterparties in tax-havens, haven–haven deposits, and deposits of non-haven counterparties in havens. Thus, we rely on LBS data provided to the BIS by the central banks of tax havens themselves. The evasion effects which we find here concern the outbound part of the evasion journey: getting the money offshore.

Table 4 shows the baseline results for reactions of non-bank deposits of non-haven counterparties in tax havens to the signature of a treaty including information exchange. The results in Johannesen and Zucman (2014) can be qualitatively confirmed and are quantitatively even larger when considering our sample. There is an overall significant effect of treaties (column 1) which is driven exclusively by treaties between tax havens and non-havens (column 2) while treaties between tax havens are economically meaningless (column 3). Positions in tax havens are reduced by almost 30% after an information exchange treaty.

--- Table 4 about here ---

Lagged reactions. We do find anticipation effects (column 4) and a somewhat less significant effect for contemporaneous signatures and the first lag (columns 5 and 6). It is plausible that professionals in tax havens who offer financial services needed for evasion strategies are well informed and react before a treaty goes into effect. By signing a treaty, however, a tax haven also signals some sort of compliance with international anti-evasion measures. As Konrad and Stolper (2016) predict, this reduces the long term credibility of the promise of secrecy and makes the tax haven less interesting for evasion in general as seen in the later lags.

The economic magnitude of this treaty effect is thus much larger than that found by Johannesen and Zucman (2014) who found effects in the area of 11% to 16% compared to our 36%. This difference in magnitude is due to treaty definitions as we show in a robustness check. Our results are more in line with the effect of the EU savings directive on Swiss deposits analyzed in Johannesen (2014a) who establishes reactions of deposits in the range of 30% to 40% (15% to 30% for other havens). What should be noted, however, is that the economic size of outbound and inbound reactions is quite similar. This indicates a connection between these two flows which we explore in more detail below.

4.4 Linkages between outbound and inbound flows

Having examined outbound and inbound flows above, we now analyze relations between these two. In a world of frictionless capital markets, there does not need to be any relation between outbound and inbound effects as the capital that was transferred to a tax haven may be reinvested anywhere in the world again. In fact, however, Hanlon et al. (2015) have demonstrated for their small sample of 4 TIEAs and ending in 2008 that there is a home bias in portfolio investment to the US, so that typically flows return to the same country where they started their journey of tax evasion. While we cannot track specific capital flows we can provide some arguments supporting the claim that there is home bias also in international tax evasion. The rational reason behind this is that many tax evading persons mainly live in one country where they aim for enjoying the benefits from their evaded capital.

--- Figure 4 about here ---

To support this idea we plot, for all available countrypairs that signed a treaty and for which BIS data is available in both directions, the relative changes in outbound and inbound bank deposits around an information exchange treaty. In the case of home bias, i.e. a relation between these flows, the changes should be lined up close to a 45-degree line in Figure 4 which has changes in outbound flows on the x-axis and respective changes on inbound flows on the y-axis. This expected relation is indeed evident in the data. Since this graphical representation again includes positions which have nothing to do with evasion, the fact that a positive correlation is visible is additionally striking.

4.5 Changes over time.

Our relatively long sample period allows us to compare different reactions over time. Interestingly, we find that the effect of treaties on capital flows weakens. Figure 5 shows this development for both outbound and inbound reactions of tax evaders. In both cases, we estimate our baseline results with a rolling window, limiting the sample to eight quarters before and after the time indicated on the horizontal axis. We then plot the coefficient on treaty signatures over time and indicate statistical significance with the shaded areas, light grey indicating 10% and dark grey 5% significance.

--- Figure 5 about here ---

The decreasing effect of information exchange treaties is unexpected given results by Johannesen and Zucman (2014) who argue that treaties do not reduce the amount of tax evasion but induce a shift of capital into non-complying tax havens. If such a shift would continuously occur, new treaties should have larger rather than smaller effects as a decreasing number of tax havens accumulates more and more capital. As a caveat, it should be pointed out that deposit shifting was hard to detect even before our sample was available. Johannesen and Zucman (2014) themselves report mixed results concerning robustness checks and Johannesen (2014a) finds mixed results on deposit shifting concerning the EU savings directive. Nevertheless, the fact that we find a decreasing effect is striking.

There are two interpretations which arise from this finding. Either, treaties are indeed successful in decreasing tax evasion or evaders are increasingly relying on other outside options to evade taxes. Since calculations of aggregate evaded capital as provided by Zucman (2013) point, if anything, to an increase of evasion, the first interpretation is unlikely. Instead, there is mounting evidence, that some of the activities usually attributed to tax havens are increasingly carried out directly in non-haven countries. Dyreng et al. (2013) show intra US competition along such lines focusing on the role of Delaware as a domestic tax haven. Sharman (2010) provides qualitative evidence showing that also firms in OECD countries make it possible to set up sham corporations with bank accounts without any personal identification. Representatives of the Cayman Islands, Bermuda and the Ilse of Man have been quick to point out this ‘hypocrisy’ at the 2016 London corruption summit arguing that the focus on small jurisdictions is outdated (European Parliament, 2016). This allegation goes too far as our research still shows robust and strong evasion effects in tax havens. The sham corporations set up by Sharman (2010) via firms in OECD countries are also mostly incorporated in the small, affluent and well governed islands which Dharmapala and Hines (2009) and Hines (2010) have characterized. Still, this new outside option for evaders is a promising venue for future research.

5 Robustness

This robustness section is organized along three themes: analyses of inbound flows, variations of tax haven definitions and analyses of outbound flows.

Sample period. To test the robustness of our main results, the inbound journey, we first test whether the results we find are an artifact of the sample period or hold over subsamples. Table 5 reports the results with column 1 repeating the baseline from Table 2 (Table 3) for easy comparison. Column 2 shows results for a sample limited to 2003:IV - 2011:II, which is the time period used by Johannesen and Zucman (2014). Our main result holds as can be seen by the significant and economically meaningful reaction of the fourth to the sixth lag. Interestingly, the long term reduction in deposits in tax havens which signed TIEAs loses significance somewhat. We attribute this to the simple fact that, in a sample ending in 2011, most treaties are not signed early enough to allow such long lag lengths here. Column 3 shows results with the financial crisis excluded which we time from 2007:II with Bear Stearns fund failures to 2008:IV when the US started to emerge from the crisis. Again, the results are virtually unchanged which shows that they do not depend on the sample period.

--- Table 5 about here ---

Bank claims. Next, we check the identification strategy by testing for effects in parts of banks' balance sheets where we do not expect evasion to have a significant impact. So far, we have used bank liabilities against international nonbank counterparties to proxy deposits of firms and households. If such deposits are indeed used for tax evasion and if we have identified tax evasion correctly, we should find no sensible effects for bank claims against non-bank counterparties. In non-haven countries, from which this data are reported, we do not expect bank lending to react significantly to lower evaded deposits. We neither find results for overall claims (column 4) nor for loan claims (column 5). The fact that claims are lower after more than three years (lag 12 and later) is consistent with our interpretation of a general negative signaling effect of treaties on the attractiveness of the tax haven which signs them.

Tax haven list. The controversies surrounding tax haven lists are very relevant for the inbound journey since we use data reported against 46 tax haven counterparties here which can change considerably when changing the tax haven list. Table 6a reports results for

different lists commonly referred to in the literature (see the appendix for an overview of different lists). Column 1 repeats the baseline results before we change the tax haven dimension in the counterparties to that of the OECD (2000) list (column 2) and the list provided in Gravelle (2015) (column 3). Results are affected only in magnitude and stay significant throughout.

--- Table 6a about here ---

A tougher test is the reduction of the tax haven list to the absolute minimum on which recent studies agree. We therefore compile a tax haven list with the consensus candidates of Hines and Rice (1994), the OECD (2000), Dharmapala (2008), Dharmapala and Hines (2009), Johannesen and Zucman (2014), Bilick and Fuest (2014), Hanlon et al. (2015) and Gravelle (2015). This means that we are deleting 22 countries⁵ from the tax haven list used so far, including most notably Ireland, Macao, and Belgium. Column 4 shows that our results hold despite losing almost half of our observations. To go even further, we now include the tax havens thus dropped from the tax haven list as non-haven countries. Macao and Ireland are now in the same category as France and Sweden when it comes to facilitating tax evasion. Column 5 shows that that this finally does reduce both the magnitude and the significance of our results. Signs remain consistent but here the effect does seem to get blurred. Since tax haven lists necessarily carry a certain value judgement, we report the results nonetheless although including Macao as a non-haven for example seems somewhat unreasonable.

--- Table 6b about here ---

For completeness, Table 6b repeats the same exercise for the outbound journey. Since the tax haven dimension in this direction is the reporting country level, we rely on a much smaller number of tax havens. Indeed, reducing the list from our baseline results to the consensus list only drops 3 tax havens which report data: Belgium, Chile, and Ireland. The OECD (2000) and the Gravelle (2015) list are identical when reduced to reporting havens

⁵ Which are: Aruba, Austria, Belgium, Chile, Costa Rica, Ireland, Jordan, Lebanon, Macao, Malaysia, Maldives, Mauritius, Nauru, Niue, Samoa, San Marino, Seychelles, Tonga, Trinidad and Tobago, Uruguay and the U.S. Virgin Islands.

which is why we drop the former. We can see that results fluctuate somewhat in magnitude but remain unchanged qualitatively.

Replication of the outbound flow analysis. Since the outbound journey is inspired by Johannesen and Zucman (2014), we continue the robustness analysis by replicating their results with our data. Table 7 thus uses their preferred lag order specification as a point of comparison which column 1 shows in our sample, tax haven list, and treaty specification. Column 2 again reduces the sample length to 2003:IV-2011:II which, if anything, makes results stronger. While it is not our focus to evaluate the quantitative effect of tax and information exchange agreements, it seems still worthwhile to determine what gives rise to their lower results.

--- Table 7 about here ---

We therefore change the treaty variable as well as the tax haven list to the ones used by these authors who have made both available. The results (column 3) are quantitatively very close to those of Johannesen and Zucman (2014). It is therefore not the sample length which drives our quantitatively larger results but the differing list of information exchange treaties. Since the goal of this study is not to evaluate the OECD initiative quantitatively but to employ information exchange treaties to identify tax evasion, this again confirms our choice.

More treaties. In order to establish the robustness of our results to this choice of treaties, we broaden our very restrictive definition of which treaties constitute a credible threat of detection. We limit this analysis to treaties signed within our balanced sample since old treaties, while making information exchange possible, do not communicate increased compliance with non-haven authorities. First, table 8 first compares the baseline (column 1) to the inclusion of countrypairs which had an older treaty in force that allowed some sort of information exchange (column 2). Since this change makes the results rather more pronounced, it seems that the signaling of increased compliance with non-haven tax authorities is a more relevant piece of information to evaders than the (slight) actual chance of detection.

--- Table 8 about here ---

The other columns now change the specification of treaties as follows: First, we include the 31 treaties signed within the balanced panel dimension which do not include paragraphs 4 and 5⁶ but were reviewed by the OECD and met the standard (column 3). Then, we include another 61 treaties which were not reviewed at the time of writing (column 4). Finally, we also include those 22 treaties that were reviewed and failed to meet the OECD standard. Results are broadly consistent.

6 Conclusions

In this paper, we present the first comprehensive evidence on outbound capital flows to tax havens and their inbound return. Our database for capital flows is based on non-bank deposits which the Bank for International Settlements has made public in October 2016. We establish for the first time in the literature an evasion effect in inbound bank deposits, mirroring the one shown for outbound flows before by Johannesen and Zucman (2014). The signature of information exchange treaties between a non-haven and a tax haven reduces the amount of bank deposits in both directions significantly. While this is quite directly plausible for outbound flows since dirty money in tax havens is conventional wisdom, it is surprising for inbound flows as those funds have already been white-washed. It is, however, in line with narrative evidence indicating concerns of tax evaders that inbound flows may stimulate tax authorities to search for earlier illegal behavior.

Beyond this main finding we examine flows in more detail: we find for inbound flows that they also react with a lag pattern on treaties. Moreover, disaggregating treaties into TIEAs and DTCs shows that conventional double taxation treaties do not impact capital flows between non-havens and havens in either direction. They rather tend to increase capital flows between non-havens.

Regarding outbound flows, we confirm the Johannesen and Zucman (2014) result for a somewhat different sample. Interestingly, as we are able to cover a longer and more recent period, we find that the effect of treaties on capital flows weakens over time. This is unexpected given the earlier result that treaties do not reduce the amount of tax evasion but

⁶ As described before, these paragraphs relax the requirements of the requesting party from demanding 'necessary' to 'foreseeably relevant' information.

generate a shift of capital into non-complying tax havens. If such a shift would continuously occur, new treaties should rather have larger than smaller effects as the remaining tax havens accumulate more capital. Our results are consistent with two interpretations: either treaties do indeed reduce the amount of tax evasion or tax evaders do prefer other kinds of tax evasion, such as putting their money into countries so far assumed to be non-havens. Which of these interpretations holds is a crucial issue for policy and thus also for future research.

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Figure 1: The clean homecoming of dirty money

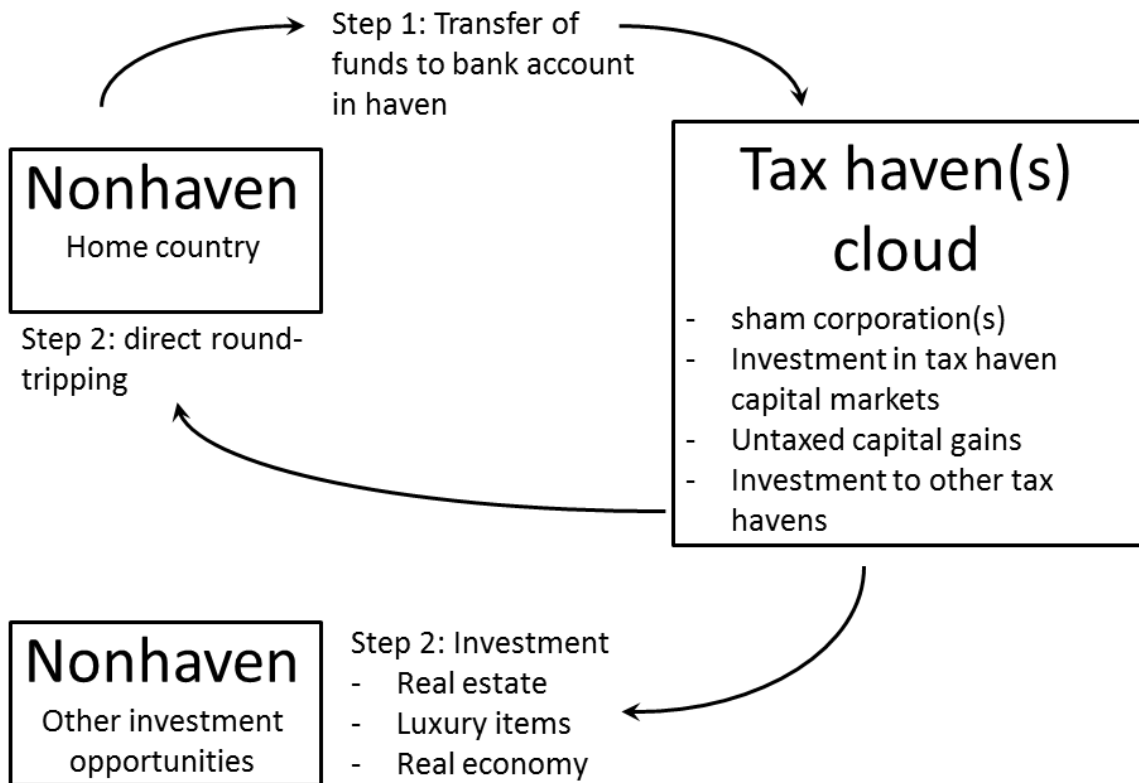
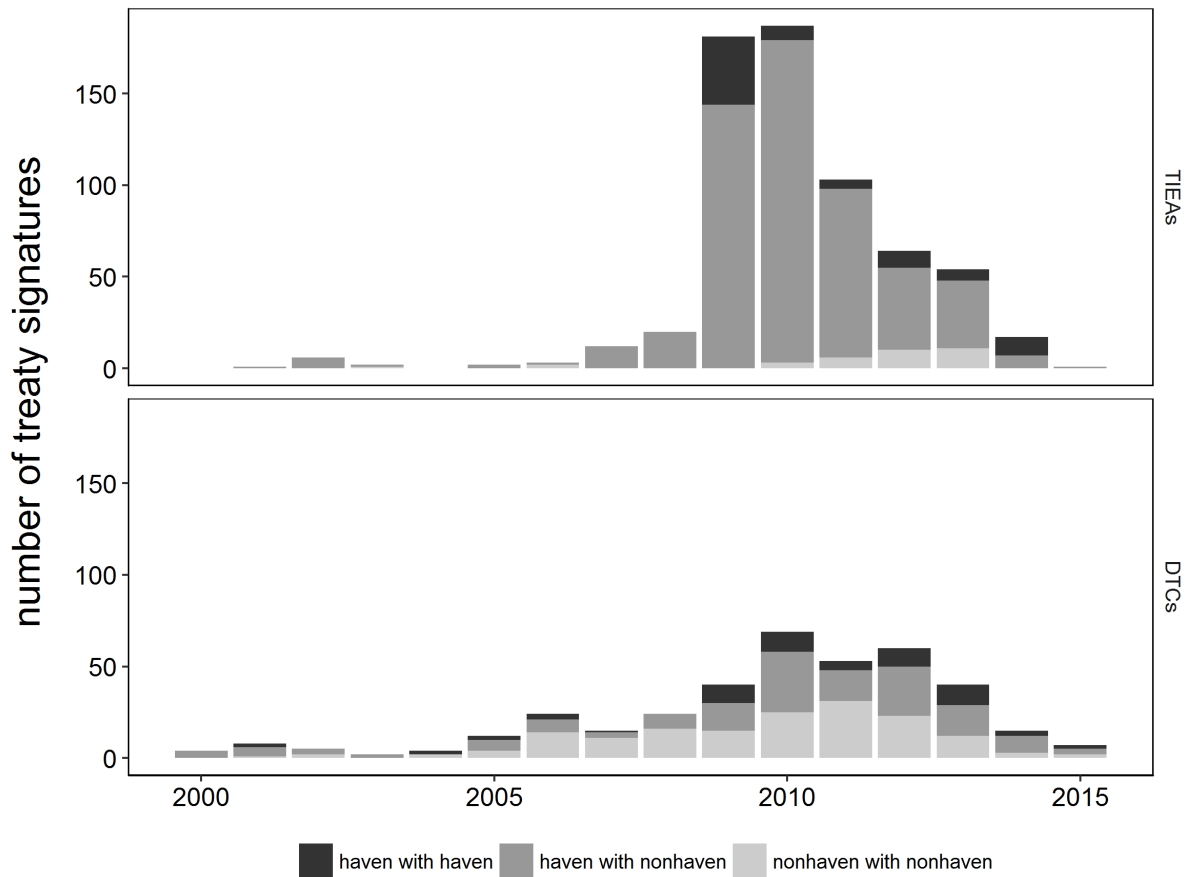


Table 1: Tax havens with significant available deposit data

Jurisdiction	Population (2016 CIAfb estimate)	Affiliation	Treaties with non- havens	BIS bilateral LBS availability	Availability as counterparty (balanced panel)
Austria	8,711,770	EU member state	14	2007q3 – 2016q1	28 (15)
Bahamas	327,316	Commonwealth of Nations	21	-	28 (13)
Bahrain	1,378,904	-	18	-	26 (10)
Belgium	11,409,077	EU member state	11	1977q4 – 2016q1	28 (14)
Bermuda	70,537	British Overseas Territory	26	-	28 (11)
Cayman Islands	57,268 (July 2013 est.)	British Overseas Territories	25	-	28 (13)
Chile	17,650,114	-	3	2002q4 – 2016q1	27 (9)
Cyprus	1,205,575	EU member state	15	-	27 (10)
Guernsey	66,297	British Crown Dependency	34	2001q4 – 2016q1	26 (9)
Hong Kong	7,167,403	Special Administrative Region of the P.R. of China	14	2014q4 – 2016q1	27 (15)
Ireland	4,952,473	EU member state	9	1977q4 – 2016q1	28 (15)
Isle of Man	88,195	British Crown Dependency	28	2001q4 – 2016q1	23 (8)
Jersey	98,069	British Crown Dependency	32	2001q4 – 2016q1	26 (10)
Luxembourg	582,291	EU member state	26	1977q4 – 2016q1	28 (14)
Macao	597,425	Special Administrative Region of the P.R. of China	9	2003q4 – 2016q1	24 (6)
Panama	3,705,246	-	17	-	28 (10)
Singapore	5,781,728	-	25	-	28 (14)
Switzerland	8,179,294	-	18	1977q4 – 2016q1	28 (14)

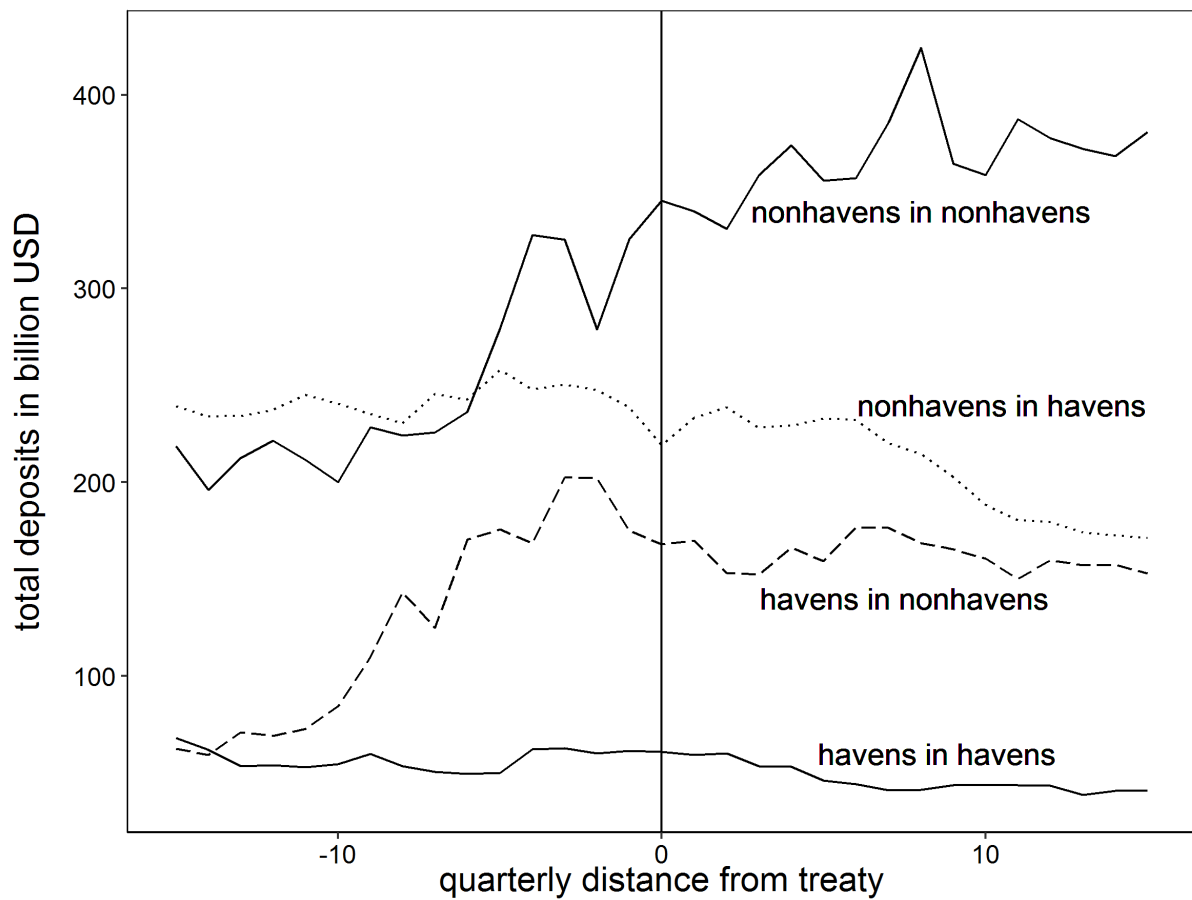
Notes: Combined haven lists of Gravelle (2015) and Johannesen and Zucman (2014). Narrowed down to havens which either report BIS statistics themselves or appear as counterparties to at least 10 other reporting countries in the balanced panel used in the main analysis. Population statistics and affiliations are taken from the CIA World Factbook. Treaty count is taken from the OECD Exchange of Information Tax Portal as used in the analysis. LBS data availability reflects the deposit data from the Bank for International settlements used in the text. A comprehensive table including all tax havens is included in Appendix 1.

Figure 2: Unique TIEAs and DTCs signed over time



Notes: Treaty count is taken from the OECD Exchange of Information Tax Portal as used in the main analysis and aggregated on a yearly basis, plotted on the horizontal axis. The haven–non-haven distinction is based on the combined lists of Gravelle (2015) and Johannesen and Zucman (2014) as in the main text. All countries not included therein are considered non-havens.

Figure 3: Bank deposits around treaty signatures



Notes: Bank for International Settlements LBS claims against nonbank counterparties grouped in four countrypair categories. Positions are summed for countrypairs which signed a treaty and for which BIS LBS data is available. The graph shows windows of +/- 15 quarters around the quarter of signature which is represented by the vertical line. In order to keep the level information consistent where LBS data is not available for the full 15 quarters before or after a treaty, we calculate missing observations using average growth rates of available data in that same countrypair group (top coded at 1% to avoid extreme outliers for very small economies). The haven–non-haven distinction is based on the combined lists of Gravelle (2015) and Johannesen and Zucman (2014) as in the main text. The dotted line represents deposits of non-haven counterparties in havens: ‘outbound’ in the main text. The dashed line represents deposits of haven counterparties in non-havens, ‘inbound’ in the main text.

Table 2: Reaction of deposits in non-havens to information exchange agreements

Counterparties from	<i>Dependent variable:</i>				
	log(deposits in non-havens)				
	all	tax havens	tax havens	tax havens	tax havens
	(1)	(2)	(3)	(4)	(5)
Signed (t : T)	-0.052 (-0.632)	-0.360*** (-3.087)			
Signed (t : t+3)			-0.137 (-1.470)	-0.096 (-1.033)	-0.100 (-1.162)
Signed (t+4 : t+6)			-0.299*** (-2.916)	-0.267*** (-2.586)	-0.273*** (-2.855)
Signed (t+7 : T)			-0.352*** (-2.813)	-0.339*** (-2.680)	-0.392*** (-3.031)
Growth of GDP/capita				0.022 (0.099)	
Openness					-0.001* (-1.719)
countrypair fixed effects	Yes	Yes	Yes	Yes	Yes
year-qtr fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	34,397	9,010	9,010	7,215	6,463
R ²	0.160	0.220	0.219	0.189	0.123
Adjusted R ²	0.142	0.200	0.199	0.166	0.096

Notes: t-values in parentheses, robust standard errors. The treatment variables ('Signed') take value 1 for the respective periods given in parentheses, with t referring to the time of treaty signature and T to the last time observation. The openness indicator is (exports+imports)/GDP. * denotes 10% significance, ** 5% significance, and *** 1% significance.

Table 3: Reaction of deposits in non-havens to different treaties

Counterparties from	<i>Dependent variable:</i>			
	log(deposits in non-havens)			
	havens (1)	havens (2)	non-havens (3)	non-havens (4)
Signed (t : T)	-0.360*** (-3.087)		0.274** (2.188)	
DTC		-0.170 (-0.930)		0.289** (2.092)
TIEA		-0.430*** (-3.243)		0.150 (0.876)
countrypair fixed effects	Yes	Yes	Yes	Yes
year-qtr fixed effects	Yes	Yes	Yes	Yes
Observations	9,010	9,010	25,387	25,387
R ²	0.220	0.221	0.147	0.147
Adjusted R ²	0.200	0.202	0.129	0.129

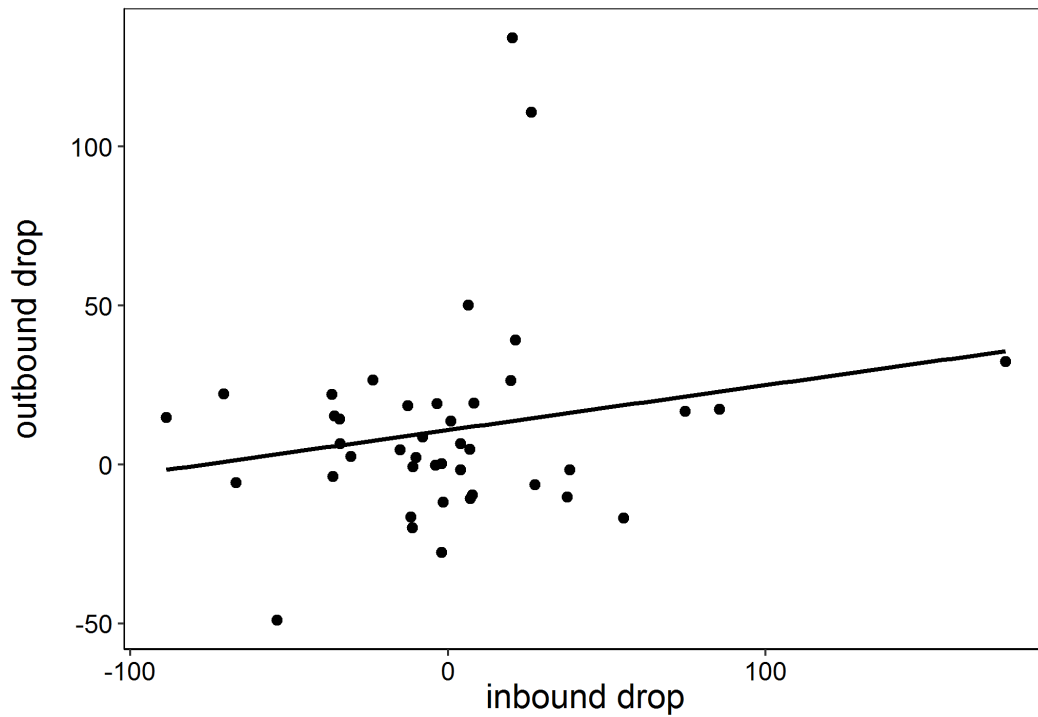
Notes: t-values in parentheses, robust standard errors. The treatment variables ('Signed') take value 1 for the respective periods given in parentheses, with t referring to the time of treaty signature and T to the last time observation. DTC stands for double taxation convention, TIEA for tax and information exchange agreement. Both are based on OECD definitions. * denotes 10% significance, ** 5% significance, and *** 1% significance.

Table 4: Reaction of deposits in tax-havens to information exchange agreements

Counterparties from	<i>Dependent variable:</i>					
	log(deposits in tax-havens)					
	all	tax havens	non-havens	non-havens	non-havens	non-havens
	(1)	(2)	(3)	(4)	(5)	(6)
Signed (t : T)	-0.212*** (-3.323)	-0.105 (-0.951)	-0.287*** (-3.653)	-0.303*** (-3.655)		
Signed (t-2)				-0.171*** (-2.797)		-0.159*** (-2.684)
Signed (t-1)				-0.187*** (-2.643)		-0.174** (-2.544)
Signed (t)					-0.190*** (-2.863)	-0.203*** (-2.864)
Signed (t+1)					-0.141** (-2.024)	-0.154** (-2.094)
Signed (t+2)					-0.176** (-2.569)	-0.189*** (-2.610)
Signed (t+3 : T)					-0.275*** (-3.566)	-0.288*** (-3.579)
countrypair fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
year-qtr fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	39,538	10,123	29,415	29,415	29,415	29,415
R ²	0.083	0.094	0.081	0.082	0.081	0.081
Adjusted R ²	0.064	0.072	0.062	0.062	0.061	0.062

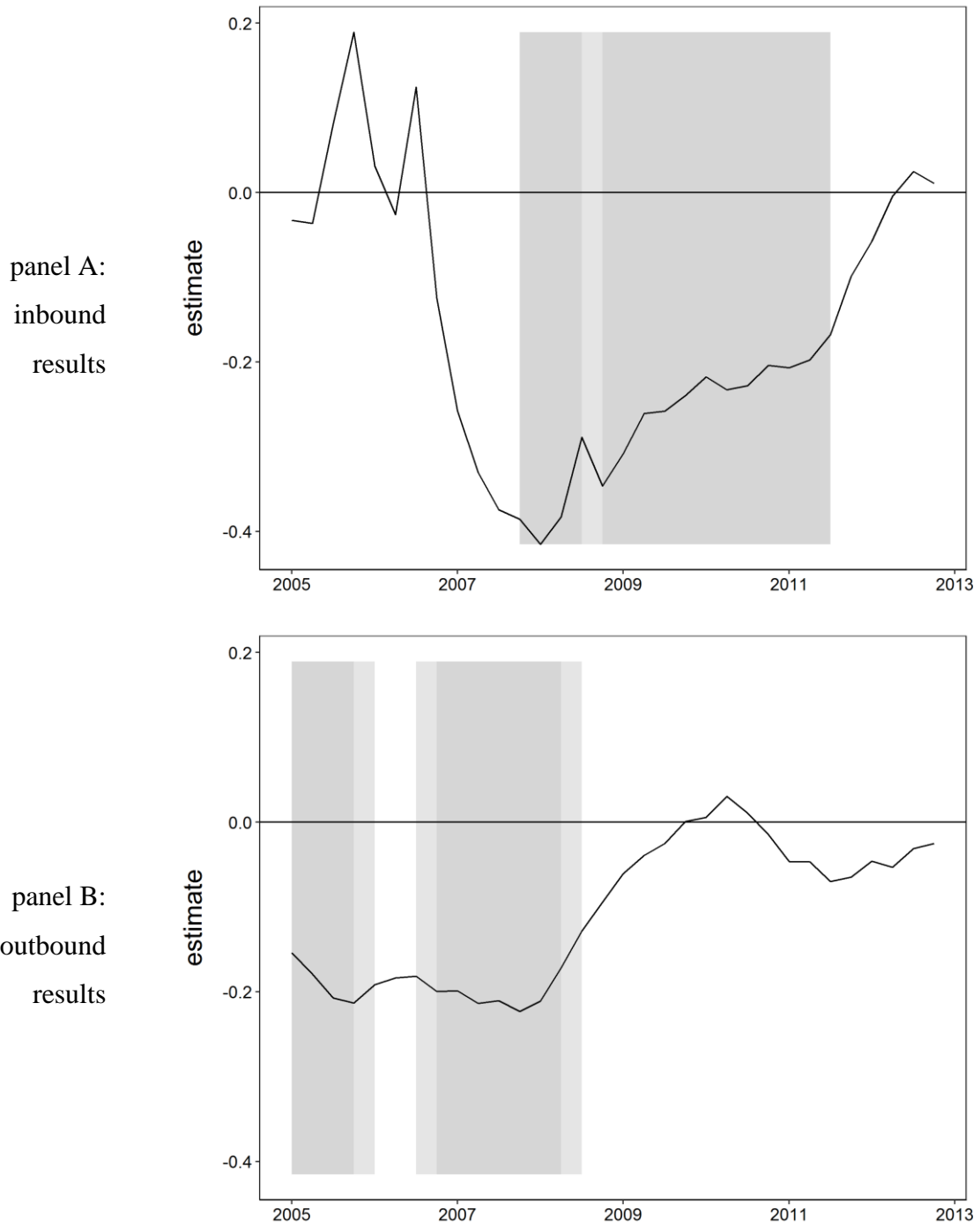
Notes: t-values in parentheses, robust standard errors. The treatment variables ('Signed') take value 1 for the respective periods given in parentheses, with t referring to the time of treaty signature and T to the last time observation. * denotes 10% significance, ** 5% significance, and *** 1% significance.

Figure 4: Deposit drops in reaction to haven–non-haven treaties



Notes: Calculated based on the baseline results. The graph shows changes in deposits in relation to deposit levels around treaties for haven–non-haven countrypairs which signed a treaty and for which BIS data is available in both directions. This limits the representation to countrypairs that include havens for which deposit data has been released (see table 1). To calculate the outbound drop, we take into account the anticipation effects we find and deduct deposits in havens by non-havens in $t+1$ from those in $t-2$ with t being the quarter of signature. For the inbound drop, we deduct deposits in non-havens by haven counterparties in $t+6$ from those in $t+3$ as our baseline results suggest. We show both values as a ratio of mean deposits in the same window ($t:t+3$) starting with the signature date. The solid line is the line of best fit. In line with the main text, treaties are taken from the OECD Exchange of Information Tax Portal as used in the main analysis and the haven-non-haven distinction is based on the Gravelle (2015) and Johannesen and Zucman (2014).

Figure 5: Changes in treaty effects over time



Notes: Estimates in a rolling window of +/- 8 quarters around the quarter plotted on the horizontal axis. Estimations in panel A equivalent to Table 2, column 2: showing the reaction of deposits in non-havens by haven counterparties (inbound). Estimations in panel B equivalent to Table 4 column 3 showing the reaction of deposits in havens by non-haven counterparties (outbound). The dark grey area denotes 5% significance while the light grey area denotes 10% significance. Estimated coefficients are plotted on the vertical axis and the horizontal line denotes a 0 effect.

Table 5: Robustness of inbound results

	<i>Dependent variable:</i>				
	log(deposits in non-havens)			log(claims)	log(loan claims)
	(baseline) (1)	(2003:IV-2011:II) (2)	(no cris) (3)	(claims) (4)	(loan claims) (5)
Signed (t : t+3)	-0.137 (-1.470)	-0.108 (-1.116)	-0.165* (-1.742)	-0.084 (-0.981)	-0.118 (-1.245)
Signed (t+4 : t+6)	-0.299*** (-2.916)	-0.300*** (-2.737)	-0.290*** (-2.670)		
Signed (t+7 : T)	-0.352*** (-2.813)	-0.230 (-1.568)	-0.347*** (-2.710)		
Signed (t+4)				-0.165 (-1.434)	-0.189 (-1.490)
Signed (t+5)				-0.193 (-1.553)	-0.186 (-1.598)
Signed (t+6)				-0.152 (-1.187)	-0.211* (-1.727)
Signed (t+7)				-0.163 (-1.555)	-0.265** (-2.368)
Signed (t+8)				-0.107 (-0.795)	-0.165 (-1.180)
Signed (t+9)				-0.202 (-1.444)	-0.258* (-1.700)
Signed (t+10)				-0.177 (-1.208)	-0.211 (-1.368)
Signed (t+11)				-0.162 (-1.230)	-0.190 (-1.251)
Signed (t+12 : T)				-0.379** (-2.490)	-0.382** (-2.117)
countrypair fixed effects	Yes	Yes	Yes	Yes	Yes
year-qtr fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	9,010	5,270	8,160	6,948	5,913
R ²	0.219	0.195	0.229	0.091	0.100
Adjusted R ²	0.199	0.163	0.208	0.062	0.068

Notes: t-values in parentheses, robust standard errors. The treatment variables ('Signed') take value 1 for the respective periods given in parentheses, with t referring to the time of treaty signature and T to the last time observation. All results are based on calculations for non-haven – tax-haven countrypairs. No cris drops the period from 2007:II to 2008:IV from the sample. * denotes 10% significance, ** 5% significance, and *** 1% significance.

Table 6a: Robustness of results to changes in tax haven list (inbound)

Tax haven list	<i>Dependent variable:</i>				
	log(deposits in non-havens by tax-haven counterparties)				
	(baseline) (1)	(OECD 2000) (2)	(Gravelle 2015) (3)	(consensus havens) (4)	(consensus both) (5)
Signed (t : t+3)	-0.137 (-1.470)	-0.235** (-2.225)	-0.220** (-2.182)	-0.176* (-1.771)	-0.079 (-0.907)
Signed (t+4 : t+6)	-0.299*** (-2.916)	-0.406*** (-3.288)	-0.384*** (-3.306)	-0.323*** (-2.875)	-0.184* (-1.709)
Signed (t+7 : T)	-0.352*** (-2.813)	-0.415*** (-2.741)	-0.399*** (-2.786)	-0.326** (-2.309)	-0.287* (-1.941)
countrypair fixed effects	Yes	Yes	Yes	Yes	Yes
year-qtr fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	9,010	6,148	7,208	5,671	7,526
R ²	0.219	0.240	0.237	0.236	0.151
Adjusted R ²	0.199	0.218	0.216	0.214	0.128

Notes: t-values in parentheses, robust standard errors. The treatment variables ('Signed') take value 1 for the respective periods given in parentheses, with t referring to the time of treaty signature and T to the last time observation. All results are based on calculations for non-haven – tax-haven countrypairs. 'Consensus havens' limits the tax havens to those agreed on by the authors cited in the text. 'Consensus both' adds the countries thus excluded from the tax-haven list to the non-haven countries. * denotes 10% significance, ** 5% significance, and *** 1% significance.

Table 6b: Robustness of results to changes in tax haven list (outbound)

<i>Dependent variable:</i>				
log(deposits in tax-havens by non-haven counterparties)				
Tax haven list	(baseline outbound)	(Gravelle 2015)	(consensus havens)	(consensus both)
	(1)	(2)	(3)	(4)
Signed (t : T)	-0.303*** (-3.655)	-0.352*** (-4.293)	-0.379*** (-4.713)	-0.333*** (-4.441)
Signed (t-2)	-0.171*** (-2.797)	-0.190*** (-3.084)	-0.211*** (-3.851)	-0.166*** (-3.164)
Signed (t-1)	-0.187*** (-2.643)	-0.215*** (-3.039)	-0.239*** (-3.662)	-0.179*** (-2.865)
countrypair fixed effects	Yes	Yes	Yes	Yes
year-qtr fixed effects	Yes	Yes	Yes	Yes
Observations	29,415	22,472	20,405	23,161
R ²	0.082	0.089	0.104	0.100
Adjusted R ²	0.062	0.069	0.085	0.081

Notes: t-values in parentheses, robust standard errors. The treatment variables ('Signed') take value 1 for the respective periods given in parentheses, with t referring to the time of treaty signature and T to the last time observation. All results are based on calculations for non-haven – tax-haven countrypairs. 'Consensus havens' limits the tax havens to those agreed on by the authors cited in the text. 'Consensus both' adds the countries thus excluded from the tax-haven list to the non-haven countries. * denotes 10% significance, ** 5% significance, and *** 1% significance.

Table 7: Relation of outbound results to Johannesen and Zucman (2014)

Sample Specification	<i>Dependent variable:</i>		
	log(deposits in tax-havens by non-haven counterparties)		
	(baseline)	(2003:IV-2011:II)	(JZ14 replica)
	(1)	(2)	(3)
Signed (t)	-0.187*** t = -2.837	-0.246*** t = -2.912	0.005 t = 0.098
Signed (t+1)	-0.138** t = -1.995	-0.268*** t = -3.139	-0.085 t = -1.351
Signed (t+2)	-0.172** t = -2.543	-0.292*** t = -2.891	-0.116* t = -1.769
Signed (t+3)	-0.251*** t = -3.691	-0.414*** t = -3.839	-0.188** t = -2.571
Signed (t+4 : T)	-0.269*** t = -3.483	-0.341*** t = -3.680	-0.213*** t = -2.794
countrypair fixed effects	Yes	Yes	Yes
year-qtr fixed effects	Yes	Yes	Yes
Observations	29,415	17,205	16,585
R ²	0.081	0.109	0.123
Adjusted R ²	0.061	0.077	0.092

Notes: t-values in parentheses, robust standard errors. The treatment variables ('Signed') take value 1 for the respective periods given in parentheses, with t referring to the time of treaty signature and T to the last time observation. All results are based on calculations for tax-haven – non-haven countrypairs. The second column reduces the sample length to that of Johannesen and Zucman (2014), the third column also employs their treaty definition and their tax haven list. * denotes 10% significance, ** 5% significance, and *** 1% significance.

Table 8: Robustness of inbound results to treaty definition

	<i>Dependent variable:</i>				
	log(deposits in tax-havens by non-haven counterparties)				
	(baseline)	(balanced signature)	(+ no para 4/5)	(+ not reviewed)	(+ no standard)
	(1)	(2)	(3)	(4)	(5)
Signed (t : t+3)	-0.137 (-1.470)	-0.152 (-1.645)	-0.146 (-1.603)	-0.137* (-1.653)	-0.185** (-2.174)
Signed (t+4 : t+6)	-0.299*** (-2.916)	-0.319*** (-3.095)	-0.308*** (-3.032)	-0.283*** (-3.020)	-0.326*** (-3.421)
Signed (t+7 : T)	-0.352*** (-2.813)	-0.428*** (-3.138)	-0.433*** (-3.204)	-0.436*** (-3.327)	-0.470*** (-3.595)
countrypair fixed effects	Yes	Yes	Yes	Yes	Yes
year-qtr fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	9,010	9,010	9,010	9,010	9,010
R ²	0.219	0.222	0.223	0.223	0.226
Adjusted R ²	0.199	0.202	0.203	0.203	0.206

Notes: t-values in parentheses, robust standard errors. The treatment variables ('Signed') take value 1 for the respective periods given in parentheses, with t referring to the time of treaty signature and T to the last time observation. All results are based on calculations for tax-haven – non-haven countrypairs. The second column ignores treaties signed before the sample period. The third column includes treaties signed in the sample period which did not include the paragraphs relaxing the wording to requiring only 'foreseeably relevant' information instead of 'necessary' information. Column 4 additionally includes treaties signed in the the sample period which were not reviewed by the OECD and column 5 includes those treaties which were reviewed but did not meet the standard. * denotes 10% significance, ** 5% significance, and *** 1% significance.

Appendix

Table A1: Tax havens full list

Jurisdiction	Population (2016 CIAfb estimate)	Affiliation	Treaties with non- havens	BIS bilateral LBS availability	Availability as counterparty (balanced panel)
Andorra	85,660	-	14	-	25 (6)
Anguilla	16,752	British Overseas Territory	13	-	-
Antigua and Barbuda	93,581	Commonwealth of Nations	11	-	-
Aruba	113,648	Self-governed within the Kingdom of the Netherlands	12	-	22 (3)
Austria	8,711,770	EU member state	14	2007q3 – 2016q1	28 (15)
Bahamas	327,316	Commonwealth of Nations	21	-	28 (13)
Bahrain	1,378,904	-	18	-	26 (10)
Barbados	291,495	Commonwealth of Nations	15	-	25 (6)
Belgium	11,409,077	EU member state	11	1977q4 – 2016q1	28 (14)
Belize	353,858	Commonwealth of Nations	13	-	26 (6)
Bermuda	70,537	British Overseas Territory	26	-	28 (11)
Cayman Islands	57,268 (July 2013 est.)	British Overseas Territories	25	-	28 (13)
Chile	17,650,114	-	3	2002q4 – 2016q1	27 (9)
Cook Islands	9,556	Self-governing in free association with New Zealand	14	-	-
Costa Rica	4,872,543	-	15	-	28 (7)
Curacao	149,035	Self-governed within the Kingdom of the Netherlands	Added with Sint Maarten (Dutch part) to construct synthetic Netherlands Antilles		
Cyprus	1,205,575	EU member state	15	-	27 (10)
Dominica	73,757	Commonwealth of Nations	15	-	22 (2)
Gibraltar	29,328	British Overseas Territory	20	-	25 (6)
Grenada	111,219	Commonwealth of Nations	11	-	22 (3)
Guernsey	66,297	British Crown Dependency	34	2001q4 – 2016q1	26 (9)
Holy See (Vatican City State)	1,000 (2015 est.)	-	-	-	-
Hong Kong	7,167,403	Special Administrative Region of the P.R. of China	14	2014q4 – 2016q1	27 (15)
Ireland	4,952,473	EU member state	9	1977q4 – 2016q1	28 (15)

Isle of Man	88,195	British Crown Dependency	28	2001q4 – 2016q1	23 (8)
Jersey	98,069	British Crown Dependency	32	2001q4 – 2016q1	26 (10)
Jordan	8,185,384	-	-	-	27 (6)
Lebanon	6,237,738	-	-	-	26 (7)
Liberia	4,299,944	-	14	-	25 (9)
Liechtenstein	37,937	-	15	-	24 (7)
Luxembourg	582,291	EU member state	26	1977q4 – 2016q1	28 (14)
Macao	597,425	Special Administrative Region of the P.R. of China	9	2003q4 – 2016q1	24 (6)
Malaysia	30,949,962	Commonwealth of Nations	12	-	28 (12)
Maldives	392,960	-	-	-	23 (2)
Malta	415,196	EU member state, Commonwealth of Nations	17	-	27 (9)
Marshall Islands	73,376	-	10	-	23 (6)
Mauritius	1,348,242	Commonwealth of Nations	13	-	26 (7)
Monaco	30,581	-	14	-	-
Montserrat	5,267	British Overseas Territory	9	-	-
Nauru	9,591	Commonwealth of Nations	-	-	17 (1)
Netherlands Antilles	Synthetic	Added Sint Maarten (Dutch part) and Curacao after Separation	16	-	25 (-)
Niue	1,190	Self-governing in free association with New Zealand	6	-	-
Palau	21,347	-	-	-	-
Panama	3,705,246	-	17	-	28 (10)
Saint Kitts and Nevis	52,329	Commonwealth of Nations	13	-	-
Saint Lucia	164,464	Commonwealth of Nations	13	-	21 (3)
Saint Vincent and the Grenadines	102,350	Commonwealth of Nations	12	-	20 (6)
Samoa	198,926	-	9	-	20 (4)
San Marino	33,285	-	25	-	17 (2)
Seychelles	93,186	-	11	-	23 (7)
Singapore	5,781,728	-	25	-	28 (14)
Sint Maarten (Dutch part)	41,486	Self-governed within the Kingdom of the Netherlands		Added with Curacao to construct synthetic Netherlands Antilles	
Switzerland	8,179,294	-	18	1977q4 – 2016q1	28 (14)
Tonga	106,513	Commonwealth of Nations	-	-	16 (-)
Trinidad and	1,220,479	Commonwealth of Nations	-	-	25 (5)

Tobago					
Turks and Caicos Islands	51,430	British Overseas Territory	13	-	21 (6)
Uruguay	3,351,016	-	18	-	28 (7)
Vanuatu	277,554	Commonwealth of Nations	-	-	20 (6)
Virgin Islands, British	34,232	British Overseas Territory	18	-	-
Virgin Islands, U.S.	102,951	Organized, unincorporated territory of the USA	-	-	-

Notes: Combined haven lists of Gravelle (2015) and Johannesen and Zucman (2014). Narrowed down to havens which either report BIS statistics themselves or appear as counterparties to at least 10 other reporting countries in the balanced panel used in the main analysis. Population statistics and affiliations are taken from the CIA World Factbook. Treaty count is taken from the OECD Exchange of Information Tax Portal as used in the analysis. LBS data availability reflects the deposit data from the Bank for International settlements used in the text. A comprehensive table including all tax havens is included in Appendix 1.

Table A2: Disagreements in Tax Haven lists

	Glautier and Bassinger (1987)	Hines and Rice (1994)	OECD (2000)	Dharmapala (2008)	Johannesen and Zucman (2014)	Gravelle (2015)
Andorra		1	1	1	1	1
Anguilla		1	1	1	1	1
Aruba			1	1	1	1
Austria	1				1	
Belgium					1	
Chile					1	
Costa Rica	1				1	1
Dominica		1	1	1	1	1
Ireland	1	1		1		1
Jordan		1		1		1
Lebanon		1		1		1
Macao		1		1	1	1
Malaysia					1	
Maldives		1	1	1		1
Malta		1	1	1	1	1
Marshall Islands		1	1	1	1	1
Mauritius			1	1		1
Monaco		1	1	1	1	1
Nauru			1	1	1	1
Netherlands	1					
Niue			1	1	1	1
Saint Lucia		1	1	1	1	1
Samoa			1	1	1	1
San Marino			1	1	1	1
Seychelles			1	1	1	1
Tonga			1	1		1
Trinidad and Tobago					1	
Uruguay					1	
Virgin Islands, U.S.			1	1	1	1

All of the surveys shown in table A2 include the following list of countries as tax havens: Antigua and Barbuda, Bahamas, Bahrain, Barbados, Belize, Bermuda, Cayman Islands, Cook Islands, Curacao*, Cyprus, Gibraltar, Grenada, Guernsey**, Hong Kong, Isle of Man, Jersey**. Liberia, Liechtenstein, Luxembourg, Montserrat, Panama, Saint Kitts and Nevis, Saint Vincent and the Grenadines, Singapore, Sint Maarten (Dutch part)*, Switzerland, Turks and Caicos Islands, Vanuatu, Virgin Islands, British

* Curacao and Sint Maarten (Dutch part) are included as the Netherlands Antilles in some publications, they separated on the 10th of October 2010.

** Guernsey and Jersey are included as The Channel Islands in some publications.