



Trinity College Dublin

Coláiste na Tríonóide, Baile Átha Cliath

The University of Dublin

Automatic for the (tax) people: information
sharing and
cross-border investment in tax havens

Agustín Bénétrix, Lorenz Emter and Martin Schmitz

TEP Working Paper No. 1321

November 2021

Trinity Economics Papers

Department of Economics

Automatic for the (tax) people: information sharing and cross-border investment in tax havens*

Agustín Bénétrix¹, Lorenz Emter², and Martin Schmitz³

¹*Trinity College Dublin, IMTCD*

²*Trinity College Dublin, IMTCD and Central Bank of Ireland*

³*European Central Bank*

November 26, 2021

Abstract

This paper examines the impact of international automatic exchange of information (AEOI) treaties on cross-border investments in tax havens. Using a restricted version of the BIS Locational Banking Statistics we find that AEOIs significantly reduced cross-border deposits. A sectoral breakdown assessment reveals that households were the key driving force behind this contraction. Analysing other forms of cross-border investment, we observe that tax havens' portfolio and direct investment assets in non-haven countries fell significantly after AEOI introduction, indicating a reduction of round-tripping investments. However, we also document evidence of households' deposits shifting to non-AEOI haven countries. Moreover, we observe larger FDI positions and deposits by non-bank financial institutions between tax haven countries, suggesting an increased use of shell corporation networks since AEOI introduction.

Keywords: cross-border banking, tax havens, international tax treaties, tax evasion

JEL Classification: G21, G28, H26, H87, K34

*Emails: Agustín Bénétrix benetria@tcd.ie, Lorenz Emter lorenz.emter@centralbank.ie and Martin Schmitz martin.schmitz@ecb.int. We are grateful for insightful discussions and comments to Goetz von Peter and Swapan-Kumar Pradhan, as well as seminar participants at Trinity College Dublin. The views expressed are those of the authors and do not necessarily reflect those of the European Central Bank and/or the Central Bank of Ireland.

1 Introduction

Tax havens are generally thought of as places that harbour assets from non-residents seeking to hide ownership to limit tax liabilities. Such international tax evasion does not only reduce tax revenues and the effective taxation of the wealthy, it can also have an eroding effect on trust in state institutions and the tax system (Alstadsæter, Johannesen, & Zucman, 2019; Menkhoff & Miethe, 2019). Tax evasion via offshore tax havens is therefore of great concern to policy makers. Recent media coverage of large-scale data leaks and other whistle-blower reports fuel this concern and highlight the relevance of tax evasion via tax havens. The most prominent examples are the Panama Papers in 2016 and, more recently, the Pandora Papers. The Pandora Papers highlight the prevalence of shell corporations set up in tax haven jurisdictions in order to disguise the ultimate ownership of financial and non-financial assets.

Governments have tried to tackle the issue through several multilateral and bilateral policy initiatives – with mixed success.¹ Johannesen and Zucman (2014) show that early efforts by G20 countries, in the form of tax information exchanges on request, to crack down on tax havens resulted in a reallocation of deposits towards those tax havens which signed the least number of bilateral information exchange treaties. This highlighted that upon-request information sharing between the tax authorities of two countries, while having some deterring effect, experienced limited success in containing overall tax evasion. Menkhoff and Miethe (2019) corroborate these findings adding that the effect of “information-on-request treaties” dissipates over time. The authors highlight this cannot be explained by deposit shifting alone and they do not find evidence of “transitioning into legality” which implies that tax evaders might try to put their funds into “new disguises that circumvent regulatory requirements” (Menkhoff & Miethe, 2019, p. 66).

Against this background, the OECD pursued a more comprehensive coverage of tax information treaties, including the automatic exchange of information (AEOI) facilitated by the Common Reporting Standard (CRS). These efforts, together with the adoption of the Foreign Account Tax Compliance Act (FATCA) by the United States Congress in 2010, resulted in 94 jurisdictions being committed to ensuring the effective automatic exchange of information with their respective relevant exchange partners by end 2019. This implies that the network of bilateral treaties has expanded significantly since the study of Johannesen and Zucman (2014) and the threat of enforcement has become arguably more credible since information is exchanged automatically between the tax authorities of participating countries.²

In this paper we use restricted data on deposits held in tax haven jurisdictions from the BIS locational banking statistics combined with information on the timing of entering AEOI treaties to assess the impact of these latest efforts to reign in offshore tax evasion.³ Using data until 2019Q4, including the breakdown by counterparty sector isolating household deposits, we

¹See Slemrod (2015) for a more general overview of the economic literature on tax administration, compliance, and enforcement.

²See Christensen and Tirard (2016) for a detailed overview of the evolution of international treaties on exchange of information in tax matters.

³BIS statistics alone cannot distinguish between tax evasion and avoidance, since the tax filings of the deposit holders remain unobserved.

can illuminate some hitherto open questions.

First, we investigate whether it is actually deposits by households which are affected by the treaties. Hence, we can overcome a key limitation of the existing literature which is based on deposits by the entire non-bank sector (i.e. including non-bank financial institutions, non-financial corporations, governments, and households). In order to assess the effect of information exchange, existing studies assume that corporations were unaffected by tax information treaties and used rough estimates of the share of deposits belonging to households (Ahrens & Bothner, 2020; Johannesen & Zucman, 2014).

Second, we assess the longer-term effects of the AEOI. Menkhoff and Miethe (2019) find that the initial effect of the AEOI treaties is similar to earlier information-on-request treaties. Since their analysis only extends to the end of 2017 the authors note that they cannot assess the longer-term effects of the AEOIs “[...] due to their novelty and the resulting lack of observations”. Ending their sample in 2017 as well, Casi, Spengel, and Stage (2020) and Ahrens and Bothner (2020) also investigate the short-term effect of AEOIs and find that these reduced non-bank cross-border deposits in tax havens.⁴

Third, this paper also extends the literature by analysing the effect of AEOI treaties on other financial instruments beyond deposits, i.e. foreign direct investment and portfolio investment, which have gone unexplored by the related literature. Due to the complexity of the global financial system, the AEOI treaties may affect other segments of international investment positions apart from bank deposits. Volumes of cross-border investment vis-à-vis other countries are disproportionately high in tax havens, also in other investment categories (Lane & Milesi-Ferretti, 2018). Moreover, anecdotal evidence suggests that tax evaders typically do not just park their wealth in tax havens in the form of bank deposits but also make use of shell companies and sham foundations to further invest these funds and obfuscate ownership.⁵ In a similar vein, Heckemeyer and Hemmerich (2020) find that portfolio investment positions between tax haven and OECD countries were reduced by bilateral information upon request treaties between 2001 and 2014, suggesting that the threat of information exchange also reduced round-tripping of investment.⁶

Our findings suggest that the broader coverage of bilateral treaties and the threat of automatic information exchange significantly reduced cross-border deposits by non-banks in tax havens. As a novelty to the literature we show that this is driven by households, while deposits of non-bank financial institutions (NBFIs) and non-financial corporations (NFCs) in tax havens were unaffected. The impact of AEOIs uncovered in previous studies might therefore

⁴Focusing exclusively on the OECD Common Reporting Standard (CRS) in the case of Casi et al. (2020).

⁵The case of Harald Joachim von der Goltz, a U.S. taxpayer who was sentenced to prison in September 2020 in the wake of the Panama Papers Investigation serves as a prime example. “[...] von der Goltz evaded his tax reporting obligations by setting up a series of shell companies and bank accounts, and hiding his beneficial ownership of the shell companies and bank accounts from the IRS. These shell companies and bank accounts made investments totaling tens of millions of dollars. [...] von der Goltz engaged the services of Mossack Fonseca [...] to create a sham foundation and shell companies formed under the laws of Panama and the British Virgin Islands to conceal from the IRS and others the ownership by von der Goltz of accounts established at overseas banks, as well as the income generated in those accounts.” <https://www.justice.gov/opa/pr/us-taxpayer-panama-papers-investigation-sentenced-prison> [accessed 16.08.2021]

⁶Such round-tripping could happen via funds held by non-haven residents in havens which were subsequently reinvested in the non-haven country of residence.

have been underestimated. We find that bilateral household deposits from non-haven countries in haven banks decrease by 28.5 percent upon signature of the AEOI legislation, while the effect on deposits by the broader non-bank sector is found to be only 12.5 percent, similar to the 11.5 percent effect found in [Casi et al. \(2020\)](#). Moreover, we do find the impact of the AEOI to be persistent, in contrast to results documented for earlier bilateral initiatives for information exchange on demand, as documented by [Menkhoff and Miethe \(2019\)](#). These findings highlight that AEOI agreements are effective at curbing tax evasion, since deposits related to transparent tax avoidance strategies should not react to the threat of information exchange ([Menkhoff & Miethe, 2019](#)).

We furthermore document a significantly negative effect of AEOI on portfolio investment assets reported by tax havens residents vis-à-vis non-haven residents, in line with the results in [Heckemeyer and Hemmerich \(2020\)](#). Similarly, the FDI liability positions of non-havens vis-à-vis havens decline significantly after joining the AEOI. We interpret this as evidence for reduction in round-tripped investment from non-havens through havens. Moreover, we observe that non-havens report decreasing FDI assets in tax havens after joining the AEOI, suggesting that part of these assets were related to corporate structures with a tax-evading purpose.

However, we also find some evidence of negative side effects of the AEOI. The more granular breakdown of our banking data allows us to document evidence of deposit shifting by the household sector, in line with [Johannessen and Zucman \(2014\)](#) for earlier treaties. This suggests that the AEOI is more effective than earlier initiatives in that it is more persistent, yet it remains incomplete as long as non-participating haven countries allow households to simply shift deposits. Moreover, banks in haven countries report increasing deposits from NBFIs resident in other tax havens after AEOI introduction. We interpret this as evidence that networks of shell companies used to obfuscate ultimate beneficiaries of account holders might have become more elaborate. This is corroborated by the finding that signing up to the AEOI framework is associated with a positive effect on FDI assets between tax havens. Hence, future policy initiatives should be aimed at increasing transparency regarding ultimate ownership of investments by looking-through corporate structures.

In the remainder of the paper we present the policy initiatives, data and some stylised facts in [Section 2](#) and the econometric approach in [Section 3](#). The results of the econometric analysis are presented and discussed in [Section 4](#), before [Section 5](#) concludes.

2 Policy Initiatives and Offshore Deposits

2.1 Global Policy Initiatives on Exchange of Information

The global financial crisis led policy makers to put emphasis on the implementation of national and international tax transparency rules. This included a push to fight tax evasion in the form of households' undeclared foreign assets. The OECD and the EU, in particular, wanted to achieve a model for cross-country exchanges of information between tax authorities. An earlier effort had been the EU's Savings Directive (and the related agreements with Switzerland and other countries), which became effective starting in 2005. While this exchange of information

was automatic, it was limited in terms of country coverage and type of information (only related to interest income). In the OECD, a first agreement in 2009 covered the information exchange on request (EOIR) to which more than 150 jurisdictions have committed since. The US adopted its US Foreign Account Tax Compliance Act (FATCA) in 2010. Within this framework the US has negotiated bilaterally with other countries bilateral intergovernmental agreements (IGAs) which provide for a reciprocal exchange of information on the financial income earned by their residents in the partner country.

In 2014, the Common Reporting Standard (CRS) on Automatic Exchange of Information (AEOI) was approved among the OECD countries. The AEOI commits the participating countries' authorities to collect information from their financial institutions on foreign residents' accounts and exchange this information automatically with the relevant participating countries on an annual basis. Our dataset on AEOIs is based on the date each country joined the OECD initiative. For a group of 56 early adopter countries, the starting date is October 2014, while for individual countries that joined later we use the date when the respective national legislation was adopted (or when an official public commitment was made). Hence, we use the date individual countries sign the Multilateral Competent Authority Agreement (MCAA), thereby committing to introduce the CRS into national law. The (perceived) threat of being discovered by national tax authorities once the CRS becomes effective should motivate individuals to remove funds (or further obfuscate their ownership) from tax havens after these countries commit to the exchange of information and before it actually becomes effective.

Figure 1 shows the number of country pairs included in our dataset becoming covered by an AEOI treaty in a given quarter. While the bulk of new AEOI relationships was formed at the end of 2014, i.e. when the early adopters announced their participation, there is still considerable time variation during our sample period.

As of the announcement date, automatic exchange of information was theoretically possible with all other countries that had already joined the initiative. Hence, this possibility should trigger residents of AEOI countries with undeclared assets in the AEOI country to immediately withdraw these assets. In the same way, we use the signature dates for bilateral agreement of the United States related to the FATCA IGA.

2.2 Data on Offshore Investment

Our data source for cross-border deposits is the restricted version of the BIS Locational Banking Statistics (LBS) which detail the deposit liabilities of banks resident in 44 reporting countries vis-à-vis non-bank counterparties located in over 200 countries. The data on these positions are collected according to national accounts and balance of payments principles. Hence, the compilation is based on the residence of entities and the data are not consolidated at the group level. In 2015, the BIS started to report a more detailed breakdown of cross-border positions by counterparty sector.⁷

These data, available quarterly from 2014 onward for most reporting countries, provide

⁷See Avdjiev, McGuire, and Wooldridge (2015) and Luna and Hardy (2019) for details on the enhanced breakdown

a more granular breakdown of the non-bank counterparty sector into non-bank financial institutions and non-financial counterparties. The latter includes non-financial corporations, households and governments.⁸ The BIS LBS also breaks down banks' positions by instrument. For our purposes, liabilities in the form of deposits are primarily of interest. The detailed breakdown by counterparty sector and instrument is only available in the restricted version of the LBS that reporting central banks have access to.⁹

To distinguish tax haven countries from non-havens we use the list of tax havens in Johannesen and Zucman (2014) who include countries which have either strict bank secrecy laws, legal provisions restricting the access to bank information for tax purposes, or not having treaties for the exchange of information at all. The full list of tax havens can be found in appendix A. Since these criteria are not stable across time and the appropriate list of tax haven countries is subject to debate, we test the robustness of our results using an alternative list employed by Casi et al. (2020).

For our purposes, the 8 out of 19 tax havens covered by the definition of Johannesen and Zucman (2014), which report the detailed sectoral breakdown of their banks' liabilities in the BIS LBS since before joining the AEOI, are of particular interest. In these countries the share of foreign households in banks' total cross-border liabilities vis-à-vis the non-bank sector was around 35 percent before countries joined the AEOI framework during our sample period between 2014Q1 and 2019Q4 (Table 1). This is considerably higher than for the 12 non-haven countries which report the detailed breakdown where cross-border liabilities vis-à-vis households account for only 10 percent. However, it is lower than 50 percent as ad-hoc assumed by Johannesen and Zucman (2014).¹⁰

As regards other financial instruments, i.e. bilateral foreign direct investment and portfolio investment, we employ the International Monetary Fund's Coordinated Direct Investment Survey (CDIS) and Coordinated Portfolio Investment Survey (CPIS), respectively. These data are available for a wider set of countries than the BIS LBS. The full list of countries can be found in Table A.2 in the appendix. Out of the more than 40 US dollar (USD) trillion in total bilateral portfolio investment asset positions recorded in the CPIS at mid-2014, almost 40 percent involved a tax haven as one of the counterparties. For equity investment, the share even reached around 45 percent. Tax havens are also major counterparties in international direct investment, being involved in 46 percent of global bilateral asset and more than 50 percent of global bilateral liability positions in 2014, which amounted to close to 28 USD trillion that year, according to the CDIS.

⁸The household sector refers collectively to households and non-profit institutions serving households.

⁹One caveat is that the restricted version of the LBS available to reporting central banks might provide only partial coverage for some country pairs in case of confidentiality of certain observations which would only be visible to the BIS. This concern is alleviated by the fact that reporting countries considered as tax havens in the literature do typically not make use of this additional layer of confidentiality, according to information kindly provided by the BIS.

¹⁰It is, of course, conceivable that the share of household deposits was indeed higher during the period that Johannesen and Zucman (2014) analysed and has fallen as a consequence of earlier efforts to curb tax evasion.

2.3 Tax Treaties and Offshore Deposits

In this section we provide some graphical evidence on the evolution of cross-border deposits by non-bank investors held in non-havens and havens as defined by Johannesen and Zucman (2014). Figure 2 shows the evolution of aggregate deposit liabilities of banks located in tax haven countries vis-à-vis non-banks abroad. Since the onset of the global financial crisis these have decreased significantly, from 2.9 trillion USD in 2008 to 1.6 trillion USD in 2019. Conversely, cross-border deposits in non-haven countries recovered swiftly after the global financial crisis and increased markedly, subsequently reaching 6.2 trillion in 2019 USD and thereby surpassing their pre-crisis peak of 4.8 trillion USD recorded in 2008.

Using data on bilateral deposits, Figure 3 shows the evolution of non-haven deposits in haven and non-haven countries centered around the specific date the possibility of AEOI between a country pair was announced. While there was a clear parallel trend before joining the AEOI, deposits in haven countries from non-haven residents began falling around the time both countries signed up for the AEOI framework. There is some evidence of anticipatory effects as the lines began to diverge approximately one year prior to joining the AEOI. Therefore, we confirm that our regression results are robust to accounting for potential anticipation effects (in Section 4.4).

The substantial extent to which deposits have been withdrawn from tax haven countries by savers in non-havens between 2014 and 2018 can be grasped from Figure 4. While the average decrease in deposits in tax havens held by non-haven residents was 24 percent, this masks some heterogeneity across havens. Deposits held in the Cayman Islands and the Bahamas decreased by more than 70 percent, while they increased by 50 and 24 percent in Hong Kong and Malaysia, respectively, and decreased only modestly in Bahrain (-6.3 percent) or Panama (-3.2 percent).

In summary, the graphical evidence suggests that the (threat of) automatic exchange of information coincided with a reduction of deposits by non-banks in tax havens. However, aggregate data on cross-border deposits alone cannot distinguish between tax evasion and avoidance, since the tax filings of the deposit holders remain unobserved. Given that clearly not all cross-border financial activities of countries categorised as tax havens are related to illegal tax evasion, it is important to run more rigorous econometric tests to establish the effect of the threat of AEOI on cross-border deposits in tax havens. Since deposits and other forms of investment related to transparent and legal tax avoidance strategies, for example, should not react to the threat of information exchange (Menkhoff & Miethe, 2019), the panel regression analysis fully exploiting the bilateral nature of our dataset in the following section can shed more light on potential tax evasion in cross-border investment positions of tax havens.

3 Empirical Strategy

3.1 Estimation Strategy for Deposits

We build on Johannesen and Zucman (2014) and estimate the following regression specification to test whether entering a bilateral automatic exchange relationship had a statistically

significant impact on deposits held in tax haven countries:

$$\ln(Dep_{ijt}) = \alpha + \beta * Sig_{ijt} + \gamma_{ij} + \theta_{jt} + \phi_i + \epsilon_{ijt} \quad (1)$$

where Dep_{ijt} is the *log* of deposits in reporting country i from counterparty (or “saver”) country j . Sig_{ijt} is a dummy variable equal to one from quarter t in which both countries of a given country pair entered a bilateral exchange relationship (see Section 2.1 for further details).

Country pair, reporting country, and saver country time fixed effects are denoted by γ_{ij} , ϕ_i , and θ_{jt} , respectively. Pair fixed effects control for time-invariant factors like distance and common language, while saver country time fixed effects control for unobserved developments specific to saver countries. Controlling for these developments is key, since they might affect the supply of deposits in tax havens. For example, non-haven saver countries have started various domestic amnesties and voluntary disclosure programs during the period studied which could drive part of the reduction in cross-border deposits in haven countries depicted in Figure 2 (Menkhoff & Miethe, 2019).¹¹ Standard errors are robust to autocorrelation and heteroscedasticity and clustered at the country-pair level. We use this empirical setup in all regressions we present and outline any changes to the specification in the text.¹²

We start our analysis in the first quarter of 2014. We control for the impact of previous treaties with the pair fixed effects γ_{ij} . Having said this, the effect of these treaties dissipated from 2010 onward as shown by Menkhoff and Miethe (2019).

The coefficient of interest in all our estimations is β . We expect β to be statistically different from zero and negative for deposits in tax havens from non-banks resident in non-haven countries. Since the information exchanged refers to individual account holders, we expect the effect of AEOI to be limited to household deposits. Deposits from banks should not be affected (Menkhoff & Miethe, 2019). Deposits from NFCs and NBFIs could be affected negatively if they are related to tax evasion strategies through shell corporations, in particular if authorities are aware of the ultimate beneficiaries of the accounts. However, if evaders manage to successfully obfuscate their ownership these types of deposits might not be affected or may even increase after AEOI introduction.¹³ As shown by Sharman (2010), setting up anonymous shell companies with corporate bank accounts might not be easy given “know your customer” requirements for financial institutions, but still possible in many cases. Hence, the sign of β is an empirical question in this case which we answer in our analysis.

¹¹Note that the effect of these programs is somewhat ambiguous since they might also increase tax evasion in certain cases, as found for voluntary disclosure by Langenmayr (2017) or decrease the number of undisclosed offshore accounts as documented for US enforcement efforts by Johannesen, Langetieg, Reck, Risch, and Slemrod (2020).

¹²Note that this empirical framework differs from the case study design employed by Casi et al. (2020). We show that our results are robust to using the alternative specification in appendix B.

¹³NFC and NBF deposits would also not be affected in case they are not related to tax evasion purposes, of course.

3.2 Estimation Strategy for portfolio investment and FDI

We extend the analysis of the effect of AEOI to foreign portfolio and foreign direct investment (FDI) positions. Hence, Dep_{ijt} represents the log of portfolio and direct investment between country i and j , respectively in these estimations.

Since bilateral data on these alternative forms of bilateral investment positions are available at semi-annual and annual frequency only, respectively, we collapse Sig_{ijt} to the respective frequency. In order to still be able to compare investment positions in tax havens and non-havens before and after joining the AEOI framework, we start our sample period in 2014H1 for portfolio investment and in 2013 for FDI.

We expect β to be negative and significant for equity portfolio investment assets reported by tax havens vis-à-vis non-havens. Since we focus on the effect of AEOI between countries i and j , this would be consistent with a reduction in round-tripping of assets by tax evaders in which they park deposits in tax havens which are in turn invested in their country of residence to earn capital income, which is hidden from domestic tax authorities (De Simone, Lester, & Markle, 2020; Hanlon, Maydew, & Thornock, 2015; Heckemeyer & Hemmerich, 2020). We do expect a similar result for FDI assets reported by havens vis-à-vis non-havens since these assets require details about the ultimate owner (because of the controlling ownership characteristic) and would hence become less suited for tax evasion purposes after these information get collected and potentially exchanged by authorities in the AEOI. However, if these FDI investments were related to the setting up of sham corporations which continue to successfully hide the true owner, there might be no or even a positive effect.

4 Findings

In this section we present the results of our econometric analysis. We start by detailing the estimated effects of AEOI on bank deposits, the most widely looked-at measure in the literature. We extend the existing literature by providing results for the full sectoral breakdown of bilateral deposit data available in the restricted version of the BIS LBS. Subsequently, we complement our results for bank deposits by presenting estimates of the effect of AEOI on other forms of investment channelled through tax havens, i.e. portfolio and direct investment and show that our results are robust to various alternative specifications.

4.1 Deposits

4.1.1 Deposits by non-banks

To establish comparability with estimates in the literature, we start by showing the results for non-bank deposits (Table 2). Column 1 reveals that deposits in haven countries decrease after a country pair has joined the AEOI framework. In column 2 we restrict the sample to country pairs that include only non-haven saver countries.¹⁴ This leads to a larger coefficient,

¹⁴Note that we do not restrict the non-haven sample to OECD and EU countries only like in Casi et al. (2020), as tax evasion and illicit capital flows to offshore havens are also prevalent in other countries (Andersen, Johannesen, & Rijkers, 2021).

highlighting that AEOI treaties induce non-banks to reduce their deposits in haven countries. On average, the signature of an AEOI treaty reduces non-bank deposits by 12.5 per cent.¹⁵ This is similar in magnitude to the effect of information on demand treaties estimated by Johannesen and Zucman (2014) who found that non-bank deposits decrease by 11 per cent. Casi et al. (2020) find that the "CRS induced a reduction of 11.9 per cent in cross-border deposits parked in traditional offshore countries". Moreover, we find in line with our expectations that non-bank deposits between haven countries (column 3) and those from haven countries in non-havens (column 4) are not affected by the signature of AEOI treaties.

Finally, column 5 sheds light on the timing of the response to AEOI signature. Following Johannesen and Zucman (2014) we include a dummy equal to one in the quarter t of the announcement of a country pair becoming subject to AEOI (contemp.), dummies equalling one in quarter $(q) + 1$, $q + 2$, and $q + 3$ respectively, and a dummy equal to one in all quarters after $q + 3$. This allows for the fact that AEOI treaties may not enter into force immediately after a country commits to signing it into national law and provides an estimate of the longer-term effect of AEOI treaties.¹⁶ We find that the strongest quarterly impact occurs immediately after the announcement, while the effect seems to dissipate somewhat over time, as found in Menkhoff and Miethe (2019), while remaining significantly negative.

4.1.2 Deposits by sub-sectors

To gain deeper insights of the effect of AEOI treaties we make use of the restricted version of the bilateral BIS data, which provides a breakdown of the non-bank sector into sub-sectors.

Table 3 shows the estimation results for deposits by households. For comparability reasons column 1 reports a re-estimated coefficient for non-bank deposits for the smaller sample of country pairs that the household sector breakdown is available for. The estimate is similar to the one reported in column 2 of Table 2, albeit slightly larger. Column 3 of Table 3 highlights that households reduced their deposits in haven countries particularly strongly, i.e. by 28.5 per cent. Note that this is similar but larger than what one would obtain using the Johannesen and Zucman (2014) approximation of multiplying the non-bank deposits estimate by two assuming that 50 per cent of all non-bank deposits in tax havens belong to households. Column 6 shows that the effect of the AEOI on deposits from households is very persistent and even becomes stronger over time. This result is confirmed by an alternative specification in which we replicate the case study design of Casi et al. (2020), presented in Figure B.1.

To gain some intuition of the economic significance of our estimate of a reduction in household deposits by 28.5 per cent, we can apply it to the 245 USD billion in deposits that non-haven households held in reporting havens in our sample prior to the latter joining the AEOI. This would imply that non-haven households withdrew approximately 70 USD billion from our sample of haven countries. As noted by Menkhoff and Miethe (2019) such estimates can be considered lower bounds of the effect of the AEOI because of the limited, albeit representative, sample of tax havens, as well as the fact that wealth stored in financial institutions other than

¹⁵ $\exp(-0.134) - 1 = -0.125$.

¹⁶Comparing signature dates to the dates of CRS introduction into national law published by Casi et al. (2020), the average gap between committing to the CRS and introducing it into national law is 4 quarters.

banks is not considered.

As expected, we do not find a significant effect of AEOI signatures on household deposits reported by tax havens vis-à-vis other tax haven residents (column 4), but perhaps surprisingly there is a significant negative coefficient for haven resident household deposits held in non-haven banks (column 5). In fact, the latter result is consistent with the reaction to IoR treaties which Menkhoff and Miethe (2019) found for deposits from non-banks resident in tax havens to non-haven banks.¹⁷ This may imply that tax haven resident entities deposit funds in non-havens which include funds of residents of non-havens, but disguised as tax haven residents. The fact that we document a decline in these deposits for the household sector only, which includes non-profit organisations serving households, implies – on the one hand – that funds by sham foundations and non-haven residents posing as haven residents became vulnerable to detection by the AEOI treaties and were withdrawn in response. On the other hand, since, as we document below, we do not find a similar effect for haven deposits in non-havens from NBFIs or NFCs, this might not be the case for shell companies or trusts.

Table 4 repeats the exercise for deposits of non-bank financial institutions. Deposits in haven countries from such companies which are resident in non-haven countries are not affected by the AEOI treaties, as evident from columns 1 and 2. However, column 3 shows that deposits in haven countries from non-bank financial institutions in other haven countries increase significantly when both countries are part of the AEOI. This points to the possibility that networks of shell companies in haven countries became more elaborate after haven countries joined the AEOI. In turn, this might make it more difficult for tax authorities in non-haven countries to identify the ultimate owner of deposits due to the complex corporate structures employed. As posited by Menkhoff and Miethe (2019) shell companies with beneficial owners close to, but not identical to, the tax evader are an example of such structures. The tax evader alleviates agency problems with these structure, while retaining an element of control. At the same time AEOI treaties can be circumvented by veiling the true identity of the evader since tax haven resident banks do not have information about the actual tax evader to submit to tax agencies in non-haven countries. Table 5 shows that deposits by non-financial corporations are not affected by the AEOI framework, which highlights once more the importance of looking at the data for deposits by households directly.¹⁸

4.1.3 Deposit shifting

The importance of using the granular breakdown of deposit data is further underlined when we turn to an analysis of deposit shifting. Table 7 takes into account potential deposit shifting behavior by tax evaders in non-haven countries, following Johannesen and Zucman (2014). We introduce in columns 1–4 a treaty coverage variable that simply counts the number of treaties

¹⁷The authors argue that “the ownership structure of shell companies, private foundations, and trusts, as well as the connected bank accounts, is theoretically vulnerable to detection if, for example, the tax evader is documented as a beneficial owner. Thus, while single deposits cannot be followed through the tax haven cloud, the analysis of inbound deposits provides a second angle for tax authorities in home countries to tackle tax evasion. They can take the occurrence of such inbound deposits to investigate their ownership and look for evidence of illegal behavior.” (Menkhoff & Miethe, 2019, p. 54)

¹⁸As expected no significant results are found for deposits by banks (Table 6).

signed by saver country j with all havens other than reporting haven country i . A positive and significant coefficient on this variable would indicate that an additional AEOI treaty with another haven country increases the deposits held by saver country j 's residents in tax haven i , as noted and found by Johannesen and Zucman (2014) in the case of information-on-request treaties.¹⁹ The fact that we do not find a significant effect of the AEOI treaties for non-bank deposits in Table 7 (column 2) might suggest that deposit shifting did not occur for these new forms of information exchange. However, making use of the more granular breakdown of deposits, we find evidence that deposit shifting by households indeed took place. Column 4 suggests that such shifting occurs to the benefit of havens which did not sign up to the AEOI framework (yet). In such havens, an additional treaty signed by non-haven j generates an increase of 3.1 percent in deposits from households resident in this non-haven. By contrast, the havens for which an automatic exchange of information with non-haven j is legislated see deposits reduced by a further 1.7 percent. These results are robust to using a measure of treaty coverage which weighs treaties according to their importance.²⁰ As column 8 shows, this measure of treaty coverage yields similar results to those obtained with the count measure. An AEOI treaty between a non-haven and a haven which accounted for 10 percent of deposits by the respective non-haven residents in tax havens induces a 2.6 percent increase in deposits if the haven country is not signed up to the AEOI, while it decreases the deposits by 1.35 percent if the haven already shares information with the non-haven. The fact that an additional treaty with other havens increases the effect of the bilateral signature of an AEOI type treaty indicates that the wider the web cast by this latest effort to curb international tax evasion, the more effective the measure becomes. However, our results also imply that households reacted to AEOI in a similar manner documented by Johannesen and Zucman (2014) in that they shifted deposits to non-participating havens.

4.2 Portfolio Investment

We proceed with the analysis for portfolio equity assets (presented in Table 8). The results show a significantly negative effect of AEOI treaties on bilateral portfolio investment assets reported by tax haven residents vis-à-vis non-haven residents (column 2) which is in line with Heckemeyer and Hemmerich (2020). These authors found a negative effect on OECD-bound portfolio investment from tax havens for the earlier information-on-request treaties.²¹

Hence, our results imply that AEOI further reduced the round-tripped investment from non-havens via tax havens. Such round-tripping may be in the form of deposits from non-haven residents parked in tax havens, but not being absorbed locally. Instead, these funds are invested in portfolio equity assets (including investment funds) in the non-haven country

¹⁹Notably we need to drop the time-varying saver country fixed effects due to their collinearity with the treaty coverage variable in this specification.

²⁰Following Johannesen and Zucman (2014), we compute the share of j 's deposits in tax havens deposited in i at the beginning of our sample, i.e. in 2014Q1. These shares "measure the relative importance of haven i to tax evaders of country j and are exogenous to recent policy developments" (Johannesen & Zucman, 2014, p. 81). For each haven-non-haven pair (i, j) , we use the shares to weigh each treaty concluded by j with havens other than j .

²¹De Simone et al. (2020) document such effects also for FATCA.

where the deposits originated from.

4.3 Foreign Direct Investment

Starting with the assets side of FDI (Table 9) we find that non-havens report decreasing FDI asset positions in tax havens after joining the AEOI (column 4). This suggests that part of these assets were related to corporate structures with a tax-evading purpose. Moreover, even if these assets were not directly linked to tax evasion, the mere existence of AEOI treaties may have induced investors to withdraw FDI funds from haven countries to avoid triggering investigations. Interestingly, we observe a positive effect on FDI assets between tax havens (column 3) which would be consistent with the “network of sham corporations” in tax havens which we also observe in bank deposits of NFBIs.

Turning to the liabilities side, non-havens joining the AEOI framework report decreasing FDI liability positions vis-à-vis havens (Table 10). This could be evidence of a termination of round-tripping schemes as observed for portfolio equity.

4.4 Robustness

In order to test the robustness of our results we start by adding a measure of financial linkages in the regression analysis, following Menkhoff and Miethe (2019). These are bilateral financial weights constructed using total claims against all international counterparties. Columns 1 and 6 of Table 11 show that these weights are statistically significant, but do not change the coefficients of interest in any meaningful way.

In a second robustness check, we account for the possibility that various leaks of information on account holders in tax haven countries that occurred during our sample period were actually driving the reduction of deposits in haven countries.²² We test this hypothesis by including a dummy variable equal to 1 for haven and non-haven country pairs in the quarter after the leak occurred in the respective tax haven.²³ As shown in columns 2 and 7 of Table 11 the results remain robust.

Third, we exclude a potentially important country pair outlier, i.e. the deposits of the US in Cayman Islands as US savers decreased their deposits in the Caymans substantially during our sample period, more than in any other country pair observation in our sample. However, as shown in columns 3 and 8 of Table 11, the estimates of the effect of AEOI treaties are not affected by the exclusion of these observations.

A fourth robustness check tests whether our results depend on the classification of tax havens based on Johannesen and Zucman (2014). As an alternative, we use the narrower list of tax havens in Casi et al. (2020), which does not classify Austria, Belgium, Chile, Macao, Malaysia, and Curacao as havens. While the coefficient for non-bank deposits is slightly reduced in size and, in fact, very close to the one reported in Casi et al. (2020) (Table 11, column 4),

²²O’Donovan, Wagner, and Zeume (2019) show, for example, that companies reduced tax avoidance in response to the Panama Paper leaks.

²³2014q1 for Switzerland, 2015q4 for Luxembourg, 2016q2 for Panama, 2016q4 for Bahamas, see Ahrens and Bothner (2020). The results are also robust if we do not lag the leak variables (not reported).

the coefficient estimate for household deposits is virtually unaffected by the change in sample (column 9).²⁴

In a final robustness check, we test whether anticipation effects are affecting our results. To do so, we include a dummy equal to one in the two quarters prior to a given country pair becoming part the AEOI framework. The estimates of the effects of AEOI signature remain highly statistically significant and virtually unchanged in size, as shown in Table 11 columns 5 and 10. For non-bank deposits we do not find any evidence of anticipation effects, whereas there is some evidence of households on non-haven countries beginning to withdraw deposits from havens in anticipation of the AEOI.²⁵

5 Conclusion

We extend the literature on the effect of AEOI treaties facilitated by the OECD CRS and US FATCA by using both restricted data on deposits held in tax haven jurisdictions from the BIS locational banking statistics, as well as data on portfolio investment and FDI from the IMF. Using these more detailed data, an extended country- and a longer time period, we answer some hitherto open questions regarding the effect of AEOI on deposits of non-haven residents in tax havens.

First, the more granular sectoral breakdown of bilateral cross-border deposit data allows us to show that the AEOI significantly reduced cross-border deposits held by non-resident households in tax havens, while deposits of non-bank financial institutions (NBFIs) and non-financial corporations (NFCs) in tax havens were unaffected. In particular, we find that bilateral household deposits from non-haven countries in haven banks decrease by 28.5 percent upon signature of the AEOI legislation, while the effect on deposits by the broader non-bank sector is found to be only 12.5 percent, similar to the 11.5 percent effect found in Casi et al. (2020).

Second, we do find the impact of the AEOI to be persistent, in contrast to results documented for earlier bilateral initiatives for information exchange on demand, as documented by Menkhoff and Miethe (2019).

Third, in the granular breakdown of our data, we also document evidence of deposit shifting by the household sector to havens not participating in AEOI, in line with Johannesen and Zucman (2014) for earlier information on demand treaties.

In a further extension of the literature on the effects of AEOI treaties, we document a significantly negative effect of AEOI on portfolio investment assets reported by tax haven residents vis-à-vis non-haven residents, in line with the results in Heckemeyer and Hemmerich (2020) for earlier information on demand treaties. Moreover, we show that FDI liability positions of non-havens vis-à-vis havens decline significantly after joining the AEOI providing further evidence of a reduction in round-tripping schemes. In addition, we observe that non-havens report decreasing FDI asset positions in tax havens after joining the AEOI, suggesting that part of these assets were related to corporate structures with a tax-evading purpose.

²⁴Casi et al. (2020) restrict the sample of saver countries to OECD and EU countries. We obtain results very similar to the ones depicted in Table 11 when replicating this approach.

²⁵The results remain also intact when we vary the forward length between 1 and 4 quarters.

However, we also find some evidence of negative side effects of the AEOI. In particular, banks in haven countries report increasing deposits from NBFIs resident in other tax havens after AEOI introduction. We interpret this as evidence that networks of shell companies used to obfuscate ultimate beneficiaries of account holders might have become more elaborate. This is corroborated by the finding that signing up to the AEOI framework is associated with a positive effect on FDI assets between tax havens. Hence, future policy initiatives should be aimed at increasing transparency regarding ultimate ownership of investments, by looking through corporate structures.

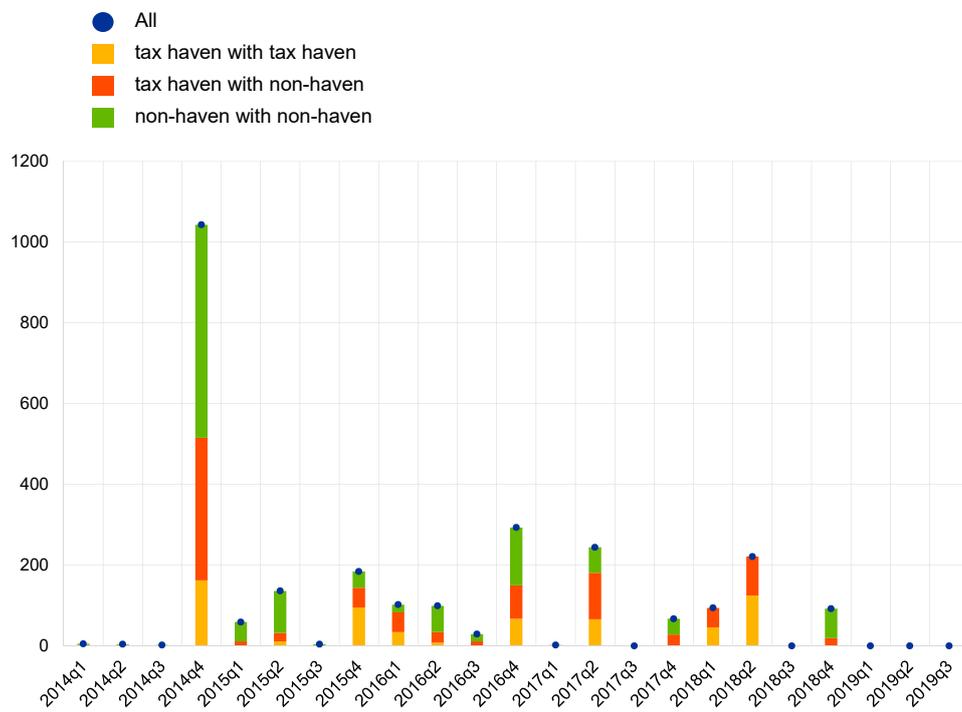
Taken together, our results suggest that the implementation of automatic information exchange is effective in limiting tax evasion by less sophisticated investors. However, it might not be equally effective for those who are able to use more complex administrative structures, such as shell companies, trusts, etc., as also argued by Johannesen and Zucman (2014). Moreover, our results imply that the AEOI is more effective than earlier initiatives in that it is more persistent but remains incomplete as long as non-participating haven countries allow households to shift deposits. Hence, future policy initiatives should be aimed at widening the network of AEOI treaties, as well as increasing transparency regarding ultimate ownership of investments by looking-through corporate structures.

References

- Ahrens, L., & Bothner, F. (2020). The big bang – tax evasion after automatic exchange of information under FATCA and CRS. *New Political Economy*, 25(6), 849–864.
- Alstadsæter, A., Johannesen, N., & Zucman, G. (2019). Tax evasion and inequality. *American Economic Review*, 109(6), 2073–2103.
- Andersen, J. J., Johannesen, N., & Rijkers, B. (2021). Elite capture of foreign aid: Evidence from offshore bank accounts. *Journal of Political Economy*, forthcoming.
- Avdjiev, S., McGuire, P., & Wooldridge, P. D. (2015). Enhanced data to analyse international banking. *BIS Quarterly Review September*.
- Casi, E., Spengel, C., & Stage, B. M. (2020). Cross-border tax evasion after the common reporting standard: Game over? *Journal of Public Economics*, 190, 104240.
- Christensen, I., Henry, & Tirard, J.-M. (2016). The amazing development of exchange of information in tax matters: from double tax treaties to FATCA and the CRS. *Trusts & Trustees*, 22(8), 898–922.
- De Simone, L., Lester, R., & Markle, K. (2020). Transparency and tax evasion: Evidence from the foreign account tax compliance act (fatca). *Journal of Accounting Research*, 58(1), 105–153.
- Hanlon, M., Maydew, E. L., & Thornock, J. R. (2015). Taking the long way home: US tax evasion and offshore investments in US equity and debt markets. *The Journal of Finance*, 70(1), 257–287.
- Heckemeyer, J. H., & Hemmerich, A. K. (2020). Information exchange and tax haven investment in OECD securities markets. *National Tax Journal*, 73(2), 291–330.
- Johannesen, N., Langetieg, P., Reck, D., Risch, M., & Slemrod, J. (2020). Taxing hidden wealth: The consequences of us enforcement initiatives on evasive foreign accounts. *American Economic Journal: Economic Policy*, 12(3), 312–46.
- Johannesen, N., & Zucman, G. (2014). The end of bank secrecy? An evaluation of the G20 tax haven crackdown. *American Economic Journal: Economic Policy*, 6(1), 65–91.
- Lane, P. R., & Milesi-Ferretti, G. M. (2018). The external wealth of nations revisited: International financial integration in the aftermath of the global financial crisis. *IMF Economic Review*, 66(1), 189–222.
- Langenmayr, D. (2017). Voluntary disclosure of evaded taxes — increasing revenue, or increasing incentives to evade? *Journal of Public Economics*, 151, 110–125.
- Luna, P. G., & Hardy, B. (2019). Non-bank counterparties in international banking. *BIS Quarterly Review September*.
- Menkhoff, L., & Miethe, J. (2019). Tax evasion in new disguise? Examining tax havens’ international bank deposits. *Journal of Public Economics*, 176, 53–78.
- O’Donovan, J., Wagner, H. F., & Zeume, S. (2019). The value of offshore secrets: Evidence from the Panama Papers. *The Review of Financial Studies*, 32(11), 4117–4155.
- Sharman, J. C. (2010). Shopping for anonymous shell companies: An audit study of anonymity and crime in the international financial system. *Journal of Economic Perspectives*, 24(4), 127–40.

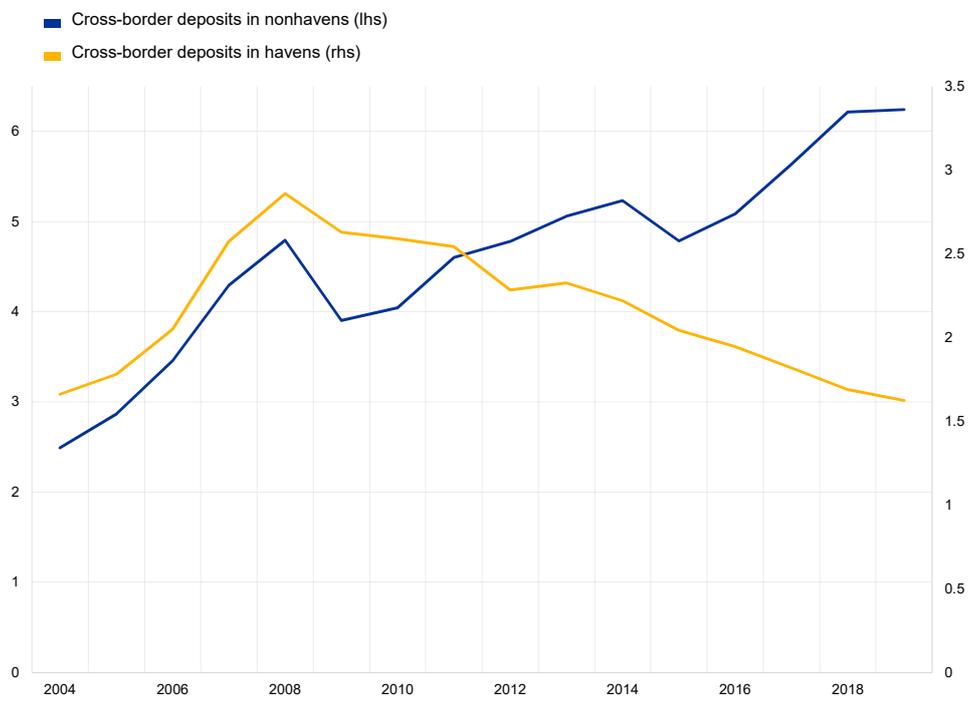
Slemrod, J. (2015). Tax compliance and enforcement: New research and its policy implications.
Ross School of Business Working Papers, 1302.

Figure 1: New automatic information exchange relationships over time



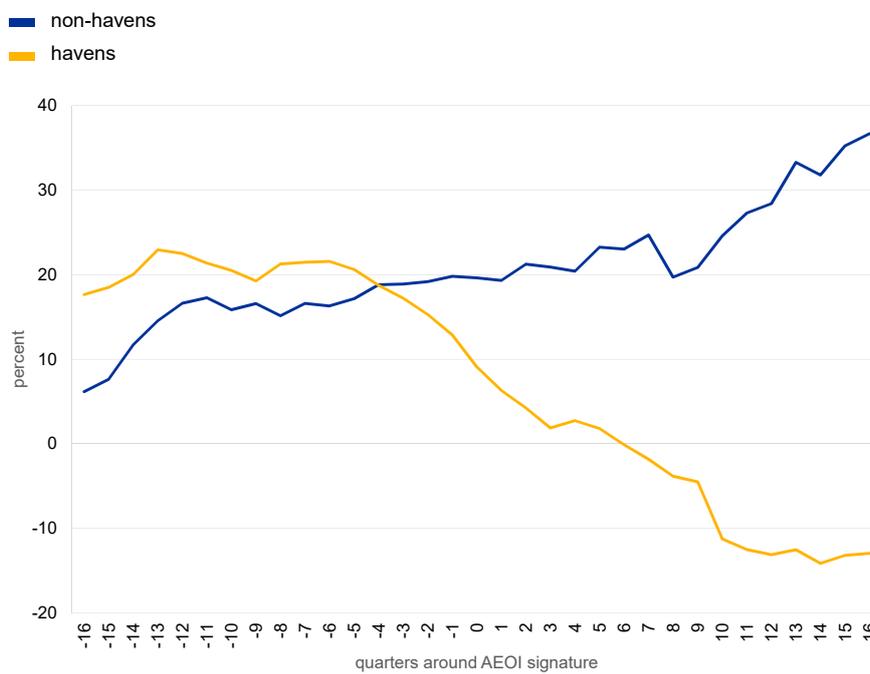
Note: Number of country pairs in the BIS LBS becoming covered by an AEOI treaty in the respective quarter. Tax haven classification according to Johannesen and Zucman (2014).

Figure 2: Non-bank cross-border deposits in haven and non-haven countries, 2004 -2019 (trillions USD)



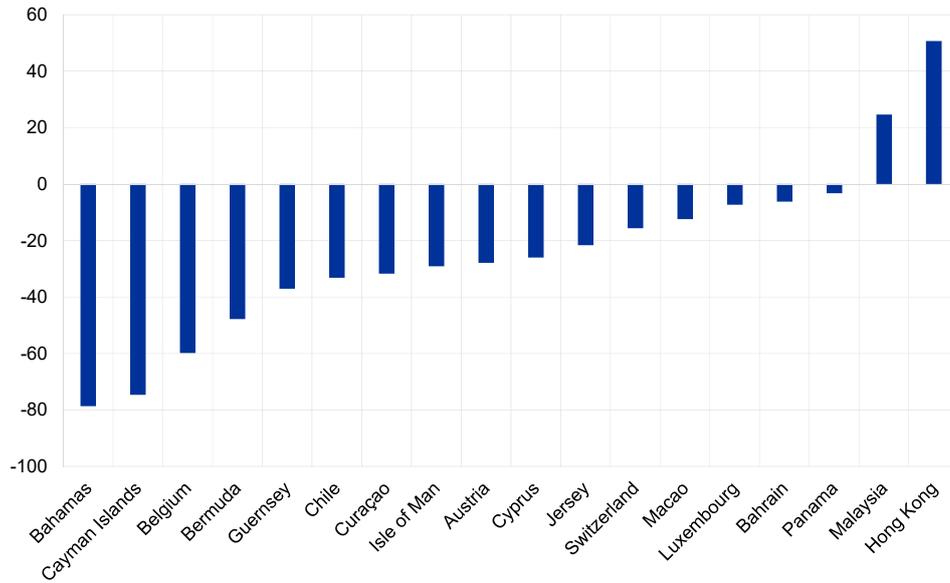
Note: sum of yearly averages of quarterly cross-border deposit liabilities vis-à-vis non-banks across individual reporting countries. Tax havens classified according to Johannesen and Zucman (2014). Source: BIS, authors' calculations.

Figure 3: Non-haven deposits in haven and non-haven countries around joining the AEOI



Note: Average deviation from country pair long term mean (since 2000) in bilateral non-bank deposits. $t=0$ signature of AEOI. Tax havens classified according to Johannesen and Zucman (2014).

Figure 4: Non-bank deposit growth by tax haven, 2014Q1 -2018Q4 (percent)



Note: Percentage change in deposits from all non-haven countries between 2014Q1 and 2018Q4. Tax havens classified according to Johannesen and Zucman (2014).

Table 1: Share of liabilities vis-à-vis households

	Non-havens		Havens	
	HH/All	HH/NB	HH/All	HH/NB
Pre-AEOI	3.71	10.17	19.07	34.74
2Y post AEOI	3.26	10.74	18.19	34.72

Note: Share of cross-border liabilities vis-à-vis households (HH) in all instruments and sectors (All) and non-banks (NB) reported by banks resident in haven and non-haven countries in the last quarter before and 2 years after joining the AEOI framework, respectively. See table A.1 for details on the country sample.

Table 2: Log of non-bank deposits in reporting country i from saver country j

	(1)	(2)	(3)	(4)	(5)
Signed	-0.098** (0.044)	-0.134*** (0.046)	0.060 (0.119)	-0.012 (0.105)	
Signed (contemp.)					-0.162*** (0.046)
Signed (+1 quarter)					-0.140*** (0.048)
Signed (+2 quarters)					-0.123** (0.052)
Signed (+3 quarters)					-0.121** (0.053)
Signed (>3 quarters)					-0.115* (0.065)
Obs.	57,782	50,810	6,972	8,354	50,810
R^2	0.94	0.94	0.93	0.94	0.94
Time period	2014q1-2019q4	2014q1-2019q4	2014q1-2019q4	2014q1-2019q4	2014q1-2019q4
Reporting	Haven	Haven	Haven	Non-haven	Haven
Saver	All	Non-haven	Haven	Haven	Non-haven
Pair FE	yes	yes	yes	yes	yes
Reporting FE	yes	yes	yes	yes	yes
Saver time FE	yes	yes	yes	yes	yes

Note: Signed is a dummy equal to 1 if there exists a treaty providing for automatic information exchange between i and j in quarter q . Signed (contemp.) is a dummy equal to 1 in the quarter q when the legal event establishing information exchange between i and j occurs; signed (+1 quarter) is a dummy equal to 1 in $q + 1$, and so on. Robust standard errors (clustered at the country-pair level) in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 3: Log of deposits in reporting country i from saver country j vis-à-vis non-banks and households

	(1) Non-banks	(2)	(3)	(4) Households	(5)	(6)
Signed	-0.186* (0.101)	-0.299*** (0.081)	-0.336*** (0.091)	-0.145 (0.181)	-0.375** (0.180)	
Signed (contemp.)						-0.204** (0.082)
Signed (+1 quarter)						-0.240*** (0.080)
Signed (+2 quarters)						-0.438*** (0.106)
Signed (+3 quarters)						-0.463*** (0.108)
Signed (>3 quarters)						-0.555*** (0.135)
Obs.	26,489	29,557	26,489	3,068	4,485	26,489
R^2	0.96	0.96	0.95	0.95	0.95	0.95
Time period	2014q1- 2019q4	2014q1- 2019q4	2014q1- 2019q4	2014q1- 2019q4	2014q1- 2019q4	2014q1- 2019q4
Reporting Saver	Haven Non-haven	Haven All	Haven Non-haven	Haven Haven	Non-haven Haven	Haven Non-haven
Pair FE	yes	yes	yes	yes	yes	yes
Reporting FE	yes	yes	yes	yes	yes	yes
Saver time FE	yes	yes	yes	yes	yes	yes

Note: Signed is a dummy equal to 1 if there exists a treaty providing for automatic information exchange between i and j in quarter q . Signed (contemp.) is a dummy equal to 1 in the quarter q when the legal event establishing information exchange between i and j occurs; signed (+1 quarter) is a dummy equal to 1 in $q + 1$, and so on. Robust standard errors (clustered at the country-pair level) in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 4: Log of non-bank financial institution deposits in reporting country i from saver country j .

	(1)	(2)	(3)	(4)	(5)
Signed	0.038 (0.117)	-0.086 (0.133)	0.401* (0.231)	-0.107 (0.160)	
Signed (contemp.)					-0.065 (0.114)
Signed (+1 quarter)					-0.006 (0.132)
Signed (+2 quarters)					-0.133 (0.152)
Signed (+3 quarters)					-0.128 (0.162)
Signed (>3 quarters)					-0.152 (0.186)
Obs.	15,139	12,036	3,103	4,707	12,036
R^2	0.90	0.90	0.91	0.93	0.90
Time period	2014q1-2019q4	2014q1-2019q4	2014q1-2019q4	2014q1-2019q4	2014q1-2019q4
Reporting Saver	Haven All	Haven Non-haven	Haven Haven	Non-haven Haven	Haven Non-haven
Pair FE	yes	yes	yes	yes	yes
Reporting FE	yes	yes	yes	yes	yes
Saver time FE	yes	yes	yes	yes	yes

Note: Signed is a dummy equal to 1 if there exists a treaty providing for automatic information exchange between i and j in quarter q . Signed (contemp.) is a dummy equal to 1 in the quarter q when the legal event establishing information exchange between i and j occurs; signed (+1 quarter) is a dummy equal to 1 in $q + 1$, and so on. Robust standard errors (clustered at the country-pair level) in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 5: Log of non financial corporation deposits in reporting country i from saver country j .

	(1)	(2)	(3)	(4)	(5)
Signed	0.132 (0.125)	0.132 (0.139)	0.136 (0.283)	0.239 (0.206)	
Signed (contemp.)					0.014 (0.136)
Signed (+1 quarter)					0.085 (0.132)
Signed (+2 quarters)					0.191 (0.163)
Signed (+3 quarters)					0.228 (0.160)
Signed (>3 quarters)					-0.050 (0.220)
Obs.	19,763	16,850	2,912	4,316	16,850
R^2	0.91	0.90	0.91	0.92	0.90
Time period	2014q1-2019q4	2014q1-2019q4	2014q1-2019q4	2014q1-2019q4	2014q1-2019q4
Reporting	Haven	Haven	Haven	Non-haven	Haven
Saver	All	Non-haven	Haven	Haven	Non-haven
Pair FE	yes	yes	yes	yes	yes
Reporting FE	yes	yes	yes	yes	yes
Saver time FE	yes	yes	yes	yes	yes

Note: Note: Signed is a dummy equal to 1 if there exists a treaty providing for automatic information exchange between i and j in quarter q . Signed (contemp.) is a dummy equal to 1 in the quarter q when the legal event establishing information exchange between i and j occurs; signed (+1 quarter) is a dummy equal to 1 in $q + 1$, and so on. Robust standard errors (clustered at the country-pair level) in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 6: Log of bank deposits in reporting country i from saver country j

	(1)	(2)	(3)	(4)	(5)
Signed	0.086	0.117	0.002	-0.046	
Signed (contemp.)	(0.081)	(0.082)	(0.214)	(0.167)	0.127 (0.085)
Signed (+1 quarter)					0.131 (0.092)
Signed (+2 quarters)					0.101 (0.094)
Signed (+3 quarters)					0.162 (0.103)
Signed (>3 quarters)					0.025 (0.110)
Obs.	25,255	21,088	4,167	6,326	21,088
R^2	0.90	0.91	0.87	0.90	0.91
Time period	2014q1-2019q4	2014q1-2019q4	2014q1-2019q4	2014q1-2019q4	2014q1-2019q4
Reporting Saver	Haven	Haven	Haven	Non-haven	Haven
Pair FE	All	Non-haven	Haven	Haven	Non-haven
Reporting FE	yes	yes	yes	yes	yes
Saver time FE	yes	yes	yes	yes	yes

Note: Signed is a dummy equal to 1 if there exists a treaty providing for automatic information exchange between i and j in quarter q . Signed (contemp.) is a dummy equal to 1 in the quarter q when the legal event establishing information exchange between i and j occurs; signed (+1 quarter) is a dummy equal to 1 in $q + 1$, and so on. Robust standard errors (clustered at the country-pair level) in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 7: Deposit shifting

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Treaty coverage: Number				Treaty coverage: Share			
	Non-bank		Household		Non-bank		Household	
Signed	-0.213*** (0.055)	-0.004 (0.098)	-0.217*** (0.064)	0.064 (0.071)	-0.228*** (0.052)	-0.114 (0.070)	-0.248*** (0.028)	-0.102*** (0.030)
Treaty coverage	-0.002 (0.004)		-0.002 (0.005)		-0.009 (0.059)		-0.014 (0.027)	
Treaty coverage x Signed		-0.014* (0.007)		-0.017*** (0.005)		-0.114 (0.082)		-0.135*** (0.029)
Treaty coverage x (1-Signed)		0.005 (0.005)		0.031*** (0.009)		0.074 (0.072)		0.263*** (0.057)
Observations	44,140	44,140	25,740	25,740	44,140	44,140	22,204	22,204
R-squared	0.94	0.94	0.96	0.96	0.94	0.94	0.95	0.95
Time period	2014q1- 2019q4	2014q1- 2019q4	2014q1- 2019q4	2014q1- 2019q4	2014q1- 2019q4	2014q1- 2019q4	2014q1- 2019q4	2014q1- 2019q4
Reporting Saver	Haven Non- haven	Haven Non- haven	Haven Non- haven	Haven Non- haven	Haven Non- haven	Haven Non- haven	Haven Non- haven	Haven Non- haven
Pair FE	yes	yes	yes	yes	yes	yes	yes	yes
Reporting FE	yes	yes	yes	yes	yes	yes	yes	yes
Saver FE	yes	yes	yes	yes	yes	yes	yes	yes

Note: The dependent variable is the log of deposits by non-banks or households held by savers of country j in banks of tax haven i at the end of quarter t . Signed is a dummy equal to 1 if there exists a treaty providing for automatic information exchange between i and j in quarter q . In columns 1–3, Treaty coverage counts the number of treaties that j has with tax havens other than i . In columns 4–6 treaty coverage measures the share of the deposits held in 2014 by residents of country j in BIS-reporting havens that are covered by a treaty in quarter q . Robust standard errors (clustered at the country-pair level) in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 8: Log of portfolio equity assets of reporting country i in country j

	(1)	(2)	(3)	(4)
Signed	-0.163*** (0.062)	-0.138** (0.065)	-0.218 (0.139)	0.046 (0.091)
Observations	13,140	9,602	3,538	9,002
R-squared	0.94	0.94	0.93	0.95
Time period	2014h1- 2019h2	2014h1- 2019h2	2014h1- 2019h2	2014h1- 2019h2
Reporting Saver	Haven All	Haven Non-haven	Haven Haven	Non-haven Haven
Pair FE	yes	yes	yes	yes
Reporting time FE	yes	yes	yes	yes
Saver FE	yes	yes	yes	yes

Notes: Signed is a dummy equal to 1 if there exists a treaty providing for automatic information exchange between i and j in quarter q . Signed is a dummy equal to 1 in the quarter q when the legal event establishing information exchange between i and j occurs. Robust standard errors (clustered at the country-pair level) in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 9: Log of FDI assets of reporting country i in country j

	(1)	(2)	(3)	(4)
Signed	0.116 (0.106)	-0.050 (0.098)	0.646** (0.309)	-0.155** (0.073)
Observations	4,043	3,233	810	5,929
R-squared	0.97	0.97	0.96	0.95
Time period	2013-2019	2013-2019	2013-2019	2013-2019
Reporting Host	Haven All	Haven Non-haven	Haven Haven	Non-haven Haven
Pair FE	yes	yes	yes	yes
Reporting FE	yes	yes	yes	yes
Host time FE	yes	yes	yes	yes

Notes: Signed is a dummy equal to 1 if there exists a treaty providing for automatic information exchange between i and j in quarter q. Signed is a dummy equal to 1 in the quarter q when the legal event establishing information exchange between i and j occurs. Robust standard errors (clustered at the country-pair level) in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 10: Log of FDI liabilities in reporting country i from saver country j

	(1)	(2)	(3)	(4)
Signed	0.033 (0.071)	0.008 (0.088)	0.118 (0.096)	-0.142** (0.064)
Observations	4,156	3,106	1,050	8,505
R-squared	0.97	0.97	0.95	0.96
Time period	2013-2019	2013-2019	2013-2019	2013-2019
Reporting Saver	Haven All	Haven Non-haven	Haven Haven	Non-haven Haven
Pair FE	yes	yes	yes	yes
Reporting FE	yes	yes	yes	yes
Saver time FE	yes	yes	yes	yes

Notes: Signed is a dummy equal to 1 if there exists a treaty providing for automatic information exchange between i and j in quarter q. Signed is a dummy equal to 1 in the quarter q when the legal event establishing information exchange between i and j occurs. Robust standard errors (clustered at the country-pair level) in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 11: Robustness checks

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	MM weights	Leaks	Non-bank deposits		Anticipation	MM weights	Leaks	Household deposits		Anticipation
			No KY-US	Casi haven				No KY-US	Casi haven	
Signed	-0.172*** (0.050)	-0.180*** (0.053)	-0.146*** (0.054)	-0.101* (0.054)	-0.199*** (0.060)	-0.281*** (0.092)	-0.297*** (0.095)	-0.365*** (0.110)	-0.364*** (0.110)	-0.322*** (0.103)
MM weight	0.037** (0.015)					0.014*** (0.005)				
Signed (-2 quarters)					-0.069 (0.056)					-0.118* (0.062)
Observations	34,203	46,203	33,481	35,518	46,203	20,054	25,306	20,760	21,260	25,306
R-squared	0.95	0.94	0.95	0.94	0.95	0.97	0.96	0.96	0.96	0.96
Time period	2014q1- 2019q4	2014q1- 2019q4	2014q1- 2019q4	2014q1- 2019q4	2014q1- 2019q4	2014q1- 2019q4	2014q1- 2019q4	2014q1- 2019q4	2014q1- 2019q4	2014q1- 2019q4
Reporting Saver	Haven Non-haven	Haven Non-haven	Haven Non-haven	Haven Non-haven	Haven Non-haven	Haven Non-haven	Haven Non-haven	Haven Non-haven	Haven Non-haven	Haven Non-haven
Pair FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Reporting FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Saver time FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes

Notes: Signed is a dummy equal to 1 if there exists a treaty providing for automatic information exchange between i and j in quarter q . MM weight denotes bilateral financial weight of counterparty j constructed using total claims against all international counterparties, as used in Menkhoff and Miethe (2019). Columns 2 and 6 include dummy variables equal to 1 for haven and non-haven country pairs in the quarter after the a leak occurred in the respective tax haven, i.e. 2014q1 for CH, 2015q4 for LU, 2016q2 for PA, 2016q4 for BH, see Ahrens and Bothner (2020). Columns 3 and 7 exclude the Cayman Island – US country pair. Columns 4 and 8 use a narrower list of tax havens as in in Casi, Spengel, and Stage (2020), which does not classify Austria, Belgium, Chile, Macao, Malaysia, and Curacao as havens. Columns 5 and 10 include a dummy equal to 1 two quarters prior to AEOI signature. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Appendix

A Additional Figures and Tables

Table A.1: Reporting country sample BIS LBS

Non-haven		Haven	
Australia	Korea*	Austria	Hong Kong SAR
Brazil	Mexico	Bahamas*	Isle of Man*
Canada*	Netherlands*	Bahrain	Jersey
China	Philippines	Belgium*	Luxembourg*
Chinese Taipei*	Portugal*	Bermuda*	Macao SAR
Denmark*	Saudi Arabia	Cayman Islands	Malaysia
Finland	South Africa*	Chile	Panama
France*	Spain	Curacao	Singapore
Greece	Sweden*	Cyprus*	Switzerland*
India	Turkey	Guernsey*	
Indonesia	United Kingdom*		
Ireland*	United States		
Italy*			

Note: Reporting countries in our sample of cross-border non-bank deposit data. Countries for which the enhanced sectoral breakdown is available in the restricted BIS LBS prior to announcing AEOI indicated by *. Tax haven classification according to Johannesen and Zucman (2014).

Table A.2: Reporting country sample CPIS and CDIS

Non-haven		Haven
Albania	Latvia	Aruba
Algeria*	Lithuania	Austria
Armenia*	Mali*	Bahamas
Argentina	Mexico	Bahrain†
Australia	Moldova	Barbados†
Azerbaijan*	Lebanon	Belgium
Bangladesh	Mongolia	Bermuda†
Belarus	Montenegro*	Cayman Islands†
Benin*	Morocco*	Chile
Bhutan*	Mozambique*	Curacao*
Bolivia	Myanmar*	Costa Rica
Bosnia*	Namibia*	Cyprus
Botswana*	Nepal*	Guernsey†
Brazil	Netherlands	Gibraltar†
Bulgaria*	New Zealand	Hong Kong SAR
Burkina Faso	Niger*	Isle of Man†
Cabo Verde*	Nigeria*	Jersey†
Cambodia*	North Macedonia	Luxembourg
Canada	Norway	Macao SAR
China	Pakistan	Malaysia
Colombia	Paraguay*	Malta
Croatia*	Peru†	Panama
Czech Rep.	Philippines	Seychelles*
El Salvador*	Poland	Singapore
Côte d'Ivoire*	Portugal	Sint Maarten*
Denmark	Romania	Switzerland
Egypt†	Russia	Uruguay
Estonia	Rwanda*	
Finland	Senegal*	
France	Serbia*	
Georgia*	Saudi Arabia†	
Germany	Slovakia	
Ghana*	Slovenia	
Greece	South Africa	
Guatemala*	Spain	
Honduras	Sri Lanka*	
Hungary	Sweden	
Iceland	Tajikistan*	
India	Tanzania*	
Indonesia	Thailand	
Ireland	Togo*	
Israel	Uganda*	
Italy	Turkey	
Japan	Ukraine	
Kazakhstan	United Kingdom	
South Korea	United States	
Kosovo*	Venezuela	
Kuwait	West Bank and Gaza	
Kyrgyz Rep.*	Zambia*	

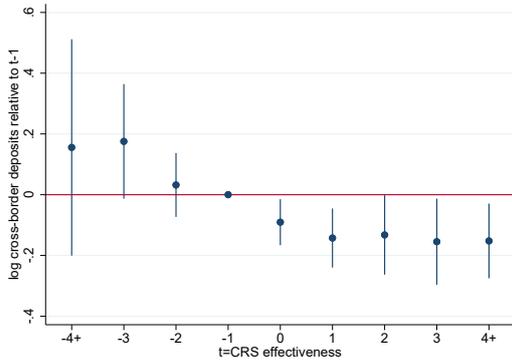
Notes: Reporting countries in our sample of cross-border portfolio (CPIS) and direct investment (CDIS) data. Countries reporting in CDIS but not CPIS denoted by *, countries reporting in CPIS but not CDIS denoted by †. Tax haven classification according to Johannesen and Zucman (2014).

B Case study design following Casi et al. (2020)

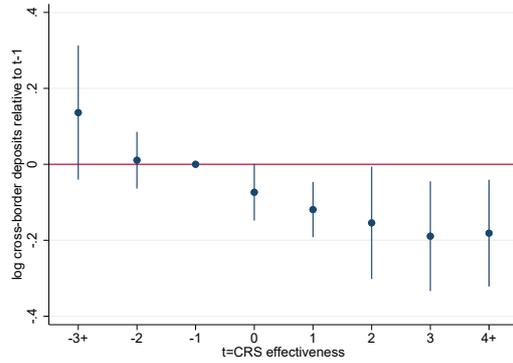
To test the robustness of our results to the econometric specification we replicate the case study design in Casi et al. (2020). Hence, we run the following regression specification:

$$\ln(Dep_{ijt}) = \sum_{k=-4}^4 \beta_k D_{it}^k * Haven_i + \gamma_{ij} + \theta_{jt} + \epsilon_{ijt} \quad (2)$$

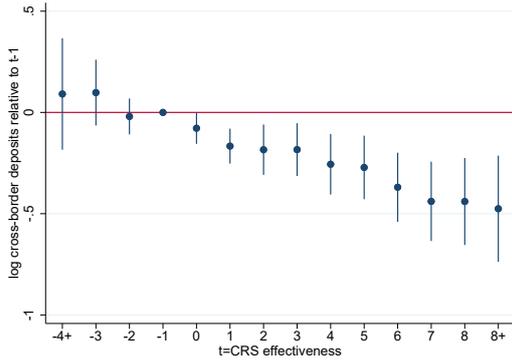
Dep_{ijt} is the *log* of deposits in reporting country i from counterparty or "saver" country j , where saver countries are restricted to be OECD and EU member states. Dummies D_{jt}^k indicate a point in time k periods from the AEOI treatment and its interaction with $Haven_i$, which is a dummy taking the value of one when the reporting country is a tax haven. Here, the AEOI treatment is the passage of the CRS law in reporting country i at time t , as detailed in table 1 of Casi et al. (2020). The indicator for period $t - 1$ is omitted, serving therefore as a benchmark, and indicators at the endpoints are binned. Country-pair and saver country time fixed effects are denoted by γ_{ij} and θ_{jt} , respectively. Pair fixed effects control for time-invariant factors like distance and common language, while saver country time fixed effects control for unobserved developments specific to saver countries. Standard errors are robust to autocorrelation and heteroscedasticity and clustered at the reporting country level. Finally, ϵ_{ijt} is the error term.



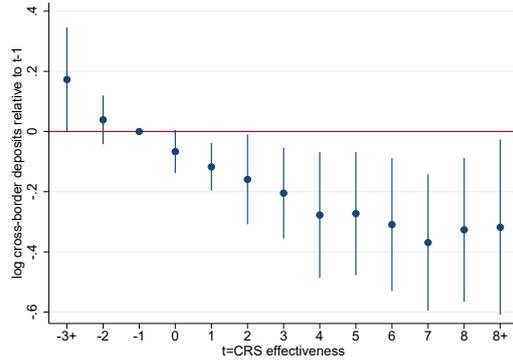
(a) Non-bank deposits, '14Q4-'17Q3



(b) Household deposits, '14Q4-'17Q3



(c) Non-bank deposits, '14Q1-'19Q4



(d) Household deposits, '14Q1-'19Q4

Figure B.1: Robustness checks - Event study à la Casi, Spengel, and Stage (2020).

Notes: The figures depict the coefficients of the interaction term in equation 2. Hence, each coefficient captures the change in cross-border deposits held in tax havens versus nonhavens around the CRS event dates (in event time) in Casi, Spengel, and Stage (2020). Each indicator term marks one quarter over the sample period relative to the quarter before the CRS event date ($t = 0$). Coefficient estimates are plotted with their 95% confidence intervals. Reporter-country time fixed effects as well as country-pair fixed effects are included. Standard errors are clustered at the reporting country level. Panels (a) and (b) show results for the sample period used in Casi, Spengel, and Stage (2020) while panels (c) and (d) depict results for an extended sample period.