Discussion Paper No. 18-036

Cross-Border Tax Evasion After the Common Reporting Standard: Game Over?

Elisa Casi, Christoph Spengel,
and Barbara Stage

ZEW
Zentrum für Europäische Wirtschaftsforschung GmbH
Centre for European Economic Research

Discussion Paper No. 18-036

Cross-Border Tax Evasion After the Common Reporting Standard: Game Over?

Elisa Casi, Christoph Spengel,
and Barbara Stage

Cross-Border Tax Evasion After the Common Reporting Standard: Game Over?*

Elisa Casi [a]
University of Mannheim

Christoph Spengel [b]
University of Mannheim
ZEW Mannheim

Barbara Stage [c]
University of Mannheim

August 2018

Abstract

Back in 2013, the Automatic Exchange of Information (AEOI) was endorsed as the prevailing universal solution to fight cross-border tax evasion. In this regard, the OECD launched a global standard for the AEOI, the Common Reporting Standard (CRS). Currently, around 100 jurisdictions have committed to implement it into respective national laws by 2018. In this study, we analyze the impact of the CRS on cross-border tax evasion using a difference-in-difference research design. By considering a period of four years (2014-2017), results suggest that the CRS induced a reduction of 14% in cross-border deposits parked in offshore locations for tax evasion purposes. Moreover, such wealth and related income has not been repatriated but rather a new location to avoid domestic tax obligations has emerged. More specifically, upon the CRS implementation at domestic level, the United States (U.S.), i.e. the only major economy in the world, which so far did not commit to the CRS, seems to emerge as a potentially attractive location for cross-border tax evasion.

JEL Classification: F42, G21, H26, H31

Keywords: Tax Evasion, Automatic Exchange of Information, Offshore Locations, Cross-Border Deposits.

*We thank Jannis Bischof, Lisa De Simone, Niels Johannesen, Kiridaran Kanagaretnam, Sebastian Siegloch, Johannes Voget and the audience at the Mannheim Taxation (MaTax) Science Campus Meeting in Mannheim (December 2017) and at the Belgian Financial Research Forum in Brussels (June 2018) for their valuable suggestions and comments. We gratefully acknowledge the financial support from the German Research Foundation sponsored Graduate School of Economic and Social Sciences of the University of Mannheim and the Leibniz ScienceCampus MannheimTaxation (MaTax).

[a] University of Mannheim, Schloss, Ostflügel, 68131 Mannheim, Germany, ecasi@uni-mannheim.de.
[b] University of Mannheim, Schloss, Ostflügel, 68131 Mannheim, Germany, spengel@uni-mannheim.de.
[c] University of Mannheim, Schloss, Ostflügel, 68131 Mannheim, Germany, stage@zew.de.

1. Introduction

A globalized world and rapid technological development enabled in the last decades increasing capital mobility. Financial flows move across countries easily and at high speed. This provides individuals several channels to transfer their wealth and related income to jurisdictions offering very attractive tax systems together with a sound level of bank secrecy, i.e. the so-called offshore locations. Recent estimates from Zucman (2013) suggest that at least 8% of the global household financial wealth is located in offshore locations translating into around 7.6 trillion dollars. When considering the past ten years, a total increase of offshore wealth by 25% has been documented.

Cross-border tax evasion, however, deprives several jurisdictions around the world from substantial tax revenue every year. In this respect, recent statistics from the Internal Revenue Service (IRS) state that the U.S. government loses annually around USD 100 billion in tax revenues due to domestically unreported wealth and related income parked in offshore locations.[1] The general consensus at the OECD level is that this cross-border tax evasion can be most effectively fought by introducing policies to exchange information across jurisdictions. Back in 2010, the U.S. was the first to react by implementing the Foreign Account Tax Compliance Act (FATCA), a system forcing foreign financial institutions to collect and transfer financial account information on U.S. citizens to the IRS. OECD member states started being interested in requesting similar financial information on their own residents. In this way, the introduction of FATCA pushed an international discussion at OECD level on developing a global standard for the AEOI. The debate culminated in early 2013 with a formal request to the OECD from the G20 to design a prototype for a universal system for the AEOI.[2] On 21 July 2014, the OECD published the final version of it, the so-called Common Reporting Standard (CRS).[3]

Thanks to its multilateral approach, broad scope and extensive country coverage, the CRS exhibits certain key features that makes it substantially different from any initiative in the field of information exchange launched so far. This is why it should induce a true revolution in the level of scrutiny on wealth and related income parked in offshore locations and substantially change the game dynamics of cross-border tax evasion. Yet, the effectiveness of the CRS has not been

[1] For more detail, see https://www.irs.gov/bUSinesses/small-bUSinesses-self-employed/abUSive-offshore-tax-avoidance-schemes-talking-points, accessed on 01.08.2018.
[2] For more details, see http://www.keepeek.com/Digital-Asset-Management/oecd/taxation/standard-for-automatic-exchange-of-financial-account-information-in-tax-matters-second-edition_9789264267992-en, accessed on 01.08.2018.
[3] For more details, see http://www.oecd.org/tax/automaticexchange.htm, accessed on 01.08.2018.

carefully investigated so far. The aim of this paper is to close this gap by empirically evaluating the impact of this unprecedented new global standard on fighting cross-border tax evasion.

In this respect, the related literature unanimously finds that the implementation of information exchange agreements does not reduce tax evasion overall but rather induces a reallocation of wealth from collaborative offshore locations, i.e. those who signed such an agreement, to non-collaborative ones.[4] The impressive country coverage achieved through the CRS should minimize if not eliminate any possibility of relocation. Indeed at present, more than 100 jurisdictions worldwide have committed to the CRS, with the intention of implementing it into national law and starting the exchange of information on foreign financial accounts either in 2017 or in 2018 for the first time.[5] In particular, most of the so-called tax havens are included in the list of participating jurisdictions implying a substantial change for bank secrecy. Thus, the volume of wealth and related income parked in offshore locations is expected to experience a significant drop. Recent estimates from Deutsche Bank and Oliver Wyman (2017, p.25) suggest USD 1.1 trillion in outflows from offshore accounts by the end of 2017 as a reaction to the CRS implementation in early adopters.

Given such premises, we initially focus on the well-known sites for hiding wealth and related income to avoid tax obligations at home and test whether the CRS implementation into national law induced a drop in cross-border tax evasion towards those jurisdictions. Although a reduction is expected, the CRS's overall effectiveness is not certain, especially with respect to the usability of the collected information (Finér and Tokola (2017)) and the possibility to exploit the category "non-reportable financial institutions" to circumnavigate CRS reporting requirements (e.g. as the case of Occupational Retirement Scheme in Hong Kong). Therefore, empirically investigating the effectiveness of the CRS in fighting tax evasion, as we do in the first part of our study, is crucial.

In the second part of our analysis, we present preliminary evidence on a new scenario, namely the rising relevance of the U.S. as an offshore location. Due to the adoption of the CRS, all traditional locations for hiding wealth and related income now automatically exchange information on financial accounts. In general, very few locations are preserving the status of non-

[4] For more details, see Johannesen and Zucman (2014), Johannesen (2014), Hanlon et al. (2015), Caruana-Galizia and Caruana-Galizia (2016), Omartian (2017) and De Simone et al. (2018).
[5] For a complete list, see OECD (2018b).

participating jurisdiction. In particular, the only major economy and major bank secrecy location that is not committed to implement the CRS at national level is the U.S. Thus, we proceed by investigating whether a reallocation of deposits to non-collaborative jurisdictions, i.e. the U.S., took place or if cross-border tax evasion has truly been put to an end.

For the purpose of our study, following the related current literature,[6] we employ as a measure of cross-border tax evasion the outstanding volume of cross-border deposits placed in offshore locations. The data used stems from the Bank for International Settlements (BIS), which provides disaggregated quarterly data on deposits held by individuals and entities that are not residents of the country where the reporting bank is located (i.e. cross-border deposits).[7] We focus on a period from the fourth quarter of 2014[8] until the third quarter of 2017. We estimate tax evaders' reaction to this unprecedented global initiative for the AEOI, by using a difference-in-difference design. More precisely, we first estimate the change in the outstanding volume of cross-border deposits in offshore locations (Jersey, Guernsey, Isle of Man, Hong Kong, Macau)[9] as compared to the change in the outstanding volume of cross-border deposits in non-offshore locations (mainly OECD and EU member states) after the respective national CRS implementation date. Secondly, we test the potential relocation behavior by estimating the change in the outstanding volume of cross-border deposits in the U.S. as compared to the change in the outstanding volume of cross-border deposits in non-offshore locations (mainly OECD and EU member states) after the CRS effectiveness date for the first waive adopters.[10] Where first wave adopters denotes those countries that request the collection of financial information starting from January 1st 2016 and exchange the financial information in 2017 for the first time.[11]

We find that upon the CRS implementation at national level the outstanding volume of cross-border deposits held in offshore locations is on average decreased by 14% compared to the one held in non-offshore locations. Furthermore, we conduct event studies, which corroborate the

[6] See for example Huizinga and Nicodème (2004), Zucman (2013), Johannesen and Zucman (2014), Alstadsæter et al. (2018) and Menkhoff and Miethe (2017).
[7] See Table A6.2 from BIS, available at http://stats.bis.org/statx/srs/table/A6.2, accessed on 01.08.2018.
[8] Observations for Hong Kong at bilateral level are available starting from the last quarter in 2014 only.
[9] The above selected offshore locations are those currently available at the BIS database at country-pair level and represent a wide-ranging sample for testing CRS effectiveness in fighting tax evasion. Indeed, they are all named as among the most important offshore locations according to Financial Secrecy Index of the Tax Justice Network (see https://www.financialsecrecyindex.com/introduction/fsi-2018-results, accessed on 01.08.2018).
[10] For the relocation test, we cannot use the exact date of CRS introduction at national level for the deposit locations because the U.S. does not introduce the CRS.
[11] For an overview of the first wave countries in our sample, see Table 3 in Appendix A.

parallel trends assumption and show a strong, statistically significant immediate decline of cross boarder deposits held in offshore locations in reaction to the CRS. Consequently, overall initial results suggest that the implementation of the CRS had a statistically significant impact on cross-border deposits held in offshore locations.

When focusing on the relocation behavior, we find preliminary results that after CRS implementation the outstanding volume of cross-border deposits held in the U.S. are on average 9% higher compared to those in non-U.S. jurisdictions. A similar increase of 8.5% is documented when additionally controlling for the bank secrecy level at the deposit location. Furthermore, we test our result by an event study, which shows that the increase of cross-border deposits in the U.S. after the CRS is both immediate and persistent over the whole post treatment period. This result may seem surprising at first because the U.S. does not generally offer a tax system as attractive as that of traditional offshore locations. Nevertheless, it offers a high degree of bank secrecy (Cotorceanu (2015)) and advantageous tax-free facilities for non-resident individuals (Brunson (2014)). Thus, while not typically classified as a tax haven, upon the introduction of the CRS, the U.S. could become highly attractive for tax evaders.[12]

To sum up, our results are of great relevance for governments of the current CRS participating jurisdictions and for those of future CRS participating jurisdictions. To the best of our knowledge, we are the first to focus exclusively on the CRS and to study its impact on cross-border tax evasion by making use of a well-established identification strategy in the tax evasion literature. The CRS deserves special attention because it overcomes major weaknesses embedded in previous policy tools for the exchange of information. In particular, thanks to its impressive country coverage it enabled so far the establishment of more than 2,600 exchange relationships worldwide. Moreover, it requests the collection and the transmission of information automatically and no longer only on request. Finally, jurisdictions reciprocally exchange extensive data on bank deposits owned by individuals as well as entities. Given the above-described key features, it is not surprising to find that a reaction to the CRS is detected even for offshore locations that were already affected by the Savings Directive and by Tax Information Exchange Agreements (TIEAs).

[12] For more details, see https://www.economist.com/news/international/21693219-having-launched-and-led-battle-against-offshore-tax-evasion-america-now-part or https://www.bloomberg.com/view/articles/2017-12-28/the-u-s-is-becoming-the-world-s-new-tax-haven, accessed on 01.08.2018.

Additionally, to the best of our knowledge, we are the first to offer preliminary evidence on which jurisdiction(s) might be emerging as preferred destination for cross-border tax evasion as a consequence of the CRS implementation. Tax evaders seem to still deem reallocation a convenient option, but a new destination appears as very attractive for cross-border deposits, namely the U.S. This represents a politically relevant result, suggesting that it might be crucial to exert international pressure on the U.S. to implement the CRS, if the CRS is expected to become successful. The CRS imposes substantial costs on the financial industry, as well as on tax authorities around the world implementing it. Estimates from Finér and Tokola (2017) range from around USD 100 Million for setting up the IT infrastructure and up to USD 800 million in terms of the start-up costs per affected financial institution worldwide. Furthermore, according to the UK government's assessment of the CRS's financial burden, the HMRC will face total costs of around USD 2 million for setting up the IT system to support the reporting, storage and analysis of the collected financial accounts information.[13] Thus, the U.S. participation in the CRS project is fundamental to make worth the substantial implementation costs for the CRS and in this way make it truly effective in putting an end to cross-border tax evasion.

The rest of the paper is organized as follows. Section 2 offers a detailed overview of the literature on cross-border tax evasion and introduce our main analysis. Section 3 provides a meticulous description of the research design with a focus on the data used and the selected empirical approach. Section 4 presents graphical evidence on the development of cross-border deposits in our country sample. Section 5 represents the core of our paper, where key results of our study are provided in detail. Section 6 offers additional tests on the effect of CRS introduction on indirect channels of tax evasion. Section 7 concludes by summarizing the key findings of our analysis. This paper is supplemented by a comprehensive appendix presenting key tables and figures.

2. Tax Evasion and Countermeasures

Tax evasion represents a pervasive phenomenon. Current statistics from the European Commission suggest an estimated yearly tax gap of around EUR 1 trillion within the EU alone,[14] while the IRS provides estimates of an annual average tax revenue loss of USD 458 billion in

[13]For more details, see https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/413976/TIIN_8148_tax_admin_automatic_exchange.pdf, accessed on 01.08.2018.

[14] For more details, see http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//NONSGML+REPORT+A8-2017-0357+0+DOC+PDF+V0//EN, accessed on 01.08.2018.

the U.S. due to non-compliant tax behavior.[15] While partially caused by missing self-reported income generated locally, an extremely important channel to avoid tax obligation in the country of residence is represented by cross-border tax evasion. In particular, cross-border tax evasion is facilitated by the existence of so-called offshore locations. In those jurisdictions, tax evaders have the chance to get access to extensive wealth management services offered by local banks, while at the same time enjoying a low or zero tax burden and a high level of bank secrecy. Empirical evidence from Zucman (2013) suggests that around 8% of worldwide household wealth is located in tax havens. More recent statistics from Alstadsæter al. (2018) show that this average value varies significantly across the world. 60% of the wealth in tax havens is held in the Gulf and certain Latin American countries, while only 15% in continental Europe and even less in Scandinavia. Moreover, Hanlon et al. (2015) estimate a tax gap of around USD 8 to 27 billion caused by U.S. investors' round-tripping activities.

As proposed in the related theoretical and empirical literature, one possible solution to reduce the annual tax revenue loss resulting from cross-border tax evasion is represented by enhancing the probability of detecting cross-border tax evasion. In their analytical study on tax evasion, Allingham and Sandmo (1972) extend the model of crime developed by Becker (1968) to the specific context of tax. The authors demonstrate that the individual level of evasion is a function of, on the one hand, incentivizing and, on the other hand, deterring factors, one deterrent being the probability of facing increased tax audits. More specifically, the optimal degree of tax evasion is negatively related to the risk of detection. Similarly, Dharmapala (2016) analyzes the impact of FATCA on tax revenue loss with focus on the U.S.. Based on an analytical model, the author demonstrates that tax policies aiming at increasing the probability of being caught by the IRS evading taxes, do increase U.S. citizens' compliance and may be effective in reducing cross-border tax evasion. Empirical evidence provided for example by Bott et al. (2017) supports the theoretical prediction that an increased threat of detection may induce a change in tax evasion behavior towards higher levels of compliance. The authors set up a randomized experiment, conducted on 15,000 taxpayers in Norway who were likely to underreport income to tax authorities.

The information exchange across jurisdictions represents the prevailing universal solution to increase the threat of detection in the context of cross-border tax evasion. The previous empirical literature intensively investigates the impact of global initiatives in the field. To begin with,

[15] For more detail, see https://www.irs.gov/newsroom/the-tax-gap, accessed on 01.08.2018.

Huizinga and Nicodeme (2004) analyze the impact of international tax policy on the fight against cross-border tax evasion. By combining data from the BIS on cross-border deposits and OECD survey data on bilateral TIEAs among OECD member states from the year 1999, they find that the existence of exchange relationships across countries does not seem to diminish external liability flows. However, they attribute the result to the – back then – inefficiency of the TIEA network, in particular the limited country coverage and the insufficient quality of the exchanged data. Such suggestions are confirmed by Johannesen and Zucman (2014), who also test the impact of TIEAs on cross-border tax evasion. The authors got access to confidential data from BIS on bilateral cross-border deposits and analyze the impact of exchange relations between tax havens and non-tax havens during the wave of TIEA introductions in 2009 and 2010.[16] They find that the introduction of a TIEA seems to reduce the level of wealth and related income parked in offshore locations to avoid tax obligation at home, but they also document reallocation behavior to non-collaborative tax havens. When considering the long-term impact of such TIEAs, a diminishing effect starting from 2010 is documented (Menkhoff and Miethe (2017)). Thus, overall results further support the idea that only an efficient system of TIEAs could put an end to cross-border tax evasion, which among other aspects inevitably requires worldwide coverage of exchange relations.

Early empirical evidence underlining the need for comprehensive worldwide coverage of exchange relations is found by authors that evaluated the first truly multilateral exchange of information model developed by the European Commission under the Savings Directive. Using bilateral data on cross-border deposits from the BIS, Johannesen (2014) investigates the effect of the introduction of the Savings Directive in Switzerland on tax evasion behavior. The author detects a strong response of tax evaders to the introduction of the 15% withholding tax on savings income. In particular, tax evaders seemed to indirectly relocate their deposits to non-EU offshore locations proving that different tax evasion strategies are highly substitutable. Similarly, also Caruana-Galizia and Caruana-Galizia (2016) focus on the effect of the above-mentioned directive on entity owners who previously hide assets offshore. The authors make use of leaked data, provided by the International Consortium of Investigative Journalists (ICIJ) in April 2013, on 270,000 entities incorporated in ten offshore locations for a period of 30 years up to 2010. Once again, empirical results confirm a reallocation of undeclared wealth and related income to non-collaborative offshore locations as a reaction to enhanced tax transparency. Further supportive evidence is provided by Omartian (2017), who by considering the leaked

[16] For an overview of TIEAs that tax havens signed with other jurisdictions, see Bilicka and Fuest (2014).

data from the Panama Papers, tests the impact of the amendment to the Savings Directive in 2005 (Directive 2005/60/EC) and FATCA on foreign asset ownership. De Simone et al. (2018) exclusively focus on FATCA and building on the empirical analysis of Hanlon, Maydew and Thornock (2015) offer strong evidence of reallocation behavior by U.S. citizens. They find that FATCA induced a reduction of foreign portfolio investments into the U.S. from tax havens, which agreed to exchange financial account information, but an increase from tax havens, which initially remained non-FATCA compliant. Thus, overall the related literature suggests that, as long as jurisdictions exist, which provide limited or null exchange of financial accounts information, tax evaders will still find the cost of reallocation to those non-collaborative locations lower than the cost of hiding wealth and the cost of income repatriation. This implies that cross-border tax evasion is expected to persist until a truly worldwide coverage of exchange relations is achieved.

In this regard, our empirical study tests the impact of CRS introduction on cross-border tax evasion. The CRS presents certain key differences making it different from previous initiative in the field of information exchange.[17] First of all, it constitutes a multilateral approach, which is similar to the EU Savings Directive but differs from FATCA and from classical bilateral TIEAs, which have instead a bilateral approach.[18] Secondly, participating jurisdictions automatically exchange information with any counterparty, which has the CRS implemented into national law. In this way, in contrast to normal TIEAs and FATCA,[19] the information is no longer exchanged only upon request and there is no requirement to negotiate single treaties on a country-by-country basis.[20] Finally, the CRS not only has a larger country coverage compared to the EU Savings Directive but also has a wider scope. Reportable financial institutions are forced to provide detailed information on financial assets held by non-resident taxpayers, which

[17] For a comprehensive overview of the CRS and its implementation at national level, see Casi et al. (2018)

[18] In particular, it requires financial institutions to collect automatically detailed financial account information on non-resident taxpayers if both their jurisdiction and the client's resident jurisdiction has a CRS system in place. For more details on it, see OECD (2018) Standard for Automatic Exchange of Financial Information in Tax Matters Implementation Handbook.

[19] Under FATCA, foreign financial institutions ("FFI") are forced to collect information on financial accounts held by U.S. citizens, which are then automatically transferred to the Internal Revenue Service (IRS). However, U.S. financial institutions are not allowed to collect the same volume of information on financial accounts held by foreign residents. Moreover, the IRS transmits data on foreign financial account holders only upon request and only if such request comes from countries, which singed the Model 1a IGA.

[20] Indeed, according to the OECD, adopting the CRS under a multilateral approach means that each participating jurisdiction sign only one agreement, which has the power to replace more than 5000 bilateral negotiations. See OECD (2018a), p. 42-43.

is not limited to interest income and covers deposits held by individuals as well as entities.[21] Thus a true revolution in the fight against cross-border tax evasion should be expected.

However, the final result is not trivial. As suggested by Huizinga and Nicodème (2004), besides geographical coverage, another element crucial to reaching a fully efficient system of exchange relations is the quality of the information collected and transmitted across jurisdictions. Finér and Tokola (2017) conducted several interviews with tax authorities in Nordic countries suggesting the level of usability of data exchanged under the CRS is far from being certain. Therefore, the effectiveness of the CRS may be questioned. Moreover, the currently locally implemented CRS model will be revised by the OECD by the end of 2018 so as to address all potentially existing loopholes, e.g. the category of non-reportable financial institutions.[22] This shows further that improvements may be needed to make the CRS a fully efficient model. Given such premises and considering the substantial cost imposed on tax authorities and financial institutions by the CRS, we believe that it crucial to test its effectiveness in stopping cross-border tax evasion. Thus our first test focuses on CRS effectiveness in reducing wealth and related income parked in traditional offshore locations to avoid tax obligation at home.

In the second and main part of the analysis, we test to what extend and to which locations deposits are shifted in response to the CRS introduction. We are interested in investigating whether and if so which new locations for cross-border tax evasion emerge, given that those traditionally considered attractive for hiding wealth and related income now automatically exchange financial account information. In particular, the U.S. is the only major economy around the world, which did not commit to the CRS and does not plan to do so in the near future.[23] Furthermore, currently under FATCA Model 1 IGA, the IRS is only obliged to transmit certain

[21] For more details on it, see OECD (2018a).

[22] Evidence in this direction is provided by the case of Hong Kong. Hong Kong initially classified Occupational Retirement Schemes ("ORSs") as non-reportable financial institutions. However, the OECD's online disclosure facility received several reports indicating the risk of exploiting "ORSs" to avoid CRS requirements. Upon international pressure, Hong Kong reacted by issuing strict guidance limiting the category of non-reportable ORSs for CRS purposes. Yet, other loopholes may still exist and may hinder the effectiveness of the CRS in fighting cross-border tax evasion. More information is available at http://www.oecd.org/tax/automatic-exchange/news/the-fight-against-offshore-tax-evasion-continues-crs-disclosure-facility-delivers-first-results.htm, accessed on 01.08.2018.

[23] On why the U.S. does not plan to join the CRS project, see https://www.taxjustice.net/2015/01/26/loophole-usa-vortex-shaped-hole-global-financial-transparency-2/, accessed on 18.05.2018. Other than the U.S., non-CRS-abiding countries generally cannot provide an attractive and stable financial sector and are not OECD and EU member states. Countries not committed to CRS so far include Algeria, Armenia, Bangladesh, Egypt, Maldives, Oman, Palestine, Philippines, Sri Lanka, Taiwan, Thailand, Turkish Republic of Northern Cyprus, United States of America, and Vietnam. See http://www.crs.hsbc.com/, accessed on 01.08.2018.

limited information to IGA partners.[24] This includes the gross interest paid for depository accounts, only if held by an individual and if it is 10 USD or more and U.S. source interests and dividends for custodial accounts, only if the accounts are already subject to reporting and only with respect to individuals and entities in partner jurisdictions. No information on the last beneficial owners of passive non-financial entities (NFEs) is collected and transmitted to IGA partners.[25] Country evidence even suggests that the U.S. duty to exchange information based on FATCA agreements is not fully respected.[26] Additionally, foreign investors enjoy advantageous tax-free facilities for non-residents individuals. This includes tax exemption on domestic-source portfolio interest or re-invested dividends (Brunson (2014)). Finally, the U.S. provides high levels of bank secrecy, because U.S. financial institutions are only required to collect a limited amount of information on foreign account holders.[27] In particular, if a tax evader sets up a shell company and through that entity owns a deposit in a U.S. bank, the financial institution is not obliged to collect any information on the ultimate owner. Currently no U.S. state or federal law obliges legal entities to maintain beneficial ownership information or even request legal entities to disclose beneficial owners´ identity when they are established.[28] For example, in states like Delaware, there is no obligation to collect the information on shareholders or directors and this makes the tracking of the beneficial owner extremely difficult.[29] Additionally, on grounds of an extensive cross-country randomized field experiment, Findley et al. (2015) find that in contrast to non-U.S. providers (especially in tax haven jurisdictions), U.S. service providers for shell company incorporation are actually less likely to comply with international

[24] Only Model 1A IGAs has a reciprocity clause. Thus, the U.S. is not required to provide financial information on foreign residents of countries signing for the purpose of FATCA the Model 2 IGA. A complete list of Model IGA is available at https://www.treasury.gov/resource-center/tax-policy/treaties/Pages/FATCA.aspx, accessed on 01.08.2018.

[25] Instead, under FATCA, IGA partners are required to provide directly (under Model IGA 2) or indirectly (under Model IGA 1) information on the account balance of depository and custodial accounts and the related interest (also on the dividend for custodial accounts), on the gross sum paid or credited for deposits other than depository and custodial, and on the beneficial owners for accounts held by passive NFEs. For a comprehensive comparison of the information requested from the U.S. to FATCA partners versus those FATCA partners in Model IGA 1 receive from the U.S., see Cotorceanu (2015), p. 1053.

[26] For more details, see http://www.sueddeutsche.de/wirtschaft/kontodaten-einbahnstrasse-in-die-usa-1.3929452?reduced=true, accessed on 01.08.2018.

[27] Furthermore, the level of financial secrecy in the U.S. has strongly increased recently. According to the Financial Secrecy Index from the Tax Justice Network, the U.S. positioned itself as second in the 2018 ranks, gaining four positions from the one in 2013, see https://www.financialsecrecyindex.com/.

[28] In May 2016 under the bank secrecy act the Treasury's Financial Crimes Enforcement Network issued a new customer due diligence requirement imposing to certain domestic financial institutions the collection of a beneficial ownership information form for their respective clients´ corporations and trusts. But the law has not yet being enacted. Moreover, even in case of execution, it has been labeled as fully ineffective because among others it allows senior managers of the company to be identified as beneficial owner (see Tax Justice Network (2018)).

[29] See Transparency International (2018), p.2.

transparency standards. This helps reducing the complexity of setting up a shell company in the U.S. (Findley et al. (2015) p.153, 157).[30] Thus, although not typically classified as a low tax country, in the post CRS world, the U.S. may represent a very attractive location for parking wealth and related income without being detected by the respective country of residence.[31]

3. Research Design

3.1. Data

Our main dataset is constructed using data from the BIS Locational Banking Statistics (LBS). It offers detailed information about the outstanding volume of claims and liabilities of internationally active banks located in reporting countries vis-a-vis counterparties residing in more than 200 jurisdictions around the world. For the purpose of our analysis, we focus on the outstanding quarterly volume of cross-border deposits, which are publicly available at bilateral level since September 2016. The data enables us, for example, to observe the total amount of deposits German residents owned in active banks located in Hong Kong. In our empirical analysis, we use all offshore deposit locations, for which data at bilateral level is publicly available in the BIS dataset, i.e. Guernsey, Hong Kong, Isle of Man, Jersey and Macau. At aggregated level the BIS provides data for all major offshore locations around the world (i.e. Bahamas, Bahrain, Bermuda, Cayman Island, Curacao, Guernsey, Jersey, Isle of Man, Hong Kong, Macau, Panama and Singapore). In 2017 our sample of five offshore locations covers almost 40% of the total volume of outstanding cross-border deposits located in the twelve offshore locations for which data is available at the BIS LBS dataset at aggregate level.[32] We compare these five deposit locations to the remaining depository (non-offshore) countries, for which data at bilateral level is publicly available in the BIS LBS dataset.[33] As location of the owner of the deposits, we select all EU and OECD member states arriving at a total of 41 countries.[34] For the

[30] Furthermore, "only 62 of the answers to the 2,336 inquiries in the United States asked for any document with a photo establishing identity." See Findley et al (2015), p.157.

[31] For more details, see https://www.washingtonpost.com/gdpr-consent/?destination=%2fnews%2fwonk%2fwp%2f2016%2f04%2f05%2fhow-the-u-s-became-one-of-the-worlds-biggest-tax-havens%2f%3f&utm_term=.73f446740fbf, accessed on 01.08.2018.

[32] This number is computed using data from Table A5 of the BIS LBS, see http://stats.bis.org/statx/srs/table/a5, accessed on 01.08.2018.

[33] This includes: Australia, Austria, Belgium, Brazil, Canada, Chile, Chinese Taipei, Denmark, Finland, France, Ireland, Italy, Korea, Luxembourg, Mexico, Netherlands, Philippines, South Africa, Spain, Sweden, Switzerland, UK, US. See BIS Table A6.2, http://stats.bis.org/statx/srs/table/a6.2, accessed on 01.08.2018.

[34] We consider EU and OECD member states as of June 2018. For the complete country overview, see Table 3 in the Appendix A.

purpose of our main analysis, we consider the time period between the last quarter of 2014 and the third quarter of 2017.[35]

The data from the BIS LBS are extensively used in the literature of tax evasion as well as international economics.[36] The main advantage of the data is the extensive country coverage. For our study we are able to collect data on cross-border deposits towards five different offshore locations, which are considered to be among the most important worldwide. Moreover, we are able to obtain figures for deposits owned by residents of 41 different jurisdictions around the world. In general, according to the BIS, their coverage rates on cross-border interbank business is around 95%.[37] Finally, the BIS data features sectoral decomposition into bank and non-bank sector. As highlighted also in Johannesen and Zucman (2014), interbank deposits should not represent a channel for tax evasion. This is why in collecting the BIS data, at the level of the sectoral decomposition we consider only data on non-bank deposits so as to exclude those owned by other financial institutions.

The data presents some limitations. First of all, the main limitation for the scope of our analysis is the impossibility to observe the final beneficial owner of a deposit. We are only able to detect the immediate owner. This implies that if a German resident sets up a shell company in Jersey and through it owns deposits in Hong Kong then deposits would be allocated to a resident of Jersey rather than to a German one. Given the well-established evidence of the use of shell companies in the literature,[38] we do address the role of shell companies in additional tests in Section 5.

[35] We need to start from the last quarter of 2014 because data for Hong Kong are available only that date on. But in this way we are able to exclude possible impacts of the big wave of bilateral TIEAs signatures in 2008-2011, the introduction of FATCA in 2010-2013 as well as the US tax reform in December 2017. The only relevant event during the selected period of time is the implementation of Basel III between 2013 and 2015 and of the fourth EU Directive on prevention of the use of the financial system for the purposes of money laundering or terrorist financing issued in May 2015 (Directive 2015/849/EU). However, those reforms are not directly influencing the movement of cross-border deposits for the purpose of tax evasion. Finally, in May 2016 under the bank secrecy act the Treasury's Financial Crimes Enforcement Network issued a new customer due diligence requirement imposing to certain domestic financial institutions the collection of a beneficial ownership information form for their respective clients´ corporations and trusts. However, this regulation has not yet being enacted.

[36] For example the following literature uses BIS data in the context of tax evasion: Huizinga and Nicodème (2004), Zucman (2013), Zucman and Johannesen (2014), Menkhoff and Miethe (2017) and Alstadsæter et al. (2018). However, the BIS data are widely used in the economics and finance literature as well. See for example Kleimeier et al. (2013), Bruno and Shin (2015) and Cerutti et al. (2015).

[37] For more details, see https://www.bis.org/publ/qtrpdf/r_qt1509e.htm, accessed on 01.08.2018.

[38] Johannesen and Zucman (2014, p.85) states that the owners of 25% of all deposits in tax havens are recorded as resident of other havens.

Secondly, the BIS statistics do not provide a distinction between individual and entity ownership. This implies that we are unable to detect the exact portion of deposits owned by individuals for the purpose of tax evasion. However, we do not see this as a limitation to our analysis. The CRS requires financial institutions to collect information on both individual and entity accounts. In case of the latter, it additionally asks to conduct accurate investigation regarding the final individual owner of the financial account. This means that when testing CRS effectiveness on cross-border tax evasion we are interested not only in the reaction of individual but also of entity owned accounts. Upon CRS local implementation, we do expect a reaction from both if they are used for tax evasion purposes.

Lastly, a limitation of the BIS data lies in the scope of the data. By focusing only on deposits, we are excluding alternative channels for tax evasion, namely equity or bond portfolios. However, as suggested by Johannesen and Zucman (2014, p.72), bank deposits can be considered as a sound proxy for testing the reaction to a shock in the scrutiny on wealth in offshore locations.[39]

Furthermore, regarding data on CRS key events, we manually collect information on both the exact CRS introduction date and the exact CRS effective date at country level by directly considering national laws. In particular, the OECD provides on its website the link to each CRS national law for both the first and second wave adopters.[40] When the information is not available through the OECD database, we search it using news alerts from the Customer & Investor Tax Transparency (CITT) News Blog by PwC.[41] As control variables, we firstly collect data on country financial secrecy levels using the Financial Secrecy Index of the Tax Justice Network.[42] The most secret locations have the highest secrecy scores in the index. While secondly information on interest income tax rates are taken from the database available at ZEW GmbH within the project for the European Commission "Effective Tax Levels using the Devereux/Griffith Methodology". The information has been collected since 1998 on all EU member

[39] Additionally, Heckemeyer and Hemmerich (2018, p.3) show that the reaction to increased information exchange by portfolio wealth held through tax haven jurisdictions mirrors the reaction by cross-border deposits held in tax havens that is observed by Johannesen and Zucman (2014). Suggesting that our estimates on the effect of the CRS on cross-border deposits may similarly apply to the other channels for tax evasion.
[40] See OECD, Automatic Exchange Portal – CRS by Jurisdiction, available at http://www.oecd.org/tax/automatic-exchange/crs-implementation-and-assistance/crs-by-jurisdiction/, accessed on 01.08.2018.
[41] For more details, see https://blogs.pwc.de/citt/, accessed on 01.08.2018.
[42] For more detail, see https://www.financialsecrecyindex.com/, accessed on 01.08.2018.

states and Canada, Japan, Norway, Turkey, Switzerland and the U.S. For the remaining countries, we manually collect the information using the country analysis and news alert from the IBFD tax research platform.

3.2. Empirical Strategy

We firstly test our expectation that CRS implementation leads to a reduction in cross-border deposits held directly in offshore locations that participate in the CRS. This is our baseline, confirming findings in the related literature according to which individuals react to increased information exchange with offshore locations by reducing wealth and related income hidden there. It is at the same time a test of our measure of tax evasion against prior research.

Similar to the regression model used in Johannesen and Zucman (2014), we employ as measure of cross border tax evasion cross border deposits available at BIS and we use a difference-in-difference strategy. Given that traditional offshore locations are all CRS compliant,[43] we compare cross-border deposits held in offshore locations versus those held in non-offshore locations. In this way, our control versus treatment group follows Hanlon et al. (2015).[44] Our sample includes as residence country all EU and OECD member states and as deposit locations all countries available in the BIS dataset including all available offshore locations. Thus in our difference-in-difference design we compare the change in deposits held in all offshore locations by residents of EU and OECD member states (treatment group), to the change in deposits in non-offshore locations by residents of EU and OECD member states (control group) after CRS implementation (post period). The function of the control group is to absorb common changes in cross-border deposits unrelated to the CRS, such as recessions and booms. We do not expect any significant reaction by tax evaders to the CRS in our control group. [45]

[43] To be more precise, when considering our sample of offshore countries, Macau is committed to the CRS, i.e. agreed to introduce the CRS into national law but so far did not enact the CRS law locally. In May 2017, a new regulation updating Macau exchange of information framework has been issued and in May 2018, Macau signed the MCAA. Thus Macau is on its way to introduce the CRS nationally soon.

[44] However, the authors use a dependent variable, i.e. the measure of cross-border tax evasion, which differs from the one we use in our research design (see Hanlon et al. (2015), p.269).

[45] Johannesen and Zucman (2014) consider as offshore locations also Austria, Belgium, Chile, Cyprus, Luxembourg and Switzerland. We do consider them as non-offshore because in our sample period all those countries already had powerful bilateral treaties for the information exchange. Nevertheless, we test the exact same sample of offshores as the one of Johannesen and Zucman (2014) and we do not document any statistically significant effect of CRS introduction in these locations, namely Austria, Belgium, Chile, Cyprus, Luxembourg and Switzerland. For more detail, see Appendix B.

We run regressions of the form:

$$\log\left(CrossBorderDeposits_{ijt}\right) = \alpha + \beta_1 PostCRSIntroDepL_{jt} + \beta_2 PostCRSIntroDepL_{jt} * Offsh_j + \gamma_{it} + \delta_{ij} + \epsilon_{ijt} \quad (1a)$$

Where the dependent variable $\log\left(CrossBorderDeposits_{ijt}\right)$ stands for (log) volume of deposits of residents of country i in banks at deposit location j at the end of quarter t. $Offsh_j$ is a dummy taking value one when the deposit location is an offshore location. It constitutes the treatment dummy in our difference in difference design.[46] $PostCRSIntroDepL_{jt}$ is the post period dummy we are interested in. It switches on after CRS implementation and stays switched on until the end of the sample period. Following the related literature, we chose the introduction date as post period for our baseline instead of the effective date of the CRS, because we expect that already at the introduction of the CRS into national laws in offshore locations tax evaders want to reduce their deposits held in offshore locations in anticipation of CRS effectiveness. As already highlighted, the CRS is not introduced everywhere at the same time. In fact, there is considerable variation in the introduction dates across residence and deposit locations as can be seen in Figure 1, which we can exploit for identification. Our standard errors are cluster robust, with clustering at the country-pair. We include country-pair and residence country-year-quarter fixed effects.

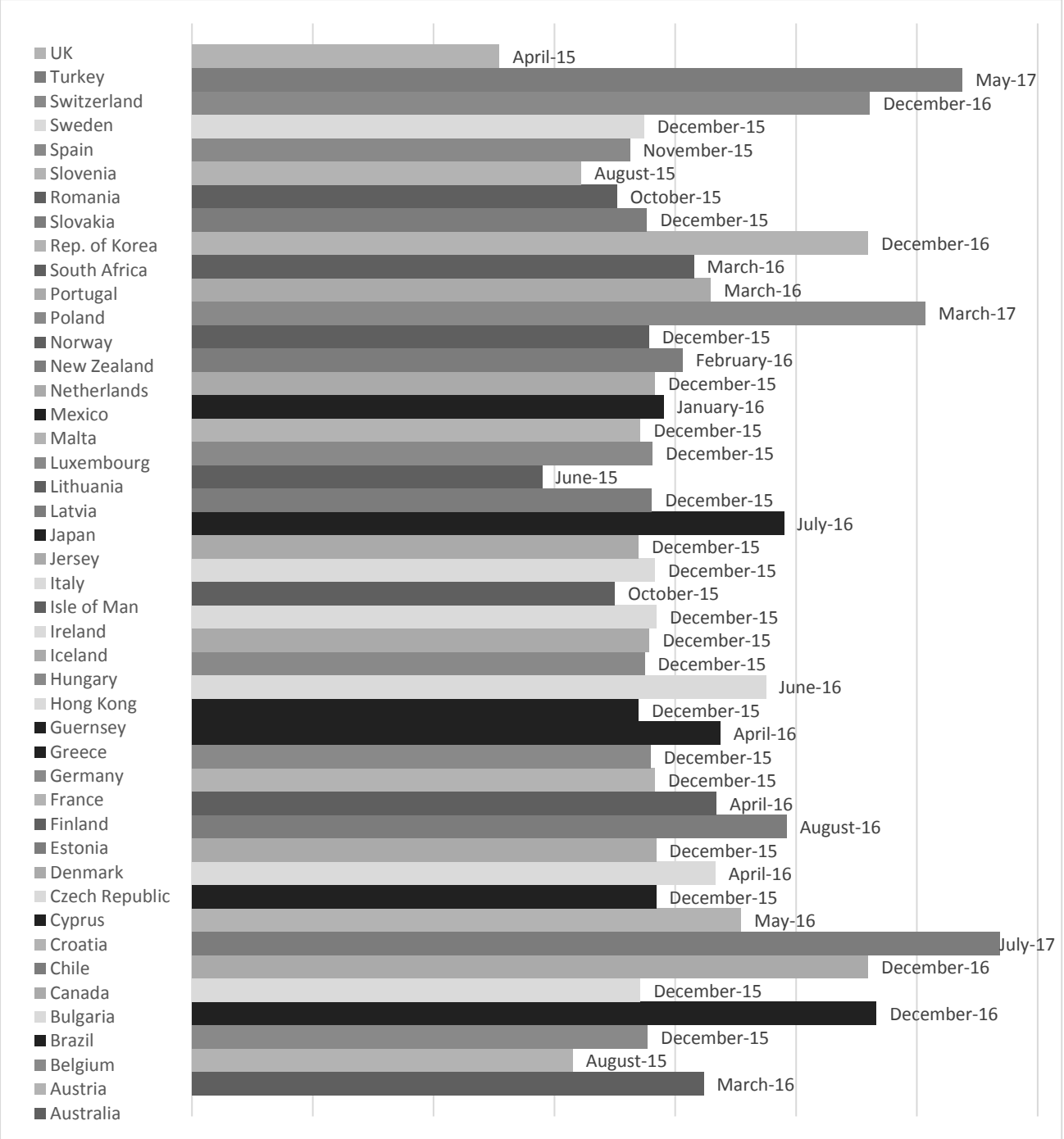
The residence country-quarter-year fixed effects allow us to further control for common time trends affecting cross-border deposits such as globalization of financial markets and economic shocks, but also residence country specific demand side shocks. The country-pair fixed effects allow us to control for all time invariant country-pair factors such as distance or common language, which might affect the change in cross-border deposits as a reaction to the CRS (Johannesen and Zucman 2014). Overall, we employ a very comprehensive fixed effects structure.[47] Identifying variation stems from the within country-pair and residence country-time changes in cross-border deposits after the CRS introduction, where we compare changes in OECD and EU residents' deposits in offshore locations to changes in OECD and EU residents' deposits in

[46] Since the treatment dummy is perfectly multicollinear with our country-pair fixed effects we do not include it as non-interacted term.

[47] For example, Johannesen and Zucman (2014) use only country-pair and quarter-year fixed effects in their similar research design.

non-offshore locations. We expect that deposits by OECD and EU residents in offshore locations are on average reduced relative to their deposits in non-offshore locations after the CRS introduction.

Figure 1: CRS Implementation into National Law – Exact Date



Notes: The figure displays the exact date of CRS implementation into national law in all countries considered for the purpose of this study, excluding those that either did not introduce the CRS yet or are not committed to it (i.e. Chinese Taipei, Israel, Macau, Philippines and the U.S.).

We do expect that the reaction by tax evaders occurs in response to the CRS introduction at the offshore location rather than in the location of residence of the tax evader. This is because if the CRS is only introduced in the residence location, offshore deposits are not immediately affected. They are only affected after CRS is (also) introduced in the offshore location where the wealth and related income is hidden. To proof our claim, we show in an additional regression reported in Appendix B Table 11 that the reaction to CRS introduction occurs on implementation in the deposit location rather than the residence location.

We want to rule out that our results are driven by concurrent events systematically related to the CRS implementation at the individual country level. Although to our knowledge there were none such concurrent events, we are concerned that the exact CRS introduction dates could be correlated with other factors affecting cross-border tax evasion, such as other measures that were simultaneously taken in the deposit locations (our fixed effects structure controls for changes in the residence location). Therefore, in an alternative specification, we use a post period dummy (PostCRSFirstWave) that is constant across all observations and not directly related to country-specific CRS implementation. The post period we chose is the period starting in the first quarter of 2016, i.e. the time when financial intuitions of the first wave adopters – those jurisdictions exchanging information under CRS in 2017 for the first time – start collecting information for CRS purposes. We chose this point, because it is the plausible point if one expects that tax evaders wait to the last possible date before being tracked by financial institutions located in most reportable jurisdictions. While it does not capture anticipation effects for the first wave adopters, it can capture them for the second wave of adopters, and it therefore constitutes a feasible compromise.[48] We run a new regression of the form:

$$\log\left(CrossBorderDeposits_{ijt}\right) = \alpha + \beta_2 PostCRSFirstWave_t * Offsh_j + X_{ij} + \gamma_{it} + \delta_{ij} + \epsilon_{ijt} \qquad (1b)$$

All variables and specifications of the fixed effects remain the same as in regression (1a), except for the treatment dummy $\text{PostCRSFirstWave}_t$, a dummy equal to one starting in 2016 – the period of the first wave of information collection for the CRS – and zero otherwise. Thus in this regression, we compare the change in the volume of foreign deposits in offshore locations after the CRS is effective in the first wave adopters to the change in the volume of deposits in

[48] See Table 3 in the Appendix A for a comprehensive list of first wave and second wave adopters.

the control group deposit locations (mainly EU and OECD countries). Finally, in a robustness check, we additionally tests country-specific CRS effective dates.

Next, in the second part of our analysis, we extend our study by investigating the new game dynamics brought by the reduction of the attractiveness of traditional offshore locations, i.e. the emerging relevance of the U.S. in the context of cross-border tax evasion. We test it by investigating changes in cross-border deposits located in the U.S. after versus before the CRS effectiveness. Thus, we add to our baseline estimations from above an interaction term that indicates the change in cross-border deposits non-residents hold in the U.S. after CRS implementation. We run new regressions of the form:

$$\log(CrossBorderDeposits_{ijt}) = \alpha + \beta_1 PostCRSFirstWave_t * Offsh_j + \beta_2 PostCRSFirstWave_t * US_j + X_{ij} + \gamma_{it} + \delta_{ij} + \epsilon_{ijt} \quad (2)$$

Model (2) corresponds one-to-one to model (1b), except for the added interaction term of the $PostCRSFirstWave_t$ dummy and the US_j dummy. That interaction captures the treatment effect of the CRS on foreign deposits held in the U.S.. US_j is a dummy equal to one for the U.S. as deposit location and zero for the remaining deposit locations. Thus, in our main test we conduct a difference in difference analysis where we compare the change in deposits held in the U.S. to the change in deposits held in other non-offshore jurisdictions after the implementation of the CRS in the respective EU or OECD residence country (while controlling for the effect of the CRS in the offshore locations). The fixed effects lead to identification of the change within the country-pair and residence-quarter-year. The implementation of the CRS is measured using the non-staggered treatment dummy, which is only time and not country dependent and switching to one when the CRS is effective in the first wave adopters. β_2 is the coefficient of interest. We expect a positive coefficient for β_2 as wealth and related income are relocated to the U.S**.** We chose to base this test on the non-staggered specification of the CRS treatment period instead of identifying the effect based on the introduction of the CRS at the individual country level – as in our baseline analysis –, because we do not have an implementation date at the level of the deposit location in case of the U.S.

Additionally we wonder if the relocation effect is driven by the fact that the U.S. is the only relevant country (and the only country in the group of OECD or EU member states) not endorsing the CRS. It could be the case that other forms of financial secrecy that are observed in the

U.S. and elsewhere are the main reason for deposits being reallocated there, rather than the lack of commitment by the U.S. to adopt the CRS. If this is the case, the more financial secrecy a non-offshore jurisdiction offers, the more likely it is that deposits are relocated there, as they are removed from offshore locations. Therefore, by adding the financial secrecy score of the deposit locations as variable to our regression, we investigate whether jurisdictions that offer comparable financial secrecy to the U.S. are equally interesting as relocation locations.

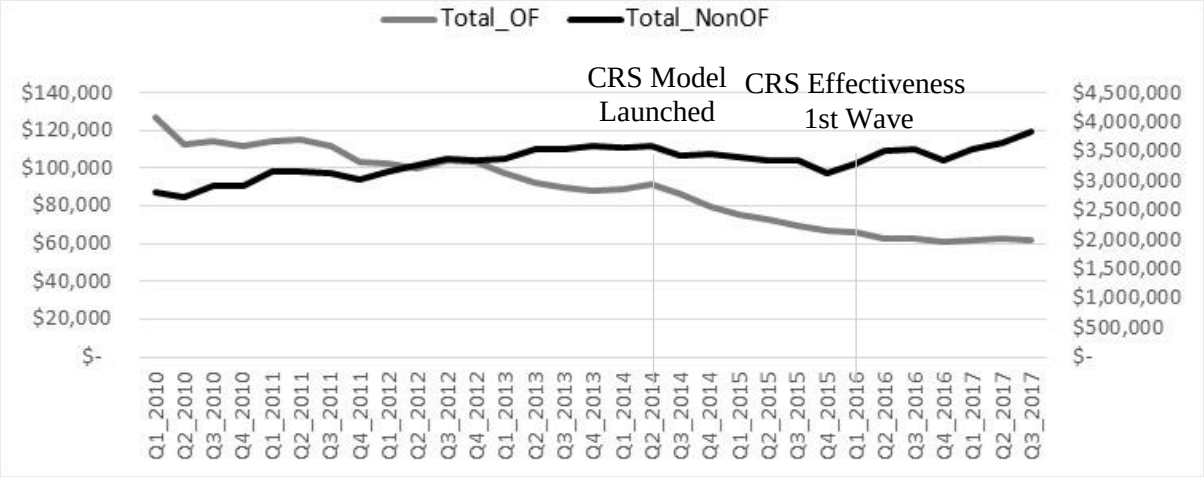
Finally, we confirm further that the relocation of funds to the U.S., which we observe in our sample, is driven by tax considerations rather than some other factor, such as hiding of money for laundering activities. We add the interest tax rates of the residence country as an additional control variable and an interaction of that variable with the interacted variables of interest, i.e. the respective post-CRS period specification variable and the U.S. variable. The resulting triple interaction is a measure of the incentive by residents of high interest tax countries to evade taxes by moving deposits across borders to the U.S.. Higher interest taxes in the residence country increase incentives for tax evaders to relocate hidden income and wealth to the U.S. and therefore, we expect to find a stronger effect of relocation to the U.S. from residence countries with higher taxes on interest. In this way, we test whether residents of countries, with higher tax burden or an increase in the tax burden on bank deposits, are those more likely to relocate their wealth and related income to the U.S.

4. Graphical Evidence

For our empirical test on the effect of the CRS on money hidden in offshore accounts, we compare deposits held by EU and OECD residents in five offshore locations, i.e. Guernsey, Honk Kong, Isle of Man, Jersey and Macau, versus those held in 26 non-offshore locations (mainly EU and OECD member states), i.e. our control group. Figure 2 depicts the data used in the first empirical analysis and shows the evolution of cross-border bank deposits in offshore locations versus those in our control group (data is as reported by the BIS). Until the fourth quarter of 2012 there are repeatedly periods where both groups trend similarly, mostly between the end of 2010 and the end of 2011. In 2013, around the date of the G20 endorsement of the AEOI (9 April 2013), a steadily increasing trend in non-offshore cross-border deposits is detected while offshore deposits start a solid constant decline. Yet the main drift apart occurs in the second quarter of 2014, at the moment when the OECD model for the CRS is launched and immediately endorsed by the G20. During the CRS local implementation phase, which starts

with the UK in March 2015, cross-border offshore deposits experience a strong drop. The evolution of cross-border deposits in non-offshore locations prior to the CRS might be an imperfect counterfactual, but we can exclude that our results are driven by general economic conditions that apply to all residence countries which we hold constant over the control and treated group.

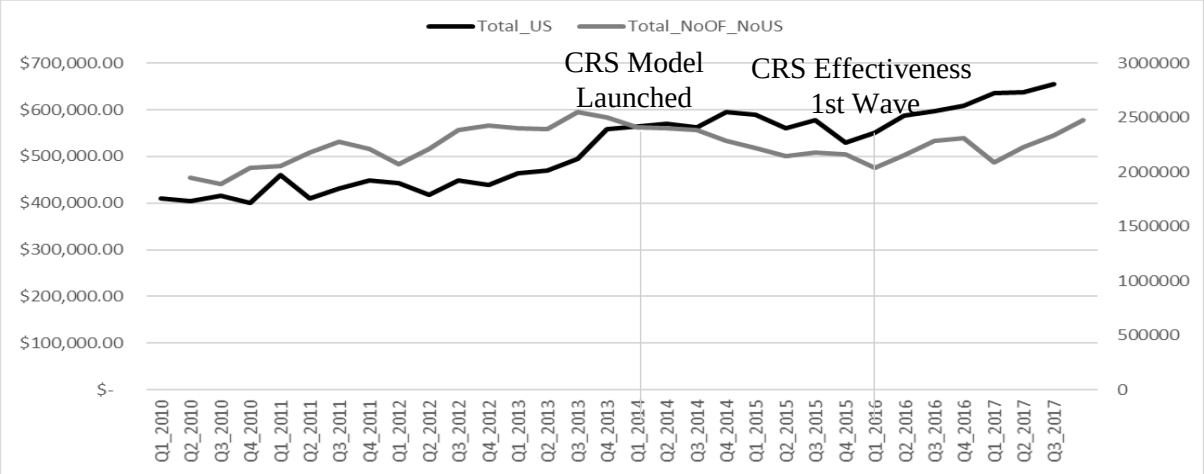
Figure 2: Offshore versus Non-Offshore Locations Deposits Trend



Notes: The figure charts total cross-border deposits held by residents of EU and OECD countries in offshore locations (left axis) versus those held in non-offshore locations from the first quarter in 2010 until the third quarter of 2017. Given the data limitation when starting from 2010, offshore locations in the table are only Guernsey, Isle of Man and Jersey. While non-offshore locations include Australia, Austria, Belgium, Brazil, Canada, Chile, Chinese Taipei, Denmark, Finland, France, Ireland, Italy, Korea, Luxembourg, Mexico, Netherlands, Philippines, South Africa, Spain, Sweden, Switzerland, UK and US. The data is from the BIS Table A6.2 and amounts are reported in USD.

Next as a starting point for the second and main empirical analysis, Figure 3 confirms graphically our relocation test. In our empirical analysis, we compare the effect of the CRS in the U.S. to the rest of the available countries in the BIS data (mainly OECD and EU countries and controlling for offshore locations) after the first wave of the CRS implementation into national laws. As clearly observable in Figure 3, the increase of cross-border deposits in the U.S. is parallel to the trend in the selected non-offshore locations until the discussion around the CRS starts at the beginning of 2013. Starting from the end of 2013, the trend in the two groups starts moving in opposite directions. In the U.S., it continues to increase while in non-offshore locations, it oscillates around a constant flat trend. During the local CRS implementation phase – between the beginning of 2015 and the end of 2016 – the U.S. experiences again a steady increase in cross-border deposits. The observations from Figure 3 strengthen our empirical results, by showing that the increase of cross-border deposits in the U.S. may not merely be driven by economic factors – if that were the case, we would expect a similar trend in the other non-offshore countries.

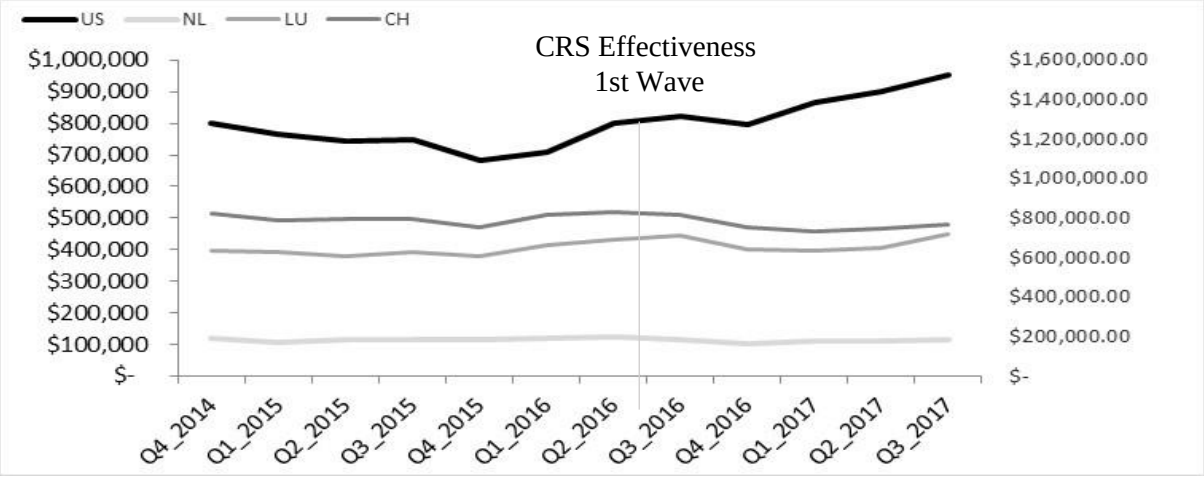
Figure 3: U.S. versus Non-Offshores (No US) Deposits Trend



Notes: The figure charts cross-border deposits held by residents of EU and OECD countries in the U.S. (left axis) and cross-border deposits held by residents of EU and OECD countries in other non-offshore locations excluding the U.S. (right axis) from the first quarter in 2010 until the third quarter of 2017. Non-offshore locations include Australia, Austria, Belgium, Brazil, Canada, Chile, Chinese Taipei, Denmark, Finland, France, Ireland, Italy, Korea, Luxembourg, Mexico, Netherlands, Philippines, South Africa, Spain, Sweden, Switzerland and UK. The data is from the BIS Table A6.2 and amounts are reported in USD.

Finally in Figure 4, we limit the sample to the period considered in our regression analysis (2014-2017) to compare the evolution of cross-border deposits situated in the U.S. versus those situated in other non-offshore secrecy locations such as Luxembourg, the Netherlands and Switzerland.

Figure 4: Deposit Trend in Top Secrecy Locations



Notes: The figure charts cross-border deposits held by residents of EU and OECD countries in the U.S. (left axis) and cross-border deposits held by residents of EU and OECD countries in Luxembourg, the Netherlands and Switzerland (right axis) from fourth quarter of 2014 until the third quarter of 2017. We restrict the time period so as to include observations for the Netherlands. The data is from the BIS Table A6.2 and amount are reported in USD.

While cross-border deposits in the U.S. steadily increase around local CRS implementation between 2015 and 2016 no trend is visible in the other considered locations. Figure 4 further supports our test for relocation to the U.S. by showing that the increase in cross-border deposits

in the U.S. is not due to the general financial secrecy level of the country but rather from its non-participation in the CRS.

5. Empirical Results

5.1. Descriptive Statistics

Table 1 provides descriptive statistics on all cross-border deposits held in offshore locations on which the BIS provides data. The time period covered is from 2010 until 2017. The number of observations is the same for all places except for Hong Kong and Macau where data is only available from end of 2014 onwards. The mean to GDP ratio shows that in the small islands of Guernsey, Jersey and Isle of Man cross-border deposits are relatively more important than in Hong Kong and Macau. This may partially be due to the fact that most of the deposits considered in our sample are owned by residents of EU member states and they may find Guernsey, Jersey and Isle of Man as preferable locations to hide wealth and related income given the geographical proximity. Hong Kong has the largest average, minimum and maximum amount of deposits in absolute terms.

Table 1: Descriptive Statistics on Offshore Locations & U.S. (2014-2017)

Deposit Location	Observations	Mean (M $)	Mean to GDP (M $)	Stand. Deviation (M $)	Min (M $)	Max (M $)
GG	486	411.7		1,370.8	0.0	8,366.3
JE	492	802.8		3,391.1	1.0	23951.0
IM	491	438.1		1,840.5	0.6	13,415.6
HK	492	1,347.3		2,809.3	2.5	17,371.3
MO	412	140.5		509.3	0.0	4,515.8
US	480	14,858.2		52,945.8	6.0	37,3090.0

Notes: The table depicts the deposits held by OECD and EU residents in the available offshore locations for our sample period, which starts in the last quarter of 2014 and runs until the first quarter of 2017. The data is taken from the BIS. GG stands for Guernsey. JE stands for Jersey. IM stands for Isle Next, Table 2 provides the mean of cross-border deposits located in offshore locations, the U.S. and all other non-offshore locations before and after CRS implementation. Cross-border deposits in offshore locations strongly decrease, by around 30%, after CRS became effective. In all other non-offshore locations excluding the U.S. they decrease slightly, by around 13%. In contrast, in the U.S. cross-border deposits increase after CRS effectiveness by 15%. These findings corroborate our evidence that upon CRS implementation wealth and related income parked in offshore locations for the purpose of tax evasion decline on average while in the U.S. increase on average.

Next, Table 2 provides the mean of cross-border deposits located in offshore locations, the U.S. and all other non-offshore locations before and after CRS implementation. Cross-border deposits in offshore locations strongly decrease, by around 30%, after CRS became effective. In all

other non-offshore locations excluding the U.S. they decrease slightly, by around 13%. In contrast, in the U.S. cross-border deposits increase after CRS effectiveness by 15%. These findings corroborate our evidence that upon CRS implementation wealth and related income parked in offshore locations for the purpose of tax evasion decline on average while in the U.S. increase on average.

Table 2: Deposits Changes in Sample Before and After the CRS (2010-2017)

Sample	Observations	Mean (M$)	St. Dev. (M$)	Min (M$)	Max (M$)
OF, before CRS	3,144	855	3011	0	30,917
OF, after CRS	1,386	599	2162	0	22,614
US, before CRS	879	13,282	48,994	5	373,090
US, after CRS	280	15,274	52,677	8	359,448
Non-US + Non-OF, before CRS	14,652	3,867	27,276	0	749,655
Non-US + Non-OF, after CRS	5,391	3,374	22,004	0	611,654

Notes: The table compares where residents of the EU and OECD hold deposits for the period starting in the first quarter of 2010 until the first quarter of 2017. The data is taken from the BIS. OF stands for offshore locations countries as deposit locations as defined in the paper. U.S. stands for the U.S. as deposit location. Non-U.S. + Non-OF stands for all other available deposit locations. Before CRS is the period before the first wave of information exchange under the CRS. After CRS is the period after the first wave of information exchange under the CRS.

5.2. Main Results of the Test on CRS Effect on Offshore Locations

Results from our estimation of equation 1a reported in Table 4 confirm our expectation on CRS effect on traditional locations for cross-border tax evasion. We observe a highly significant 14% reduction of cross-border deposits held by residents of the OECD and EU in offshore locations upon the introduction of the CRS when compared to the change in cross-border deposits in the control countries (see Column 1 Table 4). This effect is similar yet slightly larger in terms of size to what Johannesen and Zucman (2014) find in their test of the effect of bilateral information exchange on cross-border deposits in tax havens and it is more significant here. [49] On first inspection, the CRS introduction accordingly seems to have a similar effect in a deposit location as a bilateral treaty. However, CRS is introduced on top of bilateral treaties in most of our sample country-pairs and on top of the European Savings Directive in case of Jersey, Guernsey and Isle of Men, which indicates that CRS's broader scope is effective in further

[49] They find an 11% decrease.

reducing cross-border tax evasion. Our data give an intuition for the economic relevance of the CRS: In a given quarter-year, the average amount of deposits held by all residence countries in our sample in the offshore locations Guernsey, Hong Kong, Isle of Man, Jersey and Macau, is USD 123 billion. Thus, according to our findings the average amount of deposits in these five offshore locations is decreased by about USD 17 billion upon CRS implementation. Back of the envelope calculations allow a lower bound estimate of a reduction of cross-border deposits in all twelve BIS classified offshores after CRS implementation by USD 43 billion.[50]

In Column 2 of Table 4, as an alternative specification of the post CRS period and robustness check, we estimate equation 1b, where we chose a post period dummy (PostCRSFirstWave) that is defined as the period after the first wave adopters implemented the CRS. It is constant across all observations and not directly related to country-specific CRS implementation. Using this second, alternative measure, we find that in the post treatment period deposits held in offshore locations are on average 23.1% below those held in the control group countries (see Column 2 of Table 4). The effect is highly significant. This robustness check suggest an economically even larger magnitude. Back of the envelope calculations reveal that deposits in the five considered offshore locations decrease on average by USD 28 billion after CRS effectiveness in the first wave adopter countries and about USD 70 billion when extrapolated to all twelve BIS classified offshore locations. All regressions include country-pair and residence country-quarter-year fixed effects and standard errors are robust and clustered on the country-pair level.

Additionally to the country-specific CRS introduction dates and the effective date for first wave adopters, we test the country-specific CRS effective dates. Directionally we expect the same effect. The results are statistically significant (see Column 3 of Table 4). In particular, after effectiveness of the CRS in the deposit locations, cross-border deposits are on average 17.2% lower in the offshore locations as compared to non-offshore locations (see Column 3 of Table 4).

[50] For our calculations we assume that the five offshores make up 40% of total offshores deposits. This estimate is based on aggregate data from 2017 provided by BIS. When evaluating the overall effect of the CRS on cross-border deposits held in offshores the following should be considered. The size of the effect we calculate above represents a lower bound of the overall CRS effect for two key reasons. First, we get access to data on bilateral cross-border deposits located in a representative but limited subsample of five offshore locations. Second, three out of five offshore locations we consider, were already affected by the EU Savings Directive. Meaning that Guernsey, Isle of Man and Jersey already automatically exchanged information on interest income held by EU individual residents in local banks and EU residents represent the majority of the account owners in our sample.

TABLE 4: CHANGE IN CROSS-BORDER DEPOSITS IN OFFSHORES UPON CRS INTRODUCTION & EFFECTIVENESS

DEPENDENT VARIABLE	Log of Cross-Border Deposits		
CRS SPECIFICATION	Country Specific Introduction Date	First Adoption Wave	Country Specific Effective Date
VARIABLES	(1)	(2)	(1)
PostCRSIntroDepL	-0.0462		
	(0.0303)		
PostCRSIntroDepL * Offsh	-0.140***		
	(0.0502)		
PostCRSFirstWaveAdopters		0.248*	
		(0.129)	
PostCRSFirstWaveAdopters * Offsh		-0.231***	
		(0.0596)	
PostCRSEffDepL			-0.0646**
			(0.0324)
PostCRSEffDepL * Offsh			-0.172***
			(0.0583)
Constant	4.502***	4.101***	4.514***
	(0.0336)	(0.124)	(0.0342)
Macao included in the sample	NO	YES	NO
Observations	11,477	11,889	11,477
R-squared	0.060	0.060	0.061
Number of countrypair	1,017	1,056	1,017
Country-Pair FE	YES	YES	YES
Residence-Quarter-Year FE	YES	YES	YES

Notes: Cluster robust standard errors in parentheses, clustered at the country-pair level. The dependent variable is the log of cross-border deposits held by residents of country i in banks of deposit location j in the end of quarter q. The unit of observation is the residence and deposits country pair and the sample period goes from the last quarter of 2014 to the third quarter of 2017. Offsh is a dummy taking value one when the deposit location j is an offshore location. PostCRSIntroDepL is a dummy, which equals one in the period after the implementation date of the CRS in the deposit location. PostCRSFirstWaveAdopters is a dummy equal one starting in the period of the first wave of information exchange. PostCRSEffDepL is a dummy and denotes the effective date of the CRS in the deposit location. All regressions include country-pair and residence country-quarter-year fixed effects.

*** significance at the 1 % level,

** significance at the 5% level,

* significance at the 10% level.

5.3. Main Results of the Test for the Relocation to the U.S.

Results from the estimation of equation 2, i.e. our test of whether the introduction of the CRS leads to a relocation of deposits to the U.S., are reported in Table 5. Relative to all other locations in our sample and after controlling for the effect of the CRS on offshore deposits, deposits by EU and OECD residents in the U.S. significantly increase, on average by 9%, after CRS effectiveness in the first wave adopters (see Column 1 of Table 5). The effect size is substantial

and therefore economically highly relevant. In a given year the average amount of deposits held by all residence countries in our sample in the U.S. is USD 551 billion. Thus, given our coefficient estimates, that amount is increased by USD 50 billion upon CRS implementation. This amount is large enough to assume that a substantial amount of cross-border deposits, that after CRS effectiveness were removed from offshore locations (our lower bound estimate is USD 70 billion), are relocated to the US. To investigate more closely the mechanism through which the threat of the CRS works on relocation of hidden wealth and related income to the U.S., we conduct further tests adding more controls beyond the fixed effects structure.

First, we add an interaction of the secrecy score number with the post treatment dummy to control for the secrecy of the deposit location, but the variable does not load. After controlling for financial secrecy, the observed increase in the U.S. is almost unchanged, i.e. 8.5% (see Column 2 of Table 5). This finding gives a first indication that money laundering or other non-tax secretive reasons do not drive the movements of deposits that we observe in response to the CRS. If they were, we would expect that the overall most secretive locations also attract the most deposits and therefore the coefficient on the financial secrecy variable would be positive and significant.

Finally, our test of whether residents of countries with higher tax burden on bank deposits, measured as the resident country's interest tax rate, are those more likely to relocate their wealth and related income to the U.S. is inconclusive. While the direction of the effect is large and as expected, results are insignificant at conventional significance levels. After adding the variable for the interest tax rate and interacting that variable with our post-treatment interaction variable, results are insignificant on our previous coefficient of interest. This suggests that the relocation of deposits to the U.S. may be highly correlated with the residence countries' tax rate and could therefore be caused by the tax incentives faced by residents of high interest tax rate countries.

TABLE 5: RELOCATION OF CROSS-BORDER DEPOSITS TO THE U.S. IN THE AFTER CRS PERIOD

DEPENDENT VARIABLE	Log of Cross-Border Deposits		
CRS SPECIFICATION	First Adopter Wave of CRS		
VARIABLES	(1)	(2)	(3)
PostCRSFirstWaveAdopters * Offsh	-0.226***	-0.240***	-0.240***
	(0.0600)	(0.0651)	(0.0651)
PostCRSFirstWaveAdopters * US	0.0902*	0.0850*	-0.00874
	(0.0478)	(0.0497)	(0.107)
Secrecy * PostCRSFirstWaveAdopters		0.00107	0.00270
		(0.00218)	(0.00242)
Res_ITax			-18.72
			(15.87)
US*Res_ITax			1.185
			(0.933)
PostCRSFirstWaveAdopters * US * Res_ITax			0.357
			(0.397)
Constant	4.097***	4.096***	5.350***
	(0.124)	(0.124)	(0.262)
Observations	11,889	11,889	8,011
R-squared	0.060	0.061	0.016
Number of countrypair	1,056	1,056	705
Countrypair FE	YES	YES	YES
Residence-Quarter-Year FE	YES	YES	YES

Notes: Cluster robust standard errors in parentheses, clustered at the country-pair level. The dependent variable is the log of cross-border deposits held by residences of country i in banks of deposit location j in the end of quarter q. The unit of observation is the residence-deposits country-pair and the sample period goes from the last quarter of 2014 to the third quarter of 2017. Offsh is a dummy taking value one when the deposit location j is an offshore location. PostCRSFirstWaveAdopters is a dummy equal one starting in the period of the first wave of information exchange. U.S. (CH, LU, NL) is a dummy equal one when the deposit location j is the U.S. (CH, LU, NL). Res_ITax is a variable indicating the level of the interest rate tax at the residence location i in quarter q. Secrecy is a variable indicating the secrecy ranking of the deposit location j in the Financial Secrecy Index 2018 (constant across all time periods). All regressions include country-pair and residence-quarter-year fixed effects.

*** significance at the 1 % level,
** significance at the 5% level,
* significance at the 10% level.

5.4. Robustness Checks

5.4.1. Event Study

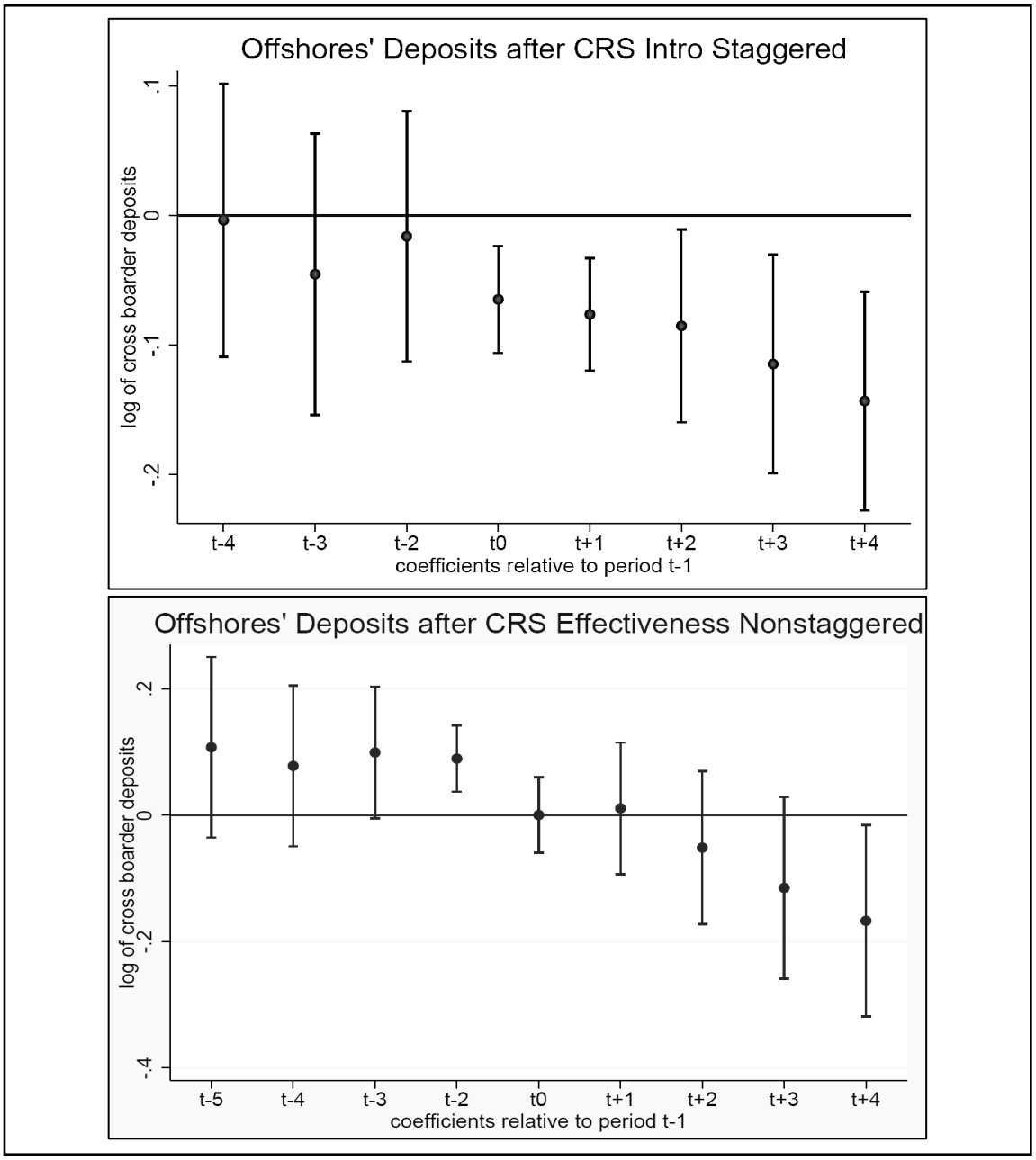
In this section, we report graphical results from event-study regressions. Event studies can be used to evaluate the common trends assumption and to assess how quickly the reaction to the CRS emerges, and thus to gain a more comprehensive picture of how the CRS affects tax evasion through the use of cross-border deposits.

To do so, we estimate a version of equation 1a and equation 1b (the test of the CRS's effect on cross-border deposits held in offshore locations), in which we replace the single coefficient of the interaction of the CRS post period and the offshore indicator with 9 separate indicator variables, each marking one quarter over the t–5 to t+4 period relative to the quarter before the CRS treatment event date (t–1). We omit the indicator for period t–1. It therefore serves as benchmark. We limit the sample to quarters from t–5 to t+4. Figure 5 plots the coefficients for each relative quarter together with the 95% confidence interval. We use the log of cross-border deposits as the dependent variable, and country-pair fixed effects. The upper panel reports the results for the staggered CRS event specification, at the introduction date of the CRS in the deposit locations. The lower panel reports the results for the non-staggered CRS event specification, at the CRS adoption date of the first waver adopters.

For the staggered CRS specification (upper panel of Figure 5) the reduction in cross-border deposits held in offshore locations is immediate as the coefficients become significant starting with the introduction quarter (t=0). The effect size increases in absolute magnitude over time and remains significant through quarter t+5. The parallel trends assumption is corroborated as well, since in the pretreatment period the coefficients lie close to zero and are statistically insignificant.

In the case of the non-staggered specification (lower panel of Figure 5) the time-series pattern is less sharp. Nonetheless the graph depicts an increasing reduction in cross-border deposits over the post-event time (t0 to t+4) relative to the pre-period, although only the coefficient in the last period (t+4) is significant. The coefficients in the pre-period (t–2 to t–5) are statistically indistinguishable from the benchmark quarter, showing that there is no pre-trend.

Figure 5: Event Study Test of the Effect of the CRS Implementation in Offshore Locations



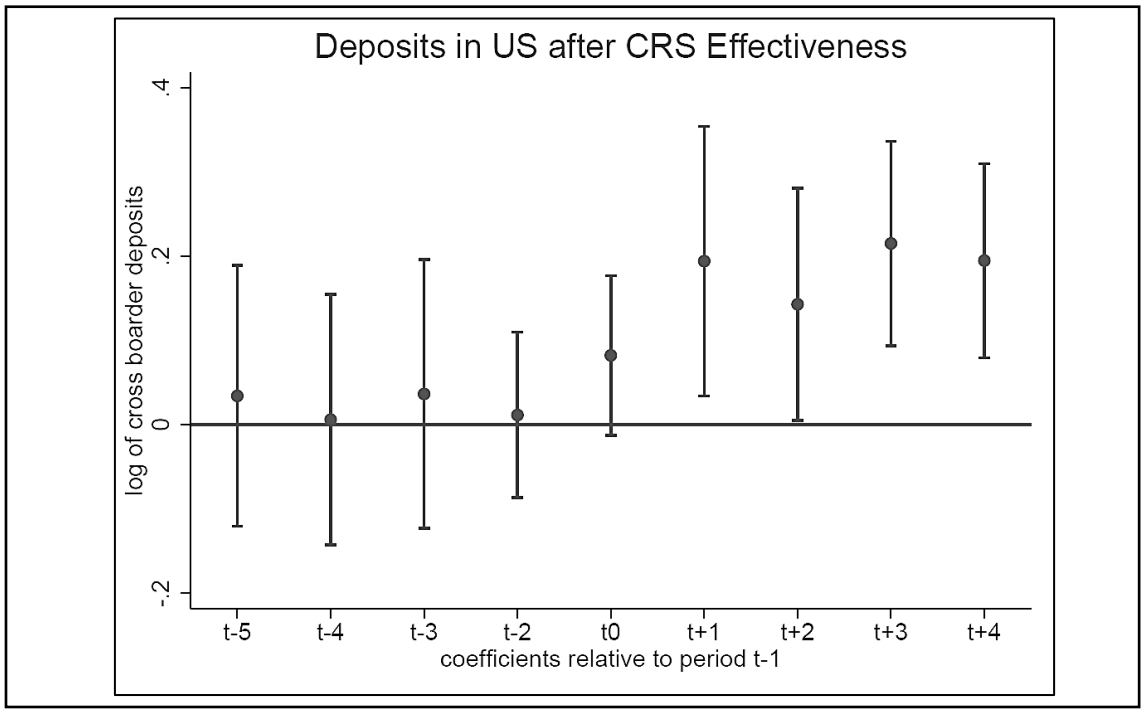
Notes: The figure charts coefficient estimates of cross-border deposits held by residents of EU and OECD countries in offshores around the CRS event dates (in event time). We estimate Eq. 1a (upper panel) and Eq. 1b (lower panel) but replace the single coefficient of the interaction of CRS introduction and the offshores indicator with 9 separate indicator variables, each marking one quarter over the t–5 to t+4 period relative to the quarter before the CRS event date (t–1).We omit the indicator for period t–1. It therefore serves as benchmark, and has a coefficient value of zero (and no confidence interval). The figure plots the coefficient estimates of the 9 quarters together with their 95% confidence intervals for the staggered CRS event date at introduction of CRS in the deposit location (upper panel) and for the non-staggered CRS event date at effectiveness of CRS in the first wave adopters (lower panel). We use the log of cross-border deposits as the dependent variable, and country-pair fixed effects.

We furthermore conduct an event study for our test of cross-border deposits relocation to the U.S.. To do so, we estimate a version of equation 2, in which we replace the single coefficient

of the interaction of the CRS first wave adoption indicator with the U.S. indicator with 9 separate indicator variables, each marking one quarter over the t–5 to t+4 period relative to the quarter before the treatment event date (t–1). Again, we omit the indicator for period t–1, such that it serves as benchmark, and we limit the sample to quarters t–5 to t+4. We use the log of cross-border deposits as the dependent variable, and country-pair fixed effects. Figure 6 plots the coefficients for each relative quarter together with the 95% confidence interval.

The reduction in cross-border deposits parked in offshore locations is fairly immediate as the coefficient size increases sharply and is almost significant in t=0. It becomes significant starting with the first quarter after CRS effectiveness in the first wave adopters (t=1). The effect size remains significant through quarter t+5. Finally, also in this third test of the parallel trends assumption the coefficients in the pre-period (t–2 to t–5) are statistically indistinguishable from the benchmark quarter, showing that there is no pre-trend.

Figure 6: Event Study Test of the Relocation Behavior upon CRS Implementation



Notes: The figure charts coefficient estimates of cross-border deposits held by residents of EU and OECD countries in the U.S. around the CRS event dates (in event time). We estimate Eq. 2 but replace the single coefficient of the interaction of CRS effectiveness in the first wave adopters and the U.S. indicator with 9 separate indicator variables, each marking one quarter over the t–5 to t+4 period relative to the quarter before the CRS treatment event date (t–1).We omit the indicator for period t–1. It therefore serves as benchmark, and has a coefficient value of zero (and no confidence interval). The figure plots the coefficient estimates of the 9 quarters together with their 95% confidence intervals for the non-staggered CRS event date at effectiveness of CRS in the first wave adopters. We use the log of cross-border deposits as the dependent variable, and country-pair fixed effects.

5.4.2. Alternative Sample

In order to preserve the maximum number of observations possible, in our main analysis we use an unbalanced sample. However, we want to rule out the possibility that our sample may suffer a selection bias due to unbalanced sampling. Thus in a robustness check, we re-run our main regression analysis using a balanced sample. This leads to the loss of around 9% of the total observations available. The balanced sample consists of almost 11,000 observations. We first investigate the change in cross-border deposits in offshore locations compared to non-offshore locations upon the implementation of the CRS. We consider the non-staggered specification, i.e. the period after the first wave adopters implemented the CRS.

Results are essentially unchanged. Cross-border deposits of OECD and EU residents located in offshore locations experience a 22.7% reduction after the CRS became effective in the first wave adopters if compared to the change in cross-border deposits in the control countries (see Column 1 Table 6). We proceed by testing the reallocation scenario. In this case, results remained also largely unchanged. Relative to all other locations in our sample and after controlling for the effect of the CRS on cross-border deposits in offshore locations, an increase of 8.06% in deposits of EU and OECD residents in the U.S. is detected after CRS effectiveness in the first wave adopters (see Column 2 of Table 6). Thus, we can rule out that our unbalanced sample suffers from selection bias due to unbalanced sampling.

TABLE 6: BALANCE SAMPLE, CHANGE IN CROSS-BORDER DEPOSITS IN OFFSHORES AND RELOCATION TO THE U.S. IN THE AFTER CRS PERIOD

DEPENDENT VARIABLE	Log of Cross-Border Deposits			
CRS SPECIFICATION	First Adopter Wave of CRS			
VARIABLES	(1)	(2)	(3)	(4)
PostCRSFirstWaveAdopters * Offsh	-0.227***	-0.222***	-0.238***	-0.238***
	(0.0566)	(0.0570)	(0.0632)	(0.0631)
PostCRSFirstWaveAdopters * US		0.0806*	0.0746	-0.0636
		(0.0482)	(0.0505)	(0.103)
Secrecy* PostCRSFirstWaveAdopters			0.00118	0.00118
			(0.00218)	(0.00219)
Res_ITax				-31.54**
				(15.76)
US * Res_ITax				1.260
				(0.946)
PostCRSFirstWaveAdopters * US * Res_ITax				0.532
				(0.371)
Constant	4.301***	4.298***	4.297***	12.63***
	(0.126)	(0.126)	(0.126)	(4.174)
Observations	10,968	10,968	10,968	10,968
R-squared	0.071	0.071	0.071	0.071
Number of countrypair	914	914	914	914
Countrypair FE	YES	YES	YES	YES
Residence-Quarter-Year FE	YES	YES	YES	YES

Notes: Cluster robust standard errors in parentheses, clustered at the country-pair level. The dependent variable is the log of cross-border deposits held by residences of country i in banks of deposit location j in the end of quarter q. The unit of observation is the residence-deposits country-pair and the sample period goes from the last quarter of 2014 to the third quarter of 2017. Offsh is a dummy taking value one when the deposit location j is an offshore location. PostCRSFirstWaveAdopters is a dummy equal one starting in the period of the first wave of information exchange. US is a dummy equal one when the deposit location j is the US. Res_ITax is a variable indicating the level of the interest rate tax at the residence location i in quarter q. Secrecy is a variable indicating the secrecy ranking of the deposit location j in the Financial Secrecy Index 2018 (constant across all time periods). All regressions include country-pair and residence-quarter-year fixed effects.

*** significance at the 1 % level,
** significance at the 5% level,
* significance at the 10% level.

5.4.3. Sample Split

Furthermore, we challenge robustness of our finding that deposits are relocated to the U.S. by investigating whether the effect of CRS prevails if we split our sample into cross-border deposits in the U.S. and cross-border deposits in non-offshore locations. We test relocation behavior to the U.S. only on the subsample of country-pairs where the deposit location is the U.S., i.e. we drop all other observations for which deposits are held in non-U.S. deposit locations from our sample. The difference-in-difference regression design thus becomes a time trends test of deposits located in the U.S., where we compare the change in deposits located within the U.S. after CRS effectiveness to before CRS effectiveness. As placebo test – in a second time trends

analysis – we investigate the reaction to CRS effectiveness in non-offshore to non-offshore deposits. In the placebo test the U.S. is excluded as residence country, because changes in cross-border deposits from the U.S. upon CRS effectiveness may be driven by the potentially stark increase in the use of U.S. shell companies in the after CRS era. We test for these changes in deposits from the U.S. to non-offshore locations in additional tests in Section 6.2 below. We add country-pair fixed effects in both, the main test and the placebo test. Thus identifying variation comes from within country-pair changes. We control for common shocks to the economy by quarter-year fixed effects. Results are displayed in Table 7.

The estimated effect of the CRS on the U.S. deposits reported in Table 7 Column 1 is directionally the same as in our main test and highly significant corroborating our difference-in-difference results for the test of relocation behavior to the U.S.. The placebo test underscores that, as we expect, no change in non-offshore to non-offshore deposits occurs after CRS effectiveness.

TABLE 7: SPLIT SAMPLE TEST COMPARING THE REACTION TO CRS ON DEPOSITS IN THE U.S. VS. DEPOSITS IN NON-OFFSHORES

DEPENDENT VARIABLE	Log of Cross-Border Deposits	
CRS SPECIFICATION	First Adopter Wave of CRS	
RESIDENCE LOCATION	EU & OECD, without U.S.	
SAMPLE	EU & OECD, non-U.S. to U.S.	EU & OECD, non-U.S. to Non-Offshores + non-U.S.
VARIABLES	(1)	(2)
PostCRSFirstWaveAdopters	0.185***	-0.00823
	(0.0641)	(0.270)
Constant	6.742***	4.308***
	(0.0453)	(0.260)
Observations	480	8,789
R-squared	0.091	0.069
Number of countrypair	40	791
Country-Pair FE	YES	YES
Quarter-Year FE	YES	NO
Residence-Quarter-Year FE	NO	YES

Notes: Cluster robust standard errors in parentheses, clustered at the country-pair level. The dependent variable is the log of cross-border deposits held by residences of country i in banks of deposit location j in the end of quarter q. The unit of observation is the residence-deposits country-pair and the sample period goes from the last quarter of 2014 to the third quarter of 2017. PostCRSFirstWaveAdopters is a dummy equal one starting in the period of the first wave of information exchange.
*** significance at the 1 % level,
** significance at the 5% level,
* significance at the 10% level.

6. Additional Tests

6.1. Test of the Use of Shell Companies in the Post-CRS Area

So far, we only address tax evaders who hold offshore bank accounts in their own name, i.e. directly. Instead of directly holding an offshore bank account, tax evaders can first set up a company in an offshore location and through that company – a so-called shell company – they then hold an offshore bank account. Shell companies are used to add layers of secrecy between the hidden account and its beneficial owner. There is vast anecdotal and empirical evidence on offshore bank accounts being held by individuals indirectly through shell companies such as the evidence reported in the context of the paradise and panama papers. In additional tests, we investigate how CRS affects the use of shell companies by tax evaders.

To identify shell companies, we follow the identification strategy proposed in Johannesen and Zucman (2014). Since our construct of cross-border deposits includes deposits owned by both entities and individuals, we can rely again on the same measure of tax evasion as in our previous specifications. For example, when an Italian saver holds assets in Jersey through a shell company in Hong Kong, the BIS assigns the funds to Hong Kong, i.e. we observe in our data these deposits as being held by a Hong Kong resident in Jersey. The use of shell companies, thus, explains why offshore-to-offshore deposits play such a dominant role in the BIS data.

We test first whether the introduction of the CRS has led to a reduction of offshore shell companies holding bank accounts in other offshore locations. The sample is restricted to deposits held by offshore residents (i.e. our proxy for cross-border deposits held through shell companies) in other offshore locations. We regress these offshore-to-offshore deposits on the post-CRS dummy. The regression takes the following form:

$$\log\left(CrossBorderDeposits_{ijt}\right) = \alpha + \beta_1 \text{PostCRSFirstWave}_t + \gamma_t + \delta_{ij} + \epsilon_{ijt} \quad (3)$$

All variables are defined as above. Following Johannesen and Zucman (2014) we add country-pair and quarter-year fixed effects as well as cluster robust standard errors at the country pair level. β_1 is the coefficient of interest. Ex ante, the direction of the effect is unclear. Anecdotal evidence suggests that the CRS could be circumvented by the setting up of shell companies in

certain circumstances.[51] In case individuals avoid CRS reporting requirements by use of shell companies in offshore locations, the coefficient should be positive and significantly different from zero. If instead, the CRS is effective in addressing tax evasion by the use of shell companies in offshore locations, we would expect a negatively significant coefficient. Indeed, this is what we find. Offshore deposits in offshore-to-offshore constellations decreased by 25.8% in our sample after the CRS is effective in the first wave CRS adopters, which indicates that the overall use of offshore shell companies in this constellation in our sample decreased as reaction to the CRS (see Table 8 Column 1). The effect is significant at the 1% level.

Secondly, we test whether offshore shell companies increased their deposits in the U.S. after the introduction of the CRS. Following our main test, we expect that the CRS leads to an increase of offshore shell companies holding bank accounts in the U.S., since U.S. bank accounts are out of reach from the CRS. We restrict the sample to offshore locations as residence countries and the U.S. as deposit location. We then regress these offshore-to-U.S. deposits on the post CRS dummy. The regression takes the form:

$$\log\left(CrossBorderDeposits_{ijt}\right) = \alpha + \beta_1 \text{PostFirstWaveCRS}_t + \gamma_t + \delta_{ij} + \epsilon_{ijt} \quad (4)$$

All variables are defined as above and we add again country-pair and time fixed effects as well as robust clustering of the standard errors at the country pair level. β_1 is the coefficient of interest, which we expect to be positive and significantly different from zero. We find an increase of 32.6% of deposits held in the U.S. by offshore residents after the CRS is effective in the first wave CRS adopters (see Table 8 Column 2). This effect is statistically significant at the 1% level. This suggests that offshore shell companies are not (all) closed down in response to the CRS and to a considerable degree offshore shell companies set up bank accounts in the U.S. Given the prominent role of shell companies, this finding is at least as politically important as our main findings with regard to direct relocation of wealth and related income to the U.S.

The previous part demonstrates the pervasive use of offshore shell companies as a way to add secrecy levels and reduce the threat of detection for tax evaders by the respective country's tax authority. As Findley et al. (2015) show, not only traditional offshore locations, but also the U.S. offers very attractive conditions for setting up shell companies. Thus, we can expect that

[51] According to the CRS guidelines, financial institutions are required to identify the controlling person(s) in case the account holder is an entity, not a person. However, it might not always be feasible to obtain information on the final beneficial owner.

upon the introduction of the CRS, given the compliance of all traditional offshore locations, tax evaders may now find it even more appealing to directly set up their shell companies in the U.S.. Furthermore, through those entities they may hold local as well as international bank deposits in non-offshore countries, since, as Menkhoff and Miethe (2018, p. 5) argue, wealthy individuals may both be unwilling to accumulate all their capital in one single country and present a home-bias investment attitude. Therefore, one can presume tax evaders to also own deposits located outside the U.S. indirectly via U.S. shell companies. This would represent a similar 'round-tripping' strategy as the one detect by Hanlon et al. (2015) in the context of U.S. taxpayers.

For example, a German taxpayer could set up an investment entity in the U.S. and through that entity own a deposit located in a Swiss bank. The CRS requirements force financial intuitions to inspect the entity to identify the final beneficial owner if the entity is located in a non-CRS participating jurisdiction. Thus, as the U.S. is not CRS compliant, one should suppose that the German taxpayer would see his indirectly owned bank account reported to the German tax authority. However, certain countries such as Luxembourg or Switzerland do consider the U.S. as a CRS participating jurisdiction given the existence of FATCA.[52] This implies that Switzerland, for example, would not investigate the beneficial owner of the U.S. entity. The German taxpayer could exploit the above-described loophole to circumnavigate the CRS requirements and avoid any tax obligation in his country of residence. In this section, we test this new channel for tax evasion via U.S. shell companies by comparing the change in cross-border deposits held by U.S. residents in non-offshore locations before and after the implementation of the CRS. Thus, we regress these U.S.-to-non-offshores deposits on the post CRS dummy. The regression takes the form:

$$\log\left(CrossBorderDeposits_{ijt}\right) = \alpha + \beta_1 \text{PostFirstWaveCRS}_t + \gamma_t + \delta_{ij} + \epsilon_{ijt} \quad (5)$$

All variables are defined as above. Following Johannesen and Zucman (2014) we add country-pair and quarter-year fixed effects as well as cluster robust standard errors at the country pair level. Results suggest an increase of 31.1% of deposits held by U.S. residents in non-offshore locations after the CRS is effective in the first wave CRS adopters (see Table 8 Column 3). This finding gives first evidence, that after the CRS implementation also the use of U.S. shell

[52] For more information, see https://blog.kpmg.ch/aeoi-ordinance-step-closer-implementing-aeoi/ or https://www.taxjustice.net/2016/06/09/luxembourg-starts-rush-to-bolster-tax-haven-usa/

companies substantially increased and confirms the relevance of the U.S. for tax evasion purposes of non U.S. residents following the CRS.

TABLE 8: CHANGE IN CROSS-BORDER DEPOSITS HELD BY SHELL COMPANIES UPON CRS EFFECTIVENESS

DEPENDENT VARIABLE	Log of Cross-Border Deposits		
CRS SPECIFICATION	First Adopter Wave of CRS		
SAMPLE	offshores to offshores deposits	offshores to U.S. deposits	U.S. to non-offshores deposits
VARIABLES	(1)	(2)	(3)
PostCRSFirstWaveAdopters	-0.258**	0.326***	0.311**
	(0.112)	(0.0548)	(0.146)
Constant	6.189***	8.047***	7.748***
	(0.0379)	(0.0582)	(0.0917)
Observations	616	57	246
R-squared	0.058	0.265	22
Number of country-pairs	56	5	0.083
Country-pair FE	YES	YES	YES
Quarter-Year FE	YES	YES	YES

Notes: Cluster robust standard errors in parentheses, clustered at the country-pair level. The dependent variable is the log of deposits held by residents of country i in banks of deposit location j in the end of quarter q. The unit of observation is the residence country deposit location pair and the sample period goes from the last quarter of 2014 to the third quarter of 2017. In column one the sample is restricted to offshores as residence country and offshores as deposit location. In column two the sample is restricted to offshores as residence country and the U.S. as deposit location. In column three the sample is restricted to U.S. as residence country and non-offshores as deposit location. Offsh is a dummy taking value one when the deposit location j is an offshore location. PostCRSFirstWaveAdopters is a dummy equal one starting in the period of the first wave of information exchange. All regressions include country-pair and quarter-year fixed effects.

*** significance at the 1 % level,
** significance at the 5% level,
* significance at the 10% level.

6.2. Test of Alternative Attractive Locations for Relocation

It could be the case that also other non-offshore locations become attractive places of relocation after CRS introduction in offshore locations. We therefore test what happens in other potentially attractive non-offshore locations after CRS effectiveness. To make results comparable to our test of relocation to the U.S., we employ exactly the same research design. As these potentially equally attractive secrecy locations we consider countries listed among the 15 secrecy locations in the FSI ranking. Next to the U.S., we have data on three of these countries, namely, Switzerland, Luxembourg, and the Netherlands.[53] In contrast to the U.S., they all implemented

[53] The full list of the top 15 in the FSI ranking is composed of Switzerland, USA, Cayman Islands, Hong Kong, Singapore, Luxembourg, Germany, Taiwan, United Arab Emirates (Dubai), Guernsey, Lebanon, Panama, Japan, Netherlands and Thailand. We exclude those countries from our test that we consider offshore locations.

the CRS. As expected, in none of these alternative locations we observe an increase in cross-border deposits (see Table 9). Cross-border deposits held in Luxembourg remain unchanged, while in the Netherlands and Switzerland cross-border deposits even seem to be decreasing relative to those in non-offshores upon CRS introduction. Of all non-offshores high secrecy locations in our sample, the U.S. is therefore the only one for which we observe an increase in cross-border deposits after CRS effectiveness as compared to the other non-offshore locations. These findings confirm that the attractiveness of the U.S. as location for cross-border tax evasion lies in its non-compliance to the CRS. While those jurisdictions that introduced the CRS – despite offering high bank secrecy – become on average less attractive.

TABLE 9: THE U.S. VS. ALTERNATIVE RELOCATION LOCATIONS

DEPENDENT VARIABLE	Log of Cross-Border Deposits			
CRS SPECIFICATION	First Adoption Wave			
SECRECY LOCATION	US	CH	LU	NL
VARIABLES	(1)	(2)	(3)	(4)
PostCRSFirstWaveAdopters *Offsh	-0.226***	-0.236***	-0.232***	-0.237***
	(0.0600)	(0.0600)	(0.0599)	(0.0597)
PostCRSFirstWaveAdopters * US	0.0902*			
	(0.0478)			
PostCRSFirstWaveAdopters * CH		-0.103*		
		(0.0528)		
PostCRSFirstWaveAdopters * LU			-0.0131	
			(0.0615)	
PostCRSFirstWaveAdopters * NL				-0.185**
				(0.0785)
Constant	4.097***	4.101***	4.101***	4.105***
	(0.124)	(0.123)	(0.124)	(0.124)
Observations	11,889	11,889	11,889	11,889
R-squared	0.060	0.061	0.060	0.061
Number of country-pairs	1,056	1,056	1,056	1,056
Country-Pair FE	YES	YES	YES	YES
Residence-Quarter-Year FE	YES	YES	YES	YES

Notes: Cluster robust standard errors in parentheses, clustered at the country-pair level. The dependent variable is the log of cross-border deposits held by residences of country i in banks of deposit location j in the end of quarter q. The unit of observation is the residence-deposits country-pair and the sample period goes from the last quarter of 2014 to the third quarter of 2017. Offsh is a dummy taking value one when the deposit location j is an offshore location. PostCRSFirstWaveAdopters is a dummy equal one starting in the period of the first wave of information exchange. US, CH, LU, NL is a dummy equal one when the deposit location j is the US, CH, LU, NL. All regressions include country-pair and residence-quarter-year fixed effects.

*** significance at the 1 % level,

** significance at the 5% level,

* significance at the 10% level.

7. Conclusion

In this study, we analyze the impact of the CRS on cross-border tax evasion. Using data on cross-border deposits publicly available at the BIS LBS database, we consider the implementation of the CRS at national level and its effect on wealth and related income parked in offshore locations to avoid tax obligation at home. We document a statistically significant decrease of deposits owned by EU and OECD residents in major offshore locations around the world upon the local implementation of the CRS. However, tax evaders seem to react even stronger around the CRS effective date for first wave adopters. Moreover, as prior literature on exchange of information agreements suggests, we did not find that the CRS truly puts an end to cross-border tax evasion, but we rather document a radical change in the game dynamics of cross-border tax evasion.

We add to the prior literature by providing strong evidence that a new unexpected location emerged, which seems to attract wealth and related income for the purpose of tax evasion. In our analysis, we consider the only major economy that so far did not commit to requesting its financial institutions to automatically collect and transmit information on foreign financial accounts, i.e. the U.S. We show that directly and indirectly owned cross-border deposits in the U.S. increase upon CRS implementation. We also detect an increase in round-tripping tax evasion through U.S. shell companies following CRS effectiveness. We are aware that other factors might confound our results. To reduce this threat as far as possible, we carefully draft our empirical analyses first by employing a well-established empirical model for cross-border tax evasion, which we use to validate our findings against earlier research. Second, we limit our analysis to a narrow period of time (2014-2017) so as to avoid that other major events – e.g. FATCA or the U.S. 2018 tax reform – may influence our outcomes. Third, we test the robustness of our results in several event studies.

We believe that our study contributes substantially to the current international debate on cross-border tax evasion. Where, next to highlighting the role of the U.S. in the post CRS era, one of our main contributions is that we provide preliminary evidence on the effectiveness of the CRS vis-à-vis reducing wealth and related income parked in traditional offshore locations to avoid tax obligation at home. We find that the CRS leads to a reduction of offshore deposits of up to USD 70 billion at the lower bound. Thus, we trust that the direct and indirect costs faced by participating jurisdictions to be CRS compliant are justified by the encouraging effect the global standard for AEOI seemed to have achieved. But our findings also strongly suggest that

international pressure on the U.S. to commit to the CRS is necessary. No end to cross-border tax evasion can be achieved if tax evaders can still find attractive relocation sites for parking wealth and related income while avoiding tax obligations at home. This is why we firmly wish the achievement of a truly global adoption of the CRS.

Finally, given the extensive network of bilateral relations on AEOI, in the future tax evaders are expected to focus more on cross-product tax evasion and less on cross-border tax evasion. Thus, we suggest for future research to investigate newly available channels to avoid tax obligations, for example crypto currency.

References

Allingham, M. G., & Sandmo, A. (1972). Income Tax Evasion: A Theoretical Analysis. *Journal of Public Economics*, 1 (3–4): 323–38.

Alstadsaeter, A., Johannesen, N., & Zucman, G. (2018). Who owns the wealth in tax havens? Macro evidence and implications for global inequality. *Journal of Public Economics*., 162: 89-100.

Bank for International Settlement. (September 2017). *Glossary - BIS Statistical Bulletin*. Basel: Monetary and Economic Department.

Bank for International Settlements. (01.02.2018). *Locational Banking Statistics: Table A5*. Available at https://stats.bis.org/statx/srs/table/A5

Bank for International Settlements. (01.02.2018). *Locational Banking Statistics: Table A6.2*. Available at http://stats.bis.org/statx/srs/table/a6.2

Becker, G. S. (1974). A Theory of Social Interactions. *Journal of Political Economy*, 82.6: 1063-1093.

Bilicka, K., & Fuest, C. (2014). With which countries do tax havens share information?. *Int. Taxation and Public Finance* 21 (2): 175-197.

Bott, K. M., Cappelen, A. W., Sorensen, E., & Tungodden, B. (2017). You've Got Mail: A Randomised Field Experiment on Tax Evasion. *Working Paper*, NHH Dept. of Economics Discussion Paper No. 10/2017. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3033775

Bruno, V., & Shin, H., S. (2015). Capital flows and the risk-taking channel of monetary policy. *Journal of Monetary Economics*, 71: 119-132.

Brunson, S. D. (2014). The U.S. as Tax Haven? Aiding Developing Countries by Revoking the Revenue Rule. *The Columbia Journal of Tax Law* , 5 (2): 170-206.

Caruana-Galizia, P., & Caruana-Galizia, M. (2016). Offshore financial activity and tax policy: evidence from a leaked data set. *Journal of Public Policy*, 36.3: 457-488.

Casi, E., Nenadic, S., Orlic, M. D., Spengel, C. (2018) A call to action: from Evolution to Revolution on the Common Reporting Standard. *Working Paper*

Cerutti, E. G. (2015). Financial Crises and the Composition of Cross-Border Lending. *Journal of International Money and Finance* , 52: 60-81.

Cotorceanu, P. A., (2015). Hiding in Plain Sight: How non-US Persons Can Legally Avoid Reporitng under both FATCA and GATCA. *Trust & Trustees*, 1-14.

De Simone, L., Lester, R., & Markle, K. (2018). Transparency and Tax Evasion: Evidence from the Foreign Account Tax Compliance Act (FATCA). *Working Paper*, Stanford

University Graduate School of Business Research Paper No. 17-62. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3037426.

Deutsche Bank and Oliver Wyman. (6 June 2017). Special Report Time to Advance and Defend. Available at http://www.oliverwyman.com/content/dam/oliver-wyman/v2/publications/2017/jun/Global-Wealth-Management-OW.PDF

Dharmapala, D. (2016). Cross-Border Tax Evasion under a Unilateral FATCA Regime. *Journal of Public Economics,* 141: 29–37.

European Commission (EC) (2003) Council Directive 2003/48/EU of 3 June 2003, on Taxation of Savings Income in the Form of Interest Payments. Official Journal of the European Union L 157/38, 1-11.

European Commission (EC) (2014) Council Directive 2014/107/EU of 9 December 2014, amending Directive 2011/16/EU as regards mandatory automatic exchange of information in the field of taxation. Official Journal of the European Union L 359/1 1-29.

European Commission (EC) (2015) Council Directive 2015/849/EU of 20 May 2015, on the Prevention of the Use of the Financial System for the Purposes of Money Laundering or Terrorist Financing. Official Journal of the European Union L 141/73 1-45.

Finér, L., & Tokola, A. (2017). The Revolution in Automatic Exchange of Information: How is Information Used and What Are the Effects? *Bulletin for International Taxation*, 71 (12): 688-696.

Findley, M., Nielson, D., Sharman, J. (2015). Causes of Noncompliance with International Law: A Field Experiment on Anonymous Incorporation. *American Journal of Political Science,* 59, 146-161.

Hanlon, M., Maydew, E. L., & Thornock, J. R. (2015). Taking the Long Way Home: U.S. Tax Evasion and Offshore Investments in U.S. Equity and Debt Markets. *The Journal of Finance*, 70.: 257-287.

Heckemeyer, J., & Hemmerich, A. (2018). Information Exchange and Tax Haven Investment in OECD Securities Markets. *Working Paper*. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3029219.

Huizinga, H., & Gaëtan Nicodème, G. (2004). Are International Deposits Tax-Driven. *Journal of Public Economics*, 88 (6): 1093–1118.

Internal Revenue Service. (2007, 8 2). Reducing the Federal Tax Gap A Report on Improving Voluntary Compliance. Washington D.C.: U.S. Department of the Treasury.

Johannesen, N., & Zucman, G. (2014). The End of Bank Secrecy? An Evaluation of the G20 Tax Haven Crackdown. *American Economic Journal: Economic Policy*, 6: 65-91.

Johannesen, N. (2014). Tax Evasion and Swiss Bank Deposits. *Journal of Public Economics*, 111: 46-62 .

Kleimeier, S., Sander, H., & Heuchemer, S. (2013). Financial Crises and Cross-Border Banking: New Evidence. *Journal of International Money and Finance*, 32: 884-915.

Knobel, A. & Heitmüller, F. (2018). Citizenship and Residency by Investment Schemes: Potential to Avoid the Common Reporting Standard for Automatic Exchange of Information. *Working Paper*. Available at: https://ssrn.com/abstract=3144444

Menkhoff, L., & Miethe, J. (2017). Dirty money coming home: Capital flows into and out of tax havens. *Discussion Paper No. 1711 DIW Berlin*

Tax Justice Network (2007). *Identifying Tax Havens.*

Tax Justice Network (2018). *Financial Secrecy Index - Narrative Report on USA.*

Transparency International (2018). *Beneficial Ownership - Country Report on USA.*

Oberson, X. (2015). *International exchange of information in tax matters: towards global transparency*. Geneva: Edward Elgar Publishing.

OECD. (2012). Update to article 26 of the OECD model tax convention and its commentary.

OECD. (2017). Common Reporting Standard User Guide, Annex 3.

OECD. (2018). Signatories of the Multilateral Competent Authority Agreement on Automatic Exchange of Financial Account Information and Intended First Information Exchange Date.

OECD. (2018). Standard for Automatic Exchange of Financial Information in Tax Matters, Implementation Handbook, *Second Edition*. Paris.

OECD. (2017). AEOI: Status of Commitments. *Global Forum on Transparency and Exchange of Information.*

Omartian, J. (2017). Do Banks Aid and Abet Asset Concealment: Evidence from the Panama Papers. *Working Paper*. Available at: https://ssrn.com/abstract=2836635 .

Xu, X., El-Ashram, A., & Gold, J. (2015). Too Much of a Good Thing? Prudent Management of Inflows under Economic Citizenship Programs. IMF *Working Paper*. Available at https://www.imf.org/external/pubs/ft/wp/2015/wp1593.pdf

Zucman, G. (2013, April 09). The Missing Wealth of Nations: are Europe and the U.S. Net Debtors or Net Creditors? *The Quarterly Journal of Economics*, 128 (3): 1321–1364.

APPENDIX A

Table 3: CRS Implementation Overview – On a Country-by-Country Basis

1st Wave (info exchanged in 2017 for the first time)	**2nd Wave (info exchanged in 2018 for the first time)**
Austria	Australia
Belgium	Brazil
Bulgaria	Canada
Croatia	Chile
Cyprus	Hong Kong
Czech Republic	Israel
Denmark	Japan
France	Macau
Germany	New Zealand
Guernsey	Switzerland
Greece	Turkey
Hungary	
Ireland	**Only committed to the CRS**
Isle of Man	Chinese Taipei
Italy	Philippines
Jersey	
Republic of Korea	**Not committed to the CRS**
Luxembourg	United States
Mexico	
Netherlands	
Romania	
Poland	
Slovak Republic	
Slovenia	
Spain	
South Africa	
Sweden	
United Kingdom	

APPENDIX B

Test of Local Responses: Repatriation and Redefinition Channel

We additionally investigate possible repatriation or redefinition behavior of tax evaders upon CRS implementation. Here we use data on the outstanding quarterly volume of local liabilities. The BIS primarily focuses on cross-border banking activity and does not provide extensive coverage on disaggregated data on local deposits. This is why the data on financial accounts at a local level is limited in scope and country coverage. We only have observations for the general category of local liability, i.e. *a liability to a counterparty located in the same country as the banking office that books the position. Opposite of a "cross-border position"*.[54] However, we are unable to get access to any instrument or sectorial specification and we have data only for a limited group of countries. For this reason, we extend the time-period of the additional analysis of the repatriation channel. We consider observations starting from the first quarter in 2010 until the third quarter in 2017.[55]

This data on local liability allows us to test indirectly to what extend deposits are repatriated as response to the CRS. For this test, we use all available local debt instrument data for non-offshore locations and test whether after CRS implementation in the first wave adopters, local liability increase. The regression takes the following form:

$$\log(Local\_DebtInstuments_{it}) = \alpha + \beta_1 PostCRSFirstWave_t + \gamma_t + \delta_i + \epsilon_{ijt} \qquad (5)$$

Local_DebtInstruments denotes deposits held in local bank accounts of country i, *PostCRS-FirstWave* is a dummy for the first wave of information exchange under the CRS and we add country and time fixed effects as well as robust clustering of the standard errors at the country level. β_1 is the coefficient of interest, which we expect to be positive and significantly different from zero. Column 1 of Table B1 reports the regression results. The coefficient takes the expected sign, however it is insignificant. This might be due to the limited sample size.

We use the same dataset as in the previous test, i.e. BIS data on local liability, to test if in addition to relocation responses, some tax evaders were able to redefine as local deposit holders in offshore locations. We call this evasion strategy redefinition. Redefining deposits as local allows the hidden wealth to fall out of the scope of the CRS, which only requires information

[54] See BIS Glossary (September 2017), p. 344.
[55] When testing for the redefinition channel, we are unable to extend the timeframe due to the lack of available data for Hong Kong and Macau.

collection on foreign owned bank accounts. It may thus be possible that deposits remain in offshore locations but the final beneficial owner is not reported under the CRS to the residence country. Anecdotal evidence suggests that one way in which for instance a UK tax evader could avoid the CRS by redefinition, is by becoming citizen of an offshore location for tax purposes. There are claims being made that offshore locations increased the sale of citizenships after the introduction of the CRS. [56] The rationale behind this is that if the UK resident is recorded as for example a Hong Kong resident, his account information will not need to be exchanged with the UK government any longer. Another option investigated already above is that the evader conceals his offshore account by adding layers between him and the account for example by setting up a shell company in the offshore location. If the hidden bank account is in the same jurisdiction as the shell company, it qualifies as local as well and potentially falls out of the CRS reporting requirements. For the test of redefinition behavior, we are now limiting the sample to the five available offshore locations. The regression takes the following form:

$$\log(Local\_DebtInstuments_{it}) = \alpha + \beta_1 PostCRSFirstWave_t + \gamma_t + \delta_i + \epsilon_{it} \qquad (6)$$

All variables are defined as in equation 5 and we add again country and time fixed effects as well as robust clustering of the standard errors at the country pair level. β_1 is the coefficient of interest, which we expect to be positive and significantly different from zero. Column 2 of Table B1 reports the regression results. The coefficient is insignificant, suggesting that the redefinition of deposit ownership was not among the important channels used to circumnavigate CRS requirements.

[56] See https://www.economist.com/finance-and-economics/2017/05/25/how-becoming-a-hong-kong-pensioner-can-save-you-tax, accessed on 30.05.2018. For more details on citizen buy schemes and individual tax evasion, see Xu, El-Ashram and Gold (2015), p. 1-6. On how to circumnavigate CRS reporting requirements by acquiring a citizenship or residence certificates, see Knobel and Heitmueller (2018).

TABLE B1: TEST OF REPATRIATION AND REDEFINITION BEHAVIOR

DEPENDENT VARIABLE	Local Debt Instruments	
CRS SPECIFICATION	First Adoption Wave	
SAMPLE	Non-offshore locations	Offshore locations
	(1)	(2)
VARIABLES	Repatriations	Redefinition
PostCRSFirstWaveAdopters	0.00272	-0.067
	(0.00964)	(0.0702)
Constant	13.70***	11.90***
	(0.0147)	(0.0781)
Observations	276	84
R-squared	0.0314	0.103
Number of deposits countries	23	7
Country FE	YES	YES
Quarter-Year FE	YES	YES

Notes: Cluster robust standard errors in parentheses, clustered at the country-pair level. The dependent variable is the log of cross-border deposits held by residents of country i in banks of deposit location j in the end of quarter q. The unit of observation is the country level and the sample period goes from the last quarter of 2014 to the third quarter of 2017. PostCRSFirstWaveAdopters is a dummy equal one starting in the period of the first wave of information exchange. All regressions include country and country-quarter-year fixed effects.

*** significance at the 1 % level,

** significance at the 5% level,

* significance at the 10% level.

APPENDIX C

Test of the Reaction to CRS Implementation in Residence Country

We expect that the reaction to CRS implementation occurs at the moment when the CRS is implemented in the deposit location rather than upon implementation in the residence location. To test this claim we run the following regression:

$$\log(CrossBorderDeposits_{ijt}) = \alpha + \beta_1 PostCRSIntroResL_{it} + \beta_2 PostCRSIntroResL_{it} * Offsh_j + \beta_3 PostCRSIntroDepL_{jt} + \beta_4 PostCRSIntroDepL_{jt} * Offsh_j + \gamma_t + \delta_{ij} + \epsilon_{ijt} \quad (7)$$

Where the dependent variable $\log(CrossBorderDeposits_{ijt})$ stands for (log) volume of deposits of residents of country i in banks at deposit location j at the end of quarter t. $Offsh_j$ is a dummy taking value one when the deposit location is an offshore location. It constitutes the *treatment* dummy in our difference in difference design.[57] $PostCRSIntroResL_{it}$ and $PostCRSIntroDepL_{jt}$ are the two post treatment period dummies we are interested in comparing. They switch on after CRS implementation and stay switched on until the end of the sample period. $PostCRSIntroResL_{it}$ denotes the implementation date of the CRS in the residence country and $PostCRSIntroDepL_{jt}$ denotes implementation of the CRS in the deposit location. We add quarter-year and country-pair fixed effects. Standard errors are cluster-robust, with clustering on the country-pair level. The regression design follows closely our baseline identification strategy, except for the fixed effects structure that had to be adapted to allow us testing of the effect of the CRS implementation in the residence country. Coefficient β_2 capures the effect of the CRS implementation in the residence country on offshore deposits and coefficient β_4 captures the effect of the CRS implementation in the deposits country on offshore deposits. We expect β_2 to be insignificant and β_4 to be negative and significant. This is what we find in table C1. The findings corroborate that the reaction to CRS implementation occurs at the moment when the CRS is implemented in the deposit location rather than upon implementation in the residence location.

[57] Since the treatment dummy is perfectly multicollinear with our country-pair fixed effects we do not include it as non-interacted term.

TABLE C1: CHANGE IN CROSS-BORDER DEPOSITS IN OFFSHORES UPON CRS INTRODUCTION IN RESIDENCE VS DEPOSIT LOCATION

DEPENDENT VARIABLE	Log of Cross-Border Deposits
CRS SPECIFICATION	Introduction Date
VARIABLES	(1)
PostCRSIntroResL	0.0319
	(0.0255)
PostCRSIntroResL * Offsh	-0.0601
	(0.0461)
PostCRSIntroDepL	0.0654*
	(0.0353)
PostCRSIntroDepL * Offsh	-0.129***
	(0.0442)
PostCRSFirstWaveAdopters * Offsh	
Constant	4.382***
	(0.0375)
Observations	11,477
R-squared	0.009
Number of countrypair	1,017
Countrypair FE	YES
Quarter-Year FE	YES

Notes: Cluster robust standard errors in parentheses, clustered at the country-pair level. The dependent variable is the log of cross-border deposits held by residents of country i in banks of deposit location j in the end of quarter q. The unit of observation is the residence-deposits country-pair and the sample period goes from the last quarter of 2014 to the third quarter of 2017. Offsh is a dummy taking value one when the deposit location j is an offshore location. PostCRSIntroResL is a dummy, which equals one in the period after the implementation date of the CRS in the residence country and equally PostCRSIntroDepL denotes implementation of CRS in the deposit location. All regressions include country-pair and quarter-year fixed effects.

*** significance at the 1 % level,

** significance at the 5% level,

* significance at the 10% level.

APPENDIX D

Test of Alternative List of Offshore Locations

In our baseline model, we strictly follow the BIS list of offshore locations and we consider all those for which we have access to cross-border deposits at bilateral level, i.e. Guernsey, Isle of Man, Hong Kong, Jersey and Macau. However, Johannesen and Zucman (2014) consider an alternative list of havens, which includes, besides traditional locations such as Cayman Island, certain OECD and EU member states, among them Austria, Belgium, Chile, Cyprus, Luxembourg and Switzerland. We decided not to include these countries in our baseline analysis, because in the period we considered those countries already had a powerful treaty network for the exchange of information with almost all OECD and EU member states. This is why we would not expect to find a significant decrease in the amount of cross-border deposits held in these locations upon the introduction of the CRS at national level or at the effective date in the first wave adopters. That intuition is confirmed in Table 11 below. Here we run the same regression as in our test of the CRS effect on offshore locations, but we employ as offshore locations all countries not included in our baseline analysis but in Johannesen and Zucman (2014).[58] As expected and in contrast to our offshore locations sample, no statistically significant decrease in the amount of cross-border deposits in these locations is detected upon CRS introduction at national level (Table D1 Column 1).

[58] We included all countries for which we have data: Austria, Belgium, Chile, Cyprus, Luxembourg, and Switzerland. We drop these countries as residence countries from our sample. In this way, we compare the change in deposits in these 'alternative' offshore countries as held by residence of the 'alternative' non-offshore countries. We do not include and do not have access to bilateral data for the Cayman Islands, Malaysia and Panama.

TABLE D1: ALTERNATIVE OFFSHORES SAMPLE;
CHANGE IN CROSS-BORDER DEPOSITS IN OFFSHORES UPON CRS INTRODUCTION

DEPENDENT VARIABLE	Log of Cross-Border Deposits
CRS SPECIFICATION	Introduction Date
VARIABLES	(1)
PostCRSIntroDepL	-0.0779**
	(0.0365)
PostCRSIntroDepL * Offsh	0.0284
	(0.0483)
Constant	4.383***
	(0.0352)
Alternative offshores definition following J&Z 2014	YES
Observations	9,758
R-squared	0.060
Number of Country-Pairs	866
Country-Pair FE	YES
Quarter-Year FE	YES

Notes: The offshores locations in this alternative sample are the group of countries identified in Johannesen and Zucman (2014) as tax haven locations. We include all tax havens identified by Johannesen and Zucman (2014) and not identified by us as offshores in so far as we have data on these locations in our sample. Cluster robust standard errors in parentheses, clustered at the residence country quarter-year level. The dependent variable is the log of cross-border deposits held by residents of country i in banks of deposit location j in the end of quarter q. The unit of observation is the residence-deposits country-pair and the sample period goes from the last quarter of 2014 to the third quarter of 2017. Offsh is a dummy taking value one when the deposit location j is an alternative offshore location. PostCRSIntroDepL denotes implementation of CRS in the deposits location. All regressions include residence country time fixed effects and deposits country fixed effects.

*** significance at the 1 % level,
** significance at the 5% level,
* significance at the 10% level.

APPENDIX E

The Development of Global Initiatives for the Exchange of Information on Tax Matters

Since more than a century, countries cooperate with each other on tax matters using information exchange agreements. The earliest forms of information exchange relations date back to 1843 when the first double tax treaty between Belgium and France was concluded.[59] One century later Art. 26 of the OECD Model Tax Convention was launched representing the leading framework for international exchange of information upon request.[60]

1998 remains one of the most crucial years in the route towards international tax transparency. Back then the OECD issued its well-known report on harmful tax competition in which key policy tools to fight tax evasion based on profit shifting to tax havens were presented. Among them special emphasis has been directed to the necessity to reach an enhanced level of tax transparency. Few years later the intensive work conducted by the Global Forum on Transparency and Exchange of Information led to the development of a comprehensive model for the tax information exchange agreements (TIEA), which was officially published by the OECD in 2002. It formed the basis for all currently active 518 bilateral exchange relations.[61] Yet, the first step towards a multilateral approach to exchange of information occurred in 2003 when the Council Directive 2003/48/EC (also commonly known as "Savings Directive") was issued by the European Commission.[62] It forced the automatic exchange of information on private saving income of non-resident reportable owners among EU member states. Alternatively, member states unwilling to exchange bank account information on foreign EU residents were granted the option to levy a withholding tax on interest income owned by each reportable individual.[63]

Finally, the FATCA issued in 2010 by the U.S. government enabled the development of an extremely powerful standard for the AEOI in tax matters. This policy tool was issued with the ambition to put an end to the substantial tax revenue loss the U.S. administration faced as a

[59] Oberson (2017).
[60] For more detail, see OECD (2012) Update to Article 26 of the OECD Model Tax Convention and its Commentary.
[61] A complete list is available at http://www.oecd.org/tax/exchange-of-tax-information/taxinformationexchangeagreementstieas.htm, accessed on 01.08.2018.
[62] For more details, see Directive 2003/48/EC of 3 June 2003.
63 In 2014 the Directive 2014/107/EU, which amends the Directive 2011/16/EU on cooperation in tax matters, repealed the Savings Directive63 and implemented the common reporting standard at the European Union level.

result of U.S. citizens parking wealth and related income in offshore locations.[64] It obliges foreign financial institutions to collect financial account information on the behalf of their clients if they are U.S. citizens and to transmit them automatically to the IRS. If foreign financial institutions are caught to be non-FATCA compliant, they are subject to a 30% withholding tax on each U.S. source payment.[65] Although the U.S. model for AEOI represents a bilateral measure it affected all major financial institutions around the world, which had to set up the IT infrastructure and the responsible department to ensure compliance with FATCA.

The G20 followed by requesting the OECD to set up a similar system. The OECD quickly responded by launching in early 2014 a global standard for the automatic exchange of information (AEOI).[1] It is mainly based on FATCA, but certain important differences between the two measures exist. Firstly, there is no universal guideline on the enforcement level, but rather single jurisdictions can independently decide upon the level of monetary penalties and the possibility of criminal prosecution. Secondly, the criteria for detecting reportable individuals are not based on citizenship but rather on residence. In particular, under the OECD model financial institutions have to collect financial data on accounts owned by foreign residents of reportable jurisdictions. Finally, under the CRS, participating jurisdictions agree to request local financial institutions to collect information on accounts held by non-resident reportable persons and to exchange it on an automatic basis, hoping to receive the same information on their residents. While under FATCA the U.S. rather requests other jurisdictions to collect and automatically transmit full information on foreign financial accounts of its own citizens. Nevertheless, U.S. financial institutions are not obliged to collect automatically extensive information on foreign accounts.

When considering the technicalities of the OECD model for AEOI, it requires participating jurisdictions to convert the CRS into domestic law, to guarantee the setting up of a suitable IT system for the collection and the transmission of the information on foreign account holders with the respective counterparties and to ensure the adequate protection on the exchanged data. Four main components constitute the OECD model for the AEOI: the competent authority

[64] For more detail, see IRS (2007) Reducing the Federal Tax Gap - A Report on Improving Voluntary Compliance.
[65] For more information on FATCA, see https://www.irs.gov/businesses/corporations/summary-of-key-fatca-provisions, accessed on 01.08.2018.

agreement (CAA), the common reporting standard (CRS), the commentaries on CAA and CRS and the CRS extensible mark-up language (XML) schema.[66]

The CAA[67] component establishes the legal basis for the CRS by setting up the rules on the type of information to be collected, the method to exchange it and the timing of collection and transmission. Participating jurisdictions have to sign it before introducing the CRS system in the domestic context. Yet they have the option to either select a multilateral model (i.e. the multilateral competent authority agreement, or MCAA), or a bilateral and reciprocal model. Currently almost all of the participating countries decided to sign a MCAA,[68] which means that they automatically exchange the required financial information with any other jurisdiction having the CRS implemented at national level. In this way, there is no longer the necessity to sign country-pair agreements before starting an exchange relation. The CRS component represents the core technical part of the OECD model for AEOI since it elaborates the due diligence and reporting procedures that financial institutions need to adhere to for the collection and transmission of the reportable foreign financial account data to their respective tax authorities. [69]

To begin with, a comprehensive definition of reportable financial institutions together with a complete list of non-reportable financial institutions is developed with institutions outside the scope of CRS, including a residual category "other low-risk financial institutions."[70] Establishing this ambiguous category may create opportunities to offshore locations to set up additional categories of non-reportable financial intuitions and in this way hinder the efficiency of the CRS in fighting tax evasion based on bank secrecy.[71] However, the aim of the OECD model for AEOI is to develop a global standard, which could be implemented worldwide and thus needs to account for special needs of single jurisdictions. This residual category of non-reportable financial institution enables a great level of adaptability of CRS to any domestic financial

[66] It is a is a reporting schema in extensible mark-up language (XML) elaborated by the OECD for exchanging the information across jurisdictions as well as to receive information from their financial institutions in a standardized manner. For more information, see OECD (2017), Annex 3, p. 230-290.
[67] A complete version can be found at OECD (2018) Multilateral Competent Authority Agreement.
[68] For a complete list of signatory jurisdictions, see OECD (2018) Signatories of the Multilateral Competent Authority Agreement on Automatic Exchange of Financial Account Information.
[69] For a summary table on CRS guidelines see in the Appendix D. For more detail on it, see OECD (2018) Standard for Automatic Exchange of Financial Information in Tax Matters Implementation Handbook.
[70] "Other low-risk financial institutions" is a residual category which includes all financial institutions not explicitly listed as non-reportable ones but still in line with the requirements under Section VIII (B) (1) (c) of the standard and the associated Commentary to be considered low risk.
[71] See Finér and Tokola (2017).

system. Furthermore, the CRS component states clear guidelines on reportable accounts,[72] for example depository accounts or custodial accounts, cash value insurance contracts as well as on non-reportable accounts. The latter also includes the option to create a specific national list of financial accounts falling outside the CRS requirements. The OECD clearly states that only financial accounts with a low risk of being used for tax evasion can be part of the excluded accounts list. Nevertheless, as previously mentioned in case of non-reportable financial institutions single jurisdictions may exploit such category, which is nevertheless essential to ensure the flexibility of a global standard.

Furthermore, the CRS offers the definition of reportable persons, i.e. those who are resident in a reportable jurisdiction for CRS purposes and are either an individual or a passive non-financial institution. If the reportable person is a passive non-financial entity, then the related financial institution is required to identify its controlling person(s) and report the financial account information of such passive non-financial entity only if it belongs to (a) reportable person(s).

Finally, the due diligence process is described in comprehensively, with distinction between pre-existing versus new accounts and the owner being an individual or an entity. Additionally, a detailed list of the information financial institutions have to collect on behalf of their clients is offered and includes among others the TIN, date and place of birth, the account balance or value, the total gross amount of interest and/or dividend paid or credited on the account, the total gross amount of other income generated with respect to the assets held in the account paid or credited to the account.[73]

The last major component is the CRS XML Schema, which represents the electronic reporting schema for transmitting the information to tax authorities and for exchanging the information across jurisdictions in a standardized manner. It is developed using an extensible mark-up language (XML) elaborated by the OECD.[74]

[72] "Reportable accounts" is defined as "account held by one or more reportable persons or by a passive non-financial entity with one or more controlling persons that is a reportable person", see OECD (2017) "Standard for Automatic Exchange of Financial Information in Tax Matters - The CRS Implementation Handbook" Page 43
[73] From OECD (2017) "Standard for Automatic Exchange of Financial Information in Tax Matters - The CRS Implementation Handbook" Page 72-75
[74] For more information on the OECD guidelines on the CRS XML Schema, see OECD (2017), Annex 3, p. 230-290.