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

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Abstract

In 2013, the Automatic Exchange of Information (AEOI) was endorsed as the prevailing universal solution to fight cross-border tax evasion and the OECD launched a global standard for the AEOI, the Common Reporting Standard (CRS). In this study, we analyze the impact of the CRS on cross-border tax evasion. Our results suggest that the CRS induced a reduction of 14% in cross-border deposits parked in traditional offshore countries for tax evasion purposes. Moreover, regardless of the 2,600 bilateral exchange relations created under the CRS, relocation still emerged as the preferred option. More specifically, upon the CRS implementation at domestic level, the United States, which so far did not commit to the CRS, seems to emerge as a potentially attractive location for cross-border tax evasion.

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1. Introduction

In the last decades, capital mobility increased substantially thanks to globalization and rapid technological development. This capital mobility 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 countries. Recent estimates by Zucman (2013) suggest that at least 8% of the global household financial wealth is located in offshore countries, translating into around 7.6 trillion dollars. In the past ten years a total increase of offshore wealth by 25% has been documented.

Cross-border tax evasion, however, deprives jurisdictions around the world from substantial tax revenue every year. 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 countries.[1] It is general consensus at OECD level that cross-border tax evasion can be fought most effectively by further increasing the information exchange between countries. Back in 2010, the U.S. were the first to act, 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 the OECD level on developing a global standard for the Automatic Exchange of Information (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 is substantially different from any initiative in the field of information exchange launched so far, including its own role model FATCA. This is why it should induce a true revolution in the level of scrutiny on wealth and related income parked in offshore countries and substantially change

[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.

the dynamics of cross-border tax evasion. Yet, the effectiveness of the CRS has not been thoroughly investigated. The aim of this paper is to close this gap.

In the related literature, it is unanimously reported that the implementation of previous information exchange agreements, such as bilateral treaties, does not reduce tax evasion overall but rather induces a reallocation of wealth from collaborative offshore countries, i.e. those who signed such an agreement, to non-collaborative ones (Johannesen and Zucman (2014), Johannesen (2014), Hanlon et al. (2015), Caruana-Galizia and Caruana-Galizia (2016), Omartian (2017) and De Simone et al. (2018)). However, compared to these earlier initiatives, the CRS achieves an impressive country coverage. At present, more than 100 jurisdictions worldwide have committed to the CRS.[4] In particular, most of the so-called tax havens are included in the list of participating jurisdictions implying a substantial change in bank secrecy. Furthermore the CRS has wider scope. Reportable financial institutions are forced to provide detailed information on financial assets held by non-resident taxpayers, which is not limited to interest income and covers deposits held by individuals as well as entities. Recent estimates by 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.

In this study, we initially test whether the CRS implementation into national law induced a drop in cross-border tax evasion through well-known sites for hiding wealth and related income, i.e. offshore countries. Next to these out movements, we investigate relocation of deposits towards an unexpected new location. Anecdotal evidence suggests that, although not typically classified as a low tax country, in the post CRS world, the U.S. may be a very attractive destination for hiding wealth and related income for tax evasion purposes. This claim may seem surprising at first, because they do not generally offer a tax system as attractive as that of traditional offshore countries. Nevertheless, they are the only major financial center that remains not committed to the CRS and they offer a high degree of bank secrecy (Cotorceanu (2015)) together with advantageous tax-free facilities for non-resident individuals (Brunson (2014)). Thus, we proceed by investigating whether after implementation of the CRS tax evaders reallocate their deposits to the U.S..

Following the related literature (Huizinga and Nicodème (2004), Zucman (2013), Johannesen and Zucman (2014), Alstadsæter et al. (2018) and Menkhoff and Miethe (2017)), we consider

[4] For a complete list, see OECD (2018b).

the outstanding volume of cross-border deposits placed in offshore countries as measure of cross-border tax evasion. The data we use originates from the Bank for International Settlements (BIS), which provides comprehensive 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).We supplement this dataset by hand collecting the exact introduction and effectiveness dates for the CRS for all countries in our sample.

We estimate tax evaders' reaction to this unprecedented global initiative for the AEOI by using a difference-in-difference design. To test whether the CRS led to a decline in deposits held in offshore countries, we compare the change in cross-border deposits held in offshore countries (treated group) to the change in cross-border deposits held in non-offshore countries (control group) after CRS implementation. Second, we test whether relocation of cross-border deposits to the U.S. occurred by estimating the change in cross-border deposits in the U.S. (treated group) as compared to the change in cross-border deposits in other non-offshore countries (control group) after the CRS implementation. Employing the country-level implementation of CRS as exogenous shocks, our model absorbs all time-invariant factors that shift cross-border deposits across countries. We control for between country-pair differences by adding ordered country-pair fixed effects, and for (demand) shocks in the residence country, by adding residence country-quarter-year fixed effects. Thus, investigating the CRS's effects on a within residence country-quarter and country-pair level. We do not expect that anticipation plays a major role, since it is both possible and sensible for tax evaders to wait until the last moment before moving deposits out of offshore countries.

We find that upon the CRS implementation at the national level cross-border deposits held in offshore countries decrease on average by 14% compared to non-offshore countries. With event studies, we show that this is due to a statistically significant immediate decline of cross boarder deposits held in offshore countries in reaction to the CRS. In our tests on relocation behavior, we find that after CRS implementation cross-border deposits held in the U.S. are on average 9% higher compared to in other non-offshore countries. What's more, in an event study we show that the increase of cross-border deposits in the U.S. after the implementation of the CRS is both immediate and persistent over the whole post treatment period.

Our results are of great relevance to governments of CRS participating jurisdictions. To the best of our knowledge, we are the first to isolate the impact of the CRS on cross-border tax evasion and to offer evidence on which jurisdiction(s) emerge as preferred destination for cross-

border tax evasion as a consequence of the CRS implementation.[5] What we show is that tax evaders still seem to deem reallocation a convenient option, but a new destination appears as very attractive for deposit holders, namely the U.S.. This represents a politically relevant result, providing evidence of an unexpected as well as undesirable effect of the missing participation of the U.S. to the CRS project. Our study highlights one critical aspect that could have the potential to maximize the benefits of a global standard for the AEOI, namely the U.S. participation in the CRS project. Nevertheless we are aware of other aspects might need improvement as well. For example at present the usability of the information collected under CRS is far from certain (Finer and Tokola (2017)) or the possibility to exploit the category "non-reportable financial institutions" represents a way to circumnavigate CRS reporting requirements (e.g. as in the case of the Occupational Retirement Scheme in Hong Kong). Still 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.

The rest of the paper is organized as follows. In section 2, we offer an overview of the related literature and develop our hypothesis. In Section 3, we describe our research design. Section 4 presents graphical evidence on the development of cross-border deposits in our sample. Section 5 contains the core of our paper, where we provide key results of our study in detail. Section 6 offers additional tests on the effect of CRS on indirect channels of tax evasion. In Section 7, we summarize our findings.

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,[6] while the U.S. provides estimates of an annual average tax revenue loss of USD 458 billion in the U.S. due to non-compliant tax behavior.[7] While partially caused by unreported income held locally, a substantial portion is caused by unreported income held abroad. Zucman (2013) estimates that around 8% of worldwide household wealth is located in tax havens. More recently Alstadsæter et al. (2018) show that this average value varies significantly across the world.

[5] Next to relocation, another option for tax evaders is to repatriate their deposits after CRS implementation. Due to a lack of high quality data, however, we do not study directly to what extend repatriation occurred.

[6] 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.

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

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.

As early as 1972, Allingham and Sandmo (1972) demonstrated that the individual level of evasion is a function of incentivizing and deterring factors, one deterrent being the probability of facing increased tax audits. The prevailing policy tool to increase the threat of detection in the context of cross-border tax evasion is the information exchange across jurisdictions. Dharmapala (2016) theoretically demonstrates that tax policies, such as FATCA, in this way, increase citizens' compliance and may be effective in reducing cross-border tax evasion. Empirical evidence provided by Bott et al. (2017) supports the above-described theoretical prediction.

The prevailing policy tool to increase the threat of detection in the context of cross-border tax evasion is the information exchange across jurisdictions. Since more than a century, countries cooperate with each other on tax matters using information exchange agreements. 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, which led few years later to the development of a comprehensive model for the tax information exchange agreements (TIEA). There is a large empirical literature on the impact of early initiatives in the field of information exchange. To begin with, Huizinga and Nicodeme (2004) focus on the effect of bilateral tax information exchange agreements (TIEAs) among OECD member states from 1999 and find that the existence of exchange relationships across countries does not seem to diminish external liability flows. They attribute the result to the inefficiency of the TIEA network, in particular the limited country coverage and the insufficient quality of the exchanged data. Johannesen and Zucman (2014) consider the subsequent wave of TIEA introductions between tax havens and non-tax havens in 2009 and 2011 and analyze its effectiveness in fighting cross-border tax evasion. They find that the introduction of TIEAs reduces the level of wealth and related income parked in offshore countries, but they also document reallocation behavior to non-collaborative tax havens. When considering the long-term impact of TIEAs, a diminishing effect starting from 2010 is documented (Menkhoff and Miethe (2017)).

Yet, the first step towards a multilateral approach to exchange of information occurred in 2003 when the Council Directive 2003/48/EC (commonly known as "Savings Directive") was issued, forcing the automatic exchange of information on private saving income among EU member states. Still empirical evidence suggests that no overall reduction in cross-border tax evasion

was achieved, but that tax evaders relocated their deposits to non-EU offshore countries (Johannesen (2014), Caruana-Galizia and Caruana-Galizia (2016) and Omartian (2017)). The U.S. instrument FATCA is found to have induced similar relocation effects (De Simone et al. (2018) and Omartian (2017)).

However, the CRS is different from these previous initiatives in the field of information exchange.[8] First, it constitutes a multilateral approach similar to the EU Savings Directive but different from bilateral approaches such as FATCA and classical TIEAs. This is because the CRS eliminates the requirement to negotiate single treaties on a country-by-country basis (OECD 2018a). Secondly, participating jurisdictions automatically exchange information with any other participating counterparty. In this way, in contrast to normal TIEAs and FATCA, the information is no longer exchanged only upon request. Thirdly, the CRS not only has a larger country coverage than any previous initiative but also wider scope. Reportable financial institutions are forced to provide detailed information on financial assets held by non-resident taxpayers, which is not limited to interest income and covers deposits held by individuals as well as entities. Thus, a true revolution in the fight against cross-border tax evasion should be expected. Consequently, our first test focuses on CRS effectiveness in reducing wealth and related income parked in traditional offshore countries to avoid tax obligation at home.

In the second and main part of the analysis, we test to what extent and to which countries deposits are shifted to, given that those traditionally considered attractive for hiding wealth and related income now automatically exchange financial account information. The U.S. are 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.[9] When compared to the CRS, the information transmitted under FATCA is limited making the U.S. relatively more attractive as compared to offshore countries that participate in the CRS.[10] Under FATCA, the IRS transmits data on foreign financial account holders only upon request and only if such request comes from countries, which singed the FATCA Model 1a Intergovernmental Agreement (IGA). The transmitted information is

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

[9] On why the U.S. do 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.

[10] 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.

further limited to the gross interest paid for depository accounts, only if held by an individual, 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 (Cotorceanu (2015), p. 1053). Country evidence even suggests that the U.S. duty to exchange information based on FATCA agreements is not fully respected.[11] Next to limited information exchange, non-resident individuals investing in the U.S. enjoy advantageous tax-free facilities. This includes tax exemption on domestic-source portfolio interest or re-invested dividends (Brunson (2014)). Further, the U.S. provides high levels of bank secrecy.[12] Currently no U.S. state or federal law obliges legal entities to maintain beneficial ownership information or even requests legal entities to disclose beneficial owners´ identity when they are established.[13] Last, on grounds of an extensive cross-country randomized field experiment, Findley et al. (2015) find that in contrast to non-U.S. providers, U.S. service providers for shell company incorporation are actually less likely to comply with international transparency standards. This helps reducing the complexity of setting up a shell company in the U.S. (Findley et al. (2015) p.153, 157).[14] Thus, although not typically classified as a low tax country, in the post CRS world, the U.S. may be very attractive for hiding wealth and related income.[15]

3. Research Design

3.1. Data

Our main dataset is constructed based on 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

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

[12] 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/.

[13] In May 2016 under the bank secrecy act the Treasury's Financial Crimes Enforcement Network issued a new customer due diligence requirement imposing on certain domestic financial institutions the collection of a beneficial ownership information form for their respective clients´ corporations and trusts. 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)).

[14] 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.

[15] 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.

jurisdictions around the world. For the purpose of our analysis, we focus on the outstanding quarterly volume of cross-border deposits (in the following revert to as cross-border deposits). 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 include all offshore countries, for which data at bilateral level is publicly available in the BIS dataset, i.e. Guernsey, Hong Kong, Isle of Man, Jersey and Macau.[16] We want to avoid including countries that are extensively exploited for corporate tax avoidance purposes, since the primary target of the CRS is individual tax evasion. Thus, we focus on a subset of offshore countries for which the chance of holding a local deposit for reasons beyond individual tax evasion is minimal. As location of the owner of the deposits, we select all EU and OECD member states arriving at a total of 41 countries.[17] Our sample period ranges from the last quarter of 201418 to the third quarter of 2017. In this way, we exclude possible confounding 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.[19] Table 1 below provides a comprehensive list of the countries considered in our analysis, divided by the status of CRS implementation. 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.

Table 1: 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	Italy	Australia	Japan
Belgium	Jersey	Brazil	Macau
Bulgaria	Republic of Korea	Canada	New Zealand
Croatia	Luxembourg	Chile	Switzerland
Cyprus	Mexico	Hong Kong	Turkey
Czech Republic	Netherlands	Israel	
Denmark	Romania		
France	Poland	**Only committed to the CRS**	
Germany	Slovak Republic	Chinese Taipei	
Guernsey	Slovenia	Philippines	
Greece	Spain		
Hungary	South Africa	**Not committed to the CRS**	
Ireland	Sweden	United States	
Isle of Man	United Kingdom		

[16] Others, such as Johannesen and Zucman (2014) or Johannesen et al. (2018) consider as offshore countries a much larger selection of countries. In Appendix B, we test the exact same sample of offshore country as the one of Johannesen et al. (2018) and our results remain unchanged.
[17] We consider EU and OECD member states as of June 2018.
[18] We start from the last quarter of 2014 because data for Hong Kong are available only from that date on.
[19] The only possibly confounding 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.

The main advantage of the data is the extensive country coverage. The coverage rates on cross-border interbank business is around 95%.[20] 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 we consider only non-bank deposits.

The limitations of the data are as follows. First, we can only observe the immediate owner and not the final beneficiary of a deposit. Given the well-established evidence of the use of shell companies,[21] we therefore address the role of shell companies in additional tests in Section 5. Second, the BIS statistics do not distinguish between individual and entity ownership. Thus, we are unable to detect the exact portion of deposits owned by individuals. 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, financial institutions are required to conduct an accurate investigation regarding the final individual owner of the financial account. This means that upon CRS implementation, we do expect a reaction from both if entity owned accounts are used for tax evasion purposes. Lastly, a limitation of the BIS data for our study 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 a sound proxy for testing the reaction to a shock in the scrutiny on wealth in offshore countries.[22]

Table 2 provides descriptive statistics on all cross-border deposits held in offshore countries on which the BIS provides data and on the U.S.. The time period covered is from 2014 until 2017. The U.S. has the largest average, minimum and maximum amount of deposits in absolute terms, followed by Hong Kong and Jersey. The small islands of Guernsey, Jersey and Isle of Man still represent important countries for cross-border deposits. This may 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 consider geographical proximity useful to hiding wealth and related income.

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

[21] 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.

[22] 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.

Table 2: Descriptive Statistics on Offshore Countries & U.S. (2014-2017)

Deposit Country	Observations	Mean (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 quarterly cross-border deposits held by OECD and EU residents in the available offshore countries and U.S. 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. IM stands for Isle of Man. JE stands for Jersey. US stands for the U.S. as deposit country.

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. The OECD provides on its website the link to each CRS national law for both the first and second wave adopters.[23] 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.[24] As control variables, we firstly collect data on country financial secrecy levels using the Financial Secrecy Index of the Tax Justice Network. The most secret locations have the highest secrecy scores in the index. Secondly, information on interest income tax rates are taken from the database available at ZEW within the project for the European Commission "Effective Tax Levels using the Devereux/Griffith Methodology". On countries not covered by this database, we manually collect the information using the country analysis and news alert from the IBFD tax research platform.

3.2. Empirical Strategy

We first test whether cross-border deposits held directly in offshore countries are reduced due to the local implementation of the CRS. Given that traditional offshore countries are all CRS compliant,[25] we compare changes in cross-border deposits held in offshore countries with those

[23] 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.
[24] For more details, see https://blogs.pwc.de/citt/, accessed on 01.08.2018.
[25] 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.

held in non-offshore countries. In this way, our control versus treatment group follows Hanlon et al. (2015).[26] Precisely, in our difference-in-difference design we compare the change in deposits held in offshore countries by residents of EU and OECD member states (treatment group), to the change in deposits in non-offshore countries 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 or booms. We do not expect any significant reaction to the CRS in our control group because changes of cross-border deposits in non-offshore countries should mainly be driven by economic activity, which we reasonably expect to be unaffected by the CRS.

We run regressions of the form:

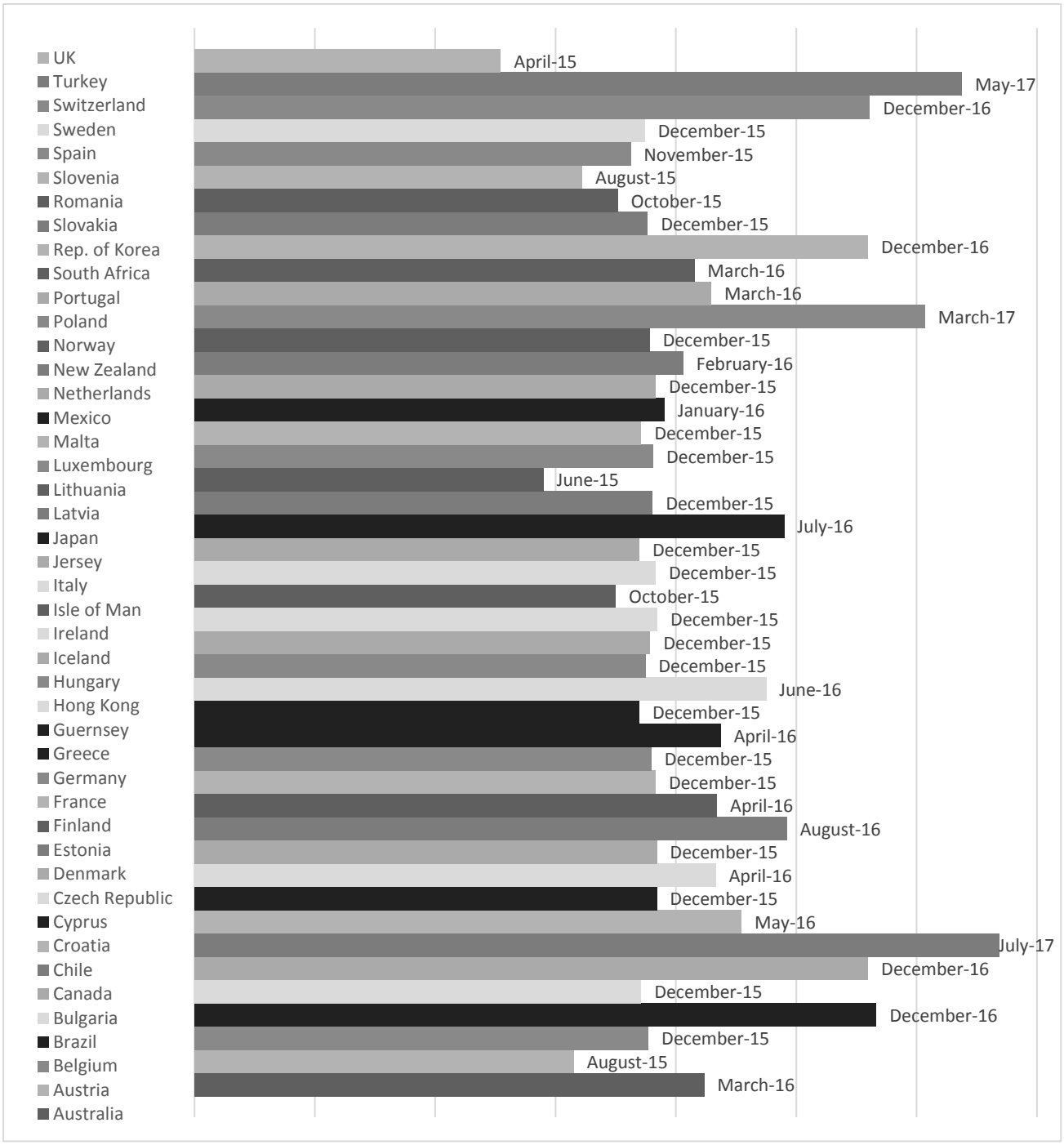
$$\log\left(CrossBorderDeposits_{ijt}\right) = \alpha + \beta_1 PostCRSIntroDepL_{jt} + \beta_2 PostCRSIntroDepL_{jt} * Offsh_j + \gamma_{it} + \delta_{ij} + \epsilon_{ijt} \quad (1a)$$

Where the dependent variable $\log\left(CrossBorderDeposits_{ijt}\right)$ stands for (log) volume of deposits of residents of country i in banks at deposit country j at the end of quarter t. $Offsh_j$ is a dummy taking value one when the deposit country is an offshore country. It constitutes the treatment dummy.[27] $PostCRSIntroDepL_{jt}$ 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 (i.e. the publication of the law into the official gazette) as post period for our baseline instead of the effective date of the CRS (i.e. the day when financial institution has to start collect information under CRS) because we expect that in anticipation of CRS effectiveness tax evaders want to reduce their deposits held in offshore countries already at the introduction of the CRS into national laws. 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 countries as can be seen in Figure 1, which we can exploit for identification.

[26] 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.265).

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

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 include ordered 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 ordered 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. Overall, we employ the most comprehensive fixed effects structure that our data allows.[28] Our standard errors are cluster robust, with clustering at the ordered country-pair level. Identifying variation stems from the within ordered 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 countries to changes in OECD and EU residents' deposits in non-offshore countries. We expect that deposits by OECD and EU residents in offshore countries are on average reduced relative to their deposits in non-offshore countries after the CRS introduction. We claim that the reaction by tax evaders occurs at the offshore countries rather than in the country of their residence, because offshore deposits are not immediately affected, if the CRS is only introduced in the residence countries. We demonstrate our claim in an additional regression reported in section 5.2.5.

With a second, alternative design choice, we rule out that our results are driven by concurrent events systematically related to the CRS implementation at the individual country level. Although we do not find any such events, the CRS introduction dates could be correlated with other factors affecting cross-border tax evasion, such as other measures that were simultaneously taken in the offshore deposit countries. Therefore, in an alternative specification, we use a post period dummy (PostCRSFirstWave) that is constant across all observations and not directly related to the 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 start collecting information for CRS purposes. It is reasonable to assume that tax evaders wait to this last possible date to relocate deposits before they are being tracked under CRS by financial institutions. While the alternative specification does not capture anticipation effects for the first wave adopters, it does for the second wave, and it therefore constitutes a feasible compromise.

We run a new regression of the form:

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

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

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 countries after the CRS is effective in the first wave adopters to the change in the volume of deposits in the control group countries (mainly EU and OECD countries). Finally, in a robustness check, we test country-specific CRS effective dates.

In the second part of our analysis, we test for 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 countries and zero for the remaining deposit countries. Thus, while controlling for the effect of the CRS in offshore countries, 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. The fixed effects identify 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.. Rather than identifying – as in our baseline analysis – the effect based on the introduction of the CRS at the individual country level, we chose to base this test on the non-staggered specification of the CRS treatment period because in the U.S we do not have an implementation date at the level of the deposit location.

As further test, we add an interaction term of the CRS post dummy with the deposit countries secrecy level measured by the FSI secrecy score. This is a test to rule out that, rather than the lack of commitment by the U.S. to the CRS, other forms of financial secrecy are the main

reason for cross-border deposits being reallocated there. If this were the case, jurisdictions offering comparable financial secrecy (measured by the secrecy score) to the U.S. would be equally interesting for deposit relocation purposes after CRS implementation, despite their commitment to CRS, and we would expect that the share of deposits relocated to a country should vary with its level of financial secrecy.

Further, we check whether the detected relocation of cross-border deposits to the U.S. is not driven by other factors, such as money 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. 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. The added triple interaction is a measure of this incentive. It allows us to 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. If they are, it corroborates that the effects we are measuring are due to tax evasion rather than for example money laundering.

4. Preliminary Graphical Evidence

In our regression analysis we test the effect of the CRS on money hidden in traditional offshore accounts as well as potential relocation of hidden money to the U.S. In this section we provide preliminary evidence in this regard based on aggregate data.

Table 3 below provides the mean of cross-border deposits located in offshore countries, the U.S. and other non-offshore countries before and after CRS implementation. Cross-border deposits in offshore countries strongly decrease, by around 30%, after CRS became effective. In non-offshore countries 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 countries for the purpose of tax evasion decline on average while in the U.S. they increase on average.

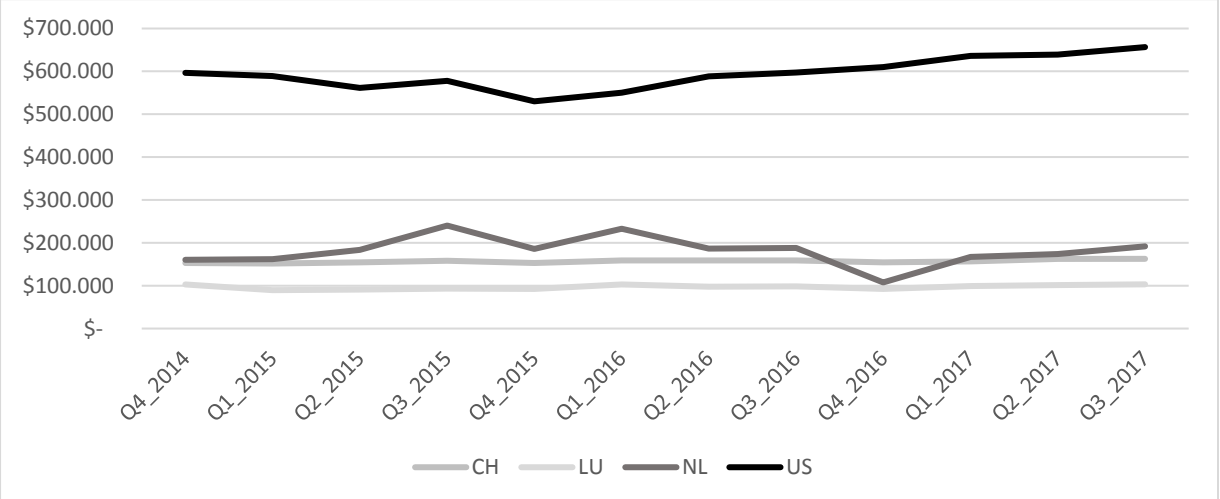
Table 3: Deposits Changes in Sample Before and After the CRS (2010-2017)

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 countries as deposit countries as defined in the paper. U.S. stands for the U.S. as deposit country. Non-U.S. + Non-OF stands for all other available deposit countries. 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.

Second in Figure 2, we find additional corroboration on the relocation effect induced by the implementation of the CRS. The sample period corresponds to the sample period considered in our regression analysis (2014-2017). We compare the evolution of aggregated cross-border deposits held in the U.S. versus those held in Luxembourg, the Netherlands and Switzerland, where the level of bank secrecy is very high.

Figure 2: Deposit Trends 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. The findings in Figure 2 thus are in line with our empirical test results which show 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 its non-participation in the CRS.

5. Empirical Results

5.1. Testing the CRS's Effects on Offshore Countries and the U.S.

We report the results from our main test on the effect of the CRS on cross-border tax evasion in Table 4. The results from the estimation of equation 1 (a and b), our test of whether the introduction of the CRS leads to a reduction of deposits held in offshore countries, can be found in Columns 4 to 6 of Table 4. The Column 1 refers to the post CRS period specified as the CRS introduction measured at country level, Column 2 to the period after the first CRS adoption wave not measured at the country level and the third to CRS effectiveness measured again at country level. Our coefficient of interest is the interaction term of the offshores variable and the respective Post-CRS dummy. The findings confirm our expectation on CRS's effect on cross border tax evasion in traditional offshore countries. We observe a highly significant 14% reduction of cross-border deposits held by residents of the OECD and EU in offshore countries upon the introduction of the CRS as compared to the change in cross-border deposits in the control countries. 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.[29] 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 Savings Directive in case of Jersey, Guernsey and Isle of Men, which indicates that CRS is effective in further reducing cross-border tax evasion. Thus, the effect is considerable in size. 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 countries Guernsey, Hong Kong, Isle of Man, Jersey and Macau, is USD 123 billion.

[29] They find an 11% decrease.

Thus, according to our findings the average amount of deposits in these five offshore countries 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 offshore location after CRS implementation by USD 43 billion.[30]

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 countries 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 countries 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 countries. Along with the country-specific CRS introduction dates and the effective date for first wave adopters, we test the country-specific CRS effective dates. The result of the test is reported in Column 3 of Table 4. The results are statistically significant and the effect size of the CRS is even larger suggesting that the main reaction occurred upon CRS effectiveness rather than introduction. After effectiveness of the CRS in the deposit countries, cross-border deposits are on average 17.2% lower in the offshore countries as compared to non-offshore countries.

We report the results from the estimation of equation 2, our test of whether the introduction of the CRS leads to a relocation of deposits to the U.S., in Columns 4 to 6 of Table 4. Column 4 reports regressions results, from running the difference in difference regression without further controls beyond the fixed effects structure. Our test shows that relative to all other countries in our sample and after controlling for the effect of the CRS on offshore deposits, deposits by EU

[30] 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 countries. Second, three out of five offshore countries 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.

and OECD residents in the U.S. significantly increase, on average by 9%, after CRS effectiveness in the first wave adopters. 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. 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 countries (our estimate is USD 70 billion), are relocated to the U.S.. 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.

In Appendix A, we re-run the same main tests for offshore countries as well as for the U.S. but using this time a balanced sample. In this way, we lose around 9% of the observations. Yet, results are in line with the above presented ones.

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

DEPENDENT VARIABLE	Log of Cross-Border Deposits					
CRS SPECIFICATION	Country Specific Intro. Date	Country Specific Effective Date	First Adoption Wave			
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
PostCRSIntroDepL	-0.0462					
	(0.0303)					
PostCRSIntroDepL * Offsh	-0.140***					
	(0.0502)					
PostCRSEffDepL		-0.0646**				
		(0.0324)				
PostCRSEffDepL * Offsh		-0.172***				
		(0.0583)				
PostCRSFirst-WaveAdopters			0.248*			
			(0.129)			
PostCRSFirst-WaveAdopters * Offsh			-0.231***	-0.222***	-0.238***	-0.238***
			(0.0596)	(0.0614)	(0.0666)	(0.0666)
PostCRSFirst-WaveAdopters * US				0.0910*	0.0852*	-0.00860
				(0.0479)	(0.0498)	(0.107)
Secrecy * PostCRSFirst-WaveAdopters					0.00120	0.00270
					(0.00221)	(0.00242)
Res_ITax						-18.72
						(15.87)
US*Res_ITax						1.185
						(0.933)
PostCRSFirstWave-Adopters * US * Res_ITax						0.357
						(0.397)
Constant	4.502***	4.514***	4.101***	3.908***	3.908***	8.703**
	(0.0336)	(0.0342)	(0.124)	(0.350)	(0.350)	(4.093)
Macao in the sample	NO	NO	YES	YES	YES	YES
Observations	11,477	11,477	11,889	11,583	11,583	11,583
R-squared	0.060	0.061	0.060	0.060	0.060	0.060
Number of countrypair	1,017	1,017	1,056	1,029	1,029	1,029
Country-Pair FE	YES	YES	YES	YES	YES	YES
Residence-Quarter-Year FE	YES	YES	YES	YES	YES	YES

Notes: Cluster robust standard errors in parentheses, clustered at the ordered 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 ordered 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. U.S. is a dummy equal one when the deposit country j is the U.S.. Res_ITax is a variable indicating the level of the interest rate tax at the residence country i in quarter q. Secrecy is a variable indicating the secrecy ranking of the deposit country j in the Financial Secrecy Index 2018 (constant across all time periods). All regressions include ordered country-pair and residence country-quarter-year fixed effects.

*** significance at the 1 % level,

** significance at the 5% level,

* significance at the 10% level.

First, we add an interaction of the secrecy score number with the post treatment dummy to control for the secrecy of the deposit country. The corresponding results are reported in Table 4 Column 5. The coefficient on the interaction of the secrecy score number with the post treatment dummy does not load and the observed increase in the U.S. is almost unchanged, i.e. 8.5%. This finding suggests that what is making currently the U.S. particularly attractive to cross-border deposits is its non-participation in the CRS, rather than being a secretive country. If the secrecy of the U.S. was the driver of the effect, rather than its non-participation in the CRS, we would expect that the overall most secretive locations also attract the most deposits in response to CRS implementation and therefore, the coefficient on the financial secrecy variable would be positive and significant.

Finally, we test 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.. The result is inconclusive as visible in Table 4 Column 6. While the effect is large and the direction of it as expected, results are insignificant at conventional significance levels. This may be due to little variation in the interest tax rates in our study period. However, 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.

5.2.**Robustness Checks**

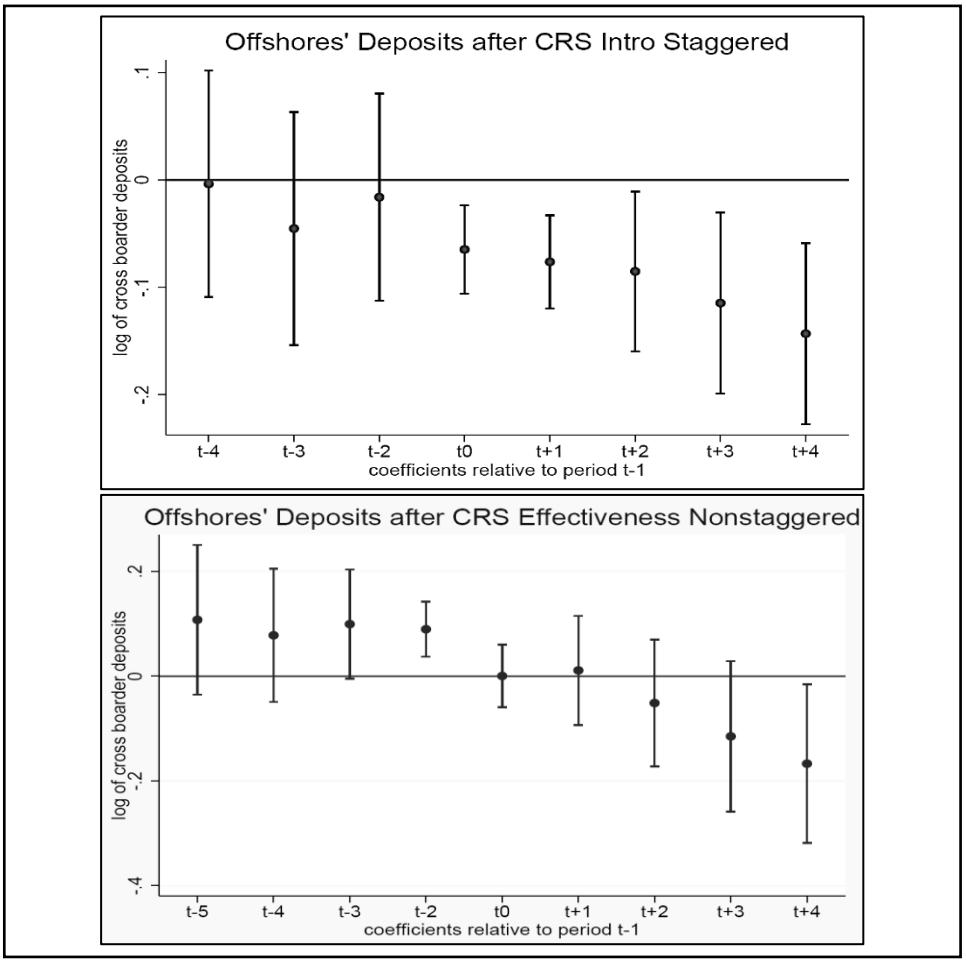
5.2.1. Event Study

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 countries), 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 3 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 ordered country-pair fixed effects. The upper panel of Figure 3 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.

Figure 3: Event Study Test of the Effect of the CRS Implementation in Offshore Countries

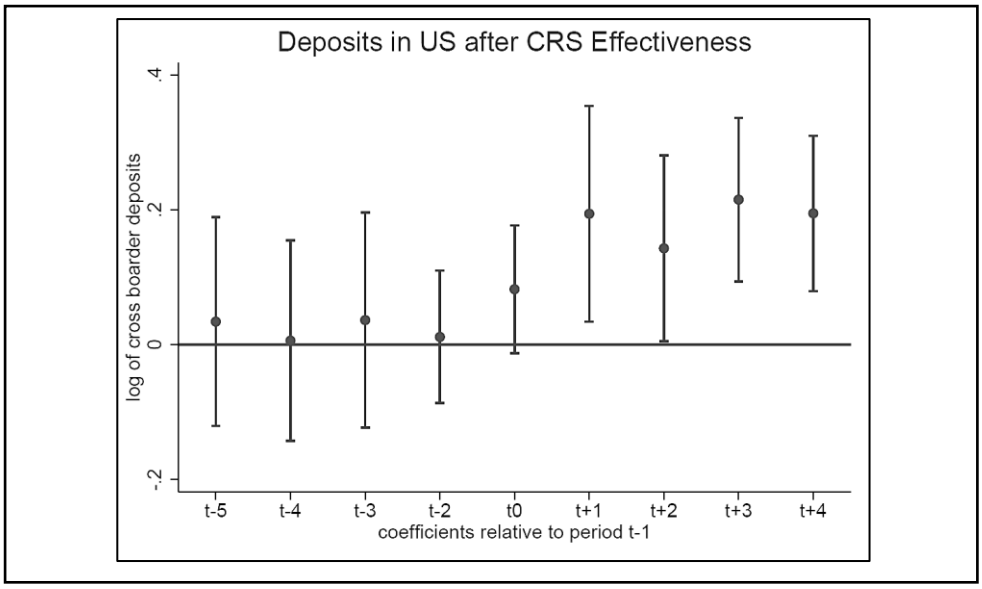


Notes: The figure charts coefficient estimates of cross-border deposits held by residents of EU and OECD countries in offshores around the CRS event dates (in event time). We estimate Eq. 1a (upper panel) and Eq. 1b (lower panel) but replace the single coefficient of the interaction of CRS introduction 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 country (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 ordered country-pair fixed effects.

For the staggered CRS specification (upper panel of Figure 3), the reduction in cross-border deposits held in offshore countries 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 (t-0 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.

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 ordered country-pair fixed effects. Figure 4 plots the coefficients for each relative quarter together with the 95% confidence interval. It shows the change in cross-border deposits in the U.S. relative to the last period before CRS was effective in the first wave adopters. The increase in cross-border deposits in the U.S. 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. 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 4: 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 ordered country-pair fixed effects.

5.2.2. Sample Split Test of Relocation to the U.S.

Furthermore, we test relocation behavior to the U.S. only on the subsample of country-pairs where the deposit country is the U.S., i.e. we drop all other observations for which deposits are held in non-U.S. deposit countries from our sample. The difference-in-difference regression design thus becomes a time trend 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. This test rules out that our main findings are driven by changes in the control group rather than in the treated group. As placebo test we investigate the reaction to CRS effectiveness in non-offshore to non-offshore deposits.[31] We add ordered country-pair fixed effects in both, the main test and the placebo test. Thus identifying variation comes from within country-pair changes.

[31] In that 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 potential 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 countries in additional tests in Section 6.1 below.

We control for common shocks to the economy by quarter-year fixed effects. Results are displayed in Table 5.

TABLE 5: 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 COUNTRY	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 ordered country-pair level. The dependent variable is the log of cross-border deposits held by residences of country i in banks of deposit country j in the end of quarter q. The unit of observation is the residence-deposits ordered 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.

The estimated effect of the CRS on the U.S. deposits reported in Table 5 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 statistically significant change in non-offshore to non-offshore deposits occurs after CRS effectiveness.

5.2.3. Test of Alternative Attractive Countries for Relocation

To further rule out that other non-offshore countries have become attractive places of relocation after CRS introduction in offshore countries, we test what happens in other potentially attractive non-offshore countries after CRS effectiveness. To make results comparable to our test of relocation to the U.S., we employ exactly the same research design. As potentially equally attractive secrecy locations, we consider countries listed among the 15 secrecy locations in the Financial Secrecy Index ranking. Next to the U.S., we have data on three of these countries,

namely, Switzerland, Luxembourg and the Netherlands.[32] In contrast to the U.S., they all implemented the CRS.

TABLE 6: THE U.S. VS. ALTERNATIVE RELOCATION COUNTRIES

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 ordered country-pair level. The dependent variable is the log of cross-border deposits held by residences of country i in banks of deposit country j in the end of quarter q. The unit of observation is the residence-deposits ordered 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 country j is an offshore country. 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 country j is the US, CH, LU, NL. All regressions include ordered country-pair and residence-quarter-year fixed effects.

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

As expected, in none of these alternative countries we observe an increase in cross-border deposits (see Table 6). Cross-border deposits held in Luxembourg remain unchanged, whereas in the Netherlands and Switzerland cross-border deposits even decrease 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 countries. These findings confirm that the attractiveness of the U.S. as location for cross-border tax evasion lies in its non-

[32] Additional countries for which we would have data and are included in the top 15 FSI ranking includes Hong Kong and Guernsey. We exclude those countries from our test because we consider them in our main tests.

compliance to the CRS. While those jurisdictions that introduced the CRS – despite offering high bank secrecy – become on average less attractive.

5.2.4. Reduced Control Group

One concern with our choice of the control group might be that concurrent changes in the depository countries might be driving the observed effects. Two concurrent events may be critical in this regard. First, Switzerland is likely to have experienced a shock to its cross-border deposits following the first quarter of 2015 when the Swiss central bank abandoned the 1.20 francs per euro cap.[33] Second, the Italian banking crisis surfacing again in the last quarter of 2016 is likely to have caused a negative shock on deposits held in Italian bank accounts.[34] To rule out that the effects, which we measure, are influenced by these countries' financial turmoil, we rerun our main tests in Table 7 below on a reduced sample excluding Switzerland and Italy as deposits countries. The results remain unchanged suggesting that the two events in Switzerland and Italy are not influential on our main outcomes.

[33] See e.g. https://www.reuters.com/article/us-swiss-snb-cap/swiss-central-bank-stuns-market-with-policy-u-turn-idUSKBN0KO0XK20150115.
[34] See e.g. https://www.theguardian.com/commentisfree/2016/nov/28/italy-failing-banks-new-japan

TABLE 7: REDUCED CONTROL GROUP: 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	First Adoption Wave
VARIABLES	(1)	(2)	(3)	(4)
PostCRSIntroDepL	-0.0429			
	(0.0341)			
PostCRSIntroDepL * Offsh	-0.145***			
	(0.0514)			
PostCRSEffDepL		-0.0672*		
		(0.0365)		
PostCRSEffDepL * Offsh		-0.176***		
		(0.0592)		
PostCRSFirstWaveAdopters			0.305**	0.304**
			(0.133)	(0.133)
PostCRSFirstWaveAdopters * Offsh			-0.236***	-0.231***
			(0.0602)	(0.0607)
PostCRSFirstWaveAdopters * US				0.0869*
				(0.0495)
Constant	4.367***	4.383***	3.908***	3.905***
	(0.0365)	(0.0372)	(0.129)	(0.129)
Observations	10,560	10,560	10,972	10,972
R-squared	0.063	0.064	0.064	0.064
Number of countrypair	940	940	979	979
Country-Pair FE	YES	YES	YES	YES
Residence-Quarter-Year FE	YES	YES	YES	YES

Notes: For this test we drop Italy and Switzerland from the sample of deposits country. Cluster robust standard errors in parentheses, clustered at the ordered country-pair level. The dependent variable is the log of cross-border deposits held by residents of country i in banks of deposit country j in the end of quarter q. The unit of observation is the residence and deposits ordered 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 country j is an offshore country. US is a dummy taking value one when the deposit country j is the U.S.. PostCRSIntroDepL is a dummy, which equals one in the period after the implementation date of the CRS in the deposit country. 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 country. All regressions include ordered country-pair and residence country-quarter-year fixed effects.

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

5.2.5. Placebo Test

We expect that the reaction to CRS implementation occurs at the moment when the CRS is implemented in the deposit country 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 country j at the end of quarter t. $Offsh_j$ is a dummy taking value one when the deposit country is an offshore country. It constitutes the *treatment* dummy in our difference in difference design.[35] $PostCRSIntroResL_{it}$ 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 country. We add quarter-year and ordered country-pair fixed effects. Standard errors are cluster-robust, with clustering on the ordered 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 8. The findings corroborate that the reaction to CRS implementation occurs at the moment when the CRS is implemented in the deposit country rather than upon implementation in the residence country.

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

TABLE 8: CHANGE IN CROSS-BORDER DEPOSITS IN OFFSHORES UPON CRS INTRODUCTION IN RESIDENCE VS DEPOSIT COUNTRY

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)
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 ordered country-pair level. The dependent variable is the log of cross-border deposits held by residents of country i in banks of deposit country j in the end of quarter q. The unit of observation is the residence-deposits ordered 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 country j is an offshore country. 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 country. All regressions include ordered country-pair and quarter-year fixed effects.

*** 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 country 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. We proceed by investigating 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). Their identification strategy relies on the fact that cross-border deposits from the BIS include deposits owned by both entities and individuals. This enables us to exploit the same measure of tax evasion as in our previous specifications. For example, when an Italian tax evader 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. As Johannesen and Zucman (2014), we first study the reaction by tax evaders to the CRS's by testing for decreases in deposits held by residents of offshore countries in other offshore countries. In the second test on the CRS's effect on relocation of deposits held by shell companies, we test for increases in deposits held by offshore residents in the U.S.. For the purpose of these analyses, we are able to extend our sample to 16 offshore resident countries. This is due to the availability of bilateral data at BIS on deposits held by residents of Aruba, Bahamas, Bahrain, Barbados, Bermuda, Cayman Islands, Curacao, Gibraltar, Guernsey, Hong Kong, Isle of Man, Jersey, Lebanon, Macau, Mauritius, Panama, Samoa and Singapore in Guernsey, Hong Kong, Isle of Man, Jersey, Macau.[36]

We test first whether the introduction of the CRS has led to a reduction of shell companies holding cross-border deposits in other offshore countries. For that purpose, 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 countries. 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 ordered country-pair and quarter-year fixed effects as well as cluster robust standard errors at the ordered 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. According to the CRS guidelines, financial institutions are required to identify the controlling person(s) in

[36] We select all countries listed as offshores at the BIS. As in our main test, we focus on those countries, for which reasons for holding cross-boder deposits locally besides individual tax evasion are minimal.

case the account holder is an entity. However, it might not always be feasible to obtain information on the final beneficial owner. Thus, holding a financial account through a shell companies located in a traditional offshore location may still represent valuable strategy to hide wealth and related income outside the country of residence.

In case individuals avoid CRS reporting requirements by the use of shell companies in offshore countries, we would expect a coefficient, which is insignificant or even positively significantly different from zero. If instead, the CRS is effective in addressing tax evasion by the use of shell companies in offshore countries, we would expect a negatively significant coefficient. Indeed, this is what we find. Offshore deposits in offshore-to-offshore constellations decreased by 24.1% 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 decreased as reaction to the CRS (see Table 9 Column 1). The effect is significant at the 5% level.

Secondly, we test whether offshore shell companies increased their deposits in the U.S. after the CRS introduction. We expect that the CRS leads to an increase of offshore shell companies holding bank accounts in the U.S.. We restrict the sample to offshore residence countries and the U.S. as deposit country. 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 ordered country-pair and quarter-year fixed effects as well as robust clustering of the standard errors at the ordered country-pair level. β_1 is the coefficient of interest, which we expect to be positive and significantly different from zero. For the purpose of this test, we cannot use the most stringent fixed effects structure given that we only consider one deposit location. We find an increase of 44.8% of deposits held in the U.S. by offshore residents after the CRS is effective in the first wave CRS adopters (see Table 9 Column 3). This effect is statistically significant at the 1% level.

As Findley et al. (2015) show, not only traditional offshore countries, but also the U.S. offer very attractive conditions for setting up shell companies. Thus, we can expect that upon the introduction of the CRS, given the compliance of all traditional offshore countries, tax evaders may now find it more appealing to also set up their shell companies in the U.S.. Furthermore, through those entities they may hold local as well as international deposits in non-offshore

countries, since, as Menkhoff and Miethe (2017, 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 own also 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 hold deposits in a Swiss bank. The CRS requirements force financial institutions 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.[37] 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. We test this second 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 countries 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 ordered country-pair and quarter-year fixed effects as well as cluster robust standard errors at the ordered country-pair level. Results suggest an increase of 31.1% of deposits held by U.S. residents in non-offshore countries after the CRS is effective in the first wave CRS adopters (see Table 9 Column 3). This finding gives first evidence, that after the CRS implementation also the use of U.S. shell companies could have substantially increased and may so confirm the relevance of the U.S. for tax evasion purposes of non-U.S. residents following the CRS

[37] 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/, accessed 01.08.2018.

TABLE 9: 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		
	(1)	(2)	(3)
VARIABLES	Offshores to Offshores	Offshores to U.S.	U.S. to non-Offshores
PostCRSFirstWaveAdopters	-0.241**	0.448**	0.311**
	(0.115)	(0.163)	(0.146)
Constant	4.392***	7.094***	7.748***
	(0.0432)	(0.0715)	(0.0917)
Observations	880	176	246
R-squared	0.037	0.198	0.083
Number of country-pairs	82	16	22
Country-Pair FE	YES	YES	YES
Quarter-Year FE	YES	YES	YES

Notes: Cluster robust standard errors in parentheses, clustered at the ordered country-pair level. The dependent variable is the log of deposits held by residents of country i in banks of deposit country j in the end of quarter q. The unit of observation is the residence country deposit country pair and the sample period goes from the last quarter of 2014 to the third quarter of 2017. In Column 1, the sample is restricted to offshores as residence country (Aruba, Bahamas, Bahrain, Barbados, Bermuda, Cayman Islands, Curacao, Gibraltar, Guernsey, Hong Kong, Isle of Man, Jersey, Lebanon, Macau, Mauritius, Panama, Samoa and Singapore) and offshores as deposit country (Guernsey, Hong Kong, Isle of Man, Jersey, Macau). In Column 2, the sample is restricted to offshores as residence country ((Aruba, Bahamas, Bahrain, Barbados, Bermuda, Cayman Islands, Curacao, Gibraltar, Guernsey, Hong Kong, Isle of Man, Jersey, Lebanon, Macau, Mauritius, Panama, Samoa and Singapore) and the U.S. as deposit country. In Column 3, the sample is restricted to U.S. as residence country and non-offshores as deposit country. Offsh is a dummy taking value one when the deposit country j is an offshore country. PostCRSFirstWaveAdopters is a dummy equal one starting in the period of the first wave of information exchange. All regressions include ordered country-pair and 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, an unprecedented standard for the automatic exchange of information, on cross-border tax evasion. We document a statistically significant decrease of deposits owned by EU and OECD residents in major offshore countries around the world upon the local implementation of the CRS. Moreover, we did not find that the CRS truly puts an end to cross-border tax evasion, but we rather document an unexpected change in the dynamics of cross-border tax evasion.

We add to the prior literature by providing strong evidence that an unexpected country seems to attract wealth and related income for the purpose of tax evasion, i.e. the U.S.. The U.S. represent the only major economy that so far did not commit to the CRS. In this analysis, we show that directly and indirectly owned cross-border deposits in the U.S. increase upon CRS implementation. We are aware of the threat of confounding factors. To reduce this threat as far as possible, we carefully draft our empirical analyses first by employing a well-established empirical model for estimation of cross-border tax evasion. Second, we implement a demanding fixed effects structure going beyond that used in much of prior research. Third, we limit our analysis to a narrow period of time (2014-2017) to avoid that other major events – e.g. FATCA or the U.S. 2018 tax reform – may influence our outcomes. Last, we test the robustness of our results in several event studies and sample splits.

We believe that our study contributes substantially to the current international debate on cross-border tax evasion. A main finding of our study is that the CRS leads to a reduction of offshore deposits of about 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 seems to have. However, our findings also suggest that the U.S. should reconsider its current position on the AEOI on foreign deposits held within its borders. This would remove one major loophole in the CRS and therefore strongly support the fight against cross-border tax evasion.

Finally, given the now extensive network of exchange relations, 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.

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APPENDIX A - Test on a Balanced Sample

In order to preserve the maximum number of observations possible, in our main analysis we use an unbalanced sample. 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 observations. In Table 1a we show that results are essentially unchanged. Cross-border deposits of OECD and EU residents in offshore countries 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 non-offshore deposit countries (see Column 1 Table 1a). Relative to all other non-offshore deposit countries in our sample an increase of 8.06% in deposits in the U.S. held by EU and OECD residents is detected after CRS effectiveness in the first wave adopters (see Column 2 of Table 1a). Thus, we can rule out that our tests suffer from selection bias due to unbalanced sampling.

TABLE 1A: 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 ordered country-pair level. The dependent variable is the log of cross-border deposits held by residences of country i in banks of deposit country j in the end of quarter q. The unit of observation is the residence-deposits ordered 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 country j is an offshore country. 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 country j is the US. Res_ITax is a variable indicating the level of the interest rate tax at the residence country i in quarter q. Secrecy is a variable indicating the secrecy ranking of the deposit country j in the Financial Secrecy Index 2018 (constant across all time periods). All regressions include ordered country-pair and residence-quarter-year fixed effects.

*** significance at the 1 % level,

** significance at the 5% level,

* significance at the 10% level.

APPENDIX B - Test of Alternative List of Offshore Countries

In our baseline model, we strictly follow the BIS list of offshore countries considering all offshores for which we have access to cross-border deposits at bilateral level, i.e. Guernsey, Isle of Man, Hong Kong, Jersey and Macau. In earlier research on tax evasion also larger countries such as Austria or Switzerland are included in tax haven lists (see e.g. Johannesen and Zucman (2014)). Austria for example may be considered as a tax haven, because it offers a tax attractive environment to firms' financing companies.[38] However, in this paper we are interested in other kinds of tax avoidance, namely, by wealthy individuals, rather than by corporations. Thus, we chose the BIS list of offshores, which is made up of small economies. In these small economies the probability that cross-border deposits are held for reasons of individual tax evasion as compared to for reasons of company tax evasion or economic activity are much higher than in larger haven countries. However, the BIS list excludes at least one country whose banks are known to be big payers in the individuals' tax evasion industry, Switzerland. Thus, in order to show that our results are robust to alternative offshore lists, we rerun our main tests on the sample of offshores used in Johannesen et al. 2018. Johannesen et al. 2018 also study individual tax evasion. They define tax havens as "the OECD (2000) list of uncooperative tax havens plus Switzerland, Singapore, Hong Kong and Luxembourg." The OECD (2000) list contains only very small countries, of which we have data for Guernsey, Jersey and Isle of Men, which we also include in our list of offshores. Therefore, following Johannesen et al. (2018), we add to our original list of offshores Switzerland and Luxembourg and delete Macau. In Table 1b below we run the same regression as in our baseline tests of the CRS effect on offshore countries and in our test of relocation to the U.S. (Tables 4 and 5), but the sample of offshore countries is based on the alternative haven list provided by Johannsen et al. (2018). Table 1b shows, that while the effect sizes are slightly smaller the significance levels remain unchanged demonstrating the robustness of our effects against alternative lists of offshores.

[38] See for example https://media.arbeiterkammer.at/wien/PDF/studien/Studie_tax_avoidance.pdf pp. 54-55.

TABLE 1B: ALTERNATIVE OFFSHORES SAMPLE: 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 Effec-tive Date	First Adoption Wave
VARIABLES	(1)	(2)	(3)	(4)
PostCRSIntroDepL	-0.0363			
	(0.0320)			
PostCRSIntroDepL * Offsh	-0.119***			
	(0.0414)			
PostCRSFirstWaveAdopters		0.229*		0.247*
		(0.131)		(0.129)
PostCRSFirstWaveAdopters * Offsh		-0.115***		-0.226***
		(0.0406)		(0.0600)
PostCRSFirstWaveAdopters * US				0.0902* (0.0478)
PostCRSEffDepL			-0.0560	
			(0.0341)	
PostCRSEffDepL * Offsh			-0.129***	
			(0.0445)	
Constant	4.499***	4.102***	4.512***	4.097***
	(0.0336)	(0.126)	(0.0341)	(0.124)
Observations	11,477	11,889	11,477	11,889
R-squared	0.060	0.056	0.061	0.060
Number of countrypair	1,017	1,056	1,017	1,056
Country-Pair FE	YES	YES	YES	YES
Residence-Quarter-Year FE	YES	YES	YES	YES

Notes: The offshores countries in this alternative sample are the group of countries identified in Johannesen et al. (2018) as tax haven. Cluster robust standard errors in parentheses, clustered at the ordered country-pair level. The dependent variable is the log of cross-border deposits held by residents of country i in banks of deposit countries j in the end of quarter q. The unit of observation is the residence and deposits ordered 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 country j is an offshore country. US is a dummy taking value one when the deposit country j is the U.S.. PostCRSIntroDepL is a dummy, which equals one in the period after the implementation date of the CRS in the deposit country. 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 country. All regressions include ordered country-pair and residence country-quarter-year fixed effects.

*** significance at the 1 % level,

** significance at the 5% level,

* significance at the 10% level.