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

We study the effect of the first global multilateral standard for the automatic exchange of information (AEOI), the so-called Common Reporting Standard (CRS), on cross-border tax evasion. Employing newly available bilateral data on cross-border deposits, we find that the CRS induced a reduction of 11.9% 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 is still a desirable option. More specifically, upon the CRS implementation at the 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.

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

JEL: F42, G21, H26, H31
1. Introduction

In the last decades, capital mobility increased substantially thanks to globalization and rapid technological development. This provides individuals incentives 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 global household financial wealth is located in offshore countries, translating into around 10% of the world GDP (Zucman, 2013; Alstadsæter et al., 2018). While financial flows to offshore countries may have legitimate motives, e.g., seeking business opportunities, they might also represent an important channel to hide wealth and related income to avoid tax obligations in the residence country. Although the exact size of the tax revenue loss is hard to quantify, it is generally agreed to be quite large. For example, according to a 2008 U.S. Senate staff report, at least USD 100 billion of tax revenue is lost every year due to offshore tax abuses (U.S. Senate Permanent Subcommittee on Investigations, 2008).

It is the general consensus at OECD level that cross-border tax evasion can be fought effectively by further increasing the information exchange between countries, but empirically this remains an open question. This paper provides evidence on the effectiveness of the most powerful multilateral agreement on the Automatic Exchange of Information (AEOI) so far, the Common Reporting Standard (CRS).

Back in 2010, the United States was the first to strongly react to whistle blowing events and international data leaks, which had highlighted how pervasive cross-border tax evasion from its citizens was. This resulted in the implementation of 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 residents. In this way, the introduction of FATCA pushed an international discussion at the OECD level on developing a global standard for the AEOI (Christensen III and Tirard, 2016). The debate culminated in early 2013 with a G20 formal request to the OECD to design a prototype for a universal system for the AEOI. On 21 July 2014, the OECD published the final version of the CRS (OECD, 2018c). 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 role model FATCA. It could, thus, induce a revolution in the level of scrutiny on wealth and related income parked in offshore countries and change the dynamics of cross-border tax evasion. Yet, the effectiveness

\(^2\)For more details, see http://www.oecd.org/tax/transparency/automaticexchangeofinformation.htm, accessed on 18.12.2018
of the CRS has not been thoroughly investigated. In this paper, we 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 instead induces a relocation of wealth from collaborative offshore countries, i.e., those who signed such an agreement, to non-collaborative ones (Johannesen and Zucman, 2014; Hanlon et al., 2015; Caruana-Galizia and Caruana-Galizia, 2016; Omartian, 2017; De Simone et al., 2019). However, compared to earlier initiatives, the CRS achieves an impressive country coverage. At present, more than 100 jurisdictions worldwide have committed to the CRS. In particular, the list of participating jurisdictions includes most of the so-called tax havens implying a substantial change in bank secrecy. Recent estimates by Deutsche Bank & Oliver Wyman (2017) 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., traditional 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 United States may be an attractive destination for hiding wealth and related income for tax evasion purposes. This claim may seem surprising at first because it is not generally perceived as offering a very attractive tax system. Nevertheless, the United States is the only major financial center that remains not committed to the CRS, and offers 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 the implementation of the CRS non-U.S. resident tax evaders relocate their deposits to the United States.4

Following the related literature (Huizinga and Nicodème, 2004; Zucman, 2013; Johannesen and Zucman, 2014; Menkhoff and Miethe, 2017; Alstadsæter et al., 2018), we consider the outstanding volume of cross-border deposits placed in offshore countries as our measure of cross-border tax evasion.5 The data we use originates from the Bank for International Settle-

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3For a complete list, see OECD (2018a).
4We are aware that other relocation channels, which are not studied here, might be used by tax evaders in response to the CRS implementation. For example, De Simone et al. (2019) attempt to measure whether in the context of FATCA investments in real estate and artwork might present attractive alternatives for cross-border tax evasion.
5Other related papers measuring cross-border tax evasion of U.S. citizens make use of
ments (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 CRS introduction and effectiveness dates for all countries in our sample.

We estimate tax evaders’ reaction to this 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 the CRS implementation. Second, we test whether the relocation of cross-border deposits to the United States occurred, by estimating the change in cross-border deposits in the United States (treated group) as compared to the change in cross-border deposits in other non-offshore countries (control group) after the CRS implementation. By employing the country-level implementation of the 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 x quarter-year fixed effects. Thus, we investigate the CRS’s effects on a within residence country-quarter and country-pair level.

We find that upon the CRS implementation at national level, cross-border deposits held in offshore countries decrease on average by 11.9% compared to non-offshore countries. If we exclude EU member states, which were already affected by the European Savings Directive\(^6\), the decrease is even higher, i.e., 27.9%. In event studies, we show that this is due to a statistically significant immediate decline of cross-border 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 United States are on average 10.9% higher, compared to those in other non-offshore countries. What is more, in an event study we show that the increase of cross-border deposits in the United States 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 and to offer evidence on which jurisdiction(s) emerge as a preferred destination for cross-border tax evasion upon the CRS implementation.\(^7\) Tax evaders still seem to deem reallocation a convenient option, but

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\(^6\)For more details see European Council (2003/48/EU).

\(^7\)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
a new destination appears as very attractive for deposit holders, namely the United States. This represents a politically relevant result.

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 that other aspects might need improvement as well. For example, at present, the usability of the information collected under the CRS is far from certain (Finær and Tokola, 2017) and 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 is under revision by the OECD to address potentially existing loopholes.

The rest of the paper is organized as follows. In section 2, we offer an overview of the related literature and we place the CRS in the context of previous related policies. In Section 3, we describe our research design. Section 4 contains the core of our paper, where we provide key results of our study in detail. Section 5 offers additional tests on the effect of the CRS on indirect channels of tax evasion. In Section 6, we summarize our findings.

2. Tax Evasion and the CRS as Countermeasure

Tax evasion represents a pervasive phenomenon. Estimates cited by the European Commission (2012) suggest a yearly tax gap of around EUR 1 trillion within the EU alone, whereas the Internal Revenue Service (2016) provides estimates of an annual average tax revenue loss of USD 458 billion in the United States due to non-compliant tax behavior. 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 global household wealth is located in tax havens. More recently, Alstadsæter et al. (2018) show that this estimate varies significantly across the world. 60% of the wealth in tax havens is held in the Gulf and certain Latin American countries, while only 15% in continental Europe and even less in Scandinavia. Regardless of the geographical dispersion, the ownership of this hidden wealth strongly concentrates in the top 0.01% of the wealth distribution (Alstadsæter et al., 2019). Moreover, Hanlon et al. (2015) estimate a tax gap of around USD 8 to 27 billion caused by U.S. investors round-tripping activities.

As 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. Slemrod (2018) provides an overview of tax enforcement tools. 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; Bott et al., 2017). Since more than a century, countries cooperate on tax matters using information exchange agreements. 1998 is one of the most crucial years on the route towards international tax transparency. In that year, the OECD issued its well-known report on harmful tax competition, which led a few years later to the development of a comprehensive model for tax information exchange agreements (TIEA) (Christensen III and Tirard, 2016). There is a vast empirical literature on the impact of early initiatives in the field of information exchange.

To begin with, Huizinga and Nicodème (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. The network of TIEAs extended considerably between 2009 and 2011, when, thanks to international pressure, several tax havens signed agreements with non-tax havens (Bilicka and Fuest, 2014). Johannesen and Zucman (2014) consider this first wave of TIEA introductions 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 relocation behavior to non-collaborative tax havens. When considering the long-term impact of TIEAs, Menkhoff and Miethe (2017) find a diminishing effect starting from 2010.

The first step towards a multilateral approach to exchange of information occurred in 2003 when the European 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, instead tax evaders relocated their deposits to non-EU offshore countries (Johannesen, 2014; Caruana-Galizia and Caruana-Galizia, 2016). Further supportive evidence is provided by Omar-tian (2017), who by considering the leaked data from the Panama Papers, tests the impact of the amendment to the European Savings Directive in 2005 and FATCA on foreign asset ownership. De Simone et al. (2019) exclusively focus on FATCA, and building on the empirical analysis of Hanlon et al. (2015) offer strong evidence of reallocation behavior by U.S. citizens. They find that FATCA induced a significant reduction of equity foreign portfolio investments into the United States from tax havens as well as an increase in alternative investment options not subject to FATCA reporting.

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8For more details on the amendment to the European Savings Directive see European Council (2005/60/EU).
e.g., real estate and artwork. Finally, they also document additional negative externalities such as increased renunciation of U.S. citizenship.

However, the CRS overcomes significant drawbacks of these previous initiatives in the field of information exchange. First, it constitutes a multilateral approach similar to the European 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. To date 104 jurisdictions around the world signed the multilateral agreement, meaning they commit to the exchange of information under the CRS requirements in the near future (OECD, 2018b). Secondly, participating jurisdictions automatically exchange information with any other participating counterparty. In this way, in contrast to normal TIEAs and FATCA (for information on foreign deposits in the United States), 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 a broader 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. This is why we expect to find a significant effect of the CRS, even for those offshore countries, which already implemented bilateral TIEAs, the European Savings Directive, and FATCA. Consequently, our first test focuses on the CRS’s effectiveness in reducing wealth and related income parked in traditional offshore countries to avoid tax obligations 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 United States is the only important financial center around the world, which did not commit to the CRS and does not plan to do so any time soon (Goulder, 2019, p. 139). Compared to the CRS, the information transmitted under FATCA is limited making the United States more attractive as compared to offshore countries that participate in the CRS (Hakelberg and Schaub, 2018, p. 356-9).

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9For a comprehensive overview of the CRS and its implementation at the national level, see Casi et al. (2018).

10The CRS has a similar scope as FATCA when considering the information the United States receives on its citizens having bank accounts outside national borders. However, under FATCA, the United States provides to counterparties only information on the gross interest paid for foreign depository accounts.

11Other than the United States, non-CRS-abiding countries generally cannot provide an attractive and stable financial sector and are not OECD or EU member states. Countries not committed to CRS so far include Algeria, Armenia, Bangladesh, Egypt, Maldives, Oman, Palestine, Philippines, Sri Lanka, Thailand, the United States and Vietnam. See http://www.crs.hsbc.com/, accessed on 20.03.2019.
357). Under FATCA, the IRS transmits data on foreign financial account holders only upon request and only if such request comes from countries, which signed the FATCA Model 1a Intergovernmental Agreement (IGA). The transmitted information is 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 for 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.12 Next to limited information exchange, non-resident individuals investing in the United States enjoy advantageous tax-free facilities. This includes tax exemption on domestic-source portfolio interest or reinvested dividends (Brunson, 2014). Further, the United States provides high levels of bank secrecy.13 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.14 Last, on the grounds of an extensive cross-country randomized field experiment, Sharman (2010) and Findley et al. (2015) find that in contrast to non-U.S. providers, U.S. service providers for shell company incorporation are less likely to comply with international transparency standards. In this way the complexity of setting up a shell company in the United States is reduced (Findley et al., 2015, p. 153, 157).15 Thus, although not typically classified as a low tax country, in the post CRS world, the United States may be very attractive for hiding wealth and related income.16

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12 For more details, see Sueddeutsche Zeitung (2018)
13 According to the Financial Secrecy Index from the Tax Justice Network, the United States positioned itself as second in the 2018 index, gaining four positions from the one in 2013, see https://www.financialsecrecyindex.com/, accessed on 18.12.2018.
14 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. But the law has not yet been enacted. 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 owners (see Tax Justice Network (2018)).
15 Furthermore, ”only 62 of the answers to the 2,336 inquiries in the United States asked for any document with a photo establishing identity” (Findley et al., 2015, p. 157).
16 For more details, see The Economist (2016) or Bloomberg (2017)
3. Research Design

3.1. Data

Our main dataset is constructed based on the BIS Locational Banking Statistics (LBS). This database offers detailed information about the outstanding volume of claims and liabilities of internationally active banks located in reporting countries vis-a-vis counterparties residing in more than 200 jurisdictions around the world. For our analysis, we focus on the outstanding quarterly volume of cross-border deposits (in the following referred 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, as deposit country, we include all countries for which data at bilateral level is publicly available in the BIS LBS dataset. We divide them into offshore countries (Guernsey, Hong Kong, the Isle of Man, Jersey, Luxembourg and Switzerland) and non-offshore countries (Australia, Austria, Belgium, Brazil, Canada, Chile, Denmark, Finland, France, Greece, Ireland, Italy, Korea, Macau, Mexico, Netherlands, Philippines, South Africa, Spain, Sweden, Taiwan, the United Kingdom and the United States). As offshore countries we take those available from the list of Johannesen et al. (2018). They also study individual tax evasion, and they define offshore countries as the OECD (2000) list of uncooperative tax havens plus Switzerland, Singapore, Hong Kong, and Luxembourg.\textsuperscript{17} As for the location of the owner of the deposits, we select all EU and OECD member states arriving at a total of 41 countries.\textsuperscript{18}

The main advantage of the BIS data is the extensive country coverage. The coverage rate on cross-border interbank business is around 93% as of 2016.\textsuperscript{19} Additionally, the BIS data features sectoral decomposition into bank and non-bank sector. We consider only non-bank deposits. As also highlighted in Johannesen and Zucman (2014), interbank deposits should not represent a channel for tax evasion.

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,\textsuperscript{20} we address the role of shell companies in additional tests in Section 5. Second, the BIS statistics do not distinguish between individual and entity ownership of deposits. However, we do not see this as a limitation to our analysis. The CRS requires financial institutions to collect information on both, individual and

\textsuperscript{17}Others, such as Hines and Rice (1994) and Johannesen and Zucman (2014) consider as offshore countries a different selection of countries. We select the most recent one that relates to individual tax evasion, i.e., the one of Johannesen et al. (2018).

\textsuperscript{18}We consider EU and OECD member states as of June 2018.

\textsuperscript{19}For an overview of the BIS data, see BIS (2018).

\textsuperscript{20}Johannesen and Zucman (2014, p. 85) state that the owners of 25% of all deposits in tax havens are recorded as residents of other havens.
entity accounts. In the 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 expect a reaction from both if entity owned accounts are used for tax evasion purposes. Lastly, since the BIS statistics include only bank deposits, alternative channels for tax evasion, namely equity or bond portfolios, are excluded from our analysis. Yet, 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.21

Our sample period ranges from the last quarter of 201422 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 2018 U.S. Tax Cuts and Job Act announced in Fall 2017.23 For example by including observations before 2014, our results on the CRS effect on cross-border deposits from offshore countries to the United States would be downward biased, due to the 2010 FATCA implementation. While if we include observations after 2017, our results on the CRS effect on cross-border deposits from non-offshore countries and from offshore countries to the United States could be upward biased, due to the economic effects of the 2018 U.S. Tax Cuts and Job Act.24

In Table 1 we provide a comprehensive list of the countries considered in our analysis, divided by the status of CRS implementation. Where first wave adopters denote those countries that request the collection of financial information starting from January 1, 2016, and exchanged the financial information in 2017 for the first time. While second wave adopters denote those countries that request the collection of financial information starting from early 2017 and exchanged the financial information in 2018 for the first time.

21Heckemeyer and Hemmerich (2018) show that the reaction to increased information exchange on portfolio wealth held through tax haven jurisdictions mirrors the reaction on cross-border deposits held in tax havens that is observed by Johannesen and Zucman (2014). This suggests that our estimates on the effect of the CRS on cross-border deposits may similarly apply to other cross-border channels for tax evasion.

22We start from the last quarter of 2014 because data for Hong Kong are available only from that date on.

23The only possibly confounding events during the selected period are 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 (European Parliament and Council, 2015/849/EU). However, those reforms are not directly influencing the movement of cross-border deposits for the purpose of tax evasion.

24The BIS data includes, both individual and entity cross-border deposits. Entity cross-border deposits in the United States may increase in response to the tax changes induced by the Tax Cuts and Job Act 2018. ? findings point to an increase in total FDI activity as a result of the lowered tax burden in the United States.
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.\textsuperscript{25} When the information is not available through the OECD database, we search it using news alerts from the Customer and Investor Tax Transparency (CITT) News Blog by PwC.\textsuperscript{26} As control variable, we collect data on country financial secrecy levels using the 2018 Financial Secrecy Index of the Tax Justice Network. The most secret locations have the highest secrecy scores in the index.

In Table 2 we provide descriptive statistics on cross-border deposits held by OECD and EU residents in the deposit countries considered in our sample. The period covered is from 2014 until 2017. The United Kingdom has the largest average volume of cross-border deposits (USD 28,241 Million), followed by the United States (USD 14,858 Million), and France (USD 11,186 Million). Despite the small size of the country, the Netherlands follow with USD 7,265 Million in cross-border deposits owned by OECD and EU residents. This may be related to the importance of the Netherlands as conduit country for financial flows of multinationals investing worldwide (European Parliamentary Research Service, October 2018). Among our group of off-

\begin{table}[h]
\centering
\begin{tabular}{|l|l|}
\hline
\textbf{1\textsuperscript{st} Wave (info exchanged in 2017 for the first time)} & \textbf{2\textsuperscript{nd} Wave (info exchanged in 2018 for the first time)} \\
\hline
Austria & Australia \\
Belgium & Brazil \\
Bulgaria & Canada \\
Croatia & Chile \\
Cyprus & Hong Kong \\
Czech Republic & Iceland \\
Denmark & Israel \\
France & Japan \\
Germany & Macau \\
Guernsey & New Zealand \\
Greece & Switzerland \\
Hungary & Turkey \\
Ireland & United States \\
Isle of Man & United Kingdom \\
\hline
\end{tabular}
\end{table}


\textsuperscript{26}For more details, see https://blogs.pwc.de/citt/, accessed on 18.12.2018.
Table 2: Descriptive Statistics on Deposits Countries (2014-2017)

<table>
<thead>
<tr>
<th>Deposit Country</th>
<th>Observations</th>
<th>Mean (M $)</th>
<th>Stand. Deviation (M $)</th>
<th>Min (M $)</th>
<th>Max (M $)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>480</td>
<td>500</td>
<td>1,244</td>
<td>0.3</td>
<td>7,223</td>
</tr>
<tr>
<td>Austria</td>
<td>478</td>
<td>949</td>
<td>3,054</td>
<td>2.2</td>
<td>25,179</td>
</tr>
<tr>
<td>Belgium</td>
<td>480</td>
<td>2,572</td>
<td>6,836</td>
<td>3.6</td>
<td>43,511</td>
</tr>
<tr>
<td>Brazil</td>
<td>179</td>
<td>81</td>
<td>317</td>
<td>1</td>
<td>2,781</td>
</tr>
<tr>
<td>Canada</td>
<td>433</td>
<td>3,348</td>
<td>16,685</td>
<td>0.8</td>
<td>131,631</td>
</tr>
<tr>
<td>Chile</td>
<td>367</td>
<td>13</td>
<td>74</td>
<td>0</td>
<td>1,281</td>
</tr>
<tr>
<td>Denmark</td>
<td>449</td>
<td>683</td>
<td>1,481</td>
<td>7</td>
<td>9,223</td>
</tr>
<tr>
<td>Finland</td>
<td>407</td>
<td>748</td>
<td>2,553</td>
<td>0.1</td>
<td>19,349</td>
</tr>
<tr>
<td>France</td>
<td>480</td>
<td>11,186</td>
<td>26,315</td>
<td>4</td>
<td>168,198</td>
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<tr>
<td>Greece</td>
<td>104</td>
<td>43</td>
<td>78</td>
<td>1</td>
<td>353</td>
</tr>
<tr>
<td>Guernsey</td>
<td>486</td>
<td>411</td>
<td>1,370</td>
<td>0</td>
<td>8,366</td>
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<tr>
<td>Hong Kong</td>
<td>492</td>
<td>1,347</td>
<td>2,809</td>
<td>3</td>
<td>17,371</td>
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<tr>
<td>Ireland</td>
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<td>1,321</td>
<td>3,593</td>
<td>0</td>
<td>20,661</td>
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<tr>
<td>Isle of Man</td>
<td>492</td>
<td>437</td>
<td>1,838</td>
<td>0.5</td>
<td>13,416</td>
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<tr>
<td>Italy</td>
<td>437</td>
<td>1,230</td>
<td>3,364</td>
<td>1.4</td>
<td>21,162</td>
</tr>
<tr>
<td>Jersey</td>
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<td>802</td>
<td>3,391</td>
<td>1</td>
<td>23,951</td>
</tr>
<tr>
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<td>447</td>
<td>126</td>
<td>300</td>
<td>0</td>
<td>1,591</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>480</td>
<td>2,424</td>
<td>5,266</td>
<td>14</td>
<td>31,037</td>
</tr>
<tr>
<td>Macau</td>
<td>412</td>
<td>141</td>
<td>509</td>
<td>0</td>
<td>4,516</td>
</tr>
<tr>
<td>Mexico</td>
<td>87</td>
<td>243</td>
<td>746</td>
<td>0</td>
<td>4,379</td>
</tr>
<tr>
<td>Netherlands</td>
<td>300</td>
<td>7,265</td>
<td>12,804</td>
<td>8</td>
<td>67,782</td>
</tr>
<tr>
<td>Philippines</td>
<td>163</td>
<td>30</td>
<td>100</td>
<td>0</td>
<td>671</td>
</tr>
<tr>
<td>Spain</td>
<td>480</td>
<td>1,630</td>
<td>3,695</td>
<td>1</td>
<td>25,168</td>
</tr>
<tr>
<td>South Africa</td>
<td>384</td>
<td>95</td>
<td>329</td>
<td>1</td>
<td>2,448</td>
</tr>
<tr>
<td>Sweden</td>
<td>468</td>
<td>733</td>
<td>1,543</td>
<td>0.6</td>
<td>16,022</td>
</tr>
<tr>
<td>Switzerland</td>
<td>480</td>
<td>3,920</td>
<td>5,787</td>
<td>23</td>
<td>27,310</td>
</tr>
<tr>
<td>Taiwan</td>
<td>492</td>
<td>185</td>
<td>489</td>
<td>0</td>
<td>3,755</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>480</td>
<td>28,241</td>
<td>85,081</td>
<td>12</td>
<td>611,654</td>
</tr>
<tr>
<td>United States</td>
<td>480</td>
<td>14,858</td>
<td>52,946</td>
<td>6</td>
<td>373,090</td>
</tr>
</tbody>
</table>

Notes: The table depicts the quarterly cross-border deposits volume held by OECD and EU residents in the deposits countries considered in our sample from the fourth quarter of 2014 until the third quarter of 2017. The data are in millions of US dollars and are taken from the BIS. A observation stands for the deposit value by country-pair and by quarter-year.

shore countries, Switzerland, Luxembourg, and Hong Kong have the largest average volume of cross-border deposits with USD 3,920 Million, USD 2,424 Million, and USD 1,347 Million, respectively. The small islands of Guernsey, the Isle of Man, and Jersey still represent important countries for cross-border deposits with average values of USD 411 Million, USD 437 Million, and USD 802 Million, respectively. This may be due to the fact that most of the cross-border deposits considered in our sample are owned by residents
of EU member states, who may consider geographical proximity useful to hiding wealth and related income.

3.2. Empirical Strategy

3.2.1. Measuring reduction of cross-border deposits in offshore countries

We first test whether cross-border deposits held directly in offshore countries are reduced due to the local implementation of the CRS. We use two different empirical models, beginning with event studies, followed by a difference in difference analysis. The event studies are used to evaluate the common trends assumption and to assess the dynamics of the response to the CRS so as to gain a more comprehensive picture of how the CRS affects tax evasion through the use of cross-border deposits.

In both, the event study and the difference in difference design, we compare changes in cross-border deposits held in offshore countries (treatment group) with those held in non-offshore countries (control group) after the CRS implementation (post-period). We use this identification strategy because traditional offshore countries are all CRS compliant. In this way, our control versus treatment group follows Hanlon et al. (2015). The identifying variation results from differences in the timing of CRS adoption across countries and differences in the relevance of CRS for offshore and non-offshore deposit destinations. The function of the control group is to absorb common changes in cross-border deposits unrelated to the CRS, such as recessions or booms. As elaborated in section 2, we expect that deposits if held for tax evasion purposes in offshore countries, are on average reduced relative to the deposits in non-offshore countries after the CRS introduction. 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 demonstrate the absence of relocation of deposits to our control group countries in Section 4.3.2, Table 5, Column 2.

We begin our analysis with an event study design of the form:

\[ \log(\text{Deposits}_{ijt}) = \sum_{k=-4}^{4} \alpha_k D_{jt}^k \times \text{Offsh}_{j} + \gamma_{jt} + \theta_{ij} + \epsilon_{ijt} \]  

(1)

The variables of interest are the dummies \( D_{jt}^k \) indicating a point in time \( k \) periods from the CRS treatment and interacted with \( \text{Offsh}_{j} \), which is a

\[ \text{Deposits}_{ijt} \]

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)).

\[ \text{Repatriation does not lead to changes in the volume of the deposits in our control group because our sample is restricted to cross-border deposits.} \]
dummy taking value one when the deposit country is an offshore country. Here the CRS treatment is the local introduction of the CRS in country \( j \) at time \( t \). We measure the effect on the (log) volume of cross-border deposits \((\log(Deposits_{ijt}))\) between residence country \( i \) and deposit country \( j \) at the end of quarter \( t \). As is the standard in the literature for event studies, we omit the indicator for period \( t-1 \). It, therefore, serves as a benchmark. We bin the treatment indicators at the endpoints.\(^{29}\) Further, we include residence country \( x \) quarter-year fixed effects \( \gamma_{it} \) as well as ordered country-pair fixed effects \( \theta_{ij} \). The error term is denoted by \( \epsilon_{ijt} \).

While we use the event study mainly to establish that the common trends assumption holds, we use the difference in difference design to estimate the average effect of the CRS on cross-border deposits held in offshore countries. In the difference in difference analysis, we run regressions of the form:

\[
\log(Deposits_{ijt}) = \alpha + \beta_1 PostCRSIntroDepL_{jt} + \beta_2 PostCRSIntroDepL_{jt} \times Offsh_{j} + \gamma_{it} + \theta_{ij} + \epsilon_{ijt} \\
\text{(2)}
\]

Where the dependent variable is unchanged and \( Offsh_{j} \) again is a dummy taking value one when the deposit country is an offshore country. It constitutes the treatment dummy.\(^{30}\) \( PostCRSIntroDepL_{jt} \) is the post-period dummy we are interested in. It switches on after CRS implementation in the deposits country and stays switched on until the end of the sample period.

As in the event study design, we include residence country \( x \) quarter-year fixed effects \( \gamma_{it} \) as well as ordered country-pair fixed effects \( \theta_{ij} \). The residence country \( x \) 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. Our standard errors are cluster-robust, with clustering at the ordered country-pair level. If wealth and related income are moved away from offshore countries upon CRS implementation, the coefficient \( \beta_1 \) should be negative.

\(^{29}\)Binning implies here that the indicator \( t-4 \) stands for treatment at time \( t-4 \) or more periods ago and the indicator \( t+4 \) stands for time \( t+4 \) or more periods in the future. In general, we design our event studies based on Schmidheiny and Siegloch (2019) and Fuest et al. (2018).

\(^{30}\)Since the treatment dummy is perfectly multicollinear with our country-pair fixed effects, we do not include it as non-interacted term.
We assume that the reaction by tax evaders occurs in the offshore deposit country rather than in the country of their residence because offshore deposits are not immediately affected if only the residence country introduces the CRS. We test our assumption in an additional regression, reported in Section 4.3.4.

Notes: The figure displays the exact date of CRS implementation into national law in all countries considered for 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 United States).

Figure 1: CRS Implementation into National Law Exact Date

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. We do not select the effective date of the CRS (i.e. the day when financial institutions have to start collecting 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 variation in the introduction dates across residence and deposit countries, as can be seen in Figure 1, which we can exploit for identification.

As a second alternative specification, we use a post-period dummy (Post-CRSFirstWave) 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 institutions of the first wave adopters started collecting information for CRS purposes. We run a new regression of the form:

$$
\log(Deposits_{ijt}) = \alpha + \beta_1 PostCRSFirstWave_t * Offsh_j + \gamma_{it} + \theta_{ij} + \epsilon_{ijt}
$$

All variables and specifications of the fixed effects remain the same in equation 3 as in equation 2, except for the treatment dummy PostCRSFirstWave, a dummy equal to one starting on January 1, 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 cross-border deposits held in offshore countries after the CRS is effective in the first wave adopters to the change in the volume of cross-border deposits in the control group countries (mainly EU and OECD countries). Finally, in a robustness check, we test country-specific CRS effective dates. If wealth and related income are moved away from offshore countries upon CRS implementation, the coefficient $\beta_1$ should be negative.

3.2.2. Measuring the relocation of cross-border deposits to the United States

In the second part of our main analysis, we test for changes in cross-border deposits located in the United States after versus before the CRS implementation.\footnote{In robustness tests we also test the effect of the CRS in other secrecy locations, Section 4.3.3.} We begin again with an event study to explore pre-trends and dynamic effects of the CRS on cross-border deposits held in the United States versus in other non-offshore countries, which formally reads as:

$$
\log(Deposits_{ijt}) = \sum_{k=-4}^{4} \beta_k D^k * US + \beta_0 PostCRSFirstWave_t * Offsh_j + \gamma_{it} + \theta_{ij} + \epsilon_{ijt}
$$
The variables of interest are the dummies $D^k_{jt}$ indicating a point in time $k$ periods from the CRS treatment and interacted with $US$, which is a dummy taking value one when the deposit country is the United States. Here the CRS treatment is the implementation of the CRS in the first wave adopters. Rather than identifying the effect based on the introduction of the CRS at the individual country level, we base this test on a non-staggered specification of the CRS treatment period, because there is no implementation date at the level of the deposit country in the United States. Equivalently to above, we measure the effect on the (log) volume of cross-border deposits, $\log(\text{Deposits}_{ijt})$, between residence countries, $i$, and deposit countries, $j$, at the end of quarter $t$. Also, in this case, we omit the indicator for period $t-1$. It, therefore, serves as a benchmark. We bin the treatment indicators at the endpoints.\footnote{That is the indicator $t-4$ stands for treatment at time $t-4$ or more periods ago and the indicator $t+4$ stands for time $t+4$ or more periods in the future.} Further, we include residence country x quarter-year fixed effects $\gamma_{it}$ as well as ordered country-pair fixed effects $\theta_{ij}$. Since, for this baseline test, we retain the entire sample, we control for the reduction of cross-border deposits held in offshore countries by adding the interaction $PostCROF_{\text{FirstWave}}t*Offsh_{j}$ from our first analysis. We confirm that the control group is not driving our results in a split sample test, where we drop the control group from our sample (Section 4.3.2, Table 5, Column 1).

Next, we measure the average effect of the CRS on cross-border deposits in the United States in a difference in difference design. For this purpose, we add to equation 3 an interaction term that indicates the change in cross-border deposits non-residents hold in the United States after the CRS implementation. We run new regressions of the form:

$$
\log(\text{Deposits}_{ijt}) = \alpha + \beta_1 PostCROF_{\text{FirstWave}}t*Offsh_{j} + \beta_2 PostCROF_{\text{FirstWave}}t*US + \gamma_{it} + \theta_{ij} + \epsilon_{ijt} \tag{5}
$$

All variables are the same as defined in equation 3, except for the added interaction term of the $PostCROF_{\text{FirstWave}}t$-dummy and the $US_{j}$-dummy. As in the event study, the implementation of the CRS is measured using the non-staggered treatment dummy, which is only time and not country dependent and which is switching to one when the CRS is effective in the first wave adopters. The added interaction captures the effect of the CRS on foreign deposits held in the United States. Thus while controlling for the effect of the CRS in offshore countries, we compare the change in deposits held in the United States 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 country-quarter-year. $\beta_2$
is the coefficient of interest. If wealth and related income are relocated to the United States upon CRS implementation, the coefficient $\beta_2$ should be positive.

4. Empirical Results

4.1. Event Study

![Figure 2: Event Study Test of Reaction to CRS Implementation in Offshore Countries](image)

Notes: The figure charts coefficient estimates of cross-border deposits held by residents of EU and OECD countries in offshore around the CRS event dates (in event time). We estimate Eq. 1 (upper panel) but replace the single coefficient of the interaction of CRS introduction, and the offshores indicator with 8 separate indicator variables, each marking one quarter over the t-4 to t+4 period relative to the quarter before the CRS event date (t=0). We bin the treatment indicators at the endpoints and omit the indicator for period t-1. It, therefore, serves as a benchmark and has a coefficient value of zero (and no confidence interval). The figure plots the coefficient estimates of the 8 quarters together with their 95% confidence intervals for the staggered CRS event date at the introduction of CRS in the deposit country. We use the log of cross-border deposits as the dependent variable and residence country x quarter-year fixed effects as well as ordered country-pair fixed effects.

We commence our analysis by reporting graphical results from event-study regressions from equation 1. Figure 2 plots the coefficients, which each mark the change in cross-border deposits held in offshore countries versus non-offshore countries in one quarter over the t-4 to t+4 period, relative to the quarter before the CRS treatment event date (t=0). The results are shown together with the 95% confidence interval. They corroborate the parallel trends assumption since in the pre-treatment period the coefficients lie close to zero and are statistically insignificant. In the post-treatment period, the effect size increases in absolute magnitude over time and remains significant through quarter t+4. The increase in the effect size suggests that some
tax evaders wait until information collection under the CRS commences (i.e., when the CRS becomes effective) before moving their deposits from offshore countries.

We continue with the event study results from equation 4, which is our first test of cross-border deposits relocation to the United States. Figure 3 plots the coefficients, which each mark the change in cross-border deposits held in the United States versus other countries, controlling for offshore countries, in one quarter over the t-4 to t+4 period, relative to the quarter before the CRS treatment event date (t=0). The results are shown together with the 95% confidence interval. The coefficients in the pre-period (t-1 to t-4) are statistically indistinguishable from the benchmark quarter, showing that there are no significant pre-treatment trends. After the CRS treatment date we observe an increase in cross-border deposits in the United States, which is relatively immediate. From t=1 the coefficient size increases sharply and is almost significant, turning significant in t=3. While estimates are a bit noisier when compared to Figure 2 – at least partially due to smaller numbers of observations –, the sign of the point estimates show that there
is an increase in cross-border deposits held in the United States after CRS effectiveness compared to the control group countries.

4.2. Difference in Difference Estimates

We report the results from our main test on the effect of the CRS on cross-border tax evasion in Table 3. The results from the estimation of equation 2 and 3, our test of whether the introduction of the CRS leads to a reduction of deposits held in offshore countries, can be found in Columns 1 to 3 of Table 3. Column 1 refers to the post CRS period specified as the CRS introduction measured at the country level, Column 2 to CRS effectiveness measured again at country level and Column 3 to the period after the first CRS adoption wave not measured at the country level. Our coefficient of interest is the interaction term of the offshore variable and the respective Post-CRS dummy. We observe a highly significant 11.9% reduction of cross-border deposits held by residents of the OECD and EU in offshore countries upon the local introduction of the CRS as compared to the change in cross-border deposits in the control countries.

This effect is very similar in terms of size to what Johannesen and Zucman (2014) find in their test of the effect of bilateral information exchange agreements on cross-border deposits in tax havens, and it is more significant here.\textsuperscript{33} On first inspection, the CRS introduction, accordingly, seems to have a similar effect as a bilateral treaty. However, for two reasons this result suggests that the CRS is considerably more effective than previously concluded bilateral treaties. The CRS is introduced on top of bilateral treaties in most of our sample country-pairs, and our sample mainly includes EU member states where also the European Savings Directive was in place. Thus, the information on interest income gained on the majority of the accounts considered in our sample has been already automatically exchanged across EU member states. In Section 4.3.1 below, we run the same regression analysis as above, but we limited our sample to non-EU member states as countries of residence of tax evaders. As expected, then the effect of the CRS is considerably larger.

Based on our main estimate of a 11.9% reduction in cross-border deposits, we provide an intuition for the economic relevance of the CRS. In a given quarter-year, the average amount of cross-border deposits held by all residence countries in our sample in the offshore countries is USD 389 billion. Thus, in our sample, the average amount of deposits is decreased by about USD 46 billion upon CRS implementation. This should be considered a lower bound estimate for three reasons. First, we get access to data on bilateral cross-border deposits located in a representative but limited sub-sample of offshore countries. That is, we base our calculation on

\textsuperscript{33} Johannesen and Zucman (2014) find an 11% decrease.
Table 3: Change in Cross-Border Deposits Upon CRS Introduction & Effectiveness

<table>
<thead>
<tr>
<th>CRS SPECIFICATION</th>
<th>Variables</th>
<th>Country Introduction</th>
<th>Country Effectiveness</th>
<th>First Adoption Wave</th>
<th>First Adoption Wave</th>
<th>First Adoption Wave</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LogDeposits</td>
<td>LogDeposits</td>
<td>LogDeposits</td>
<td>LogDeposits</td>
<td>LogDeposits</td>
<td>LogDeposits</td>
</tr>
<tr>
<td>PostCRS * Offsh</td>
<td>-0.119***</td>
<td>-0.118***</td>
<td>-0.115***</td>
<td>-0.109***</td>
<td>-0.0800</td>
<td>(0.0417)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PostCRS * US</td>
<td>0.109**</td>
<td>0.121**</td>
<td>0.121**</td>
<td>0.121**</td>
<td>0.121**</td>
<td>(0.0504)</td>
</tr>
<tr>
<td>PostCRS * Secrecy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Observations 11,884 11,884 11,884 11,884 11,884
R-squared 0.972 0.972 0.972 0.972 0.972
Country-Pair FE YES YES YES YES YES
Residence-Quarter-Year FE YES YES YES YES YES
Number of Country-Pairs 1051 1051 1051 1051 1051

Notes: 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 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. PostCRS is a dummy, which equals one in the period after the introduction date of the CRS in the deposit location, the effective date of the CRS in the deposit location, or the period of the first wave of information exchange, respectively, depending on the CRS specification reported above the regression results. US is a dummy equal to one when the deposit country j is the United States. Secrecy is a variable indicating the secrecy ranking of the deposit country j in the Financial Secrecy Index 2018 (constant across all periods). All regressions include ordered country-pair and residence country x quarter-year fixed effects.

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1
the residence and offshore countries in our sample. Second, we are only analyzing deposits located in banks. While the CRS affects deposits in a wider range of financial institutions, including for example investment entities and specified insurance companies, and sources of investments other than bank deposits, e.g., equity or bond portfolios. Third, to the extent that the reduction observed is due to the declaration of income rather than relocation, tax evaders do not necessarily need to repatriate all income held in offshores to make a declaration, just the amount needed to pay back taxes and fines (Hakelberg and Schaub, 2018, p. 356). In sum, this implies that a much larger total effect of the CRS on cross-border tax evasion can be expected, based on our findings.

Along with the country-specific CRS introduction dates, we test the country-specific CRS effective dates. The result of the test is reported in Column 2 of Table 3. The results are statistically significant. After the effectiveness of the CRS in the deposit countries, cross-border deposits are on average 11.8% lower in the offshore countries as compared to non-offshore countries. In Column 3 of Table 3, as an alternative specification of the post CRS period and robustness check, we estimate equation 3, where we chose a post-period dummy (PostCRSFirstWave) that is defined as the period after CRS becomes effective for the first wave adopters. It is constant across all observations and not directly related to country-specific CRS implementation. Using this second alternative measure we find a very similar result, that is that in the post-treatment period deposits held in offshore countries are on average 11.5% below those held in the control group countries (see Column 3 of Table 3). The effect is highly significant.

We report the results from our test of whether the introduction of the CRS leads to relocation of deposits to the United States (the estimation of equation 2) in Columns 4 to 5 of Table 3. Column 4 reports regression 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 and OECD residents in the United States significantly increase, on average by 10.9%, 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 United States is USD 551 billion. Given our coefficient estimates, that amount is increased by USD 60 billion upon CRS implementation, which is large enough to assume that a substantial part of cross-border deposits, that after CRS effectiveness were removed from offshore countries (the estimate for our six offshore countries is USD 46 billion), are relocated to the United States.

For a complete list, see OECD (2018c, p. 61).
To investigate more closely the mechanism through which the threat of the CRS works on the relocation of hidden wealth and related income to the United States, we conduct a further test. We add an interaction of the secrecy score number with the post-treatment dummy to control for the secrecy of the deposit country. This is a test of whether, after controlling for the effect of the CRS in offshore countries, cross-border deposits in secrecy countries are affected by the CRS implementation. The United States ranks high in the secrecy index. A statistically significant and positive coefficient of the interaction term would suggest that equally secretive countries to the United States also attract relocated cross-border deposits. This would highlight that relocation does not only occur to the United States. If not – that is, if the coefficient is negative or insignificant – then other secretive locations do not attract deposits after CRS implementation on average. Results support the latter explanation, we find no positively significant coefficient on the interaction with the secrecy variable and the CRS implementation indicator. The coefficient on the United States dummy is almost unchanged. We further investigate the role of other secrecy locations by testing them individually in section 4.3.3.

In Appendix A, we re-run the main tests for offshore countries as well as for the United States but using this time a balanced sample. In this way, we lose around 9% of the observations. Yet, results are entirely in line with the above-presented ones. Furthermore, we show in Appendix C, that our results are directional the same if we extend our sample to the period from 2010 to 2018.

4.3. Robustness Checks
4.3.1. The CRS Effect Net of the European Savings Directive

In our baseline model, the sample of residence countries includes mainly EU member states. However, since 2003 and up to the introduction of the CRS, EU residents were subject to the European Savings Directive. This means that banks were either required to automatically report information on interest income earned by foreign EU households to local tax authorities, who further transmitted the information to the respective home country of the household (as in most EU member states and Guernsey, Isle of Man, Jersey) or a withholding tax of initially 15% - then increased to 20%-35% - was levied on interest income of foreign EU households (as initially in Austria, Luxembourg and most of the tax havens). In order to net out the effect of the European Savings Directive, we re-run our baseline model including as residence countries only OECD member states, which are not EU member states, namely Australia, Canada, Chile, Israel, Iceland, Japan, South Korea, Mexico, New Zealand, Norway, Switzerland, Turkey, and the United States. Results are displayed in Table 4. We observe a highly significant 27.9% reduction of cross-border deposits held by residents of the non-EU OECD member states in offshore countries upon the introduction
Table 4: Non-EU Residents’ Change in Cross-Border Deposits Upon CRS

<table>
<thead>
<tr>
<th>CRS SPECIFICATION</th>
<th>Country Introduction</th>
<th>Country Effectiveness</th>
<th>First Adoption Wave</th>
</tr>
</thead>
<tbody>
<tr>
<td>VARIABLES</td>
<td>LogDeposits</td>
<td>LogDeposits</td>
<td>LogDeposits</td>
</tr>
<tr>
<td>PostCRS * Offsh</td>
<td>-0.279***</td>
<td>-0.277***</td>
<td>-0.325***</td>
</tr>
<tr>
<td></td>
<td>(0.0670)</td>
<td>(0.0694)</td>
<td>(0.0705)</td>
</tr>
<tr>
<td>Observations</td>
<td>3,490</td>
<td>3,490</td>
<td>3,490</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.968</td>
<td>0.968</td>
<td>0.968</td>
</tr>
<tr>
<td>Country-Pair FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Residence-Year FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Number of Country-Pairs</td>
<td>306</td>
<td>306</td>
<td>306</td>
</tr>
</tbody>
</table>

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 ordered country-pair and the sample period goes from the last quarter of 2014 to the third quarter of 2017. Residence countries are Australia, Canada, Chile, Israel, Iceland, Japan, South Korea, Mexico, New Zealand, Norway, Turkey and the United States. Offsh is a dummy taking value one when the deposit location j is an offshore location. PostCRS is an indicator variable, in Column 1, for the period after the implementation date of the CRS in the deposit location, in Column 2, for the effective date of the CRS in the deposit location, and, in Column 3, for the period of the first wave of information exchange, respectively, depending on the CRS specification as reported above the regression results in the table. All regressions include ordered country-pair and residence country x quarter-year fixed effects.

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

As expected, this finding shows that, while the overall effect of the CRS introduction (our preferred specification) on the use of offshores is 11.9%, the reduction in those countries unaffected by the European Savings Directive is much larger. A similar effect is detected when considering the country-specific effective dates (see Column 2 in Table 4). In Column 3 of Table 4, we consider the period after the first CRS adoption wave not measured at the country level, and we find that in the post-treatment period deposits held in offshore countries are on average 32.5% below those held in the control group countries. The effect is highly significant.

4.3.2. Sample Split Test of Relocation to the United States

To corroborate the robustness of our finding that the United States receives an increasing amount of cross-border deposits upon CRS implementation, we conduct a split sample analysis. We test relocation behavior to the United States only on the subsample of country-pairs where the deposit country is the United States, i.e., from our sample we drop all other observations for which deposits are held in non-U.S. deposit countries. The difference-in-difference regression design thus becomes a time trend test of deposits located in the United States, where we compare the change in de-
posits located within the United States 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 a placebo test, we investigate the reaction to CRS effectiveness in non-offshore to non-offshore deposits. \(^{35}\) We add ordered country-pair fixed effects in both, the main test and the placebo test. Results are displayed in Table 5.

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>Deposits in U.S.</th>
<th>Deposits in Non-Offshores &amp; Non-U.S.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PostCRS</td>
<td>0.158***</td>
<td>0.0430</td>
</tr>
<tr>
<td></td>
<td>(0.0381)</td>
<td>(0.0286)</td>
</tr>
<tr>
<td>Observations</td>
<td>480</td>
<td>8,248</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.989</td>
<td>0.965</td>
</tr>
<tr>
<td>Country-Pair FE</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Residence-Quarter-Year FE</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Number of Country-Pairs</td>
<td>40</td>
<td>746</td>
</tr>
</tbody>
</table>

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 ordered country-pair and the sample period goes from the last quarter of 2014 to the third quarter of 2017. PostCRS is a dummy equal to one starting in the period of the first wave of information exchange. The fixed effects used are reported in the table.

Robust standard errors in parentheses

\ *** p < 0.01, ** p < 0.05, * p < 0.1

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 United States. In Column 2 of Table 5, the placebo test underscores that, as we expect, no statistically significant change in non-offshore to non-offshore deposits occurs after CRS effectiveness.

4.3.3. Alternative Attractive Countries for Relocation

To further rule out that other countries exhibiting high secrecy have become attractive places of relocation after CRS introduction in offshore countries, we test what happens in other potentially attractive countries after CRS effectiveness. To make results comparable to our test of relocation to the United States, we employ the same research design. As potentially equally attractive secrecy locations, we consider countries listed among the

\(^{35}\) In that placebo test, we exclude the United States as residence country because changes in cross-border deposits from the United States 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 United States to non-offshore countries in additional tests in Section 5 below.
Table 6: Relocation of Cross-Border Deposits to the United States vs. Alternative Countries

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PostCRS * Offsh</td>
<td>-0.109*** (0.0416)</td>
<td>-0.139*** (0.0439)</td>
<td>-0.111*** (0.0344)</td>
<td>-0.122*** (0.0443)</td>
<td>-0.122*** (0.0445)</td>
</tr>
<tr>
<td>PostCRS * US</td>
<td>0.109** (0.0504)</td>
<td>0.00524 (0.0628)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PostCRS * LU</td>
<td></td>
<td></td>
<td>-0.137 (0.156)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PostCRS * GG</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-0.0823 (0.0600)</td>
</tr>
<tr>
<td>PostCRS * HK</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-0.0796 (0.0543)</td>
</tr>
<tr>
<td>PostCRS * CH</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Observations 11,884 11,884 11,884 11,884 11,884
R-squared 0.972 0.972 0.972 0.972 0.972
Country-Pair FE YES YES YES YES YES
Residence-Quarter-Year FE YES YES YES YES YES
Number of Country-Pairs 1051 1051 1051 1051 1051

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 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. PostCRS is a dummy equal to one starting in the period of the first wave of information exchange. US, LU, GG, HK, CH is a dummy equal one when the deposit country j is the United States, Luxembourg, Guernsey, Hong Kong, or Switzerland, respectively. All regressions include ordered country-pair and residence country x quarter-year fixed effects.

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

ten secrecy locations in the Financial Secrecy Index ranking. Next to the United States, we have data on Switzerland, Luxembourg, Guernsey, and Hong Kong. In contrast to the United States, they all implemented the CRS, and they are part of our offshore countries sample. We rerun our main test of relocation to the United States replacing the US-dummy with a dummy for Luxembourg, Guernsey, Hong Kong, and Switzerland respectively. We control for the reaction to the CRS in the respective other offshore countries with an interaction of the CRS treatment dummy (PostCRS) and offshore dummy (Offsh), e.g., when testing for the effect in Luxembourg, the reaction in all other offshore countries is controlled for with this interaction term.

As expected, in none of the alternative countries tested we observe a statistically significant increase in cross-border deposits (see Table 6). Of all high secrecy locations in our sample, the United States is, therefore, the only country for which we observe on average a statistically significant increase in cross-border deposits after CRS effectiveness as compared to the other non-offshore countries.
4.3.4. Placebo Test of the CRS Introduction Effect in Residence Countries

In our main test, we assume 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:

$$log(Deposits_{ijt}) = \alpha + \beta_1 PostCRSDepL_{it} + \beta_2 PostCRSDepL_{it} \times Offsh_j + \beta_3 PostCRSResL_{jt} + \beta_4 PostCRSResL_{jt} \times Offsh_j + \gamma_{it} + \delta_{ij} + \epsilon_{ijt}$$  \hspace{1cm} (6)

Where the dependent variable $log(Deposits_{ijt})$ 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 the treatment dummy taking value one when the deposit country is an offshore country.\textsuperscript{36} We are interested in comparing the two post-treatment period dummies, i.e., $PostCRSDepL_{it}$ and $PostCRSResL_{jt}$. They switch on after CRS implementation and stay switched on until the end of the sample period. $PostCRSDepL_{it}$ denotes the introduction of the CRS in the deposit country, and $PostCRSResL_{jt}$ denotes the introduction of the CRS in the residence 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 to test the effect of the CRS implementation in the residence country. Coefficient $\beta_2$ captures the effect of the CRS implementation in the deposit country on offshore deposits, and coefficient $\beta_4$ captures the effect of the CRS implementation in the residence country on offshore deposits. We expect $\beta_2$ to be negative and significant and $\beta_4$ to be insignificant. This is what we find in Table 7. 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.

5. The Use of Shell Companies in the Post-CRS Era

So far, we only address tax evaders who hold offshore bank accounts in their 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

\textsuperscript{36}Since the treatment dummy is perfectly multicollinear with our country-pair fixed effects, we do not include it as non-interacted term.
Table 7: CRS’s Effect of Introduction in Residence vs. Deposits Country

<table>
<thead>
<tr>
<th></th>
<th>Estimate</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>PostCRSDepL * Offsh</td>
<td>-0.126***</td>
<td>(0.0385)</td>
</tr>
<tr>
<td>PostCRSResL * Offsh</td>
<td>0.0148</td>
<td>(0.0473)</td>
</tr>
</tbody>
</table>

Observations 11,884
R-squared 0.970
Country-Pair FE YES
Quarter-Year FE YES
Number of Country-Pairs 1051

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 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. PostCRSResL is a dummy equal to one after the CRS is introduced in the residents country, and PostCRSDepL is a dummy equal to one after the CRS is introduced in the deposits country. All regressions include ordered country-pair and residence country x quarter-year fixed effects.

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

through that company (a so-called shell company) 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 detect 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. 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. We first study the reaction by tax evaders to the CRS by testing for decreases in deposits held by residents of offshore countries in other offshore countries. Secondly we test whether the CRS effect leads to a relocation to the United States of cross-border deposits held through shell companies. Lastly, we test for the increasing relevance of the United States as a location for shell companies. For these analyses, we maintain the same sample of deposit countries, but we are able to extend our sample to 18 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, the Isle of Man, Jersey, Lebanon, Macau,
Mauritius, Panama, Samoa and Singapore in Guernsey, Hong Kong, the Isle of Man, Jersey, Luxembourg and Switzerland.  

Table 8: Change in Cross-Border Deposits held by Shell Companies After CRS

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>(1) Offshore to Offshore LogDeposits</th>
<th>(2) Offshore to US LogDeposits</th>
<th>(3) US to Non-Offshore LogDeposits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PostCRS</td>
<td>-0.109** (0.0453)</td>
<td>0.177*** (0.0456)</td>
<td>0.227* (0.127)</td>
</tr>
<tr>
<td>Observations</td>
<td>1,338</td>
<td>208</td>
<td>246</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.975</td>
<td>0.985</td>
<td>0.963</td>
</tr>
<tr>
<td>Country-Pair FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
</tbody>
</table>

Notes: Standard errors in parentheses. In case of column 1, where there are more than 40 country-pairs in the sample, 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 ordered 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 offshore countries as residence and deposit country. In Column 2, the sample is restricted to offshore countries as residence country and the United States as deposit country. In Column 3, the sample is restricted to the United States 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. PostCRS is a dummy equal to one starting in the period of the first wave of information exchange. All regressions include ordered country-pair fixed effects.

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, we restrict the sample 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:

$$\log(DE\text{posits}_{off,off,t}) = \alpha + \beta_1 PostCRSFirstWave_t + \theta_{off,off} + \epsilon_{off,off,t}$$

(7)

All variables are defined as above. We add ordered country-pair as well as cluster-robust standard errors at the ordered country-pair level. $\beta_1$ 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

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37 We select all countries listed as offshore countries at the BIS.
institutions are required to identify the controlling person(s) in 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 shell companies located in a traditional offshore country may still represent a 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 about 10% in our sample after the CRS is effective in the first wave adopters, which indicates that the overall use of offshore shell companies in this constellation decreased as a reaction to the CRS (see Table 8 Column 1). Based on average deposits held through the 18 offshore countries in our sample in Guernsey, the Isle of Man, Jersey, Luxembourg and Switzerland, this is equivalent to a reduction of about USD 17 billion.

Secondly, we test whether offshore shell companies increased cross-border deposits in the United States after the CRS introduction. We restrict the sample to offshore residence countries and the United States as deposit country. We then regress these offshore-to-U.S. deposits on the post CRS dummy. The regression takes the form:

$$\log(\text{Deposits}_{off,US,t}) = \alpha + \beta_1 \text{PostCRSFirstWave}_t + \theta_{off,US} + \epsilon_{off,US,t} \quad (8)$$

All variables are defined as above. $\beta_1$ is the coefficient of interest, which we expect to be positive and significantly different from zero. We employ ordered country-pair fixed effects. We find an increase of about 18% of deposits held in the United States by offshore residents after the CRS is effective in the first wave adopters (see Table 8 Column 2). Based on average deposits held through the 18 offshore countries in our sample in the United States, this effect is equivalent to an increase of USD 48 billion.

In our last tests, we investigate the role of the United States as a location for shell companies. As Sharman (2010) and Findley et al. (2015) show, not only traditional offshore countries but also the United States 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 set up shell companies in the United States. Furthermore, through those entities, they may hold local as well as international deposits in non-offshore countries, since wealthy individuals may both be unwilling to accumulate all their capital in one single country and present a home-bias investment attitude.
(Coeurdacier and Rey, 2012). Therefore, one can presume tax evaders to own also deposits located outside the United States indirectly via U.S. shell companies. This would represent a similar round-tripping strategy as the one detected 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 United States and through that entity hold deposits in a German bank account.

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:

\[
\log(\text{Deposits}_{US,\text{Non-Off},t}) = \alpha + \beta_1 \text{PostCRS}\text{FirstWave}_t + \theta_{US,\text{Non-Off}} + \epsilon_{US,\text{Non-Off},t} \quad (9)
\]

All variables are defined as above. We add ordered country-pair fixed effects as well as cluster-robust standard errors at the ordered country-pair level. Results suggest an increase of about 23% of deposits held by U.S. residents in non-offshore countries after the CRS is effective in the first wave CRS adopters (see Table 8 Column 3). Based on average deposits held by U.S. residents in the non-offshore countries in our sample this is equivalent to a USD 187 billion increase. 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 United States for tax evasion by non-U.S. residents following the CRS implementation.

6. Conclusion

In this study, we analyze the impact of the implementation of the CRS, an unprecedented standard for the automatic exchange of information, on cross-border tax evasion. We document a statistically significant decrease of cross-border deposits ranging from 11.8% (held by residents of non-offshore countries) to 22.8% (held by residents of offshore countries) in major off-shore countries around the world upon the local implementation of the CRS. Moreover, we do not find that the CRS truly puts an end to cross-border tax evasion, instead we document a change in the dynamics of cross-border tax evasion.

We add to the prior literature by providing first evidence that an unexpected country seems to attract wealth and related income for the purpose of tax evasion, i.e., the United States. The United States represent the only major economy that so far did not commit to the CRS. In this analysis, we show that cross-border deposits in the United States increase upon CRS implementation between 10.9% (held by residents of non-offshore countries)
to 46.8% (held by residents of offshore countries). 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 and by conducting event study analyses. Second, we implement a demanding fixed effects structure going beyond that used in much of prior research. Adding residence country x quarter-year fixed effects enables us to control for residence country-specific demand-side shocks to cross-border deposits. Third, we limit our analysis to a narrow period (2014-2017) to avoid that other major events may influence our outcomes. Last, we test the robustness of our results in alternative samples (e.g., split sample and alternative relocation countries).

We believe that our study contributes substantially to the current international debate on cross-border tax evasion. A key finding is that the CRS leads to a reduction of deposits in traditional offshore countries of USD 46 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 United States 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, cryptocurrency.

References


Goulder, R., 2019. The blacklist game: Should the EU label the United States a tax haven? Tax Notes International 93, 135-139.


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 A.9 we show that results are essentially unchanged. Cross-border deposits of OECD and EU residents in offshore countries experience a 12.2% reduction after CRS introduction and a 12.9% 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 and 2 Table A.9). Relative to all other non-offshore deposit countries in our sample an increase of 9.5% in deposits in the United States held by EU and OECD residents is detected after CRS effectiveness in the first wave adopters (see Column 2 of Table A.9). Thus, we can rule out that our tests suffer from selection bias due to unbalanced sampling.
Table A.9: Balanced Sample, Change in Cross-Border Deposits After CRS

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>(1) Country Introduction</th>
<th>(2) First Adoption Wave</th>
<th>(3) First Adoption Wave</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LogDeposits</td>
<td>LogDeposits</td>
<td>LogDeposits</td>
</tr>
<tr>
<td>PostCRS* Offsh</td>
<td>-0.122*** (0.0410)</td>
<td>-0.129*** (0.0401)</td>
<td>-0.123*** (0.0411)</td>
</tr>
<tr>
<td>PostCRS * US</td>
<td></td>
<td></td>
<td>0.0052* (0.0067)</td>
</tr>
<tr>
<td>Observations</td>
<td>10,968</td>
<td>10,968</td>
<td>10,968</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.973</td>
<td>0.973</td>
<td>0.973</td>
</tr>
<tr>
<td>Country-Pair FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Residence-Quarter-Year FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Number of Country-Pairs</td>
<td>914</td>
<td>914</td>
<td>914</td>
</tr>
</tbody>
</table>

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 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. PostCRS is an indicator variable, in Column 1, for the period after the introduction date of the CRS in the deposit location and, in Column 2 and 3, for the period of the first wave of information exchange. US is a dummy equal to one when the deposit country j is the United States. All regressions include ordered country-pair and residence country x quarter-year fixed effects.

Appendix B. Reduced Control Group

Table B.10: Reduced Control Group, Change in Cross-Border Deposits After CRS

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>(1) Country Introduction</th>
<th>(2) First Adoption Wave</th>
<th>(3) First Adoption Wave</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LogDeposits</td>
<td>LogDeposits</td>
<td>LogDeposits</td>
</tr>
<tr>
<td>PostCRS * Offsh</td>
<td>-0.115** (0.0467)</td>
<td>-0.121*** (0.0453)</td>
<td>-0.114** (0.0463)</td>
</tr>
<tr>
<td>PostCRS * US</td>
<td></td>
<td></td>
<td>0.113** (0.0516)</td>
</tr>
<tr>
<td>Observations</td>
<td>10,967</td>
<td>10,967</td>
<td>10,967</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.971</td>
<td>0.971</td>
<td>0.971</td>
</tr>
<tr>
<td>Country-Pair FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Residence-Quarter-Year FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Number of Country-Pairs</td>
<td>974</td>
<td>974</td>
<td>974</td>
</tr>
</tbody>
</table>

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 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. PostCRS is an indicator variable, in Column 1, for the period after the introduction date of the CRS in the deposit location and, in Column 2 and 3, for the period of the first wave of information exchange, respectively depending on the CRS specification as reported above the regression results in the table. US is a dummy equal to one when the deposit country j is the United States. All regressions include ordered country-pair and residence country x quarter-year fixed effects.

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
One concern with our choice of the control group might be that concurrent changes in the depository countries may 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.\textsuperscript{38} 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.\textsuperscript{39} To rule out that the effects, which we measure, are influenced by these countries financial turmoil, we rerun our main tests in Table B.10 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.

### Appendix C. Extended Sample

#### Table C.11: Extended Sample, Change in Cross-Border Deposits After CRS

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PostCRS * Offsh</td>
<td>Log VLD</td>
<td>Log VLD</td>
<td>Log VLD</td>
</tr>
<tr>
<td></td>
<td>-0.311***</td>
<td>-0.246***</td>
<td>-0.228***</td>
</tr>
<tr>
<td></td>
<td>(0.0536)</td>
<td>(0.0525)</td>
<td>(0.0536)</td>
</tr>
<tr>
<td>PostCRS * US</td>
<td>0.293***</td>
<td>0.293***</td>
<td>0.293***</td>
</tr>
<tr>
<td></td>
<td>(0.0808)</td>
<td>(0.0808)</td>
<td>(0.0808)</td>
</tr>
<tr>
<td>Observations</td>
<td>29,823</td>
<td>29,823</td>
<td>29,823</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.944</td>
<td>0.943</td>
<td>0.943</td>
</tr>
<tr>
<td>Country-Pair FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Residence-Quarter-Year FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Number of Country-Pairs</td>
<td>1066</td>
<td>1066</td>
<td>1066</td>
</tr>
</tbody>
</table>

*Notes: 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 ordered country-pair and the sample period goes from the first quarter of 2010 to the third quarter of 2018. Offsh is a dummy taking value one when the deposit location j is an offshore location. PostCRS is a dummy, which equals one in the period after the introduction date of the CRS in the deposit location or the period of the first wave of information exchange, respectively, depending on the CRS specification reported above the regression results. US is a dummy equal to one when the deposit country j is the United States. All regressions include ordered country-pair and residence country x quarter-year fixed effects.

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

In our main test we restrict the sample to the period from the last quarter of 2014 to the third quarter of 2017, in order to 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 2018 U.S. Tax Cuts and Job Act announced in Fall 2017. For example by including observations before 2014, our results on the CRS effect on cross-border deposits from offshore countries to the United States would be downward biased, due to the 2010 FATCA implementation. While if we include observations after 2017, our results on the CRS effect on cross-border deposits from non-offshore countries and from offshore countries to the United States could be upward biased, due to the economic effects of the 2018 U.S. Tax Cuts and Job Act. Nevertheless, we test here how our results change if we extend our sample. Now our period ranges from the first quarter of 2010 to the third quarter of 2018 (the last available period). We report in Table C.11 our main regressions, which we run now on the extended sample. The direction of the effects is unchanged, however, the effect sizes increase. This may be due to the fact, that we now also capture some of the effect of the introduction of bilateral treaties and FATCA in our pre-period. In Table C.11 we report the results of our test on the use of shell companies in this extended sample. In the first two columns we report results which – although slightly larger in magnitude – are very similar to our results from our main sample. Results in Column 3 of Table C.11, are insignificant in the extended sample. This may be because, the effect of the CRS is compensated by the effect of the Tax Cuts and Job Act 2018.

\footnote{The BIS data includes, both, individual and entity cross-border deposits. Entity cross-border deposits held in the United States may increase in response to the tax changes induced by the Tax Cuts and Job Act 2018. Heinemann et al. (2018) findings point to an increase in total FDI activity as a result of the lowered tax burden in the United States.}
Table C.12: Extended Sample, Shell Company Tests

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>(1) Offshore to Offshore LogDeposits</th>
<th>(2) Offshore to US LogDeposits</th>
<th>(3) US to Non-Offshore LogDeposits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PostCRS</td>
<td>-0.245***</td>
<td>0.518**</td>
<td>-0.00607</td>
</tr>
<tr>
<td></td>
<td>(0.0884)</td>
<td>(0.234)</td>
<td>(0.375)</td>
</tr>
<tr>
<td>Observations</td>
<td>7,426</td>
<td>503</td>
<td>622</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.962</td>
<td>0.978</td>
<td>0.903</td>
</tr>
<tr>
<td>Country-Pair FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Quarter-Year FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Number of Countrypairs</td>
<td>244</td>
<td>16</td>
<td>21</td>
</tr>
</tbody>
</table>

Notes: Standard errors in parentheses. In case of column 1, where there are more than 40 country-pairs in the sample, 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 ordered country-pair and the sample period goes from the first quarter of 2010 to the third quarter of 2018. In Column 1, the sample is restricted to offshore countries as residence and deposit country. In Column 2, the sample is restricted to offshore countries as residence country and the United States as deposit country. In Column 3, the sample is restricted to the United States 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. PostCRS is a dummy equal to one starting in the period of the first wave of information exchange. All regressions include ordered country-pair and residence country x quarter-year fixed effects.

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1
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