Lost in Information: National Implementation of Global Tax Agreements

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DISCUSSION PAPER

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Lost in Information: National Implementation of Global Tax Agreements*

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Abstract

We study how national implementation of global tax agreements shape their effectiveness by focusing on the multilateral agreement on automatic information exchange on financial assets, the Common Reporting Standard (CRS). We create a new database on country-level enforcement which we combine with 1) micro-level data on cross-border bank transfers to Norway with unparalleled detail on hidden ownership structures and 2) macro-level data on cross-border bank deposits. Cash repatriation from tax havens increases significantly post-CRS implementation, but only from countries with high enforcement levels. A highly digitized tax administration triggers twice the drop in tax haven deposits compared to paper-based systems.

JEL classification: H26, G21, F42

Keywords: Global Tax Agreements, Tax Evasion, Financial Flows, Tax Enforcement

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1 Introduction

Global challenges require global policies and coordination, often in the form of multilateral agreements. From climate change to sanction enforcement and tax evasion, governments mandate supra-national regulators to design multilateral responses. In the context of international taxation, policymakers have made substantial progress along these lines. In an unparalleled display of international coordination, more than 100 countries agreed to a Common Reporting Standard (CRS), under which they bi-laterally and automatically exchange information on financial assets to the beneficial owners' respective home countries. Such private ownership of offshore financial assets is substantial and stable over time, corresponding to around 11% of world GDP, of which only 10% was duly reported to the home tax administrations pre-CRS (Zucman, 2013; Alstadsæter et al., 2018, 2019a; Faye and Zucman, 2023). Evidence from the US, Scandinavia, Columbia, Argentina, the Netherlands, and Switzerland show that offshore assets are concentrated at the top of the income and wealth distributions.[1] Through increased transparency across borders, the CRS aims at reducing the possibility of keeping secret bank accounts abroad, that is, discouraging tax evasion and relatedly money laundering. However, little is known about the effects of this increased transparency.

In this study, we introduce novel data sources and empirical strategies to establish whether and, more importantly, under what circumstances, the CRS worked. We thus provide useful takeaways for implementing global agreements in other areas. Pre CRS, offshore tax evasion often relied on hiding financial assets through several layers of ownership in tax havens. Our results show that the CRS effect on these assets varies dramatically with the level of enforcement in the CRS information-sending country. Results range from a 73% increase in potentially legalized tax haven transfers to a null result if CRS enforcement is weak. Turning to the countries receiving CRS information, a highly digitized tax administration triggers twice the drop in tax haven deposits, compared to a tax administration relying on paper tax returns. This previously overlooked heterogeneity in CRS enforcement on both sides of the information exchange explains the mixed results in the literature.

While the automatic exchange of information goes well beyond previous and largely unsuccessful information on request treaties, results on CRS effectiveness have been mixed. Initial reactions mirrored information on request treaties (Menkhoff and Miethe, 2019; Casi et al., 2020), yet significant loopholes exist and are exploited. These include the United States being a nonparticipating jurisdiction (Casi et al., 2020) but also citizenship by investment programs (Langenmayr and Zyska, 2023) and assets that are not covered by the CRS, such as real estate (Bomare and Herry, 2022). Yet some studies do, however, show effectiveness (O'Reilly et al., 2019), especially in conjunction with amnesties (Baselgia, 2023; Londoño Vélez and Tortarolo, 2022).

[1] see Guyton et al. (2021); Johannesen et al. (2023); Alstadsæter et al. (2019a); Londoño-Vélez and Ávila-Mahecha (2021); Londoño Vélez and Tortarolo (2022); Leenders et al. (2023); Baselgia (2023).

Previous work has analyzed the CRS as a binary event in which countries participate or not. This is a reasonable starting point since it is based on a standardized global agreement designed by one institution, the OECD. Yet countries have degrees of freedom when introducing the CRS nationally. Information-sending countries need to translate the international agreement into their respective national legal systems, train their financial institutions to report the correct data, and monitor and sanction them if they do not. Tax havens can thus send CRS-related data with very different informational values.[2] We create a new dataset building on cross-country monitoring efforts that captures these implementation differences. A second channel of heterogeneity is the capacity of the tax administrations receiving the CRS information. They differ in their willingness, prioritization, and resources.[3] We create a new dataset codifying a large survey on tax administration characteristics to analyze this heterogeneity in the receivers. Both of these dimensions, the sending and receiving characteristics, directly affect the perceived probability of detection and thus compliance (Allingham and Sandmo, 1972). International tax evaders, who concentrate in the top 0.01% of the income distribution (Alstadsæter et al., 2019a), can be expected to employ financial service providers who will be aware of these national enforcement differences.

Despite the secretive nature of tax evasion, it is possible to study enforcement heterogeneity across tax haven-sending countries. We combine our hand-coded CRS enforcement dataset with a unique daily transaction-level dataset that covers all cross-border bank transfers into Norwegian bank accounts for the implementation period of the CRS (2014-2018). The transaction-level data enables us to overcome a critical limitation in the literature so far, namely the inability to look through ownership chains structured through several tax havens. These chains, for example, a Panamanian shell company owning a Swiss bank account, have been the preferred structure for evading earlier regulation attempts (documented in Johannesen and Zucman, 2014; Johannesen, 2014; Menkhoff and Miethe, 2019). After CRS introduction, an ownership chain can be exposed, as the bank must report the ultimate ownership of an account. The Norwegian bank transfer data includes information on the direct owner of that Swiss bank account wiring funds to Norway, be it domestic in Switzerland, held from the United States, or in Panama. For the first time, we therefore can study such CRS-exposed accounts explicitly for 41 tax havens.

Using event studies with staggered adoption and binned endpoints, we document a substantial increase in transfers from CRS-exposed accounts with the start of CRS data collection. We compare these developments to a falsification group of transfers from tax haven bank accounts that are owned domestically, where we find no reactions. This approach controls for event time trends in affected tax havens beyond the global calendar time trend. The average CRS reaction hides

[2]For an overview of the heterogeneity of CRS national implementation, see (Casi et al., 2019). The OECD has also monitored the CRS national implementation over the past years. See the results of the assessment here: https://www.oecd.org/publications/peer-review-of-the-automatic-exchange-of-financial-account-information-2022-36e7cded-en.htm.

[3]See Slemrod (2019) for an overview of the tax enforcement literature.

substantial heterogeneity, depending on the CRS enforcement level of the tax haven. Transfers of CRS-exposed accounts in tax havens with strong local enforcement to Norway increase by up to 73%. Where local enforcement is weak, we document no response to CRS activation, a striking null result.

Even if all information was sent accurately, as intended by the CRS, a threat of detection is only credible if the receiving country's tax administration is expected to use the pertinent information. However, tax administrations differ in effectiveness. This can be due to differing levels of digitization, resources, staffing, employee experience, auditing levels, priorities, and many other dimensions. Well-informed tax evaders or their financial service providers are likely aware of these differences. Using Norwegian data to study information-sending countries' CRS enforcement allows us to keep receiving country characteristics fixed at a high tax authority capacity level.

To vary the receiving country's tax authority capacity, we turn to a global sample of macroeconomic data on bilateral bank deposits from the Bank for International Settlements (BIS). We compare deposits of receiving countries that activate the CRS in tax havens to deposits in non-havens and bilateral nodes that have not activated the CRS. Our identification builds on and goes beyond the previous literature (Andersen et al., 2022). Beyond a dynamic global calendar time trend, we pin down three dynamic event time trends around CRS activation, that is, a tax haven trend, a non-haven trend, and an EU trend, to capture the numerous EU directives aimed at information exchange. This creates a control group of both non-activating country pairs and deposit developments outside of tax havens, which are important to account for the global financial cycle adequately.

Our baseline estimate of the average response to CRS activation indicates a 26% decrease in tax haven deposits. To study receiving country heterogeneity, we dissect this effect, comparing, for example, the reaction of French deposits in tax havens to that of Norwegian deposits in tax havens. Based on our novel dataset of tax administration characteristics, we then correlate these receiving country-specific coefficients across many different tax administration characteristics and standard macroeconomic variables. We employ model averaging techniques to identify the most robust correlations. This methodology identifies the level of digitization as most robustly correlated with strong CRS effects, even more so than tax administrations' overall resources. We confirm this by differentiating countries along this dimension in staggered adoption event studies. We document that highly digitized receivers experience almost twice the drop in tax haven deposits, compared to receivers that are not as digitized. This comports with a lower threat of detection for tax evaders who are aware of the limited capacity on the side of their tax administration that receives CRS reports.

We probe the credibility of our results with several robustness tests: dropping each country in turn, changing the control group, excluding high GDP countries, or excluding conduit countries. We acknowledge as the main limitation of our study that CRS enforcement is not exogenously

assigned: resource-rich countries, in particular, should have greater enforcement capacity. But with the latter two exclusion tests, we demonstrate that resource-rich countries do not drive our results.

The CRS is an ambitious global agreement with the potential to reach its declared goal. We show that its success varies drastically with local implementation. Depending on tax haven implementation, our results range from stronger effects than previously thought to a null result. If the receiving country is not expected to make good use of the information transmitted, effects drop by almost half. This shows that, even in the presence of a multilateral standard, an inter-country peer review process, and high salience for policymakers, governments can unilaterally undermine global agreements. These results have implications for international cooperation on environmental policy, sanction enforcement, trade policy, tax policy at the UN level, or any agreement balancing global and national policy goals. Our study can serve as a useful blueprint for the design and analysis of such agreements.

Overall this paper contributes to the understanding of which elements make global agreements work best. In this way, we contribute to the literature studying behavioral responses to global policies in the context of climate change (see for example Nordhaus, 2015; Esty, 2008; Roelfsema et al., 2020), sanctions (see for example Drezner, 2000; Elliott and Hufbauer, 1999; Neuenkirch and Neumeier, 2015), and taxation (see the literature reviews from Beer et al., 2020; Hoopes et al., 2023; De Simone and Stomberg, 2023). Most directly our findings relate to previous work showing mixed results for the CRS effectiveness in reducing offshore tax evasion (Menkhoff and Miethe, 2019; Casi et al., 2020; Langenmayr and Zyska, 2023; Bomare and Herry, 2022; O'Reilly et al., 2019; Baselgia, 2023; Londoño Vélez and Tortarolo, 2022). We go beyond aggregated average effects and show that substantial differences in local CRS implementation exist and can shape the effectiveness of the agreement at the national level.

The rest of the paper is organized as follows. Section 2 introduces the institutional setting. Section 3 introduces the transaction data, the macroeconomic stock dataset, and our newly collected institutional datasets on enforcement stringency and tax administration. Section 4 outlines our empirical improvements together with the results. Section 5 concludes.

2 Institutional Background

The prevailing policy tool to increase the threat of detection in the context of cross-border tax evasion is international information exchange (Dharmapala, 2016). Administrative cooperation across countries using information exchange agreements has existed for a long time, but 1998 represents the most crucial year on the early route toward international tax transparency. In that year, an OECD report on harmful tax competition triggered an international debate, which culminated in the launch of a comprehensive model for tax information exchange agreements (TIEA)

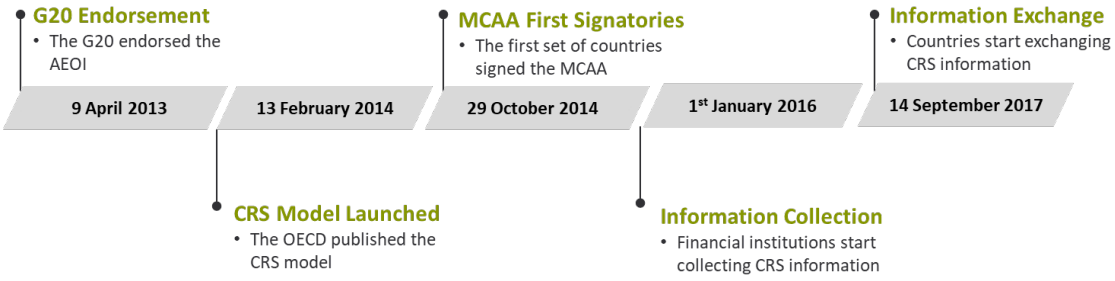
(Christensen III and Tirard, 2016).

Overall empirical evidence suggests that tax evaders' reactions to these early TIEAs were short-lived (Menkhoff and Miethe, 2019) and that new channels and locations for circumventing information exchange on financial assets exist (Huizinga and Nicodème, 2004; Johannesen and Zucman, 2014). Similarly, the introduction in 2003 of the first multilateral approach for the automatic exchange of information on interest income, via the European Savings Directive (Directive 2003/48/EC), did not end cross-border tax evasion in the European Union. Instead tax evaders relocated their deposits to non-EU tax havens (Johannesen and Zucman, 2014; Caruana-Galizia and Caruana-Galizia, 2016; Martínez-Toledano and Roussille, 2023).

In 2010, the United States was the first country to develop a standard for the automatic exchange of information covering a broad set of financial assets. By introducing the Foreign Account Tax Compliance Act (FATCA), the United States introduced a system forcing foreign financial institutions to collect and transfer information on financial assets owned by U.S. citizens to the U.S. Internal Revenue Service (De Simone et al., 2020). OECD member states reacted by demanding the same information on their residents. On 21 July 2014, the OECD published the final version of its global standard for automatic information exchange, the so-called CRS. In this study, we focus on the CRS, given its global dimension.

Currently, around 120 countries have committed to the introduction of the CRS.[4] Most countries have already passed a national law implementing the agreement locally and have started exchanging information, which takes place in September of each year.[5] In Figure 1, we provide an overview of the key events around CRS implementation. As of 2022, the CRS comprises 4,900 bilateral relationships, and, according to the OECD, members reported 47 million offshore accounts with a total value of around EUR 4.9 trillion.[6]

Figure 1: CRS Timeline of Events



The CRS has certain key features that make it substantially different from any prior initia-

[4]For a list of all countries, see the OECD report available at https://www.oecd.org/tax/exchange-of-tax-information/crs-mcaa-signatories.pdf.

[5]In appendix A.1, we provide a detailed overview of the legislative steps to become a CRS participating jurisdiction.

[6]For all statistics, see https://web-archive.oecd.org/2019-06-06/522576-implementation-of-tax-transparency-initiative-delivering-concrete-and-impressive-results.htm.

tive in the field of information exchange. First of all, it is multilateral, thus resenbling the EU Savings Directive, but it differs from FATCA and from classical bilateral tax information exchange agreements. In particular, it requires financial institutions to automatically collect detailed account information on nonresident taxpayers if both their jurisdiction and the client's resident jurisdiction have a CRS system in place. Furthermore, participating jurisdictions automatically exchange information with any counterparty that has CRS implemented into national law. In this way, there is no requirement to negotiate treaties on a country-by-country basis. In contrast to normal TIEAs and FATCA, under CRS, financial data are exchanged automatically rather than upon request. Finally, the CRS not only has a larger country coverage than the EU Savings Directive but also a broader scope. Reportable financial institutions need to provide detailed information on accounts held on behalf of nonresident taxpayers, which is not limited to interest income. To summarize, the CRS, with its multilateral approach, broad scope, and extensive country coverage, is the most powerful policy tool launched so far in the field of tax information exchange.

Although the CRS is global, its success lies in how countries introduce it locally, both at the level of the sending as well as receiving countries. In this study, we illuminate how different country characteristics, including local enforcement and tax authority capacity, shape taxpayers' responses to the CRS.

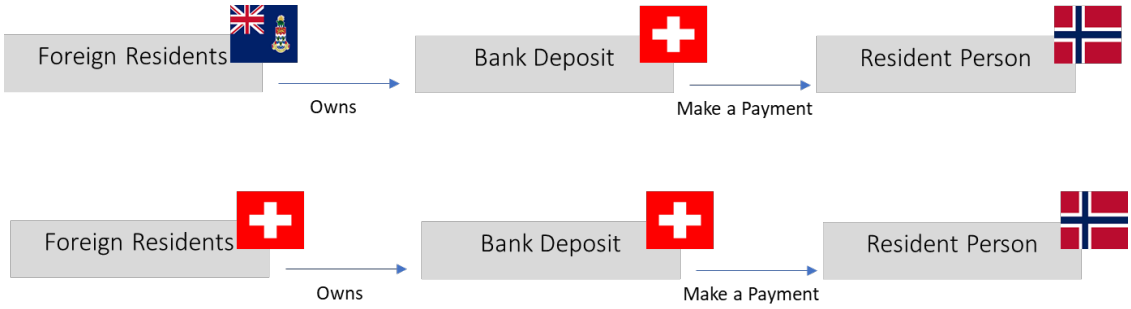
3 Data

3.1 Microdata on cross-border bank transfers - sending country analysis

To study the CRS effectiveness heterogeneity by information-sending countries we use micro-level data. This data comprises real-time daily payments from and to Norway obtained from the Norwegian tax authority's currency register for the period 2010-2018. We can identify the country in which the foreign bank account is located as well as the residence country in which the direct owner of the foreign bank account is located. One unit of observation is the number and value of transfers to Norway from a bank account located in country j, held by an owner located in country z (where j may equal z). For example, we can observe the value of a hypothetical transfer made on January 1, 2010, from a bank account located in Switzerland to a bank account located in Norway, and we can see whether the owner of the Swiss bank account is a resident of Switzerland or another country, as shown in figure 2.

For our analysis, we exclusively consider transfers from tax havens to Norway and compare the change in transfers from bank accounts located in a tax haven where the direct foreign owner is located in a different tax haven (our treated group, which we call *cross-haven transfers*) to the one from bank accounts located in a tax haven where the direct owner is located in the same haven (our control group, which we call *within tax haven transfers*). We have observations from 41 tax

Figure 2: Norwegian Currency Registry - Cross-Border Bank Transfer Data



Note: The figure shows an example of the type of cross-border bank transfers considered in our analysis. For example, in the treated group, we consider a bank transfer from a Swiss bank account to a Norwegian one,where the Swiss account is owned by a resident of the Cayman Islands (i.e., a cross-haven account). At the same, in the control group, we consider a bank transfer from a Swiss bank account to a Norwegian one, where the Swiss account is owned by a resident of Switzerland (i.e., a within-haven account).

havens. For example, we compare a transfer from a bank account in Switzerland that has a direct owner located in the Cayman Islands to a transfer from a bank account in Switzerland that has a direct owner situated in Switzerland. Our treated group exclusively comprises transfers from bank accounts located in tax havens[7] with a direct owner in another tax haven to a Norwegian bank account so as to isolate transfers made through several layers of secrecy involving the use of shell companies.

This transaction level data enables us to overcome three limitations of the data from the Bank for International Settlements (BIS). In the BIS data, only the owner country of the bank account is observable, not transfers. The Norwegian data allows us to observe where funds from havens are directed. Second, the Norwegian bank transfer data enables us to trace the ownership of the foreign bank account and isolate those transfers to Norway through layers of secrecy using shell companies in other havens from owners located in the same haven. Third, in the Norwegian data, we observe increases in transfers to Norway from a haven within individual accounts. In contrast, in the BIS data, we only observe changes to the total stock of deposits held by different counterparty countries in a haven country. This allows us to control for individual country fixed factors. A limitation of the Norwegian data is that it covers mostly Norwegian residents. Therefore we use the BIS macro data in the second part of the analysis to exploit variation in the receiving country, the country of residence of the secrecy seeker, or the tax evader.

Finally, the Norwegian microdata enables us to distinguish between individual and corporate-owned Norwegian bank accounts.[8] The literature suggests that individuals will conduct offshore transactions likely through a holding company. Even beyond Norway, indirect ownership via holding companies offers both nontax and tax advantages, including protecting personal assets from external

[7] The list of tax havens is taken from Johannesen and Zucman (2014) and Gravelle (2015).
[8] At the level of the foreign bank account, we lack any information on the ownership type.

parties, like creditors and family members, and tax-free consumption within a holding company without taking on the economic risks associated with the original company's activities (Alstadsæter et al., 2019b). Norwegian individuals have even stronger incentives to indirectly accumulate income and wealth via holding companies after a 2006 reform that introduced an exemption for capital gains and dividend income when income is corporate-owned.[9] Thus, we exclusively focus on transfers to indirectly owned company accounts, as holding wealth via holding companies is, for the above-stated reasons, common in Norway.

We expect most tax evaders to have no transfer to the respective Norwegian bank account throughout the pre-CRS period but to make transfers as a reaction to the CRS activation.[10] To ensure that we keep individual-level observations for quarters where there is no bank transfer and especially that we do not lose observations where we only have transfers post CRS, we construct a balanced sample by filling every individual-country-pair observation with a zero if no bank transfer occurs in a certain quarter-year for a specific individual-country-pair observation. To make the analysis feasible from a computational point of view, given the size of the final dataset, we exclude very small transfers, which create noise in our data but most likely do not relate to post CRS repatriation. Specifically, we exclude single transfers below NOK 10,000 (approximately USD 1,000) and transfers where the total value across our sample period is below NOK 50,000 (approximately USD 5,000).

3.2 Macro data on cross-border bank deposits - receiving country analysis

To study the CRS effectiveness heterogeneity by information-receiving country we use macro-level data. This macro-level analysis uses the outstanding volume of cross-border deposits in foreign countries, including tax havens, accessible through the Bank for International Settlements Locational Banking Statistics (LBS). The BIS provides bilateral quarterly data on deposits held by individuals and entities that are not residents of the country where the reporting bank is located. For example, we observe the total amount of deposits German residents own in active banks in Switzerland or the total amount of deposits French residents own in active banks in Italy, as shown in Figure 3. Although these data present certain limitations in terms of country coverage and granularity[11], they have a comprehensive coverage within countries that are included in the database and across the world and are therefore widely used in the literature on cross-border tax evasion (Johannesen and Zucman, 2014; Menkhoff and Miethe, 2019; Casi et al., 2020; Langenmayr and

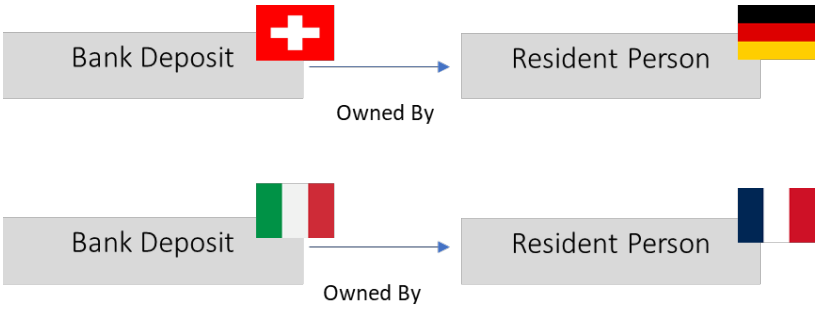
[9] For evidence on the substantial post-2005 increase in indirect ownership among Norwegian residents, see Alstadsæter et al. (2014, 2016, 2019b).

[10] Transfers could be due to one-time repatriations of offshore wealth or repeated declarations of current income streams. Note that although the declaration of CRS-exposed assets might be immediate on CRS activation, we do not expect immediate transfers on the declaration as there is a lag between tax declaration (legalization) and tax payments. Only the latter would require transfers.

[11] For an overview on the limitations, see e.g., Casi et al. (2020).

Zyska, 2023).[12]

Figure 3: Bank for International Settlement - Cross-Border Bank Deposits Data



Note: The figure shows an example of the type of cross-border bank deposits considered in our analysis. For example, in the treated group, we consider bank deposits located in Switzerland (tax haven bank deposit) and owned by a German resident. While in the control group, we consider bank deposits located in Italy (nonhaven bank deposits) and owned by a French resident.

Through the BIS LBS, we get access to bilateral-level data for 29 reporting deposit countries and 212 residence countries. For this analysis, we use all tax haven locations for which data at the bilateral level is publicly available in the BIS LBS dataset. That includes Austria, Belgium, Chile, Cyprus, Guernsey, Hong Kong, Isle of Man, Jersey, Luxembourg, Macau, and Switzerland.[13] As the residence country of the owner of the deposits, we select all countries available in the BIS database. We have a total of 212 residence countries in the sample that we use for our analysis.[14] We limit the sample period to 2014-2018 to exclude possible effects of the introduction of FATCA and the financial crises in the pre-period as well as the global Covid-19 pandemic in the post-period and to have a comparable sample period in both parts of our analysis. (The Norwegian micro data used in the sender analysis is only available until the end of 2018.) All our results are robust to a larger sample period ranging from after the financial crisis in 2009 to before the Covid-19 pandemic in 2019.

3.3 Institutional Data on the CRS and on Tax Authority Capacity

Data on the CRS introduction: For CRS event dates, we rely on the data from Casi et al. (2020), which we update by manually collecting information on the exact CRS effective date at the country level as stated in national laws. The OECD provides on its website links to each CRS national law.[15] When the information is unavailable through the OECD database, we search it using news alerts from the Customer & Investor Tax Transparency (CITT) News Blog by PwC.[16]

[12]For more details on the data, see Table A6.2 from BIS, available at http://stats.bis.org/statx/srs/table/A6.2.
[13]The list of tax havens is taken from Johannesen and Zucman (2014) and Gravelle (2015).
[14]Balancing reduces the number of countries in our sample. We perform our analysis on an unbalanced sample, but results are similar when using a balanced sample.
[15]For more information, see https://www.oecd.org/tax/automatic-exchange/crs-implementation-and-assistance/crs-by-jurisdiction/.
[16]For more information, see https://blogs.pwc.de/en/citt/about-this-blog/.

Data on the CRS enforcement: For detailed institutional information on the local enforcement of the CRS, we use the OECD peer review reports. The OECD global forum issued the first report in 2020, presenting the results of a comprehensive assessment of the domestic and international legal frameworks of each jurisdiction to verify their completeness. The representative of each CRS participating country was asked to evaluate a peer along two main dimensions. The first dimension covers the quality of the domestic legal framework: this meant, for example, a check of whether countries do not exclude risky financial assets in the list of reportable assets or whether the list of reportable financial institutions comports with the OECD model. The second dimension measures the extent to which countries exchange information internationally. In our analysis, we exclusively focus on the former because no substantial variation is reported in the latter category. Specifically, only two countries, St. Maarten and Trinidad and Tobago, score poorly with respect to their international network of information exchange. Thus we use the first dimension, which displays sufficient variation (quality of legal framework) for our analysis.

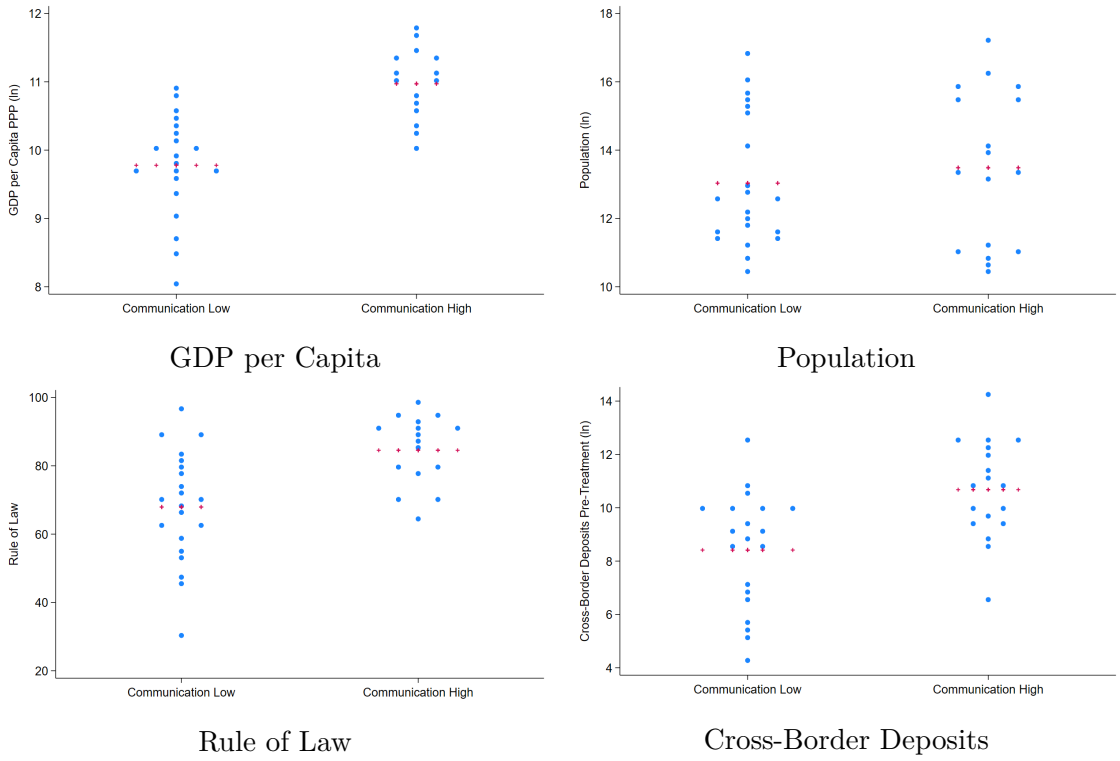
In 2022, the OECD global forum issued a second report presenting the results of a comprehensive assessment of the effectiveness of the CRS implementation in practice, including operational frameworks for financial institutions and information transmission systems. From the peer review reports, we extract the following dimensions of CRS local enforcement: communication effort, reporting verification, quality verification, and issued penalties. The communication effort indicator captures activities like direct regular communication with financial institutions, holding meetings with relevant stakeholders, and dedicated conferences with accountants and auditors.[17] These communication activities occurred around the CRS activation. Reporting verification and quality verification include, for example, detailed analysis of the population of reportable financial institutions, onsite and offsite inspections, desk-based checks to verify the quality of the reported information, and comprehensive reviews.[18] Such activities, as well as possible penalties for noncompliance, occur after the first round of data is collected and sent by the financial institutions to tax authorities. This means that any of the above-mentioned activities occurred around one year after the CRS activation in the respective country. We use the enforcement activity that occurred around CRS activation, communication, and outreach to financial institutions for our analysis based on the CRS activation shock.

Figure 4 shows the relationship of the CRS communication effort indicator with tax haven country characteristics relevant for tax evasion and economic development: GDP per capita, population, a rule of law index, and the stock of cross-border deposits pre-treatment. The figure indicates that

[17] This is an example taken from the case of Norway, see https://www.oecd-ilibrary.org/sites/36e7cded-en/1/3/3/75/index.html?itemId=/content/publication/36e7cded-en&_csp_=3814d1aa5db508be3a9f2af46257d0f4&itemIGO=oecd&itemContentType=book.

[18] This is an example taken from the case of Norway, see https://www.oecd-ilibrary.org/sites/36e7cded-en/1/3/3/75/index.html?itemId=/content/publication/36e7cded-en&_csp_=3814d1aa5db508be3a9f2af46257d0f4&itemIGO=oecd&itemContentType=book.

Figure 4: Sending Country Analysis: Havens' Country Characteristics and CRS Communication Effort

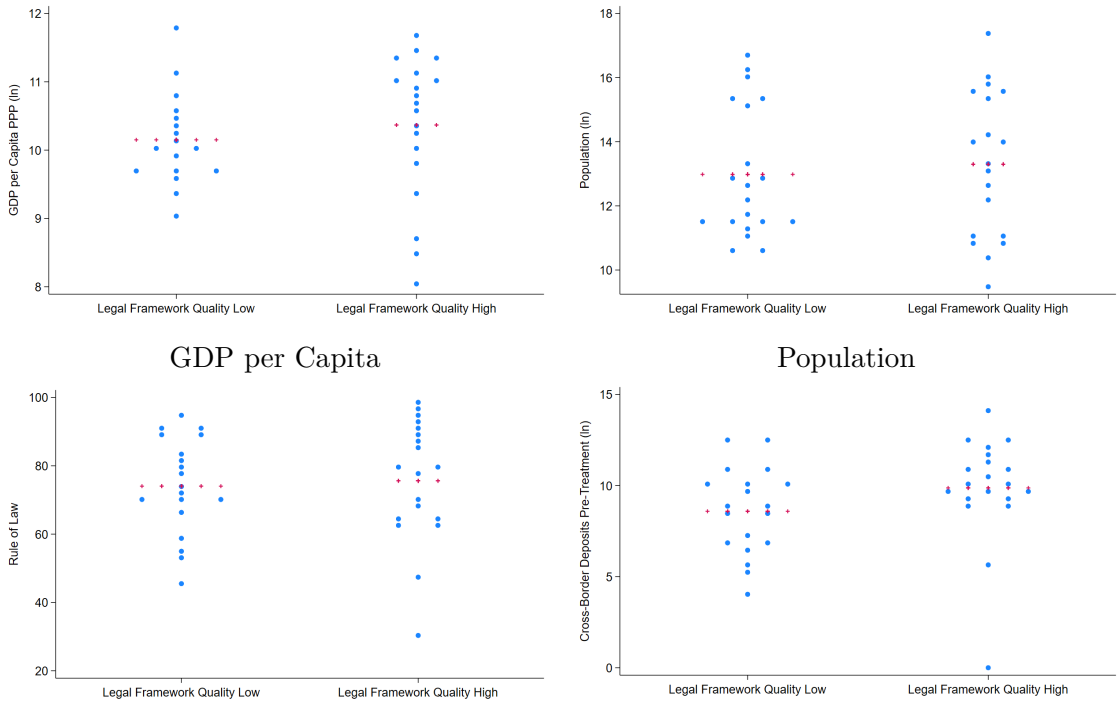


Notes: The figure shows in dot plots the relationship of the CRS communication by tax haven countries measured in a binary dummy (high versus low communication) with key country characteristics: GDP per capita in natural log, population in natural log, a rule of law index ranging between 0-100, and the top 10 percent income share in percent. Each dot denotes a tax haven country. Red crosses denote the mean values of each country characteristic by low (0) and high (1) communication.

high CRS communication effort is positively associated with GDP per capita and the stock of cross-border deposits pre-treatment. The corresponding pairwise correlations are between 0.3-0.6 and statistically significant at the 10% level. There is no statistically significant correlation between population size and rule of law and communication efforts. Nevertheless, the correlation coefficient on the rule of law is 0.45. Figure 5 shows the relationship of our legal framework implementation quality indicator with the equivalent tax haven country characteristics. The figure indicates no significant correlations with the three investigated country characteristics. The pairwise correlations are statistically insignificant at the 10% level, and the correlation coefficients are below 10%. Only the stock of cross-border deposits held in tax havens pre treatment is positively associated with a high-quality legal framework, with a correlation coefficient of about 0.2 and statistical significance at the 10% level.

Most conduit countries in our sample are classified as high enforcement countries. (Seven out of eight show high communication effort.) Yet, conduit countries only partially drive the correlations between high communication effort and legal framework quality with GDP per capita and cross-

Figure 5: Sending Country Analysis: Havens' Country Characteristics and CRS Legal Framework Implementation



Notes: The figure shows in dot plots the relationship of the CRS legal framework implementation by tax haven countries measured in a binary dummy (high versus low-quality implementation) with key country characteristics: GDP per capita in natural log, population in natural log, a rule of law index ranging between 0-100, and the top 10 percent income share in percentage. Each dot denotes a tax haven country. Red crosses denote the mean values of each country characteristic by low (0) and high (1) communication.

border deposit stock. When we drop conduits, correlations are reduced in size but still statistically significant at the 10 percent level.[19] In the results section, we probe whether the correlations between CRS enforcement and economic size drive our findings by excluding conduit or high GDP-per-capita havens from our regression analysis.

Data on tax authority capacity: To study the capability of the CRS-information-receiving countries to uncover tax evasion, we use a comprehensive OECD report on tax authority characteristics, the Tax Administration Series (TAS) on 59 economies for the years 2018 and 2019 (OECD, 2021). This report includes 101 different variables.

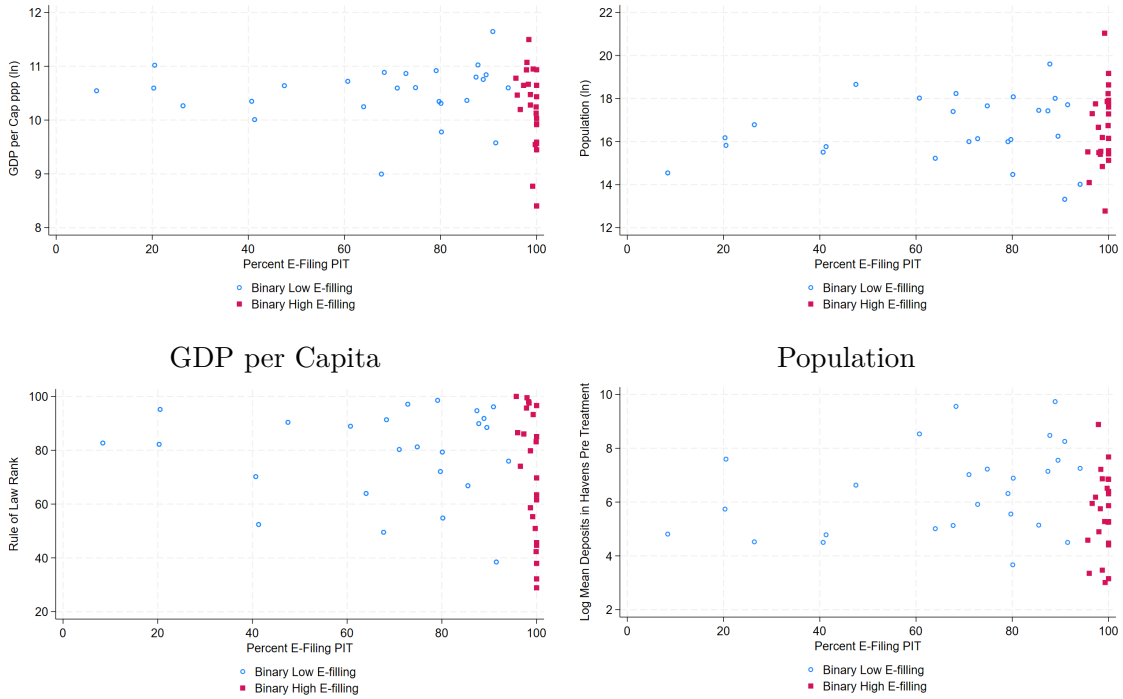
The OECD makes these variables available as 24 formatted tables in Excel corresponding to tables D.1. to D.24. in OECD (2021). We downloaded the 24 files[20] to build a merged dataset of

[19] We classify countries as conduit countries based on the lists provided by Lejour (2021) and Bolwijn et al. (2018), which include all the larger economies among the tax havens in our sample, namely Austria, Belgium, Hong Kong, Ireland, Luxembourg, Singapore, and Switzerland.

[20] The report provides a link to each file in the footnotes to the tables.

comprehensive tax authority characteristics. To obtain the final data inputs, we proceed in three manual steps. First, pre merging, we reviewed each table to unify the 24 table formats and assign unique names and identifiers to each variable. Second, after merging, we identified multicollinear sets of variables and complementarities between variables (e.g., age groups). Third, we selected the variables with sufficient country coverage and with relevance for our analysis (excluding variables relating to social security payments and value added tax).[21] In all three steps, a second author proofread.

Figure 6: Receiving Country Analysis: Country Level Personal Income Tax E-Filing Rate by Country Characteristics



Notes: The figure shows, in scatter plots, the relationship of the PIT e-filing rate with key country characteristics: GDP per capita in natural log, population in natural log, a rule of law index ranging between 0-100, and the top 10 percent income share in percentage. High e-filing rates (above the sample median) are indicated by red squares in each sub-figure, and low e-filing rates (below the sample median) are indicated by blue circles.

We next ran a model averaging exercise with these country characteristics, the procedure we describe below in section 4.2. The goal of the model averaging is to identify the variables that are highly correlated with receiving country CRS effectiveness after controlling for general country characteristics. Out of the candidate variables, the model-averaging exercise identifies digitization of the tax authority as the most relevant variable for local enforcement effectiveness. Figure 6

[21] To allow more researchers to readily use the 101 OECD variables, we will make available upon publication this merged and prepared dataset including a table mapping our dataset to the OECD 2021 report.

shows the relationship of tax authority digitization, measured as the country-level PIT e-filing rate, with key country characteristics: GDP per capita, population, a rule of law index, and the top 10 percent income share. High e-filing rates indicated by red squares in each sub-figure are evenly distributed across these indicators, suggesting no strong relationship with other central country characteristics. The unreported correlation coefficients between the e-filing rate and these country characteristics range between -0.02 and 0.22 and are statistically insignificant at the 10% level.

3.4 Summary Statistics

We provide summary statistics for the variables used in our analysis in Table 1 for the sending country analysis and Table 2 for the receiving country analysis.

In Table 1, we present the data of all Norwegian bank transfers at the individual-country-pair and year-quarter levels. In panel A, we show the summary statistics for all transfers to Norway from tax havens. We have a total of 120,958 transfers across our sample period that originate from a tax haven, and 98% of them represent a within-haven transfer. As expected, transfers through several layers of tax havens (the cross-haven transfers) are less frequent, as we observe approximately 2,000 such transfers throughout our sample period. The median (mean) number of quarterly across-haven transfers to the same Norwegian bank account is one (2.6) (e.g., we observe on average between two to three transfers to the same Norwegian bank account from all bank accounts in tax haven X where the owner is in tax haven Y). The value of cross-haven transfers varies substantially: the median quarterly value of an individual-country-pair transfer is approximately NOK 150,000 (around USD 15,000). This masks some large transfers as the mean value is approximately NOK 3 million (around USD 300,000).[22] In panel B of Table 1, we exclusively consider cross-haven transfers and show how the number and value of transfers differ across high and low CRS enforcement countries. Although the frequency of transfers is larger for the high CRS enforcement countries,[23] the median value is similar across the groups and comparable to all transfers (including the within-haven transfers).

In Table 2, we show the descriptive statistics on the receiving country analysis. This part of our analysis is based on the macro cross-border deposit data by the BIS. Table 2 panel A shows that deposits located in nonhaven countries are, on average, considerably larger than in haven countries, which is likely due to the fact that nonhaven countries include some of the largest economies (e.g., the United States), while haven countries are usually smaller jurisdictions. Limiting our sample to cross-border deposits located in haven countries, as shown in Panel B of Table 2, we observe that haven deposits held by residence countries with high e-filing rates are, on average, similar to those with low e-filing rates. Another observation is that deposits are right skewed, with the median deposits regularly falling far below the mean in deposits, even more so for low e-filing rate countries

[22] Note that in our analysis, we take into consideration large outliers by taking the natural logarithm of the value of the bank transfer.

[23] See appendix A.1, for the list of which tax haven is in which group of enforcement intensity.

Table 1: Sending Countries Analysis - Summary Statistics

Panel A - Overview on all haven transfers to Norway				
	Obs	Mean	Median	St Dev
All Transfers				
Number of Transfers	120,958	6.76	2.00	51.56
Value of Transfers	120,958	11.66	0.14	249.92
Cross-Haven Transfers				
Number of Transfers	2,211	2.58	1.00	3.97
Value of Transfers	2,211	2.97	0.15	20.28
Within-Haven Transfers				
Number of Transfers	118,747	6.84	2.00	52.04
Value of Transfers	118,747	11.82	0.14	252.22
Panel B - Overview on cross-haven transfers to Norway				
	Obs	Mean	Median	St Dev
Communcation High				
Number of Transfers	2,000	2.68	1.00	4.13
Value of Transfers	2,000	3.22	0.15	21.28
Communcation Low				
Number of Transfers	211	1.64	1.00	1.73
Value of Transfers	211	0.64	0.13	3.37
Legal Framework High				
Number of Transfers	1,531	2.89	1.00	4.61
Value of Transfers	1,531	3.40	0.14	23.43
Legal Framework Low				
Number of Transfers	680	1.86	1.00	1.67
Value of Transfers	680	2.01	0.15	10.00

Notes: The table shows the descriptive statistics for the outcome variables in our sending country analysis, the bank transfers from tax havens to Norway in million NOK (short: transfers). The observations are aggregated at the individual-country-pair-year-quarter level. Panel A shows all transfers divided into cross-haven and within-haven transfers. Panel B shows only cross-haven transfers divided into transfers from tax havens with high versus low enforcement levels. Cross-haven transfers mean transfers to Norway from a bank account located in a tax haven where the owner of the account is located in another tax haven. Within-haven transfers mean transfers to Norway from a bank account located in a tax haven where the owner of the account is located in the same tax haven.

than high e-filing rate countries.

4 Empirical Analysis

The theory of crime (Becker, 1968) extended to tax evasion (Allingham and Sandmo, 1972) points to the central role of a threat of detection on top of the possibility and size of the penalty for the decision to evade taxes. This threat of detection varies depending on the quality of the reports received from the sending country and the ability of the receiving country to use the information

Table 2: Receiving Countries Analysis - Summary Statistics

Panel A - Overview on cross-border deposits				
	Obs	Mean	Median	Std. Dev.
All Cross-Border Deposits	81,450	1,243.91	8.82	14,115.43
Cross-Border Deposits in Havens	36,847	582.07	9.84	3966.14
Cross-Border Deposits in Non-Havens	44,603	1790.66	8.00	18713.41
Panel B - Overview on cross-border deposits in havens				
	Obs	Mean	Median	Std. Dev.
High E-Filling Receiving Country	5,200	594.51	35.78	2,057.08
Low E-Filling Receiving Country	31,647	580.03	7.68	4,197.60

Notes: The table shows the descriptive statistics for the outcome variable in our receiving country analysis, the cross-border loans, and deposits in million USD (short: deposits) aggregated at the country-pair-year-quarter level provided by the BIS. Panel A shows all cross-border deposits divided into cross-border deposits located in nonhaven countries versus haven countries. Panel B shows only cross-border deposits located in haven countries after CRS effectiveness divided into haven deposits held by counterparties with high e-filing rates versus those with low e-filing rates.

received. Our empirical analysis treats both of these dimensions in turn.

4.1 Sending Country Analysis

Methodology: The first part of the analysis investigates whether the effect of the CRS differs depending on which countries individuals hold their tax haven accounts in (the sending country), holding constant the characteristics of the receiving country. The analysis comprises a difference in differences and an event study analysis utilizing the micro data on transfers from tax havens to Norway.

The event study design takes the following form with quarterly intervals and binning-up of coefficients before and after two years around the event date:

$$transfer_{ijz,t} = \alpha_{ijz} + \gamma_t + \sum_{k=-8}^{k=8} \beta_1^k CRS_{j,t-k} * Treated_{i,j,z} + \epsilon_{ijz,t}. \quad (1)$$

where $transfer_{ijz,t}$ is either (1) a binary equal to one for a transfer to a Norwegian bank account i from a bank account located in country j with an owner from country z at time t (Probability of Transfers) or (2) the logarithm of the sum of those transfers (Value of Transfers). CRS is the indicator variable for the quarter when the CRS becomes effective in the respective deposit countries, i.e., the date when financial institutions start collecting the information required under the CRS (as in the macro analysis below). $Treated$ denotes those transfers made from a tax haven bank account that is held by an owner located in a different tax haven. Since under the CRS only information on foreign deposits is collected, we compare changes in bank transfers to Norway from tax havens with direct foreign owners in another tax haven, i.e., cross-haven accounts (treated

group) after CRS activation versus before, to transfers from within-haven accounts, i.e., controlling for tax haven specific trends with transfers from tax havens with a direct owner in the same tax haven (control).

The unit of analysis is an account-deposit country-direct owner country combination: a Norwegian account (i) potentially receives transfers from more than one deposit country (j), each with a different owner country (z). We balance the sample by setting transfers of a unit (ijz) to zero if no transfer is recorded. We include account-deposit country-direct owner country fixed effects (α_{ijz}) and time fixed effects (γ_t) to control for unobserved differences at the unit level and general shocks to tax haven pair-specific cross-border deposit holdings. The coefficients of interest show the average within change in transfers to Norway from cross-haven accounts compared to within-haven accounts after the CRS (β_1).

The corresponding difference-in-differences regression equation takes the following form:

$$transfer_{ijz,t} = \alpha_{ijz} + \gamma_t + \beta_1 Treated_{i,j,z} \times CRS_{j,t} + \epsilon_{ijz,t} \tag{2}$$

CRS-exposed accounts mirror the shell company structures frequently used in cross-border tax evasion by high net-worth individuals (e.g., Johannesen and Zucman (2014)). There is substantial evidence of the tax evasion use of offshore bank accounts held by individuals indirectly through shell companies.[24] The typical setup includes a passive investment entity, like a trust, in a tax haven and, through that, ownership of financial assets in several other tax haven bank accounts (Collin, 2021). To illustrate, one notable case, characterized as "the largest tax evasion case brought against an individual in U.S. history", pertains to a former CEO of an Ohio-based software company accused of concealing approximately USD 2.7 billion in income from the Internal Revenue Service (IRS). He was able to hide his wealth from the IRS thanks to a private entity in Bermuda through which he held financial assets in Switzerland (US Senate Finance Committee, 2022). This is the type of scheme that we capture when using the cross-haven transfers to a Norwegian account from tax haven accounts with a direct owner in another tax haven.

The within-haven transfers, on the other hand, allow us to compare these across-haven transfers to transfers from a tax haven account that has a direct owner in that same tax haven. These accounts are dominated by transfers for trade reasons. Even if held for other reasons, domestically owned accounts are nonreportable under the CRS. It is theoretically possible, however, that they are ultimately owned by nonresidents, even though the direct ownership is domestic. In that case, they are subject to CRS reporting. Consequently, a limited subset of these transfers could react to the CRS, making our estimates a lower bound.[25] We show empirically that there is no change in

[24] As visible from, e.g., the Panama Papers in 2016, the Paradise Papers in 2017, the Pandora Papers in 2021, and the Suisse Secrets in 2022.

[25] Concerning a double counting of the effect, there is no compelling rationale to expect a relocation of financial assets owned by non-residents into this placebo group. If anything, it would be more exposed to CRS reporting.

transfers for this group around CRS activation. In a robustness test, we instead consider transfers from nonhavens to Norway as the control group. Results are unchanged (appendix A.3). We prefer within-haven transfers as control group because they enable us to dynamically control for time trends in transfers from tax havens around the CRS.

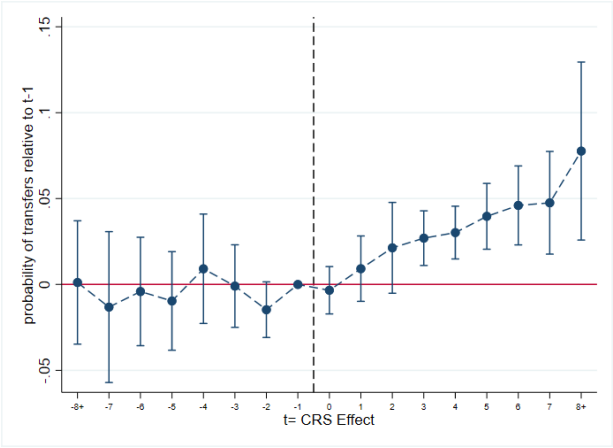
Results: In Figure 7, we show graphically the event study results for the reaction of bank transfers from tax havens to Norway, while, in Table 3 column 1, we display the results from our difference-in-differences regression analysis. In both, we investigate the change in cross-border transfers from accounts held in 41 tax havens through a foreign owner (cross-haven) versus a domestic one (within-haven). Cross-haven transfers are transfers where the owner of the foreign account is located in a tax haven, which differs from the one where the foreign account is located. In the event study, we estimate quarterly CRS treatment coefficients, each of which marks the change in bank transfers from cross-havens versus within-haven bank accounts in one quarter over the sample period, relative to the quarter before the CRS treatment event date (k=-1), with quarters before and including k-8 and after and including k+8 binned at the endpoints. In the top panel of Figure 7, we display the results of the the event study. At the bottom of Figure 7, we show coefficients from two regressions, one for treated and control transfers, to study the trends in each group individually. The coefficients for cross-haven transfers are indicated in red and those for within-haven transfers in blue. We display the results together with the 95% confidence interval.

Post CRS, we find a four percentage point increase in the probability of a bank transfer to Norway from a cross-haven account, compared to the change in the probability of a bank transfer to Norway from a within-haven account. When examining the transfers over time in Figure 7, all coefficients in the pre-period (k-1 to k-8+) are statistically indistinguishable from the benchmark quarter, supporting the validity of the parallel-trends assumption in our analysis. Post CRS, we observe an immediate and statistically significant increase in the probability of bank transfers to Norway from cross-haven accounts (red line). At the same time, there is no change in the probability of bank transfers to Norway from within-haven accounts in tax havens (blue dots). From k=3, the coefficient significantly differs from zero at the 5 percent level and remains significant until the end of the sample period. The coefficient size continues to increase until the end of the sample window. Similarly, we detect an increase in the total value of bank transfers to Norway from cross-haven accounts of about 62.6%, compared to the change in the value of bank transfers to Norway from within-haven accounts.[26] The increase is immediate and persistent over our sample period, as visible in Table 3 Column 1 and Figure 7.

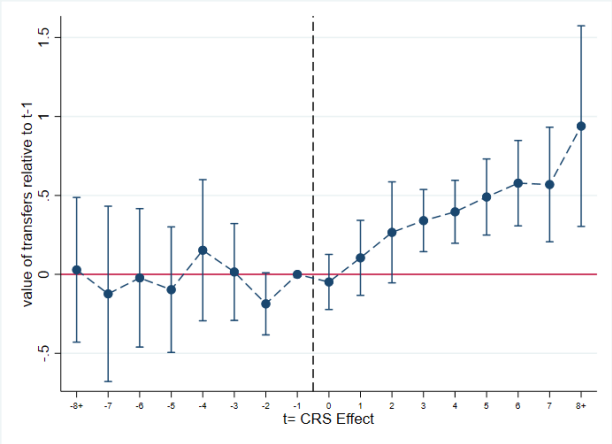
In percentage terms, the effect size is larger compared to previous studies on the impact of the CRS on illicit financial flows. Yet we examine bank transfers and not stocks of bank deposits as in, for example, Menkhoff and Miethe (2019) and Casi et al. (2020), and, importantly, thanks to the granularity of our data, we can distinguish the CRS-exposed transfers, those done under several

[26]This is computed as $62.6\% = e^b - 1$, where b = -0.486.

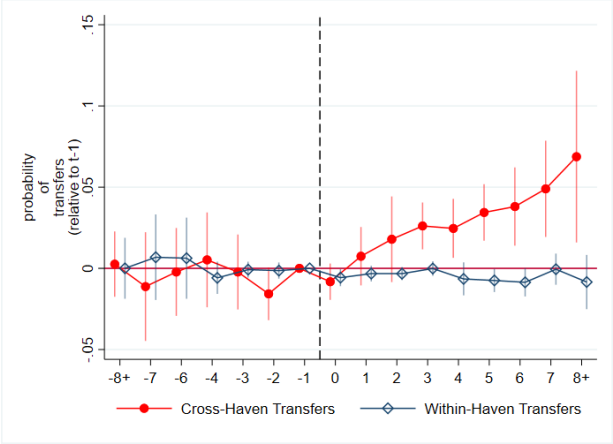
Figure 7: Sending Country Analysis - Changes in Cross-Border Bank Transfer



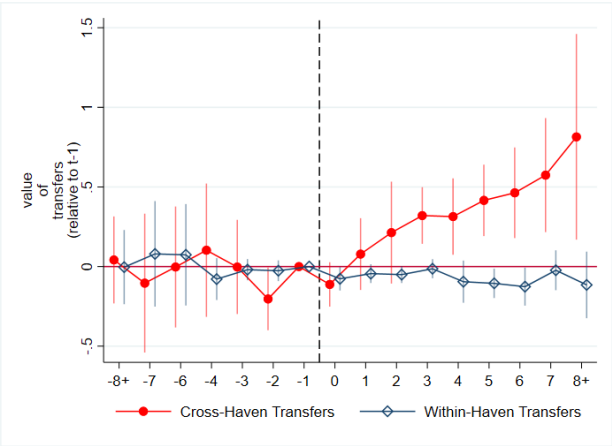
Probability of Transfers



Value of Transfers



Probability of Transfers



Value of Transfers

Notes: The figure plots the regression coefficients, β_k, and 95 percent confidence intervals (the vertical lines). The dependent variable is either (1) a dummy equal to one if a transfer to a Norwegian bank account i from a bank account located in a tax haven j with an owner from tax haven z at time t occurred or (2) the logarithm of the sum of the transfers to a Norwegian bank account i from a bank account located in a tax haven j with an owner from country z at time t. The treatment indicator takes the value of 1 in the quarter when the CRS took effect in the tax haven j. The top panels provide the regression coefficients, each of which marks the quarterly change in cross-havens bank transfers (treated) versus within-havens bank transfers (control), relative to the CRS event date. The bottom panels display the treated and control coefficients separately. The red line includes only cross-haven transfers, which means the tax havens j, where the bank account is located, differs from z, i.e., the tax havens where the owner of the foreign bank account is located. The blue line includes only within haven transfers, which means the tax havens where the bank account j is located are the same as z, i.e., the tax havens where the owner of the foreign bank account is located. We include the treatment at the event time as well as eight leads and eight lags of the treatment indicator. The lead and lag dummies are binned at the beginning and end of the event window (after two years). We use a balanced sample. Standard errors are clustered at the deposit-country level. Top panel specifications include country-pair-individual and time-fixed effects, while bottom panel specifications include country-pair-individual fixed effects.

layers of secrecy, such as bank transfers from Switzerland from a bank account where the owner is located in the Cayman Islands, from the most comparable non-CRS-exposed transfers, those that

Table 3: Sending Country Analysis - Changes in Cross-Border Bank Transfer

Panel A - Probability of Transfers					
Sample	All Transfers	Communication Split		Legal Enforcement Split	
		High	Low	High	Low
Outcome		Probability of Transfer			
	(1)	(2)	(3)	(4)	(5)
PostCRS*CrossHavensTransfers	0.041**	0.047**	0.007	0.045**	0.029
	(0.017)	(0.020)	(0.009)	(0.018)	(0.035)
Observations	949,120	810,160	138,960	547,960	401,160
R-squared	0.368	0.371	0.347	0.364	0.373
Fixed Effects	Country-Pair-Individual, Quarter-Year FE				
Clustering	Deposit Country				
Panel B - Value of Transfers					
Sample	All Transfers	Communication Split		Legal Enforcement Split	
		High	Low	High	Low
Outcome		Value of Transfer			
	(1)	(2)	(3)	(4)	(5)
PostCRS*CrossHavensTransfers	0.486**	0.548**	0.093	0.506*	0.391
	(0.219)	(0.251)	(0.098)	(0.244)	(0.407)
Observations	949,120	810,160	138,960	547,960	401,160
R-squared	0.411	0.414	0.388	0.407	0.418
Fixed Effects	Country-Pair-Individual, Quarter-Year FE				
Clustering	Deposit Country				

Notes: The table reports the main difference-in-difference estimates for the sender analysis. The dependent variable in Panel A is a dummy equal to one if a transfer to a Norwegian bank account i from a bank account located in a tax haven j with an owner from country z at time t occurred. The dependent variable in Panel B is the logarithm of the sum of the transfers to a Norwegian bank account i from a bank account located in a tax haven j with an owner from country z at time t. The unit of observation is the individual bank transfer, and the sample period goes from the first quarter of 2014 to the last quarter of 2018. The sample is balanced. PostCRS is an indicator variable for the period after the CRS took effect in the deposit country j. CrossHavensTransfers is a dummy taking the value of one when j, i.e., the tax havens where the bank account is located, differs from z, i.e., the tax havens where the owner of the foreign bank account is located. Standard errors are clustered at the deposit-country level, and all specifications include year-quarter and country-pair-individual fixed effects. Standard errors are reported in parentheses.

are motivated more likely by trade across countries.

Having established the ability of our data to capture a reaction to the CRS, the core of our analysis lies in investigating possible heterogeneous responses, depending on the local CRS enforcement level. In Table 3 columns (2)-(5) and figure 8, we study how tax haven variation in CRS-related communication efforts and the CRS legal framework shapes the probability of bank transfers to

Norway. We split our sample into countries with high communication effort if the OECD report attests to "substantial" communication and outreach activities for that country (coded as 2) and countries with low effort if the OECD report attests to "no" or "some" communication and outreach activities (coded as 0 and 1 respectively).[27]

We find that the increase in the probability of transfers to Norway from foreign accounts compared to domestic ones is driven by bank transfers from tax havens that exhibit a strong communication effort, while we find no statistically significant change in bank transfers from tax havens with low communication effort (the coefficient size is also close to zero), as visible in Table 3 column (2) and (3) Panel A and B.

In Panel A, the probability of treated transfers occurring increases by 5 (0) percentage points if from high (low) communication haven cross-border transfers relative to the control within-haven transfers. Relative to a base probability of 0.2 percent of a transfer occurring in any quarter in our treated group, this is a 25-fold probability increase in the high communication group. Panel B column 2 shows an increase of 73 percent[28] in the mean value of a quarterly transfer from a treated high communication haven account versus a control high communication haven account. In a given quarter-year, the average amount of transfers coming from a treated account is USD 30,144[29]. This means that the mean transferred amount per country-pair account and quarter increases in high communication treated to USD 52,149. Results are confirmed in the event study figure 8.

Differences across how the national CRS law has been drafted (captured by the legal framework variable) shape responses to the CRS activation to a lesser degree than communication effort, as visible in Table 3 columns (4) and (5) and in Table 3 columns (6) and (7) and Figure 8. We split our sample into countries with a high legal framework quality if the OECD Peer Review reports the country's legal framework as "In Place" and countries with a low legal framework quality if the OECD Peer Review reports the country's legal framework as "In Place but Needs Improvement" or "Not in Place."

Although only the coefficient for the high legal framework quality is statistically significantly different from zero, the size of the coefficients across the different enforcement levels is close (4.5 percent versus 2.9 percent). As visible in the event study in figure 8, changes in transfers from high and low legal framework quality countries move together across our sample period, even post CRS, although the reaction to high-quality legal frameworks, as compared to lower ones, appears more immediate and robust throughout most of the post-period.

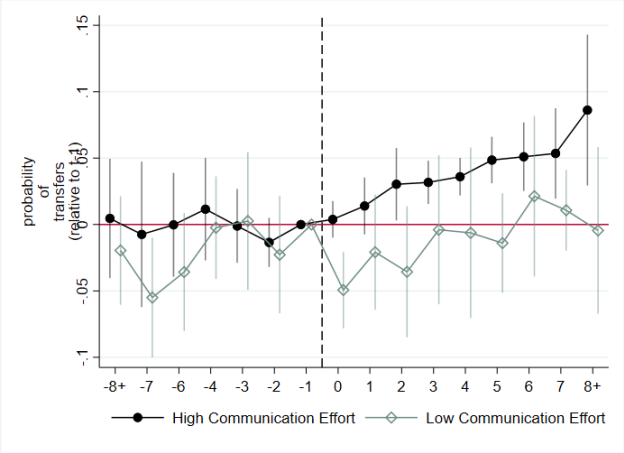
An identification challenge is that CRS enforcement is not exogenously assigned. In section 3.3,

[27] See appendix A.1 for details on the coding exercise we perform based on the OECD peer review narrative.

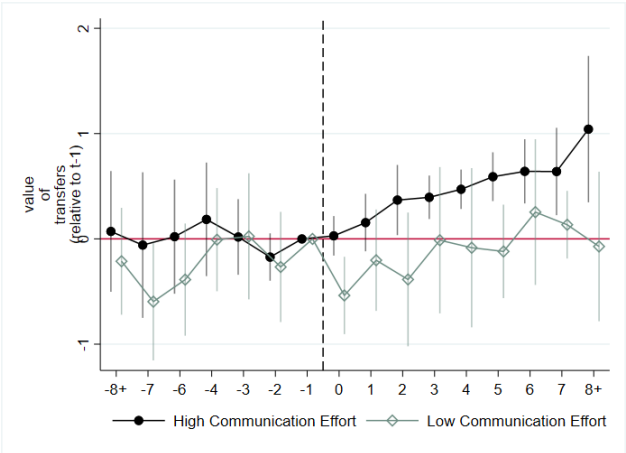
[28] The 73 percent figure is the interpretation of the log-linear coefficient of 0.548 on a 0-1 change due to CRS adoption.

[29] 30,144 USD is about 24,5184.6 NOK based on the January 1, 2018 exchange rate according to https://app.norges-bank.no/query/index.html/en/currency?currency=USD&frequency=A&startdate=2018-01-01&stopdate=2018-01-01.

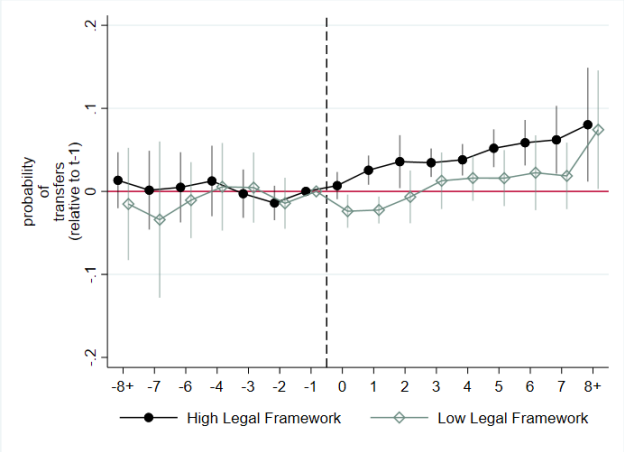
Figure 8: Sending Country Analysis - National Enforcement Test



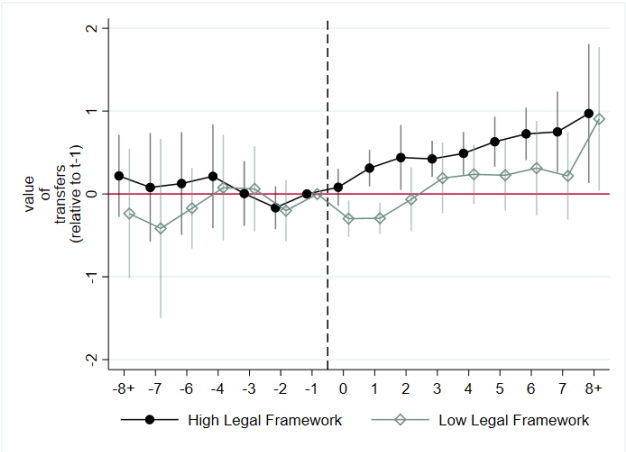
Probability of Transfers



Value of Transfers



Probability of Transfers



Value of Transfers

Notes: The figure plots the regression coefficients, β_k, and 95 percent confidence intervals (the vertical lines). The dependent variable is either (1) a dummy equal to one if a transfer to a Norwegian bank account i from a bank account located in a tax haven k with an owner from tax haven j at time t occurred or (2) the logarithm of the sum of the transfers to a Norwegian bank account i from a bank account located in a tax haven j with an owner from tax haven z at time t. CRS takes the value of 1 in the quarter when the CRS took effect in the deposit country j and $Treated$ takes the value of 1 if j, i.e., the tax havens where the bank account is located, differs from z, i.e., the tax havens where the owner of the foreign bank account is located (if it is a cross-haven transfer). The black line includes only transfers from high enforcement tax havens (either high communication effort or high legal framework) and the gray line includes only transfers from low enforcement tax havens (either low communication effort or low legal framework). We include the treatment at the event time as well as eight leads and eight lags of the treatment indicator. The lead and lag dummies are binned at the beginning and end of the event window (after two years). We use a balanced sample. Standard errors are clustered, and all specifications include country-pair-individual and time fixed effects.

we observe that almost all conduit tax havens in our sample are classified as high-communication effort countries and that high communication effort is correlated with higher GDP. To rule out that conduit countries are driving the differences in effects we observe, in Appendix A.4, we drop

conduit countries from the analysis. Results are qualitatively unchanged. Moreover, the difference between the high and low communication effort groups post treatment becomes even more apparent. Second, we test in Appendix A.4 whether our results hold if we restrict our samples of high and low enforcement to only low GDP countries. These findings are also consistent with our baseline results. In unreported event studies, we rule out that results are dominated by one haven country by dropping a haven country at a time.

Overall the results suggest that CRS implementation quality in the country sending CRS information matters for CRS effectiveness, even when the information-receiving country features high tax enforcement, as in Norway. This is especially the case for communication and outreach relating to the CRS and less so for variation in legal framework quality.

4.2 Receiving Country Analysis

In the sending country analysis, we examine differences in characteristics of CRS-information-sending countries (tax havens), holding constant the receiving country.[30] The following second part of the analysis allows us to investigate whether the effect of the CRS differs, depending on the enforcement capacity of the receiving country. Even when well implemented, the CRS could be less effective if the secrecy seeker or tax evader knows that her home country cannot make proper use of the data it receives. In this analysis, we rely on the BIS LBS macro data on cross-border held deposits and the OECD survey data on countries' tax administration capacity.

To elicit which receiving country characteristics matter most for the ability of an information-receiving country to use the CRS information, we conduct a model averaging exercise that establishes robust correlations without relying on the selection of one particular model, potentially driven by ad hoc modeling choices.

As the basis for this exercise, we first estimate the average effect of the CRS introduction by receiving country. For this purpose, we turn to a difference-in-differences specification that builds on and extends the literature studying the effectiveness of the CRS (Menkhoff and Miethe, 2019; O'Reilly et al., 2019; Casi et al., 2020). We then corroborate the findings of the model averaging exercise by turning again to the difference-in-differences specification and event studies showing that the changes to the CRS are stronger in receiving countries with high capacity, as predicted in the model averaging. The event studies are used to evaluate the common trends assumption pre treatment and to assess the dynamics of the changes following the CRS implementation.

Methodology: The starting point of our receiving country analysis is an event study showing a reaction of international tax evaders to CRS activation in international bilateral bank deposits. This empirical specification builds on an established identification strategy (Johannesen and Zucman, 2014) and has been used for early analyses of the CRS (Menkhoff and Miethe, 2019; O'Reilly et al.,

[30] The receiving country was always Norway, a country with a very developed tax authority, i.e., with high enforcement capacity.

2019; Casi et al., 2020). Several years have passed since most CRS activations, and we can now corroborate early findings. We also exploit the BIS data more fully. We compare the change in the outstanding volume of cross-border deposits in tax havens country pairs that activate the CRS (treated) to the change in the outstanding volume of cross-border deposits in non-tax havens that activate the CRS and in not-CRS participating havens (control) after the introduction of the CRS (treatment).[31] Tax haven/non-haven country pairs that did not activate the CRS are used to pin down the global tax haven time trend, while an EU-country pair dummy pins down the role of the EU Tax Savings Directives (Johannesen, 2014). The event study design takes the following form, where we bin treatment-relative time coefficients at the endpoints after and including eight quarters:

$$\begin{aligned} log(deposits)_{ij,t} =& \alpha_{ij} + \gamma_t + \sum_{k=-8}^{k=8} \delta_1^k CRS_{j,t-k} + \sum_{k=-8}^{k=8} \delta_2^k CRS_{j,t-k} * EU_{ij} + \\ & \sum_{k=-8}^{k=8} \delta_3^k CRS_{j,t-k} * TH_i + \sum_{k=-8}^{k=8} \delta_4^k CRS_{j,t-k} * TH_i * EU_{ij} + \epsilon_{ij,t}. \end{aligned} \tag{3}$$

where $log(deposits)_{ij,t}$ is the logarithm of the deposits held by residents from country i in country j at calendar time t, CRS is the indicator variable for the period when the CRS is activated in the respective countries, i.e., the date when financial institutions start collecting the information required under the CRS around which we construct event time. TH_i is a dummy taking the value of one when country i is a tax haven (treated sending country). $EUPair_{ij}$ is a dummy taking the value of one when country i and counterparty j are both EU member states. Including this dummy enables us to control for the fact that within the European Union, information on financial accounts was already automatically exchanged, thanks to the Savings Directive (European Council (2003)) and the Directive on Administrative Cooperation 1 (European Council (2011)); see also (Casi et al., 2020). We add country-pair (α_{ij}) and calendar-time (γ_t) fixed effects to control for unobserved differences between country-pairs and general shocks to cross-border deposits. The coefficients of interest show the average within change in cross-border deposits in tax havens after the activation of the CRS (δ_3), compared to the left-out event time dummy at $k = -1$.

To compare this CRS effect across receiving countries and employ our model averaging routine, we also turn to a difference-in-differences exercise to establish receiving country-specific CRS effects. We run the following general difference-in-differences regression where notation follows the event study above:

[31] In robustness tests, we restrict the sample to haven deposits to compare only haven to haven deposits in treated and control.

$$
\begin{aligned}
log(deposits)_{ij,t} =& \alpha_{ij} + \gamma_t + \beta_1 CRS_{j,t} + \\
& \beta_2 CRS_{j,t} \times EUPair_{ij} + \beta_3 CRS_{j,t} \times TH_i + \\
& \beta_4 CRS_{j,t} \times EUPair_{ij} \times TH_i + \epsilon_{ij,t}.
\end{aligned} \tag{4}
$$

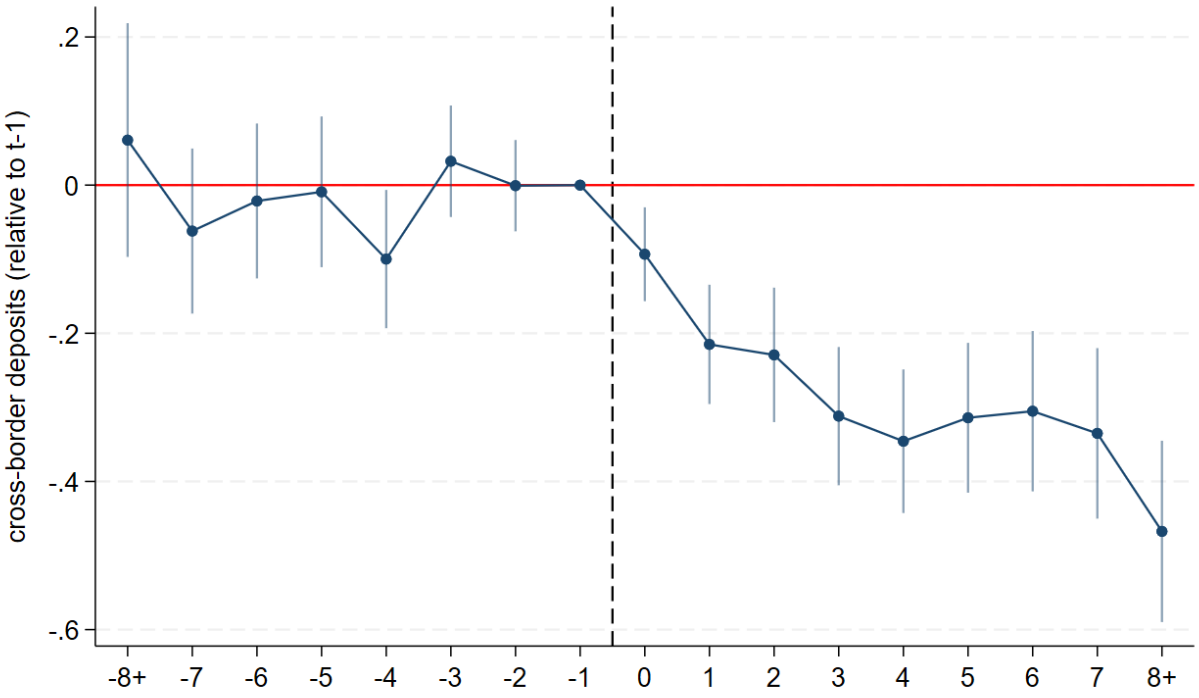
Results: In Figure 9, we report the results from our analysis of changes in cross-border deposits in tax havens pre versus post CRS. Results show a stable pre-trend, followed by a statistically significant decrease in cross-border deposits in tax havens, compared to cross-border deposits in non-tax havens, after CRS implementation. For transparency, we plot the coefficients and standard errors of the binned endpoints as well. We report the results from the corresponding difference-in-differences regression analysis in Column 1 of Table 4. We observe a 25.6% reduction in cross-border deposits in tax havens post CRS, compared to the change in cross-border deposits in nonhavens in our sample. We return to this event study and this difference-in-differences specification further below after analyzing the correlation between the receiving country-specific CRS effect and characteristics of a receiving country's tax administration.

The bilateral dimension of this dataset allows us to establish receiving country-specific CRS effects. For example, many reporting countries report the size of bank deposits from Norwegian counterparties, some of which introduce the CRS, and some of which do not. Interacting our baseline difference-in-differences dummy with a dummy variable for Norwegian counterparties and another one for each counterparty country provides a receiving country-level CRS effect relative to non-CRS adopters. This splits the average CRS effect into its receiving country level effects. Deposits in tax havens from Norway, for example, drop by more than -60%, while the effect for deposits from the United Kingdom is close to the average effect. However, we do not suggest interpreting each receiving country coefficient in isolation, since receiving-country-specific shocks can influence the results. When using the coefficients for all receiving countries in combination, such shocks cancel out and we can infer robust correlations with tax administration characteristics. In the following section, we provide evidence explaining some of this receiving country-level difference in CRS reactions.

Identifying relevant tax administration characteristics through model averaging:

In the context of the CRS, a receiving country can influence the perceived threat of detection by making better or worse use of CRS reports. But which attributes of a receiving country's tax administration dominate this perceived probability of detection? In contrast to the sending country analysis, in which we directly measure CRS implementation quality, it is unclear which of the local tax authority capacity characteristics are relevant here. Is it its size and total resources? The general conditions in an economy? The allocation of staff to detecting tax evasion? The level of digitalization? The age or experience of staff? Arguably, all of these can have some impact. It is also unclear which variables, beyond the most relevant ones, should be included as auxiliary

Figure 9: The CRS Effect on Cross-Border Deposits Revisited



Notes: The figure shows regression coefficients, each of which marks the quarterly change in bilateral cross-border deposits located in tax havens (treated) versus nonhavens (control) from deposit holders relative to the CRS event date. We plot the 95% confidence band for each coefficient. The outcome variable is the logged cross-border deposits measured at the country pair level. We control for country-pair and time fixed effects as well as for EU-pair treatment. Standard errors are clustered at the country-pair level. The event study coefficients are binned at the endpoints (binned coefficients are shown).

regressors. The model averaging exercise outlined below provides guidance on which of these characteristics dominate the receiving country-level CRS effect we have established above without relying on potentially ad hoc variable selection.

The new OECD survey data on the comparative Tax Administration Series (TAS) includes country-level information on 59 economies on several dozen variables, some of which are derived from the same underlying question. On top of our outcome variable, the receiving country's CRS effect, this dataset provides a unique source of explanatory variables about tax administration characteristics. However, it provides little time variation (within our sample period only one year of data is available), and coverage is not global. Our method therefore also shows one way the TAS can be informative for an empirical exercise even without time variation. Since not every variable is available for every country, there is a trade-off between including more countries and including more series to construct the balanced panel required for model averaging. We take a middle ground, iteratively dropping the least well-covered variable or country, whichever discards

less information, until we arrive at a balanced dataset including 29 countries and $K = 24$ variables on tax administration characteristics. To this, we add data on GDP per capita, its growth rate, CPI inflation, the top 10% income share, unemployment, the Gini coefficient, the old age dependency ratio, openness ((exports + imports)/GDP), the number of full-time equivalents working at the tax administration, as well as the total population and total workforce. This sums to 35 variables. If we want to avoid ad hoc modeling choices concerning the model size and variable inclusion, this list creates a potential model space of 2^K or 34,359,738,368 possible models M_j where $j = 1, 2, ..., 2^K$. Instead of claiming that we have found the one true model among these millions of possible combinations, model averaging approaches this model space agnostically and allows every potential combination of variables and model lengths.

To avoid calculating all models, we employ a commonly used MC^3 algorithm, which selects itself through the model space. This is done in a hybrid Bayesian-Frequentist approach, where we entertain a prior on the model size, and the model averaging is based on Bayesian econometrics. The models we run, however, are frequentist. This combines the advantages of well-understood, easy-to-communicate coefficient estimates with the possibility to show posterior inclusion probabilities for each variable.

Following Ley and Steel (2009), we use beta-binomial priors on the model space, with a prior model size of four variables. These priors place relatively little density around the mean, making them unlikely to dominate the results, but intuitively they give larger models a lower weight. Based on a measure of the model fit, the BIC, to use the BIC approximation in Raftery (1995), the algorithm then selects itself through the model space. Drawing or dropping variables informed by the model size and the total number of variables, the algorithm is more likely to update to a new candidate model if it fits better than the current one. This disciplines the algorithm into relatively well-fitting areas of the model space and ensures that we do not estimate numerous poorly fitting models.

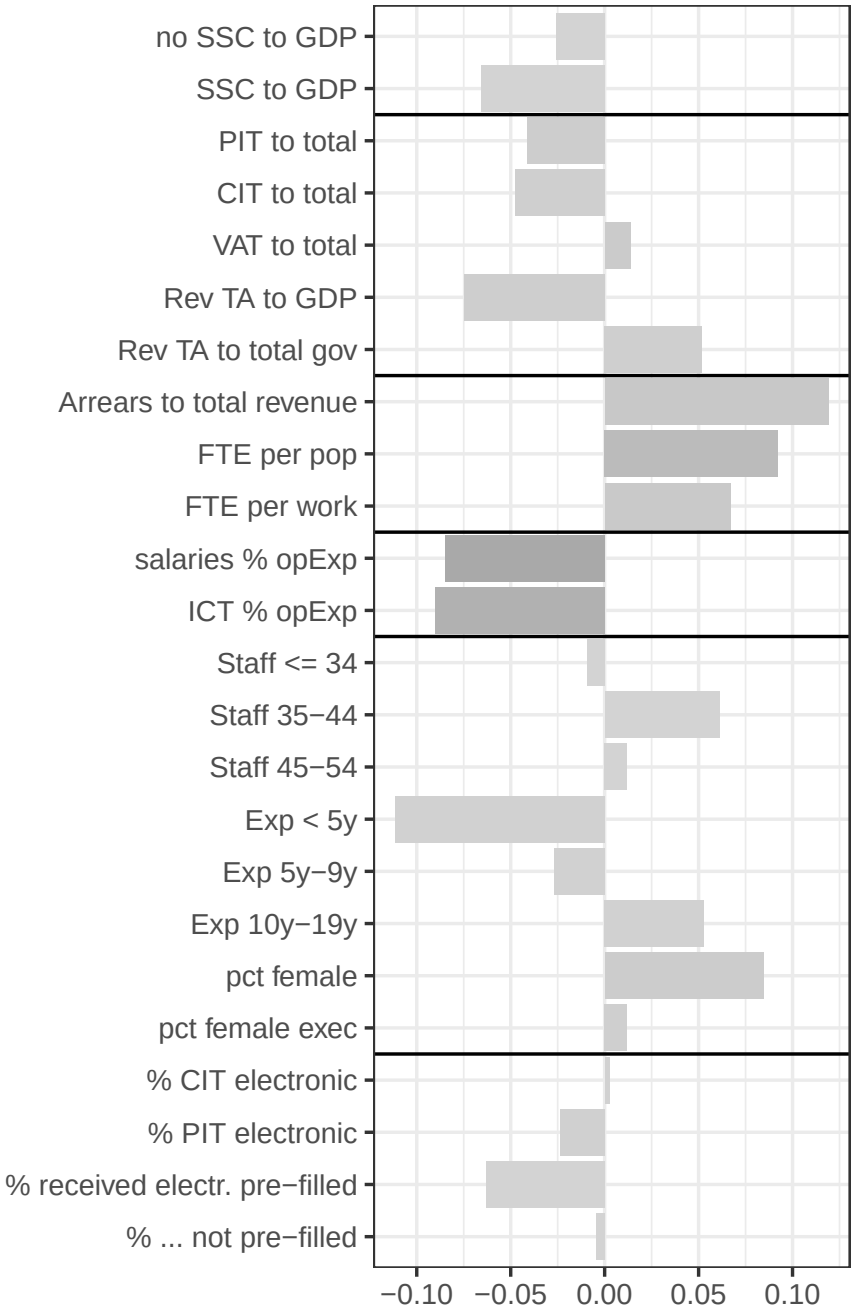
Each model visited by the algorithm has a posterior probability that is a function of the model fit and our prior on the model size. This posterior probability is used to weigh the coefficients of each model. Across all models visited, we will then have coefficients from models with very different variable combinations that allow us to compare the performance of each variable across the model space. As a second measure of variable relevance, we ignore the coefficients and report the relative posterior success of all models that include a variable in question. This posterior inclusion probability is reported in our main results together with the posterior coefficients.

Intuitively, the results below can be read as correlations while controlling for all other variables in the balanced dataset. While none of the regressions will control for all variables, all variables will be used with each other variable at some point and, if they do not contribute substantial independent variation, be weighed down by their low model fit. Finally, our algorithm starts from an empty model. To eliminate the impact of this starting model, the first 1% of all estimated

models are discarded as a burn-in following convention.

Results: Using this method, we can compare the effect of an essentially arbitrary number of potential correlates of the receiving country's CRS effect.

Figure 10: Importance of Tax Administration Characteristics



Notes: The figure plots the coefficients (in gray bars) for our model averaging. The outcome variable is the receiving country-level CRS effect, and the model averaging routine runs many models with different variable specifications. These are then weighted by the relative model fit.

Figure 10 summarizes the results. It plots the posterior coefficient size and shades by posterior inclusion probability (PIP), with higher PIP shaded darker. Since the CRS effect we estimate is negative, we are looking for negative correlations, indicating stronger CRS effects. We start with a set of variables describing the general conditions in which a tax administration operates. First, a variable counts the tax to GDP ratio, excluding social security contributions (no SSC to GDP). This measures the reliance of a country on tax income and hence the salience of tax evasion for public funding. Social security contributions (SSC to GDP), on the other hand, are not connected to international tax evasion. A country with a higher ratio of the former relies more heavily on tax revenue, compared to other income sources, and should also exhibit stronger enforcement effects. Our results confirm this for tax and social security contributions, but the PIP is low. Next we include three variables defining the revenue sources of the tax system: Personal income tax (PIT to total), corporate income tax (CIT to total), and value added tax (VAT to total), all in relation to total tax revenue. Social security contributions as a percentage of total tax revenue had to be dropped due to limited coverage across countries. Together with other taxes, which is the fifth category the OECD provides, it forms the left-out category of these ratios that would otherwise sum to one for each country. We find negative correlations for personal income tax and corporate income tax, again with low PIP values. Note here that the limited coverage of our sample makes the corporate income tax variable less informative than it would be in a global sample. The top end of the CIT to total distribution is dominated by a few South American countries, the outlier being Colombia, which had effective disclosure programs in place that could be driving this effect (Londoño-Vélez and Ávila-Mahecha, 2021). Most OECD countries have similar and small ratios here, meaning there is little CIT variation to leverage.

Another set of variables concerns the relative size of the tax administration. A larger and better-funded tax administration, as a percentage of GDP (Rev TA to GDP), indicates better tax enforcement in relation to the total national economic activity. We find that this measure is correlated with a more substantial CRS effect. The same revenue variable relative to the total government size (Rev TA to total gov), however, is correlated with a weaker CRS effect. This indicates that the size of the administration in relation to economic activity matters more for effective enforcement than its size in relation to the rest of the government. We also have access to one measure for tax administration efficiency or assertiveness in the ratio of total arrears to total revenue (Arrears to total revenue). A higher value here indicates less enforcement stringency; taxes are not collected, even when owed. Indeed we find that a higher value of this measure is correlated with a lower CRS effect. Turning to staff instead of funds, the OECD data provides the number of full-time equivalents a tax administration employs. Concerning total population (FTE per pop), we see a mitigating correlation with the CRS effect. This is consistent with the interpretation that the absolute number of people working at a tax administration does not drive strong CRS reactions. This is not surprising, given that only a small fraction of the tax administration staff will

be employed in international tax enforcement. The same measure but in relation to the working population (FTE per work) has a low PIP with a smaller coefficient.

Next we zoom into the allocation of resources within the tax administration for which two variables are available. In percentage of all operating expenditures, the OECD dataset includes total salaries paid (salaries % opExp) and total expenses for information and communication technologies (ICT % opExp). We find an effect of salaries on CRS reactions with a high PIP. ICT expenditure has an even stronger impact. Tax administrations that invest in modern technologies seem to trigger stronger responses from evaders when the CRS becomes active.

The OECD dataset also includes a number of variables indicating the age and experience structure of the staff working at the tax administration. This data is used in ratios again. We look at age (Staff <= 34, Staff 35 – 44, Staff 45 – 54), leaving out the ratio of staff of more than 54 years of age to avoid summing up to 1. We also use length of service or experience (Exp < 5y, Exp 5y – 9y, Exp 10y – 19y), leaving out the ratio of staff with more than 19 years of experience. None of these variables have high posterior inclusion probabilities. Experience seems to point toward younger workers triggering stronger reactions, again with low PIP. We do not find evidence of a strong relationship between gender and tax enforcement, with low PIP for both. If anything, a higher percentage of female staff is correlated with less reaction to the CRS. However, all results on staff characteristics presented here are quite noisy and should be corroborated by other studies before being interpreted.

We now turn to the mode of tax collection. Arguably, electronic filing of tax returns creates a stronger threat of detection: It indicates a modern tax administration and a digitalized paper trail that could be easily accessible years later. First, electronic CIT filing shows no strong effect.[32] For the PIT e-filing rate, however, there is substantial variation (25th and 50th percentile at 72% and 95.7%, respectively), and we find a correlation with CRS implementation with a relatively high PIP. Going further, we use the information on the channel of PIT filing: Against the ratio of paper PIT returns, we compare the three reported modes of pre-filled filing: The form is electronically pre-filled, though potentially requiring confirmation (% received electr. prefilled) or it is not pre-filled (% ... not prefilled). When compared to paper PIT returns, all these e-filing results seem to point in the same direction. Electronic filing and especially automatic electronic filing are correlated with stronger CRS effects.

All in all, our results indicate that the total size of a tax administration, whether counted in staff or resources, is less relevant. Instead, and beyond general conditions such as a high tax-to-GDP ratio, the resource allocation within the tax administration dominates. Variables that in some way capture ICT-related investments, be it as part of the tax administrations' expenditure or electronic filing rates, are robustly correlated with stronger CRS effects of the receiving country.

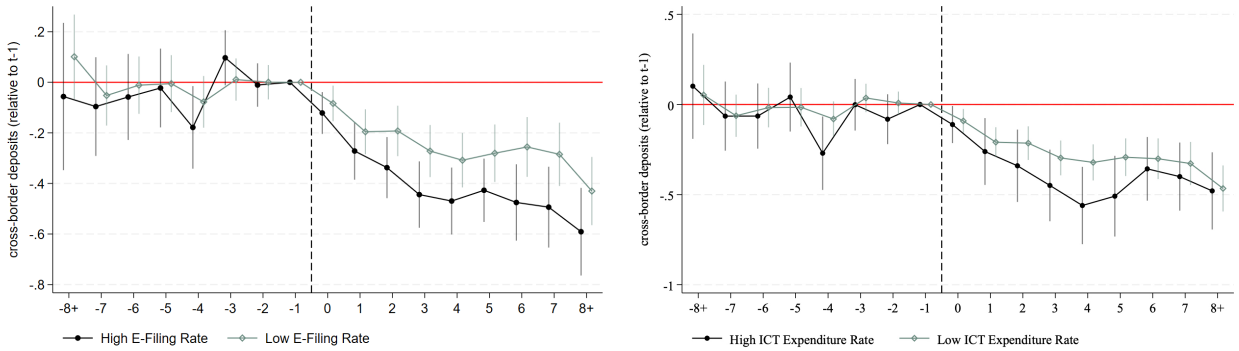
[32] Again, CIT variation is low in our sample. Almost all of our sample has a very high electronic CIT filing rate (25th and 50th percentile at 96.3% and 99.5% e-filing, respectively).

This is particularly interesting in light of the efficiency trade-off a tax administration faces when comparing its expenditures with its enforcement success.

One caveat we would like to highlight is that this exercise does not establish the optimal design of a tax administration in a cost-benefit analysis.

Results on ICT resource allocation: Having established ICT reliance in tax collection (measured either as PIT e-filing rate or ICT expenditure rate) as the most robust correlate with CRS enforcement reactions, we now return to the event study and difference-in-differences methodology introduced above to study this result in more detail. We run the same regressions as before but test for the relevance of local tax authority capacity in the receiving country. We split treated receiving countries into high and low e-filing rate countries at the median e-filing value in our sample and high and low ICT expenditure relative to operating expenditure.[33]

Figure 11: Receiving Country Analysis - Changes in Cross-Border Deposits by Personal Income Tax E-filing Rate



Panel A: PIT E-Filing Rate Panel B: ICT Expenditure Rate

The figure shows regression coefficients and associated 95% confidence bands, each of which marks the quarterly change in cross-border deposits located in tax havens (treated) versus nonhavens (control) relative to the CRS event date. The outcome variable is the logged cross-border deposits measured at the country pair level. We control for country pair and time-fixed effects as well as for EU-Pair treatment. Standard errors are clustered at the country-pair level. The event study coefficients are binned at the endpoints (binned coefficients are shown). In panel A, in the black plot, the sample is limited to those receiving countries with an above median percentage of PIT e-filing rate, versus in the gray plot, where the sample is limited to those receiving countries with a below median percentage of PIT e-filing rate or a missing PIT e-filing rate. In panel B, in the black plot, the sample is limited to those receiving countries with an above 75th percentile ICT expenditure to total operating expenditure ratio (ICT expenditure rate), versus in the gray plot, where it is limited to those receiving countries with a below the 75th percentile ICT expenditure to total operating expenditure ratio.

In Figure 11, we show event study results for the split regression on the e-filing rate and ICT expenditure rates. We plot the CRS treatment coefficients, each of which marks the change in cross-border deposits held in the tax havens versus nonhavens in one quarter over the sample period, relative to the quarter before the CRS treatment event date (k=-1), with quarters before

[33] In both cases, missing values are set to zero, this choice does not affect the outcomes.

k-8 and after k+8 binned at the endpoints. We highlight the coefficients for receiving countries with a high e-filing (ICT expenditure) rate in black and those for countries with a low e-filing (ICT expenditure) rate in gray-green. We display the results together with 95% confidence intervals.

In both graphs, except k=-4, all coefficients in the pre-period (k-1 to k-8+) are statistically indistinguishable from the benchmark quarter and show no trend over time, supporting the validity of the parallel-trends assumption in our analysis. In panel A, the split on e-filing rates, we observe that, after the CRS treatment date, there is an immediate and statistically significant decrease in cross-border deposits in tax havens compared to the nonhavens if the receiving country has a high e-filing rate. From k=3, the coefficient size levels off at about -0.5 and is significant until the end of the sample period. In the low e-filing rate countries, we also observe a decrease in cross-border deposits in tax havens compared to the nonhavens after treatment, but the effect levels off earlier, and the size of the decrease following the periods after k=1 is larger for receiving countries with a high e-filing rate compared to those with a low e-filing rate and stays larger until the end of the sample period. In panel B, we observe that, after the CRS treatment, there is an immediate reduction in cross-border deposits in both high and low ICT expenditure receiving countries, and, in the short term, the high ICT expenditure receiving countries appear to exhibit a stronger CRS effect, which partially reverses after k=5. Overall the difference in effects strengthens in the e-filing rate split, for which reason we focus on this split in the remainder. Figure 6 above showed substantial country-level variation in the PIT e-filing rate and that this country characteristic is uncorrelated with GDP per capita, rule of law, population, and tax haven exposure.

In Table 4 columns (2)-(4), we confirm the results on the relevance of local enforcement capacity in the receiving country in the difference-in-differences analysis. We split treated receiving countries into high and low e-filing rate countries as in panel A of the event study figure before. We find that the CRS treatment effect strengthens in the receiving countries with a high e-filing rate. The coefficient size is substantially larger. In a given quarter-year, the average amount of cross-border deposits held by a home country in a tax haven in our sample is USD 582 million. The reduction of 34 percent (based on a log-linear coefficient of -.408) in high e-filing countries is thus a mean reduction of USD 195 million in the average amount of cross-border deposits held by a home country in a tax haven relative to the non-haven country pair. In both sub-samples, the coefficients are statistically significantly different from zero. To test whether the difference in effect sizes is statistically significant, we run, in column 4, the same test in the full sample with a triple interaction on the e-filing dummy instead of splitting the sample. We find that this triple interaction is statistically significant with a p-value of 9%. In combination, our results show that the effect of the CRS is economically and statistically significantly stronger in high e-filing receiving countries when compared to low e-filing receiving countries.

We conduct two robustness analyses of these results. First, since part of our control group is made up of non-haven country pairs, it would be problematic if non-haven country pairs' time

Table 4: Receiving Country Analysis - Changes in Cross-Border Deposits by Personal Income Tax E-filing Rate

Sample	Full Sample	E-Filling		Full Sample
		High	Low	
Outcome	Cross-Border Deposits (log)			
	(1)	(2)	(3)	(4)
PostCRS * Haven	-0.296***	-0.408***	-0.260***	-0.260***
	(0.041)	(0.076)	(0.049)	(0.049)
High E-filling * PostCRS * Haven				-0.149*
				(0.090)
Controls (EUPair*CRS*Haven)	X	X	X	X
Baseline Interactions	X	X	X	X
Observations	81,450	11,764	69,686	81,450
R-squared	0.957	0.955	0.956	0.957
Fixed Effects	Country Pair, Quarter-Year			
Clustering	Country Pair			

Note: The table reports the main difference-in-differences estimates for the receiver analysis. The dependent variable is the logarithm of the sum of the cross-border deposits held in country i by deposit country j at time t. The unit of observation is the aggregated deposits at the country-pair level, and the sample period goes from the first quarter of 2014 to the last quarter of 2018. The sample comprises tax haven as well as non-haven deposits. Haven is an indicator for deposits held in tax havens. PostCRS is an indicator variable for the period after the CRS took effect in the deposit country. We control for heterogeneity in treatment effects for EU country pairs i,j. Standard errors are clustered at the country-pair level, and all specifications include year-quarter and country-pair fixed effects. Standard errors are reported in parentheses.

trends post-treatment differ from trends of country pairs with haven deposit countries. Then our control group is biasing our treatment effect estimate. To rule out that our results are affected by the inclusion of the non-haven pairs as control, we rerun our receiving country analysis in a sample limited to haven deposit countries (dropping all non-haven country pairs from the sample). In Appendix A.5, we find that all our results continue to hold in this much more restrictive sample (the sample is about halved), and the difference in coefficient size for high and low E-filling receiving countries is even larger. Second, our staggered difference in different specifications could be biased by heterogeneous treatment effects. Although this threat is less severe if there is a large number of non-treated control units, as is the case in our estimation, we nevertheless probe the robustness of our findings when estimating treatment effects based on the Callaway and Sant'Anna (2021). The intuition of the approach is to use only never-treated observations instead of already-treated observations as controls. In Appendix A.6, we find that while the coefficient sizes are smaller in the Callaway and Sant'Anna (2021)-based test, the difference in CRS-effect between high and low e-filling receiving countries is even more pronounced.

Taken together with our findings from the sending country analysis, we show not only that CRS implementation in the sending country matters for CRS effectiveness but also the capacity of the receiving country to use the information received. Thus, despite the CRS being drafted as a homogenous instrument across multiple countries, local implementation and tax authority capacity seem to matter significantly for its effectiveness.

4.3 Results Discussion and Limitations

With our findings, we show that notable differences exist in reactions to the CRS, depending on the country that is implementing the CRS locally. While some haven-to-non-haven country pairs show almost no response to CRS activation, in others, the effects are substantial. Note that we do not claim causality for the influence of country characteristics that we can isolate, although we add the aforementioned robustness analysis to exclude plausible alternative explanations. In our information-sending country analysis, we find that CRS enforcement is correlated with the size of the local economy (e.g., GDP) and being a conduit country. Therefore we test the robustness of our findings to excluding high GDP countries or conduit countries. In the receiving country analysis, we identified tax authority digitization as an important determinant of CRS effectiveness, and we find that tax authority digitalization is not correlated with the rule of law, GDP per capita, or a country's inequality. Yet it may be correlated with other observable or unobservable country factors. In particular, we do not take a stance on whether it is tax authority capability or willingness that results in the CRS being more or less effective. Willingness and capability are intertwined; if one nation is less willing to enforce the CRS, it will allocate fewer resources to implementation, thus hindering administration.

Beyond these limitations, what our study demonstrates is that the CRS effectiveness varies significantly across countries, and this variation correlates plausibly with the countries' tax authority capacity and the local CRS implementation. In this way, our results provide the first evidence that caution is necessary when drawing conclusions on the effectiveness of a global tax agreement from a single-country analysis and that local enforcement plays a vital role in assessing taxpayers' response to tax transparency initiatives.

5 Conclusion

Our results illuminate how the characteristics of sending and receiving countries relate to the success of the CRS as a global tax agreement. We find substantial differences in local CRS effectiveness.

On the sending country level, we build a novel dataset relying on newly published OECD Peer Review reports on CRS enforcement. Using daily bank transfer data from tax havens to Norway, we investigate heterogeneous reactions to the CRS, depending on local enforcement. On the receiving country level, we operationalize a new dataset from the OECD Tax Administration Survey with

approximately 100 variables on the capacity of the tax administration. Relying on macro data on cross-border bank deposits, we establish the critical characteristics of the receiving countries for making the CRS more effective.

Our sending country analysis of transfers to Norway provides causal evidence of a substantial increase of likely legalized flows from tax havens to Norway post CRS and confirms previous evidence of significant changes in cross-border deposits post CRS. We can isolate bank transfers conducted through several layers of secrecy, which allows us to come closer to an accurate identification of illicit financial flows when compared to the literature. Using this novel data on the ownership chains of bank accounts, we show a statistically significant increase in bank transfers from tax havens to Norway around the local CRS activation, relative to tax havens that did not introduce the CRS or that introduced the CRS later.

Yet the aggregated country effect masks substantial differences in the response of individuals related to the quality of CRS implementation in the sending country and the ability of the receiving country to use that information. We show that, around the CRS activation dates, the detected reaction is mainly driven by transfers from bank accounts located in tax havens with a high level of local CRS enforcement. This is especially true for tax havens that conducted extensive CRS-implementation-related direct communication and training sessions with local financial institutions.

Our analysis does not stop here; in addition to studying CRS responses in a resource-rich country like Norway, we also contribute to increasing the understanding of the role of heterogeneity in receiving countries for the effectiveness of the CRS. Analyzing the difference in the effectiveness of the CRS for receiving countries, we find that receiving country information processing capabilities also matter for the success of the CRS: cross-border deposits located in havens and owned by residents of countries with high personal income tax e-filing rates react significantly stronger to the CRS, compared to those held by residents of countries with low e-filing. The CRS effect for high e-filing countries is, on average, about twice as large as for low e-filing countries.

Our study's findings are crucial for policymakers, as we highlight that merely having an AEOI system is insufficient; local implementation is essential. We show that CRS implementation effects vary significantly with country characteristics related to tax authority capacity and CRS implementation quality. While we cannot rule out the possibility that other correlated country characteristics influence the observed effects, our contribution is to show that country characteristics are strongly associated with CRS effects.

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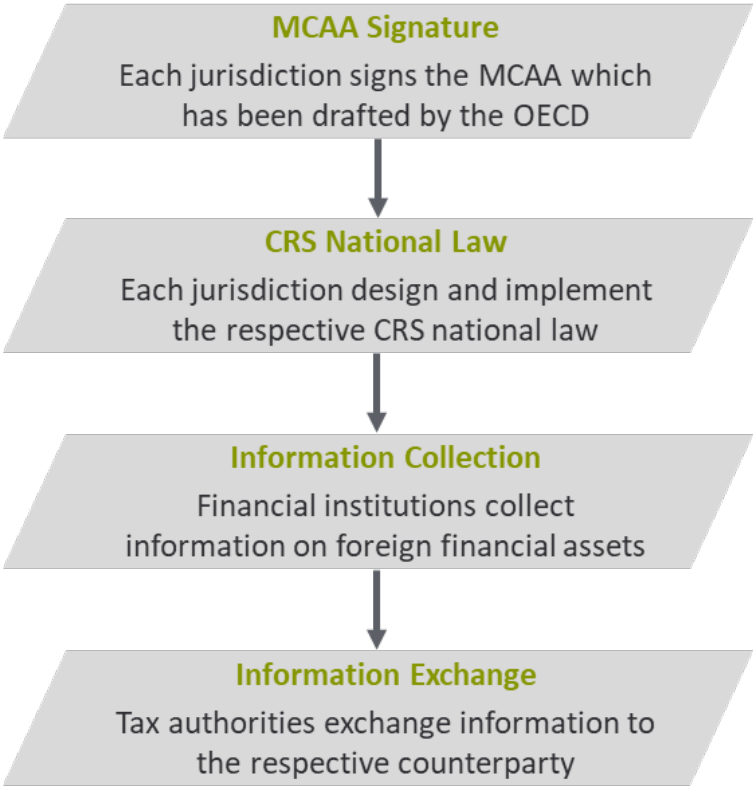
A Online Appendix: Figures and Tables

A.1 The OECD Global Forum and the Common Reporting Standard

In this section, we provide a comprehensive description of the legal process to become a CRS-participating jurisdiction and the OECD Peer review evaluation.

The OECD Model for AEOI is the bilateral or multilateral duty of participating jurisdictions to transpose the CRS into domestic law, to ensure the establishment of a suitable IT system to collect and exchange the information on foreign account holders with the respective jurisdictions and to guarantee adequate protection of the exchanged data.

Figure A.1: The CRS Journey



Notes: The figure present the steps required to become a CRS participating jurisdiction.

The first step to become a CRS participating jurisdiction is to sign the Multilateral Competent Authority Agreement (MCAA), which represents a country commitment to introduce the CRS locally by setting its legal basis at national level. As of 2023, more than 120 countries signed the MCAA.[34] Most of the signatory jurisdictions already have the CRS introduced nationally. The CRS national laws are designed following the OECD model for AEOI which dictates the diligence and reporting regulations which financial institutions must follow in order to collect and transfer the required financial information to their respective tax authorities. The OECD also provides reporting schema in extensible mark-up language (XML), i.e. the CRS XML Schema, so that all jurisdictions exchange the information in a standardised manner. Overall, each jurisdiction have

[34]For the full list of signatory jurisdictions, see https://www.oecd.org/tax/automatic-exchange/international-framework-for-the-crs/crs-mcaa-signatories.pdf

certain degree of freedom when designing the CRS law nationally, for example in the local monetary penalties for non compliance, in the specific list of non-reportable financial institutions or assets, or in the scope of reportable assets (including reporting all foreign assets or only those from CRS participating jurisdictions).[35]

Over the years, the OECD launched several initiatives that aim to monitor and assess the effectiveness of local administrative compliance to ensure an effective implementation of the CRS. Initiatives included the establishment an online disclosure facility signaling the risk of shifting income to "non-reportable financial institutions". For example, Hong Kong initially classified Occupational Retirement Schemes ("ORSs") as non-reportable financial institutions. However, the OECD received several reports on its online disclosure facility indicating the risk of exploiting "ORSs" to avoid CRS requirements. This lead to international pressure resulting in Hong Kong issuing strict guidance limiting the category of non-reportable ORSs for CRS purposes. Moreover, on 9 March 2018, the OECD released Model Mandatory Disclosure Rules for CRS Avoidance Arrangements and Opaque Offshore Structures. It sets the standard for mandatory disclosure regime requiring intermediaries, such as consultants, lawyers, or financial institutions, to report a comprehensive set of information on all currently used transactions that (purport to) circumvent the CRS and on structures that disguise the beneficial owners of assets held offshore.

Finally, the OECD launched a comprehensive peer review program which aims to assess the effectiveness of each jurisdiction's CRS law and its local implementation. The results of the the peer review have been published in two separate reports issued in 2021 and 2022 respectively. The peer review has been conducted over multiple years with multiple sessions depending on the topic of the review. The peer review is conducted by a team of CRS experts from local tax administrations and by representative of the Global Forum on Transparency and Exchange of Information for Tax Purposes. Team members change each time a new review is conducted and each member from the local tax administration team is assigned to multiple countries at the same time.

Figure A.2 shows the evaluation of criteria in the first Peer Review Report on compliance with the AEOI Standard along two dimensions, specifically to which extends the domestic and international legal frameworks are in line with the prescribed requirements under the CRS model. Both the domestic and international frameworks are evaluated either as "In Place", "In Place but Need Improvements" and "Not in Place" as described in figure A.2. We classify a country as high legal framework if the OECD Peer Review reports the country's domestic/international legal framework as "In Place".

We consider the second OECD Peer Review Report to evaluate a country's effectiveness of the CRS implementation in practice. For this purpose, we collect data on four dimensions which includes the country's communication effort, reporting verification, quality verification and enforcement.

Figure A.4 shows the results for the first country on the list, namely Andorra and provide an overview of the information we use to create our CRS enforcement dataset. Below a detailed overview of how we classify the country in our sample. We classify a country with high communication, reporting verification, quality verification if the word "substantial" or similar is used and we classify a country with high penalties if at least a monetary penalty was charged.

[35] See Casi et al. (2019) for an overview of differences across CRS national laws.

Figure A.2: Peer Review Evaluation Criteria - Legal Framework

Table 2.1. The determinations

Determination	Description
In Place	A jurisdiction's legal framework is determined as being "**In Place**" where the review of its legal framework does not identify any gaps that need to be addressed in order for the legal framework to be in accordance with the AEOI Terms of Reference. This is the case where the peer review processes have not resulted in any recommendations. It is possible, although unusual, for a legal framework to be determined to be In Place even where there is a recommendation. This is only the case where the gap is viewed as so minor that it would have a highly limited impact on the operation of the AEOI Standard.
In Place But **Needs Improvement**	A jurisdiction's legal framework is determined as being "In Place But **Needs Improvement**" where the review of its legal framework concludes that the legal framework is in place but certain aspects need improvement in order for it to be fully in accordance with the AEOI Terms of Reference. This is the case where the peer review processes have identified one or more deficiencies material to the proper functioning of elements of the AEOI Standard. The determination of In Place But Needs Improvement is therefore a broad category. It includes jurisdictions with one recommendation, as well as jurisdictions with multiple recommendations. In all cases, the deficiencies are viewed collectively as material to the proper functioning of certain elements of the AEOI Standard, but not to its overall operation.
Not In Place	A jurisdiction's legal framework is determined as being "**Not In Place**" where the review of its legal framework shows that the legal framework needs to be significantly improved in order to be in accordance with the AEOI Terms of Reference. At the extreme, this is the case where a jurisdiction has not implemented the relevant legal framework. More commonly, this is where the peer review processes have resulted in recommendations viewed collectively as having a material impact on the overall operation of the AEOI Standard. It is important to note, aside from the jurisdictions that have not implemented a legal framework, a determination of Not In Place does not mean that a jurisdiction's legal framework is not in effect. In fact, several aspects of that legal framework are likely to be in place as required. The determination instead means that the impact of the deficiencies found are viewed as creating a material risk to the overall proper functioning of the AEOI Standard (e.g. a jurisdiction's legal framework to enforce the due diligence requirements is substantively incomplete).

Notes: The table is taken from the OECD Peer Review of the Automatic Exchange of Financial Account Information 2020 and it summarize the information from the Peer Review Process on Andorra.

Figure A.3: Peer Review Evaluation Criteria - Operational Framework

Table 3. **Activities undertaken**

Activity type	Activities undertaken
Communication and outreach	Andorra has carried out substantial communication and outreach activities, such as the training of Financial Institutions, publishing a webpage with relevant and up-to-date information on compliance and constant communication with Financial Institutions' associations.
Verifying that Financial Institutions are reporting as required	Andorra has carried out substantial verification activities to ensure that Financial Institutions are reporting as required, such as ensuring all Financial Institutions registered with the AFA submit the required reports and identified one Financial Institutions incorrectly not reporting. It is following up on this issue with a view to ensuring future compliance.
Verifying whether the information reported is complete and accurate	Andorra has conducted a significant number of desk-based checks to verify whether the due diligence rules are being properly implemented and the information being reported is complete and accurate. Furthermore, Andorra has ordered and reviewed the reports of a significant number of in-depth external audits and identified no issues.
Enforcement	Following the activities mentioned above, Andorra has not yet imposed penalties and sanctions, but has one case open in court for failure to report.

Notes: The table is taken from the OECD Peer Review of the Automatic Exchange of Financial Account Information 2022.

Figure A.4: Classification Example - CRS Enforcement Dataset

Category	Classification
Communication Effort: "Country A has carried out XX communication and outreach activities. (..)"	0: NO 1: SOME 2: SUBSTANTIAL
Reporting Verification: "Country A has carried out XX verification activities to ensure that Financial Institutions are reporting as required. (..)"	
Quality verification: "Country A has conducted XX desk-based checks in one financial sector to verify whether reported information is complete and accurate. (..)"	

Finally, we list the countries in each category of enforcement level used for our analysis, i.e. communication level and domestic legal framework. The data originates from the OECD Peer Review Data on quality of CRS national implementation.

For the variable "Communication", the countries are divided into high versus low as follows:

- **Communication high**: Andorra, Belgium, Bermuda, Cayman Islands, Cook Islands, Cyprus, Guernsey, Hong Kong (China), Ireland, Isle of Man, Jersey, Liechtenstein, Luxembourg, Malaysia, Malta, Mauritius, Saint Kitts and Nevis, San Marino, Singapore, Switzerland
- **Communication low**: Anguilla, Antigua and Barbuda, Aruba, Austria, Bahamas, Bahrain, Barbados, Belize, Chile, Costa Rica, Curaçao, Dominica, Gibraltar, Grenada, Lebanon, Marshall Islands, Monaco, Montserrat, Panama, Saint Lucia, Saint Vincent and the Grenadines, Samoa, Seychelles, Turks and Caicos Islands, Uruguay, Vanuatu

For the variable "Domestic Legal Framework", the countries are divided into high versus low as follows:

- **Domestic Legal Framework high**: Anguilla, Austria, Bahrain, Bermuda, Cayman Islands, Cook Islands, Cyprus, Gibraltar, Guernsey, Hong Kong (China), Ireland, Isle of Man, Jersey, Lebanon, Luxembourg, Malaysia, Malta, Marshall Islands, Mauritius, Saint Kitts and Nevis, Samoa, San Marino, Singapore, Vanuatu
- **Domestic Legal Framework low**: Andorra, Antigua and Barbuda, Aruba, Bahamas, Barbados, Belgium, Belize, Chile, Costa Rica, Curaçao, Dominica, Grenada, Liechtenstein, Monaco, Panama, Seychelles, Sint Maarten, Switzerland, Trinidad and Tobago, Turks and Caicos Islands, Uruguay

A.2 Norwegian Tax Authorities

In our analysis on the heterogeneous responses to the local CRS enforcement, we rely on Norwegian daily bank transfers. The advantage of using these data is two-folds: on the one side, we have a large enforcement variation in the sample of sending countries as we observe transfers from 41 tax havens and on the other side, we can hold the enforcement level at the receiving country fix since we consider only transfers to Norway. Additionally, we can expect that the enforcement level in Norway is among the highest within our sample of receiving countries. In this section, we offer an overview of key statistics on Norway and the Norwegian tax authorities in particular so as to motivate why our data represents the ideal setting for testing the heterogeneous responses to the CRS where only the sending country enforcement level can explain the different reactions of taxpayers.

First, according to Worldwide Governance Indicators from the World Bank, Norway display one of the highest rule of law level being second only to Finland. Recent OECD survey offers further insights in the level of trust of the society towards public institutions: for example, 73% of businesses and 81% of individual taxpayers have trust in the Norwegian tax authority, see (OECD, 2022).

Taxes represent an important source of funding for the Norwegian government as tax revenue is more than 50% of the total revenue, where personal income taxes and value added taxes are the major source of revenue. When considering employees allocation within the Norwegian tax authority: excluding the residual category of other function, the largest percentage staff is allocated to registration taxpayer services, returns and payment processing, followed by enforced debt collections and related functions and lastly tax audits and investigations. Most of the resources are

allocated to employee wages (around 80%) and a minor part to ICT spending (around 10%). The Norwegian tax authority is highly digitized with an e-filing rate close to 99% in 2022.

Finally, Norway achieved a extremely high matching rate with respect to the CRS data and national tax return data. Out of all accounts received, 90% could be linked to existing taxpayer information. This ratio is well above the matching rates of, for example, other EU countries which ranges between 37% to 80% (EU Commission, 2018).

A.3 Sending Country Analysis - Alternative Control Group

In our baseline model, the sample of sending countries includes exclusively tax havens and we compare cross-haven transfers to within-haven transfers. For example, the control group would include a transfer to Norway from a bank account located in Switzerland and owned by a Swiss. Within-transfers represent an ideal control group because we expect them not to react once the CRS becomes effective since such transfers are not mainly not for secrecy and/or tax evasion reasons and they enable us to control for all deposit-level shocks which might occur at the same time as the local introduction of the CRS. Nevertheless we offer the results relying on an alternative control group.

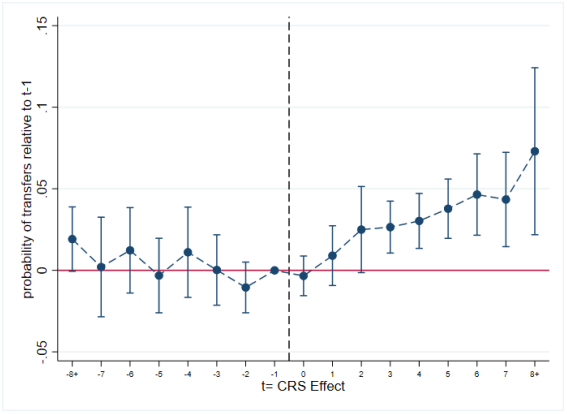
In Figure A.5, we present the baseline results comparing cross-havens transfers (treated group) and non-tax havens transfers where the foreign deposit and the owner of the foreign deposits are located in the same country. For example, the control group would include a transfer to Norway from a bank account located in Germany and owned by a German. Non-tax havens transfers represent a sound control group because one can expect such transfers to be mainly for trade reasons (similarly to within-tax haven transfers) yet we cannot rule out that the change in cross-tax haven transfers is exclusively caused by the introduction of the CRS since we are comparing transfers to Norway which originate from two different countries. Results are in line with our baseline test as we observe no changes in transfers around the introduction of the CRS for the non-tax haven transfers to Norway.

A.4 Sending Country Analysis - Excluding Conduit Countries or high GDP countries

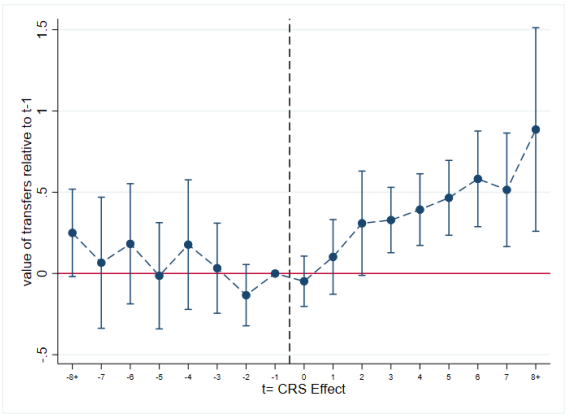
In our baseline model, the sample of sending countries includes all tax havens as listed in Johannesen and Zucman (2014) and Gravelle (2015) conditional on the country having the CRS in place and being observable in our bank transfer data. We notice that the haven countries that are considered conduit locations are overwhelmingly high-communication countries. Therefore, the difference in effects between high and low communication could be driven by conduit haven countries that may differ from other small haven countries by further characteristics.

We show the robustness of our results by excluding conduit countries. We consider the broadest list of conduit countries, which combines the one in **?** and Bolwijn et al. (2018). For our sample, this implies excluding Austria (low CRS communication, high Legal Framework); Hong Kong, Ireland, Luxembourg, Singapore (all high communication and legal framework) and Belgium, Switzerland (high CRS communication, low legal framework).

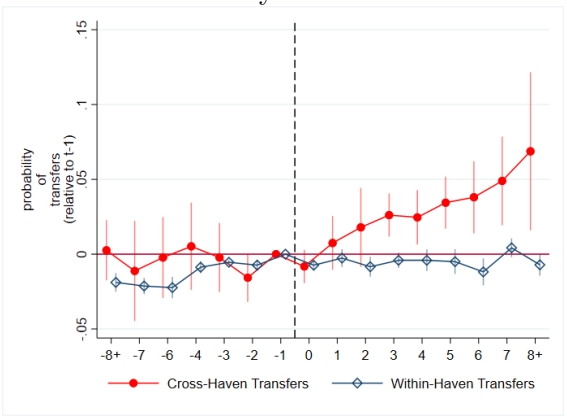
Figure A.5: Sending Country Analysis: Changes in Cross-Border Bank Transfer with Alternative Control Group



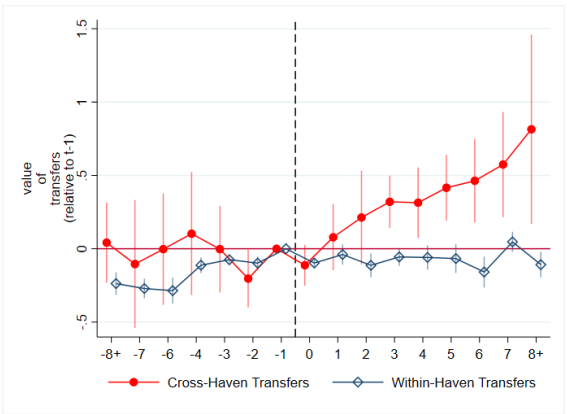
Probability of Transfers



Value of Transfers



Probability of Transfers



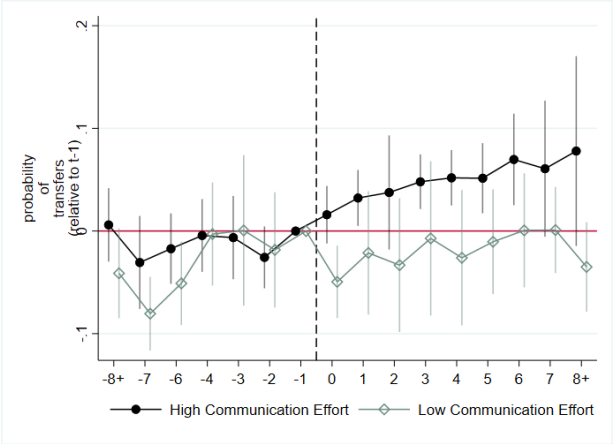
Value of Transfers

Notes: The figure is a replication of figure 7. The blue line includes only non-tax haven transfers, where the non-tax havens where the bank account j is located, is the same as z, i.e. the non-tax havens where the owner of the foreign bank account is located.

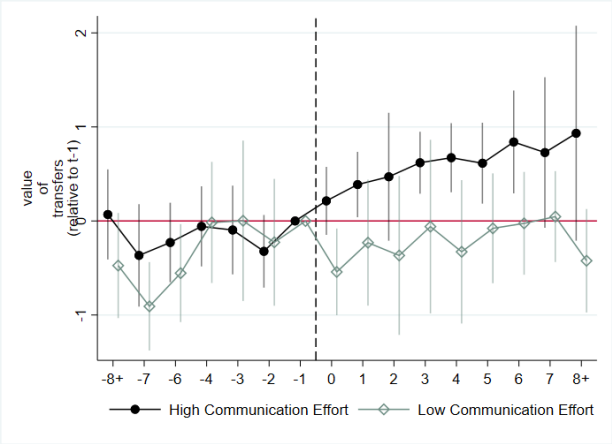
In Figure A.6, we present the baseline results comparing cross-havens transfers (treated group) and within-tax havens transfers excluding conduit countries. Results are in line with our baseline test on local enforcement level as we observe that bank transfers to Norway are mainly from tax havens with stronger CRS-related communication efforts. Relative while the taxpayers response is more similar when considering the CRS legal framework shapes the probability of bank transfers to Norway.

Furthermore, we observe in Figures 4 and 5 in our paper that CRS haven enforcement is correlated with being a high GDP per capita tax haven, therefore we test whether our results still hold if we test for the role of CRS haven enforcement within low GDP per capita havens. As visible in Figure A.7 in the sub-group of low GDP per capita havens our results hold, the transfers to Norway are dominantly in the high enforcement countries.

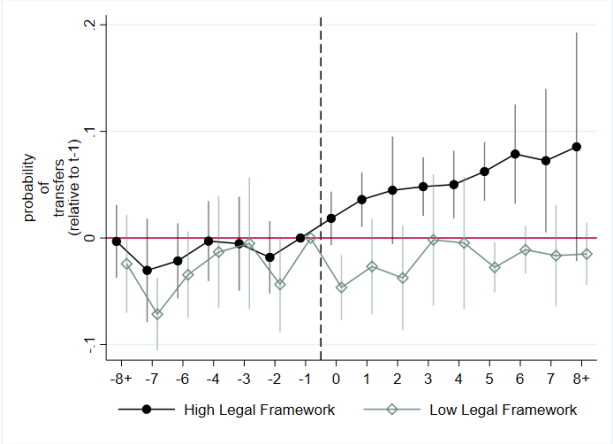
Figure A.6: Sending Country Analysis: Changes in Cross-Border Bank Transfer - Enforcement Test excluding Conduit Countries



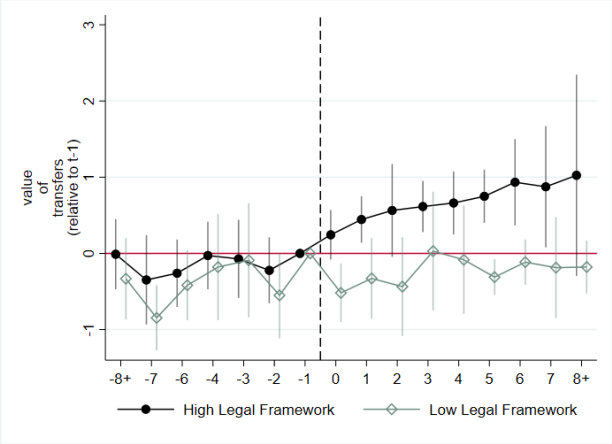
Probability of Transfers, Communication



Value of Transfers, Communication



Probability of Transfers, Law Enforcement



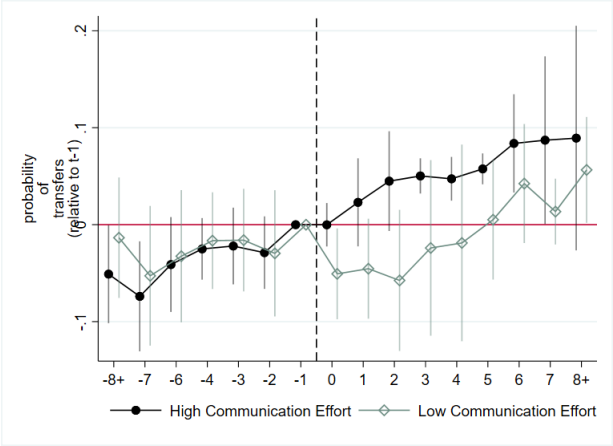
Value of Transfers, Law Enforcement

Notes: The figure is a replication of figure 8 excluding Austria, Belgium, Hong Kong, Ireland, Luxembourg, Singapore and Switzerland.

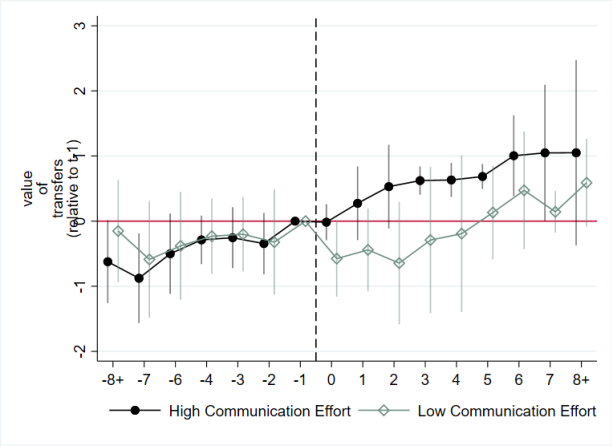
A.5 Receiving Country Analysis - Dropping Non-Haven Pairs from the control group

In the receiving-country analysis, we use all country pairs available in the BIS LBS database. This includes the placebo-CRS-treated non-haven country pairs, which we include as controls in the sample (e.g., we do not expect changes in German deposits held by French residents adopting the CRS bilaterally). However, it could be that deposits in non-havens are subject to different shocks than those located in haven countries. This would be a particular concern if the deposits in these control non-haven pairs increased after CRS treatment since the deposit reduction in our treated group would then be overestimated. To rule out that the inclusion of non-haven deposit countries in our control group affects our results, we drop non-haven country pairs in this robustness test. The control group is now limited to haven deposit countries that have not yet adopted the CRS or never adopted the CRS in our sample period. Note that the sample size is about halved. Yet, Table A.1 Column (4) indicates that the difference between high and low digitized receiving countries' CRS effectiveness is even more pronounced in this more restrictive specification. Overall, Figure

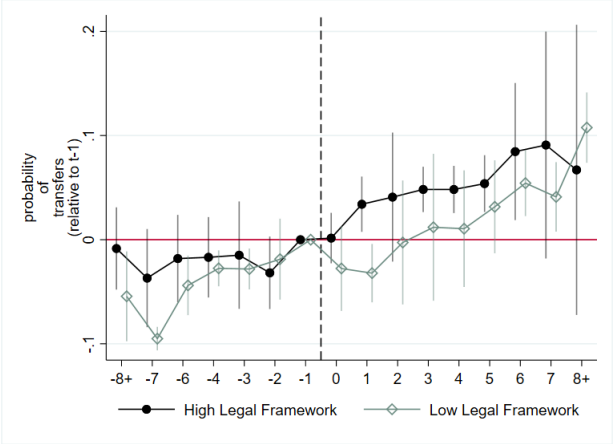
Figure A.7: Sending Country Analysis: Changes in Cross-Border Bank Transfer - Enforcement Test Excluding High GDP Countries



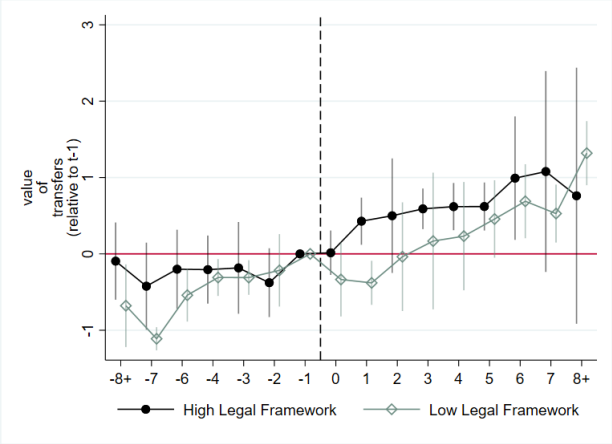
Probability of Transfers, Communication



Value of Transfers, Communication



Probability of Transfers, Law Enforcement



Value of Transfers, Law Enforcement

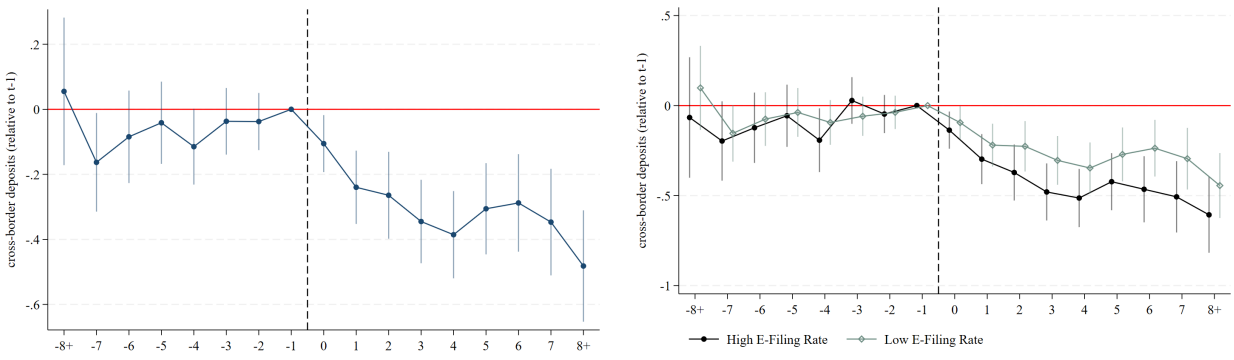
Notes: The figure is a replication of figure 8 excluding tax havens with above median GDP level. The GDP level is computed as in the descriptive statistics where GDP level is from 2018 and median is computed within the tax haven sample.

A.8 and Table A.1 show that all our results from the receiving country analysis hold without the non-haven country pairs in our control group.

A.6 Receiving Country Analysis - Callaway and Sant'Anna 2021

As a robustness test, we show our receiving country results using alternatively the estimator proposed by Callaway and Sant'Anna 2021 for staggered treatments. The intuition behind the Callaway and Sant'Anna (2021) estimator is to use only never-treated or not-yet-treated units as controls in order to obtain consistent and unbiased estimates in staggered difference in difference designs where there might be heterogeneous treatment effects. Note that our identification should be less subject to this issues of staggered differences in different designs because of a large set of never-treated units (even more so in the sending country analysis). Nevertheless, we show robustness based on the approach proposed by Callaway and Sant'Anna 2021. Our results hold in this alternative specification. We report the results in Table A.2 and Figure A.9. We rely on the stata command

Figure A.8: Receiving Country Analysis - Dynamic Effects, dropping non-haven x non-haven country pairs



Panel A: The CRS Effect Revisited

Panel B: PIT E-Filling Rate

The figure shows regression coefficients and associated 95% confidence bands, each of which marks the quarterly change in cross-border deposits located in treated havens versus non-treated havens relative to the CRS event date (we dropped non-haven country pairs from the sample). The outcome variable is the logged cross-border deposits measured at the country pair level. We control for country pair and time-fixed effects as well as for EU-Pair treatment. Standard errors are clustered at the country-pair level. The event study coefficients are binned at the endpoints (binned coefficients are shown). In panel A, we show the overall effect of CRS adoption in havens. In panel B, in the black plot, the sample is limited to those receiving countries with an above median percentage of PIT e-filing rate, versus in the gray plot, where the sample is limited to those receiving countries with a below median percentage of PIT e-filing rate or a missing PIT e-filing rate.

'csdid', with the default using only never treated controls in estimation. We add the option of long gaps. The omitted parameter at (t-1) is not reported in Figure A.9.

Table A.1: Receiving Country Analysis - Dropping non-haven x non-haven country pairs

Sample	Full Sample	E-Filling		Full Sample
		High	Low	
Outcome	Cross-Border Deposits (log)			
	(1)	(2)	(3)	(4)
PostCRS *Haven	-0.272***	-0.453***	-0.234***	-0.235***
	(0.056)	(0.111)	(0.063)	(0.063)
	0.000	0.000	0.000	0.000
High E-Filling * PostCRS *Haven				-0.216*
				(0.127)
				0.089
Controls (EUPair*CRS*Haven)	X	X	X	X
Baseline Interactions	X	X	X	X
Observations	47,246	6,273	40,973	47,246
R-squared	0.953	0.946	0.953	0.953
Fixed Effects	Country Pair, Quarter-Year			
Clustering	Country Pair			

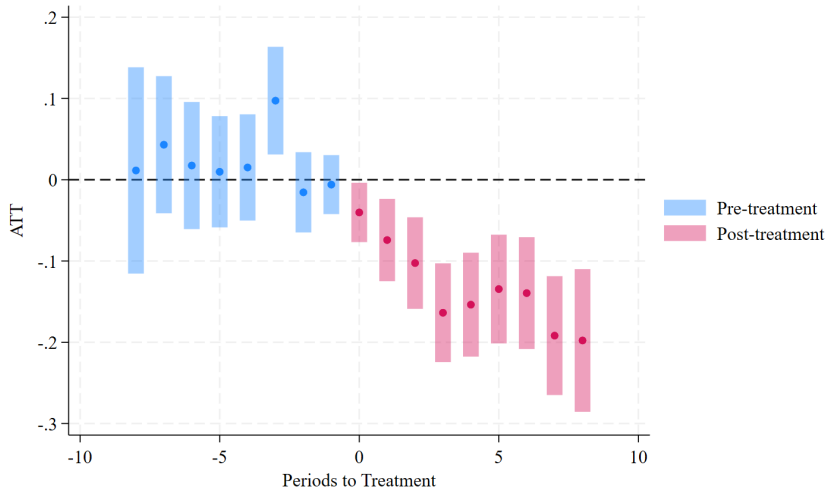
Note: The table reports the difference-in-differences estimates for the receiver analysis dropping non-haven country pairs. The dependent variable is the logarithm of the sum of the cross-border deposits held in country i by deposit country j at time t. The unit of observation is the aggregated deposits at the country-pair level, and the sample period goes from the first quarter of 2014 to the last quarter of 2018. The sample comprises tax haven as well as non-haven deposits. Haven is an indicator for deposits held in tax havens. PostCRS is an indicator variable for the period after the CRS took effect in the deposit country. We control for heterogeneity in treatment effects for EU country pairs i,j. Standard errors are clustered at the country-pair level, and all specifications include year-quarter and country-pair fixed effects. Standard errors are reported in parentheses.

Table A.2: Receiving Country Analysis - Changes in Cross-Border Deposits by Personal Income Tax E-filing Rate, Callaway and Sant'Anna (2021) based estimation

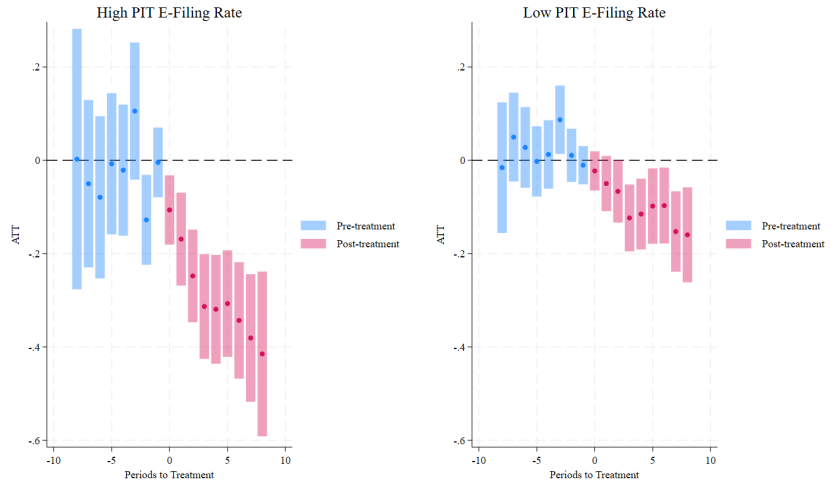
Sample	Full Sample	E-Filling	
		High	Low
Outcome	Cross-Border Deposits (log)		
	(1)	(2)	(3)
PostCRS * Haven	-0.153***	-0.319***	-0.117***
	(0.027)	(0.053)	(0.032)
Observations	80,346	11,716	68,630
Fixed Effects	Country Pair, Quarter-Year		
Clustering	Country Pair		

Note: The table reports the difference-in-differences estimates for the receiver analysis based on Callaway and Sant'Anna 2021 for staggered treatment correction (Stata command csdid). The dependent variable is the logarithm of the sum of the cross-border deposits held in country i by deposit country j at time t. The unit of observation is the aggregated deposits at the country-pair level, and the sample period goes from the first quarter of 2014 to the last quarter of 2018. The sample comprises tax haven as well as non-haven deposits. Haven is an indicator for deposits held in tax havens. PostCRS is an indicator variable for the period after the CRS took effect in the deposit country. We control for heterogeneity in treatment effects for EU country pairs i,j. Standard errors are clustered at the country-pair level, and all specifications include year-quarter and country-pair fixed effects. Standard errors are reported in parentheses.

Figure A.9: Receiving Country Analysis - Dynamic Effects, Callaway and Sant'Anna (2021) based estimation



Panel A: The CRS Effect Revisited



Panel B: PIT High/Low E-Filling Rate

The figure shows regression coefficients and associated 95% confidence bands, each of which marks the quarterly change in cross-border deposits located in treated havens versus non-treated havens and non-havens relative to the CRS event date. The outcome variable is the logged cross-border deposits measured at the country pair level. We control for country pair and time-fixed effects. Standard errors are clustered at the country-pair level. The event study coefficients are not binned at the endpoints (binned coefficients are not shown). In panel A, we show the overall effect of CRS adoption in havens. In panel B, the sample is limited to those receiving countries with high or low percentage of PIT e-filing rate. It we miss information on the percentage of PIT e-filling rate we code the country as having a low percentage.

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