When Bankers become Informants: Behavioral Effects of Automatic Exchange of Information*

Jeanne Bomare† Matthew Collin‡

February 10, 2025

Abstract

Over the past decade, more than 100 jurisdictions have signed automatic exchange of financial information agreements (AEoI) in an effort to fight cross-border tax evasion. This paper uses account data leaked from an Isle of Man bank to study the effectiveness of these agreements. We establish three sets of results. First, we find that AEoI treaties do not legally cover a large share of assets held offshore, which are thus not subject to any reporting requirement. Second, we observe that banks in charge of reporting appear to correctly identify and truthfully report most reportable individual accounts to tax authorities, but their reporting of accounts held through companies is less reliable. This difference in the quality of reporting could be due either to companies using more complex structures or to non-compliance by the bank. Third, we find evidence that bank clients who were more at risk of being reported on preemptively closed their accounts, potentially circumventing the AEoI reporting process. This paper provides new evidence on how sophisticated individuals ultimately avoided the AEoI transparency shock.

Keywords: Tax Evasion, Information Exchange, Tax Enforcement
JEL Codes: H26, G21, F42

*We thank Annette Alstadsæter, Elisa Casi, Felipe Carozzi, Jakob Miethe, Noam Noked, Nadine Riedel and Gabriel Zucman, as well as participants of seminars at the EU Tax Observatory, PSE, and at the 23rd LAGV, the CESifo Venice Summer Institute 2024 and the IIPF 2024 for helpful comments and suggestions. Thijs Busschots, Souleymane Faye and Edoardo Montagner provided excellent research assistance. This publication benefited from the support of the European Union (GA no. TAXUD/2022/DE/310) and the EUR grant ANR-17-EURE-0001. Views and opinions expressed in this publication are those of the authors only and do not necessarily reflect those of the European Union.

†CenTax, Paris School of Economics, EU Tax Observatory
‡EU Tax Observatory, NMBU

1 Introduction

Tax authorities routinely rely on various forms of third-party reporting to ensure that taxpayers report their income and wealth truthfully (Kleven et al., 2011; Pomeranz, 2015). This is complicated by the growing ability of taxpayers to shift their assets overseas to tax havens, jurisdictions that initially refused to share information with foreign tax authorities. As a result, offshore financial assets in tax havens have grown to approximately 10% of global GDP (Faye et al., 2023), leading to a substantial amount of lost tax revenue (Pellegrini et al., 2016). This figure has remained stable over the past decade, despite the implementation of several sets of bilateral agreements aimed at curbing offshore tax evasion and offshore secrecy (Johannesen and Zucman, 2014; Johannesen, 2014; Caruana-Galizia and Caruana-Galizia, 2016).[1] However, in the 2010s, countries began to enter into agreements specifically aimed at improving the cross-border information that tax authorities have access to: automatic exchange of information (AEoI) agreements were designed to establish third-party reporting of foreign financial assets between participating countries on an automatic, annual basis. In contrast to an established literature on the effectiveness of domestic third-party reporting, we know less about its effectiveness when those responsible for the reporting (financial institutions) are not located in the same jurisdiction as those receiving the information (tax authorities), as well as when the latter are unable to check or enforce the quality of the reporting.

In this paper, we use leaked data from a bank in the Isle of Man to study the effectiveness of automatic information exchange policies. We focus on three main measure of effectiveness. First, we study the coverage of AEoI treaties and how legal loopholes lead to some customers not being reported, despite being tax residents of participating countries. Second, we analyze the reports sent by the offshore bank to estimate the quality and coverage of the information sent to foreign tax authorities. AEoI crucially relies on offshore institutions sending correct information about reportable accounts, and their compliance will directly affect how their clients react to the new transparency policy. Finally, we study the behavioral responses of offshore account holders to the implementation of automatic information exchange policies. More precisely, we focus on analyzing ways in which offshore users could have circumvented AEoI treaties.

We find that banks in charge of information reporting appear to identify reportable accounts correctly and to communicate this information truthfully to tax authorities for individuals, but less so for companies. This could be due either to companies using more complex structures, making determining the reporting status of their owner more difficult for the bank, or to errors by staff. We also establish that AEoI agreements seem to leave a large proportion of assets either outside of their scope or subject to a form of self-reporting rather than third-party reporting, especially for financial assets held through companies. Lastly, we find that customers

[1] These sets of policies include Exchange of Information upon Request treaties at the bilateral level, as well as Voluntary Disclosure Programs enforced at the country level.

targeted by AEoI are more likely to close their accounts around the announcement of the implementation of exchange of information, and that their net worth held at the bank falls significantly. However, overall, clients holding their accounts indirectly through an entity appear to be less affected by AEoI than individuals holding account in their own name, which suggests that incomplete coverage of financial assets held through entities significantly diminishes the effectiveness of AEoI.

Although automatic exchange of information is a relatively new innovation, it has rapidly spread in popularity over the last 15 years. In the early 2010s,[2] the United States began implementing the Foreign Account Tax Compliance Act (FATCA), forcing most jurisdictions around the world to regularly and automatically exchange information on bank account balances held by US citizens. Following the US approach, the UK designed an automatic information sharing agreement with the Crown Dependencies and Overseas Territories (UK CDOT) in 2013.[3] The most ambitious step was taken soon after by the OECD, which endorsed a Common Reporting Standard (CRS) for the Automatic Exchange of Information in 2014. More than 100 jurisdictions have committed to implementing the CRS, and the latest round of CRS information exchanged led to the reporting of $12.6 trillion in assets.[4]

AEoI has been shown to have an effect on the amount of wealth held in offshore centers. Johannesen et al. (2023) study the implementation of FATCA and find that U.S. taxpayers hold around $4 trillion in foreign accounts including almost half in ax havens, which is an order of magnitude higher than what US taxpayers disclosed during previous enforcement initiatives (Johannesen et al., 2020). De Simone et al. (2020) show that FATCA led to a decrease in equity foreign portfolio investment to the United States from tax havens, investments that can partly be attributed to U.S. investors' offshore tax evasion. Using data published by the Bank for International Settlements (BIS), several papers show that the CRS led to a reduction of cross-border bank deposits held in offshore centers of between 11% and 38%, depending on the time-period and the sample of tax havens considered (Menkhoff and Miethe, 2019; Casi et al., 2020; O' Reilly et al., 2021; Beer et al., 2019).

However, Automatic Exchange of Information policies also suffer from several loopholes, some of which have already be documented in the recent years. First, Casi et al. (2020) find that the introduction of the CRS led to an increase in deposits held in the United States, which currently does not exchange information under the CRS. As some states such as Delaware and South Dakota provide a combination of favorable tax rates and secrecy, this suggests that tax evaders relocated their assets towards non-participating offshore

[2]See O' Reilly et al. (2021) for a detailed timeline of the expansion of tax transparency and the introduction of the CRS.

[3]The Crown Dependencies include Jersey, Guernsey and the Isle of Man. The British Overseas Territories are made of fourteen territories, which include important offshore centers such as Bermuda, the British Virgin Islands, the Cayman Islands and Gibraltar.

[4]See OECD Secretary-General Tax Report to G20 Leaders: India, September 2023, OECD, Paris, page 10. https://www.oecd.org/en/publications/2023/10/oecd-secretary-general-tax-report-to-g20-finance-ministers-and-central-bank-governors-g20-ind794e51c2.html

centers. Second, AEoI agreements only cover financial assets, which means that offshore account holders could rebalance their portfolio away from financial assets towards real assets, to avoid being reported. Bomare and Herry (2023) show that the implementation of the CRS led to an increase in real estate investments from offshore centers in the UK, suggesting a significant shift from offshore financial assets to offshore real estate. De Simone et al. (2020) also find indirect evidence that U.S. taxpayers started to invest more in real estate as a means to bypass the FATCA reporting requirements, studying real estate prices. Third, as AEoI relies on reporting information to the home country of offshore accounts holders, another way that taxpayers could avoid being detected is to make use of citizenship-by-investment programs (Langenmayr and Zyska, 2023).

Still, little is known about the precise ways taxpayers can circumvent AEoI, or what share of aggregate offshore financial wealth is actually captured by the reporting framework.[5] In this paper, we study in detail the effectiveness of AEoI and the behavioral effects of the implementation of these agreements. To do that, we exploit data leaked from an offshore bank in the Isle of Man, the Cayman National Bank, Isle of Man (CNB from hereon). The data contains detailed information on over 37,000 accounts maintained by around 4,500 customers of the bank covering the period from 2007 until mid-2019. During this period, the Isle of Man signed automatic exchange agreements with the United States (FATCA), the United Kingdom (the UK Intergovernmental Agreement, or UK-CDOT) and dozens of other jurisdictions (the CRS). The leak includes detailed information on the clients of the bank, allowing us to identify the clients who seem to be resident of countries participating to AEoI agreements. In addition, the leak also includes data on customers who were ultimately reported under the three exchange schemes, so that we are able to determine both who seem to have been reported by the bank. The data has already been used extensively in Collin (2021a), who investigates the characteristics of individuals and firms that store their money in offshore centers. This paper shows that clients of the bank are mostly from rich countries, and likely from the upper end of the income and wealth distributions. A substantial proportion of account holders are also connected to political elites (PEP), which the bank had correctly identified.

Exploiting this data, we establish three main sets of results. First, leveraging the fact that we have access both to accounts that were reported by the bank and to those which were not, we are able to estimate the proportion of wealth managed by CNB which is liable to reporting under automatic exchange of information agreements. In a first set of results, we show that AEoI, and the CRS in particular, leaves a sizeable proportion of assets out of scope. We identify three main legal loopholes. First, assets held by active companies based in the same jurisdiction as the reporting bank or in jurisdictions non-participating to the

[5] In the recently-published Global Tax Evasion Report, Alstadsæter et al. (2023b) estimate that only 27% of offshore wealth remains untaxed after the rollout of the CRS, although this estimate is based on preliminary evidence from Danish CRS data.

CRS are not reportable under the agreement. To the extent that the active versus passive classification can be manipulated, this leaves room for passive businesses to pose as active to avoid reporting. Second, pre-existing accounts which maintain a balance below $250,000 do not have to be reported by the bank. Finally, the bank does not have to report on some closely-held private entities – largely those with significant investment income – which managed to obtain the status of reporting entities themselves. In this case, AEoI agreements allow some clients to effectively circumvent third-party reporting in favor of self-reporting, raising a concern that these entities may have a lower incentive to truthfully report.[6] These initial findings suggest that a significant portion of assets remains beyond the scope of AEoI.

Second, as we directly observe who was reported by the bank and who was not, we are able to determine whether the bank reported information about its clients comprehensively. Out of the assets that should have been reported by the bank, our estimates indicate that more than 80% were indeed reported through AEoI. This figure hides a significant heterogeneity in the coverage of the reporting according to the type of the account holder. While individuals are correctly reported in at least about 90% of the cases, our results indicate that between 19% and 41% of the value of company accounts reportable by the bank was not communicated to foreign tax authorities over the 2017-2019 period. This could be due to errors in reporting or because of complexity in the structure of the assets.[7]

Third, we study active decisions that were made by clients of the bank to avoid being reported under AEoI. We proceed in two ways. First, we study the behavior of clients of CNB with an account already opened at the bank around the introduction of automatic exchange of information agreements. Using a stacked event-study design which utilizes the latest innovations in differential-treatment timing (Goodman-Bacon, 2021; Cengiz et al., 2019), we show that the owners of companies residing in countries committing to exchange of information were around 10% more likely to close their accounts after the announcement of an AEoI agreement than other company owners. Their net worth also decreases significantly directly after the announcement. Individuals with accounts at the bank do not react strongly at the moment of the announcement, but we find evidence that they take action to avoid being reported later, before the start of an exchange reporting period. Individual customers who were more at risk of being reported were around 5% more likely to close their accounts three months *prior* to the start of an exchange reporting period. Net worth, as calculated by the bank itself, falls significantly. This evidence is consistent with company owners and individuals strategically closing their accounts before they became eligible for reporting under various exchange schemes. The differential timing of reaction could indicate either that company owners need more

[6]This is similar to the "shell bank" loophole in FATCA, which have been used by U.S. taxpayers to bypass the AEoI reporting requirements and evade taxes on large sums of income. See e.g. Noked and Marcone (2023).

[7]We note that these results are based on the information available to us in the leak, and these estimates might change if we had access to the exact same set of information as the bank itself or to the methodology the bank used to e.g. identify its customers and calculate their net worth.

time to re-organize their offshore portfolios, so that they react early in the timeline of AEoI agreements; or that they are more sophisticated taxpayers who may be benefiting from professional advice regarding their offshore assets, leading them to react earlier.

Then, we include new account openings in the analysis and study the evolutions of the stock of clients of CNB, by comparing the overall number of clients from countries affected by AEoI and from other countries. We use a staggered difference-in-differences design (Callaway and Sant'Anna, 2021) to study the relative number of reportable and non-reportable clients of the bank. We find that the relative number of reportable individuals holding accounts in their own name decrease compared to the number of non-reportable individuals around the announcement and implementation of AEoI. However, we do not find a decrease in the overall number of reportable company owners compared to non-reportable ones. This is coherent with incomplete coverage of AEoI for indirectly-held assets, leaving room for alternative strategies to avoid compliance. Our results suggest that while AEoI is a credible threat of detection for directly-held accounts, legal loopholes make it less efficient to detect all indirectly-held accounts and might not deter taxpayers from countries participating to exchange of information from opening offshore accounts through entities.

Our results have important consequences for the implementation of AEoI. First, we show that to be effective, AEoI agreements must cover all types of assets, accounts and structures. Leaving some accounts out of the scope of reporting triggers incentives to restructure offshore portfolios towards these accounts in order to avoid reporting requirements, and affects the effectiveness of AEoI agreements. We also show that a large share of AEoI reporting is actually not undertaken by banks, but by other financial institutions, including investment entities. When these investment entities are closely-held, this is likely to turn third-party reporting intended by AEoI into self-reporting, thus affecting its reliability. A first step to close this loophole would be to ensure banks are responsible for reporting all the accounts they maintain. Most of the information needed for reporting should already be available to banks because of anti-money laundering regulations, which would reduce their additional compliance costs. It would also decrease the number of financial institutions in charge of reporting, reducing compliance costs for financial institutions overall and monitoring costs for countries receiving information under AEoI.

This paper first contributes to a descriptive literature studying the amount of wealth held offshore (Faye et al., 2023; Zucman, 2013; Pellegrini et al., 2016; Vellutini et al., 2019; Henry, 2012) and its distribution across countries (Alstadsæter et al., 2018) and within countries (Alstadsæter et al., 2019; Guyton et al., 2021; Londoño Vélez and Ávila-Mahecha, 2021; Leenders et al., 2023; Johannesen et al., 2023). In this study, we extend this growing body of research by focusing specifically on one bank and its clients. Using data on assets held by each client of the bank, we gain new insights on the types of structures used by offshore clients and the precise composition of their offshore portfolios.

Second, our paper relates closely to the expanding literature on the impacts of policies designed to enhance transparency (see Slemrod (2019) for an overview). Specifically, it contributes to the body of research evaluating the effectiveness of Automatic Exchange of Information in enforcing tax compliance (Menkhoff and Miethe, 2019; Casi et al., 2020; O' Reilly et al., 2021; Beer et al., 2019; Johannesen et al., 2023; De Simone et al., 2020). As so little is known about the effectiveness of automatic exchange of information, its coverage, and the strategies offshore users implemented to circumvent the new reporting requirements, this paper provides a valuable contribution to this literature, even though we tackle these questions using data from a single offshore bank. Our study confirms that individuals engaging in non-compliant behavior adapt their strategies in response to changes in the global tax landscape, likely seeking alternative means to conceal their assets and continue under-reporting (Johannesen, 2014; Johannesen and Zucman, 2014; Casi et al., 2020; Martínez-Toledano and Roussille, 2023). Our paper is particularly close to two other papers. First, Boas et al. (2023a) leverage Danish bank data and administrative data on CRS reporting to study the coverage of the CRS, and the characteristics of offshore account holders and the assets that were reported. Second, Alstadsæter et al. (2023a) study AEoI policies at a cross-country level, and examine which variables matter for the effectiveness of AEoI implementation. Our contribution focuses specifically on behavioral effects of AEoI, and on the various ways taxpayers can still avoid being reported under these new policies (Bomare and Herry, 2023; Langenmayr and Zyska, 2023). Our paper has one main advantage in this regard: we are able to directly-observe the behavior of those who indirectly own assets via companies, whether or not they are reported on by the bank, where prior work has either been limited by using data on direct ownership or conditional on reporting to foreign tax authorities.

Third, we complement empirical studies exploiting leaked datasets to analyze the extent, the distribution, or the structure of offshore tax evasion (Caruana-Galizia and Caruana-Galizia, 2016; Omartian, 2017; Alstadsæter et al., 2019; Londoño Vélez and Ávila-Mahecha, 2022; Collin, 2021a). We make an important contribution studying the portfolio of offshore assets managed by a specific bank.

The rest of the paper is structured as follows. Section 2 provides more details on AEoI agreements and their timeline of implementation. Section 3 describes the offshore bank data we use in the paper. In section 4, we analyze the coverage of AEoI agreements while we study behavioral responses to these treaties in section 5. Section 6 concludes.

2 Institutional Setting

2.1 Automatic Exchange of Information agreements

Until the 2010s, governments had few tools to track wealth held offshore by their residents. Tax havens largely maintained strict bank secrecy and did not share information about the accounts and assets managed by their financial institutions. In the aftermath of the financial crisis, tax havens faced pressure to adopt information exchange agreements upon request. These agreements allowed foreign governments to request the financial information of one of their resident if there was suspicion of illegal activity. However, they were largely ineffective, as authorities typically needed concrete evidence of wrongdoing before they could make a request (Johannesen and Zucman, 2014).

To improve transparency, automatic exchange of information agreements were introduced. Automatic Exchange of Information treaties aim at establishing third-party reporting of cross-border financial assets. Under this standard, participating countries have to automatically exchange financial information about their respective residents. These agreements limit the opportunities for taxpayers to hold offshore financial assets without declaring them, because the tax authorities now have access to information about these assets. The three regimes that we study are as follows:

FATCA. The United States launched the first AEOI treaties with the Foreign Account Tax Compliance Act (FATCA), which was passed into law in March 2010. FATCA is a unilateral AEOI framework where foreign financial institutions (FFIs) are required to report information about their US account holders to the IRS, or face a substantial withholding penalty on their US source income. The first exchanges of information under FATCA took place in 2015, for accounts held in FFIs in 2014.

UK CDOT. Following the example of the US, the United Kingdom launched its own FATCA-type agreement with the Crown Dependencies and the Overseas Territories,[8] the UK CDOT (or UK FATCA). Under the UK CDOT, banks in Crown Dependencies and Overseas Territories are required to report on their UK account holders to HMRC. The Isle of Man announced its intention to participate in an automatic exchange of information agreement with the UK on December 7th, 2012.[9]. When the agreement came into force, HMRC was running an offshore disclosure scheme allowing those with assets in the three Crown dependencies to disclose their worldwide assets and income with potentially lower levels of penalties, which expired

[8] The Crown Dependencies are Jersey, Guernsey and the Isle of Man. The Overseas Territories include Akrotiri and Dhekelia, Anguilla, Bermuda, the British Antarctic Territory, the British Indian Ocean Territory, the British Virgin Islands, the Cayman Islands, the Falkland Islands, Gibraltar, Montserrat, the Pitcairn Islands, Saint Helena, Ascension and Tristan da Cunha, South Georgia and the South Sandwich Islands, the Turks and Caicos Islands. All of these are self-governing territories that have strong links to the UK, but are not part of the United Kingdom.

[9] https://www.gov.im/categories/business-and-industries/news/?altTemplate=ViewCategorisedNews&id=8457&iomg-device=Mobile

on the last day of 2015.[10] However, as of March 2015, only 232 disclosures had been made for the entire Isle of Man.[11] The UK CDOT was phased out and supplanted by the Common Reporting Standard in 2016.

Common Reporting Standard. The Common Reporting Standard (CRS) is a standard of AEOI designed by the OECD in 2014. It is the most ambitious AEOI agreement to date, establishing exchange of information between more than 100 jurisdictions as of 2024, including major tax havens. The Isle of Man is an "early adopter" jurisdiction, meaning it committed to making its first exchanges under the Common Reporting System by the 30th of September, 2017, for accounts that were held in 2016.

Whether a client is reportable under the CRS depends on their country of residence, on the type of assets they hold in foreign accounts, and on the structure through which they hold these assets. The Isle of Man has to report on all eligible residents of CRS-participating countries that have active exchange relationships with the Isle of Man. There are two reasons why the Isle of Man might not exchange information with a CRS-participating country. First, the Isle of Man has to enforce legal agreements to facilitate the exchange of CRS data with all counterparty jurisdictions. If these agreements are not in place at the date of exchange, the Isle of Man cannot provide information even to countries which committed to the CRS. Second, some CRS-participating countries are considered as "non-reciprocal jurisdictions", which means that the Isle of Man receives information from these countries about Isle of Man account holders, but is not required to provide information in return - typically because the other jurisdiction does not levy an income tax. For the Isle of Man, these jurisdictions include Qatar and the United Arab Emirates.

2.2 Main CRS loopholes

In studying the coverage of AEOI agreements, we focus on the CRS as it is the most wide-ranging exchange policy, with more than 100 countries exchanging information.

Although the CRS (and similar AEOI frameworks) aims to be comprehensive, there are still various ways offshore assets can avoid reporting.[12]

First, it only covers financial assets, meaning that offshore users can avoid reporting by rebalancing their offshore portfolio away from financial assets and towards non-financial assets. Bomare and Herry (2023) show that the CRS led to an increase in real estate investment from tax havens, suggesting that offshore users invested in properties to avoid being reported on. De Simone et al. (2020) also find indirect evidence that real estate was used to bypass the new reporting requirements imposed by FATCA, by identifying increases

[10] https://www.gov.uk/guidance/offshore-disclosure-facilities

[11] https://www.gov.uk/government/publications/offshore-disclosure-facilities-isle-of-man/crown-dependency-disclosure-facility-figures-isle-of-man

[12] For a thorough examination of CRS loopholes, see Noked (2018).

in real estate prices in markets open to foreign investment after the implementation of the US policy.

Second, banks are allowed to apply a $250,000 reporting threshold for accounts held by entities (i.e. companies or trusts). Pre-existing accounts below that threshold do not need to be investigated nor reported until the sum of all accounts held by a beneficial owner exceeded $250,000 at the end of a reporting year, allowing some account holders to avoid reporting for multiple years simply by keeping their end-of-year account balances below the threshold. Similarly, only beneficial owners owning more than 25% of the shares of an entity need to be reported on in the case of entities accounts.

Third, active companies are subjected to significantly more lenient reporting constraints than passive companies. Active companies are companies receiving less than 50% of their income from passive sources (i.e. interests, dividends, rents etc.) and with less than 50% of their assets producing or held for the production of passive income. Active companies are only reported on if they are incorporated in CRS-participating jurisdictions. For example, a consultancy company registered in the Cayman Islands would not be reportable as the Cayman Islands do not participate to the CRS, even if its beneficial owners were based in the United Kingdom. In addition, active companies incorporated in CRS-participating jurisdictions are only reported on at the entity level, meaning that no beneficial ownership information is gathered or exchanged with the counterparty country. For example, an account held by another consultancy company based in Luxembourg, a CRS-participating jurisdiction, will be reported to Luxembourg, without any information about the beneficial owners of the company. Even if the company is owned by tax residents of e.g. the United Kingdom, another CRS-participating jurisdiction, no information will be shared with the UK about the account. In addition, Luxembourg has no obligation under the CRS to share information with the UK about this company and its foreign accounts. The fact that an active company is reported at the entity level entails that active companies located in the same country as the financial institution in charge of the reporting, will fall out of the scope of the CRS. In our case, this means that active companies based in the Isle of Man will not be subject to any reporting, even if their beneficial owners are from CRS-participating jurisdictions.

Typically, account holders specify their type of entity as part of a self-certification form which is gathered by the financial institution during the account holding process. However, the ultimate decision as to how to classify an entity is made by staff at the financial institution, relying on the evidence they have on file as to the company's many source of income and activities. If the active versus passive classification can be manipulated, this provides incentives for passive entities to pose as active, or for foreign financial institutions to stretch this classification, to avoid extensive reporting requirements.

Fourth, financial institutions (FIs) are not required to report accounts held by entities that are themselves considered as FIs. Some entities that are professionally managed and that earn at least 50% of their income

from investing, administering, or managing financial assets are considered as financial institutions and can carry out their own reporting. These structures are classified as "Type A investment entities", but we will refer to them in the rest of the paper as "investment entities". They are typically trust companies and asset management firms. Entities that are themselves managed by a Type A investment entity, and whose income is primarily attributable to investing, reinvesting or trading in financial assets are also classified as financial institutions. In this case, the investment entity managing them will be in charge of the reporting.

In cases where investment entities are closely-held, this provision of the CRS almost turns the third-party reporting introduced by AEOI into self-reporting. The incentives to truthfully report are then way less stringent for these structures, which could be used to keep offshore assets hidden. This loophole is also present in the FATCA and is sometimes known as the "shell-bank" loophole, indicating that some individuals might create financial institutions from scratch to avoid the new reporting requirements obligations. Some high-profile cases suggest that it has been used to conceal offshore assets from the US tax authorities (Noked and Marcone, 2023). As we will explain in the next section, due to the nature of the leak, we are not able to fully discern compliance among investment entities, as the bank was not responsible for keeping track of their reporting behavior.

Finally, the CRS might also be circumvented if taxpayers gave false information to financial institutions. This could include: false beneficial ownership information, alternative passports or documentation from a second home in order to suggest that they are tax domiciled in a different country. While there is some evidence that this is happening at scale, in particular via the use of citizenship-by-investment programs (Langenmayr and Zyska, 2023), we will not study this type of behavior here. This is because our classification of account holders by type is dependent on the due diligence documents already collected by the bank. Thus if a client gave the bank false information, we only have access to that same false information and will not be able to detect that it is incorrect.

3 Data

3.1 Leaked customer data from an offshore bank

In this paper, we use data leaked from a bank based in the Isle of Man, the Cayman National Bank in the Isle of Man (CNB). CNB is a branch of the Cayman National Bank based in Douglas, the capital of the Isle of Man. The data was published online in November 2019 by Distributed Denial of Secrets (DDOS), a transparency collective specialized in the publication of leaks data. It was collected by "Phineas Fisher', a hacker describing themselves as a "hacktivist" who breached the security system of CNB and shared the

data with DDOS.[13]

The data provides a unique insight into the working of the offshore world. The Isle of Man, a British Crown Dependency, is considered as a tax haven in most of the lists used in international categorizations and in the literature (Gravelle, 2009; Zucman, 2013; Hines and Rice, 1994; Menkhoff and Miethe, 2019; Johannesen and Zucman, 2014). Exploiting data directly coming from an offshore bank offers a rare opportunity to investigate the strategies and behaviors of offshore users and of offshore bankers. No customer-identifiable information is reported in this paper, nor in the appendix.

The "Sherwood" leak, as DDOS named it, is a 2TB data set that includes the contents of several dozen hard drive images taken from CNB's servers. It is an unstructured leak that contains two snapshots from 2016 and 2019 of the bank's customer record databases, as well as documents used and maintained by employees about their clients and their activities, such as beneficial ownership documents, emails and other working documents.

As these snapshots come directly from CNB's servers, they provide extensive information about the evolutions of the assets held at the bank over time. The leaked data contains information on around 4,500 customers who maintained over 37,000 accounts at the bank, from the end of 2007 until mid-2019. CNB caters to a wide span of clients, and customers of the bank include individuals who have an account in their own name, but also companies and trusts. A smaller pool of clients includes foundations, funds and partnerships. Using the documents from the leak, Collin (2021b) reconstructs a complete monthly panel of the evolution of deposits, investments and loans held at the bank over the 2007-2019 period, including information on whether changes in the account balances are due to e.g. interest or dividend income, wire transfers in and out of the account, capital gains income etc.

We draw on this database for our analysis, and supplement it with another set of data. From the leak, we have access to the names and country of residence of individuals with accounts in the own names at the bank. We use this exhaustive ownership data to identify reportable accounts i.e. accounts owned by individuals residing in countries participating to AEoI. The Sherwood leaks also provide information on the names of entities maintaining accounts at CNB, as well as their country of incorporation. However, we do not always have access to data on the ultimate owners of these accounts i.e. on the identity and country of residence of the beneficial owners of entities with accounts at the bank. Beneficial ownership information is directly available for only about 60% of the companies and 40% of the trusts in our data.

In order to analyze the effects of automatic exchange of information on offshore users, we complete the missing beneficial ownership information by hand, using due diligence documents maintained by the

[13]Phineas Fisher is responsible for other high-profile hacks, including the Catalan police union, the Turkish Justice and Development Party (AKP) and several firms that produce spyware and surveillance software for authoritarian governments.

bank and sometimes complemented with external sources like administrative beneficial ownership registers.[14] Appendix B provides detail of the process we used to assign missing beneficial ownership information in our data. In the end, we are able to identify beneficial owners of about 84% of the companies that had accounts at the bank over the 2007-2019 period.[15]

Finally, we are able to observe with a high degree of likelihood which clients the bank ultimately reported on, as the leak contains reports prepared by the bank between 2015 and 2019 for the purpose of exchanging information under FATCA, the UK CDOT agreement and the CRS. These reports include precise information on the account (account number, amount held, type and amount of income accruing to the account, type of the company if the account is held by a company) and its owner(s) (name, date of birth and tax identification number, country of residence). While we cannot directly observe that these reports are the actual versions sent to the authorities, the reports in the leak were contained in folders used for the preparation of AEoI reporting, are in the exact format used for various reporting regimes (FATCA/UK-CDOT/CRS) and are dated around the time the bank would have had to send reports to the Isle of Man authorities in order to have them ready for cross-jurisdictional exchange.[16]

3.2 Descriptive statistics

The data provides information on 37,000 accounts maintained at the bank by around 4,500 customers, over the period 2007-2019. Collin (2021b) provides a first analysis of the characteristics of the clients of the bank. He shows that most customers are from relatively richer countries, and likely from the top of the distribution of income and wealth in these countries. He also finds that CNB maintained accounts for a substantial number of politically-exposed persons (PEPs).

Funds held at the bank. CNB is a fairly small, boutique bank with a limited number of customers. Figure 1 shows the number of customers with an account at the bank since 2008, excluding trusts accounts.[17] This number increases sharply from 2008 to 2011, and peaks in 2016 before decreasing until the end of our period of analysis.

[14] In addition to account balances, the data contains up-to-date records on many different characteristics pertinent to each client's nationality and residence country. These include correspondence addresses, 'domicilia' indicators (e.g. passports, tax identifier numbers, reported birth locations), and sometimes the tax residence. Appendix Figure A.3 shows an anonymized example of a document found in the bank's files, that we use to assign beneficial ownership information when it is missing.

[15] As we do not study trusts in this paper, we did not exhaustively gather beneficial ownership for trusts.

[16] In one instance, some non-reportable individuals were included in a report, resulting in a communication from the Isle of Man Financial Services Authority (IOMFSA) and CNB, leading to an update of the report. As both the communication and the updated report are observable to us, this gives us more confidence that we are observing the final working versions of the reports prepared by the bank.

[17] We exclude trusts accounts because a large share of trusts account held at the bank are linked to Employer-financed retirement benefit schemes (EFRBS). EFRBS are a British tax planning tool that was reformed several times over our period of analysis, with no link to AEoI agreements. Appendix Figure A.1 shows the number of customers with an account at the bank over time, including trusts accounts.

Figure 2 shows the amount of deposits held by customers over time. At its peak, the bank managed about $200 million in customers' deposits. When including investment accounts deposited at CNB, the bank managed about $400 million at its peak over the period 2015-2019 (see Appendix Figure A.2).

Type of clients. Even though CNB manages a limited amount of funds, the bank caters to a diversified pool of clients making it an ideal laboratory to study the reaction of offshore users to changes in the international tax environment. First, it attracts a large set of types of clients. Panel (a) of Table 1 shows the breakdown of clients with at least one account at CNB over the period of analysis, by type. Most of the clients of the bank are entities, with 57% of the clients being trusts and 31% being companies. Individuals only account for about 10% of the clients. Figure 4 shows the evolution of the share of total deposits held at the bank by client type, since 2008. Trusts have made up the largest share of the bank's deposits until 2010. Since 2010, the share of the companies is growing and reached about 70% in 2019.[18] Through the whole period, individuals have only accounted for 10% or less of the total deposits held at the bank. Second, Clients at CNB have accounts that vary significantly in size, with some clients only flowing small sums through their accounts while others deposit several million at the bank. Figure 3 shows the distribution of the maximum value (in log) of the deposit accounts maintained at CNB, excluding accounts that do not seem to be in use (with a maximum value of 0). Most of the account values follow a log-normal distribution, with about 44% of the active accounts having a maximum value of more than $100,000, about about 13% having a maximum value of more than $1 million.

Origin of clients. Figure 5 show the number of clients of the bank, either with an account in their own name or through a company, by region of the world. We show the United Kingdom and the Isle of Man as two separate regions, as they are the most represented groups of customers. Most of the clients of the bank are from the United Kingdom, with this country accounting for 51% of combined number of individual owners and beneficial owners of companies with an account at the bank. As the Isle of Man is a Crown Dependency with strong historical and cultural ties to the UK, the over-representation of UK tax citizens in clients of the bank is to be expected. Isle of Man customers represent 15% of the clients overall, indicating that the bank also captures a share of the domestic financial services market. The third most represented region of origin among clients of the banks is the Europe and Central Asia region (excluding the UK and the Isle of Man), which confirms the importance of geographical and cultural proximity for offshore preferences.[19] Table 1 provides further disaggregated figures on the origin of clients of CNB, by type. Panel (b) shows the direct

[18] The decrease in the share of trusts is likely due to changes in the taxation of Employer-financed retirement benefit schemes (EFRBS) trusts in the UK, which have no link with the introduction of AEoI.

[19] Trusts and the origin of their beneficiaries are not included in this figure, as we did not consistently gather information about their identity yet.

origin of clients i.e. the country of residence for individuals, and the country of incorporation for entity accounts. Most of individuals with accounts at the bank are from the Isle of Man (43%) and the United Kingdom (24%). Companies follow the same patterns, with 68% of the companies with accounts at the bank incorporated in the Isle of Man and 16% in the UK. The vast majority of trusts is similarly incorporated in the Isle of Man (76%), with a large share also incorporated in Cyprus (19%). Panel (c) presents the breakdown of companies accounts by ultimate origin i.e. by country of the beneficial owner. Most of the beneficial owners of companies accounts are from the UK (50%), with smaller shares also coming from the Isle of Man (9%), Ireland (5%) and Israel (4%).

AEoI reports from the bank. Figure 6 shows estimates of client deposit accounts for the bank over a ten year period, during which the FATCA, UK CDOT, and CRS reporting became active.

About 11% of individual and company accounts maintained by the bank after January, 2013 were included in one of the reports prepared for FATCA/UK IGA/CRS.

When considering only deposits held by individual and company clients at CNB, we estimate that between 27% and 77% of totals held at the bank can be attributed to a country participating to AEoI between 2013 and 2018. Only between 15% and 23% of these deposits were held on an account that ended up being reported through AEoI, either because of the design of the rules of AEoI or because of possible mistakes/non-compliance by the bank.

3.3 Representativity of the bank.

How representative is CNB of the banking industry in the Isle of Man, and of banks based in tax havens more generally? If the bank provides an ideal setting to study responses of offshore users to international taxation changes thanks to its diverse pool of clients, we need to understand how it compares to other banks on the island and on different tax havens to assess the external validity of our results.

Position in the banking sector in the Isle of Man. First, it is important to note that the number of banks active in the Isle of Man has been steadily decreasing since the beginning of the 2000s, going from almost 60 in 2004 to 11 in 2022.[20] In 2012, when the automatic exchange of information agreement between the Isle of Man and the United Kingdom was announced, CNB was one of the only 33 banks in activity based on the island. Even though it is a small bank, CNB thus is an important part of the financial infrastructure of the Isle of Man. At its peak, the bank held accounts for around 2.5% of all companies registered in the Isle of Man.

[20] CNB did not close down after the leak, and is still active as of 2024.

Moreover, the geographic distribution of the clients of the bank aligns closely with that of Isle of Man bank users overall. Figure 7 shows the distribution of deposits by the origin of direct account holder, both for CNB and for all Isle of Man banks. Data for all Isle of Man banks come from the Isle of Man Financial Services Authority, which publishes reports providing the aggregate of direct origin of deposits.[21] The geographic distribution for CNB differs from the one presented in Figure 5 because it allocates deposits for entities based on the country of incorporation rather than the country of the beneficial owner. The distribution of direct origin of deposits is comparable for CNB and for other banks. In both cases, the United Kingdom and Isle of Man individuals or entities account by far for the largest share of deposits. However, compared to other banks, CNB holds a relatively larger share of deposits from individuals based in the Isle of Man and relatively smaller share from North America, the Middle East and the Far East.[22]

Position of the Isle of Man in the offshore industry. The Isle of Man is an offshore financial center that offers a combination of low tax rates on personal income and corporate income and secrecy, that is characteristic of most tax havens. Tørsløv et al. (2023) estimate that in 2018 it attracted about $2 billion in shifted corporate profits, or about two thirds of the corporate profits declared on the island.

It also attracts a large stock of foreign deposits, with foreign non-bank deposits being systematically higher than domestic non-bank deposits since at least 2001, according to the Bank for International Settlements data. Appendix Figure A.5 shows the normalized evolution of cross-border deposits held by foreigners, in some of the major tax havens used for individual tax evasion. The trend of deposits in the Isle of Man closely follows the evolution of deposits in most of the other tax havens, with a peak of foreign deposits in 2007-2008, and then a continuous decrease until 2020. There are only two exceptions: Hong Kong and Panama, in which foreign deposits have been constantly increasing since the beginning of the 2000s. This figure shows that the Isle of Man seems to be representative of the trends in deposits in most of the main tax havens.

4 The coverage of AEOI reporting

Previous studies of automatic exchange of information agreements have focused on the effects of AEoI using aggregate data O' Reilly et al. (2021); Menkhoff and Miethe (2019); Casi et al. (2020); Beer et al. (2019); **?**); De Simone et al. (2020); Alstadsæter et al. (2023a), or receiving-country data (Boas et al., 2023b). They

[21] In its Banking Statistical Bulletin, the Isle of Man Financial Services Authority reports aggregate of the geographical source of non-bank customer deposits in the Isle of Man, prepared as part of the Basel prudential standards. The leak included the same prudential report CNB prepared for reporting.

[22] As the figure only shows the country of the account holder, i.e. in the case of entities the country of incorporation, note that it does not mean that CNB has overall less clients from North America, the Middle East or the Far East than other banks in the Isle of Man.

shed light on the effects of the reporting framework on the amount of deposits held in tax havens, as well as on the repatriation or relocation behavior of offshore users. However, little is known about the coverage of AEoI agreements and how much wealth escapes these reporting regimes.[23] Even if AEoI led to a reduction in cross-border deposits held in tax havens, it might only be catching a limited share of all assets held offshore, either by design or through non-compliance of offshore financial institutions. The unique nature of the leaked data allows us to complement previous CRS studies by getting an insight into the coverage of AEoI agreements.

Consider a stock of wealth,[24] w^T, which is the total dollar value of all financial wealth held offshore by tax residents of CRS countries. Contrast this with w^*, which is the total dollar value of all financial wealth which is *eligible* for reporting under existing automatic exchange of information regimes. This wealth is eligible both because it is held "offshore" from wherever a person's tax residence is and because it falls within whatever reporting thresholds were in place at that time. This is the amount of wealth that should be reported in automatic-exchanges if banks correctly identify all eligible accounts and report them. Eligible wealth will deviate from total wealth, w^T, such that $w^* <= w^T$ because some wealth will fall underneath the reporting threshold in a given year, will be held in non-reporting jurisdictions or will be held in a manner which legally precludes reporting, even if done intentionally to avoid detection.[25] Holding behavior constant, the gap between total offshore wealth and currently eligible wealth is the amount of additional wealth that would be subject to reporting (and if appropriate, subsequent taxation) if all conditions for reporting are dropped, and financial institutions are asked instead to report on any accounts that have a connection to a CRS beneficial owner. In this case, we would have $w^* = w^T$.

Now consider the amount of wealth which is actually reported through AEoI regimes, w^R, which will always be some proportion of eligible wealth so that:

$$w^R = \gamma w^* \tag{1}$$

While there may be some instances where $\gamma > 1$, such as when banks choose to ignore reporting thresholds and report wealth which is technically ineligible for reporting, in most instances we would expect $\gamma < 1$, as banks will imperfectly be able to detect (or be willing to detect) reportable assets and income. This might be driven by imperfections in a bank's compliance procedure or gaps in the design of the reporting regime -

[23] To our knowledge, the only paper studying the coverage of the CRS is Boas et al. (2023b) for Denmark. In this work, the authors find that about 30% of Danish taxpayers who transact routinely with offshore accounts do not appear in a CRS report. However, this estimate is based only on offshore accounts held directly by taxpayers, and does not include accounts that would be held through companies. Thus, this is likely to be a lower-bound.

[24] Throughout this section we use "wealth" and "financial wealth" interchangeably.

[25] For instance, if a person spread their wealth out across financial institutions or jurisdictions so that no account falls above the reporting threshold, this would still be a legal avoidance of reporting, even if it went against the spirit of the regime.

e.g. a customer is fully complying and not attempting to evade detection, but the bank still does not have sufficient information to determine that they are reportable.

The main challenge to understanding whether AEoI reporting regimes have brought "an end to banking secrecy", is that while authorities routinely report w^R,[26] the amount of offshore wealth that has been reported, very little is known of either w^* or w^T.

Using the customer data made available in the CNB data leak, we reconstruct reasonable estimates of each of these amounts w^T, w^*, w^R for this bank, during the period where it was obligated to report under FATCA, UK CDOT and the CRS, to determine the full amount of wealth that escapes reporting, either because of eligibility requirements or due to potential underreporting by offshore financial institutions.

4.1 Scope of the CRS

4.1.1 Individuals

Figure 8 shows the amounts held at the bank by individuals over the period 2016-2018. Panel A presents a breakdown of the deposits held by individuals, according to their tax residency. Individual accounts totaled about $32 million at the end of 2016, and their value decreased to about $16 million at the end of 2018. Over this period, individuals from CRS-participating countries held between 19% and 52% of the deposits. Panel B shows that the bank correctly reported on 89% of these individuals in 2016. This reporting rate rises over the years to reach 97% in 2018. This is consistent with the bank learning about the CRS reporting requirements over the years, and increasing its accuracy when reporting individuals.[27]

The main country of residence of the other non-CRS individuals is the United Arab Emirates. Even though the United Arab Emirates formally participates to the CRS, they are not an Isle of Man CRS reportable country; they send information to the Isle of Man under the AEoI treaty, but the Isle of Man is not required to provide information to the United Arab Emirates. This is likely because the UAE does not levy individual taxes on its residents.

4.1.2 Companies.

Figure 9 shows the amounts held at the bank by companies over the 2016-2018 period, excluding investment entities. Active and passive companies (known as non-financial entities in the CRS regulations) held about

[26] For example, the OECD recently reported that in 2022, they estimate that information on more than 120 million financial accounts covering about €12.6 trillion has been reporting under the CRS. See https://www.oecd.org/en/publications/2023/10/oecd-secretary-general-tax-report-to-g20-finance-ministers-and-central-bank-governors-g20-india-october-2023_794e51c2.html

[27] As we have not conducted a comprehensive review of the documents of individual account holders, it is possible that the bank has additional information on the remaining account holders that were not contained in its online databases.

$53 million at the bank at the end of 2016. This amount decreased to $32 million by the end of 2018. Panel A shows that these holdings were always ultimately owned by beneficial owners from CRS-participating countries: they represent 51% of the beneficial owners in 2016, and 87% in 2018.

However, only 59% of the assets held by CRS beneficial owners were ultimately reported on by the bank in 2016, 31% in 2017 and 36% in 2018. There are two main legal reasons why the bank did not report on the rest of the assets. First, a large share of the deposits held at the bank by CRS beneficial owners are held through active companies incorporated in countries where the Isle of Man does not send information to: as high as 51% of the deposits were held through such vehicles in 2017. Even if the bank is aware that they belong to CRS beneficial owners, these accounts do not have to be reported under the terms of the agreement. Most of these active companies are incorporated in the Isle of Man, as banks do not have to report on active companies based in their own jurisdiction.

Second, between 5% and 9% of the assets were accounts opened before 2016, that were under the reporting threshold of $250,000 at the cut-off reporting dates (December 31 2016-2018). As pre-existing accounts staying below the reporting threshold on the last day of the year do not have to be reported the subsequent year, the bank excluded these accounts from its reports.

Finally, 14-25% of assets held by companies owned by CRS-reportable owners were not reported on for reasons we cannot determine. These are assets that we have connected to reportable beneficial owners using the bank's own documentation, but for which there is no indication a report was sent. This could be due to potential mistakes: for example, the bank did not appear to report on passive companies held by Indian beneficial owners, even though India is an Isle of Man reportable jurisdiction. But this could also be due to non-compliance by the bank. With the data currently at our disposal, we are not able to distinguish between mistakes, non-compliance, and cases for which the bank might have add more information justifying the lack of reporting. Taken together with the amounts that were actually reported by the bank, and leaving aside the legal reporting loopholes of the CRS, these estimates suggest that between 19% and 41% of reportable assets held by CRS beneficial owners were not reported on over 2016-2018, because of potential mistakes or non-compliance.

4.1.3 Isle of Man nominees.

Figure 8 shows that a sizeable share of individuals from non-CRS participating countries are individuals from the Isle of Man (see Table 1).[28] This is the case for beneficial owners of companies as well: over the period we study, we link between 13-49% of the assets held by active and passive non-financial entities to ultimate owners from non-CRS countries. Most company owners in this category are resident of the Isle of

[28]This percentage reaches 56% in 2018.

Man, and to a lesser extent the United Arab Emirates.

One way to obscure the true ownership of assets in the offshore industry is to use a nominee in whose name assets are registered, even though they are not the true owners. These nominees can sometimes be chosen among employees of offshore corporate service providers, and some of the Isle of Man individuals or beneficial owners holding accounts at CNB could be acting as nominees for other owners. However, we note that approximately 84,000 people live in the Isle of Man. For directly-held accounts, if the bank captured a similar share of the domestic personal banking market as it does the domestic corporate market, it would have over 2,000 legitimate Isle of Man individual clients (it had 191, over the period covered in the data).

In order to check whether Isle of Man individuals and company owners are legitimate clients based on the islands, or nominees who would act as account holder for someone else to avoid them being reported, we check whether the probability for an Isle of Man client to open an account at CNBIOM is affected by AEoI. Appendix Figure A.6 shows the result of a simple regression of this probability over time, with the red line corresponding to the announcement of the UK CDOT, which affect the largest group of clients in our sample (United Kingdom tax residents). The relative probability of Isle of Man individuals and beneficial owners to open an account at CNB does not increase after the announcement or over the 2010-2018 period, indicating that Isle of Man account holders are likely legitimate individuals or business owners depositing their assets at CNBIOM.

4.1.4 Investment entities.

The investment entities classification. Until this point, our coverage estimates for indirectly-held accounts only include companies that we identify as active or passive non-financial entities. As we detail in section 2.2, under the CRS some entities are not classified as either active or passive entities, but as investment entities. Investment entities are entities that are either A) professionally managed and earning at least half of their income from investing, administrating or managing financial assets or B) managed by an entity in category A) and whose income is primarily attributable to investing, reinvesting or trading in financial assets. For the majority of entities that were classified as investment entities, the bank itself was not responsible for sending a CRS report. Instead, because they are considered as foreign financial institutions themselves, investment entities are in charge of reporting holdings belonging to owners resident of CRS-participating countries that they manage.

In Figure 10, Panel A, we compare the total amount held at in the bank by these investment entities (in green) to holdings of other types of companies (in yellow). Investment entities hold between $170 million and $210 million through CNB over the period, dwarfing the assets held by other types of companies.

We only have access to CRS reports sent by the bank, so that we cannot estimate the percentage of assets

that were actually reported by investment entities. Investment entities include some closely-held financial institutions, meaning that CRS reporting in this case would be closer to self-reporting than to the third-party reporting AEoI intended to establish. Rates of evasion are significantly larger for self-reported income than for third-party reported income (Kleven et al., 2011), and anecdotal evidence suggests that investment entities do not fully comply withe their AEoI reporting obligations (Noked and Marcone, 2023). Panel B shows that more than 85% of the deposits held through investment entities can be traced back to beneficial owners from CRS countries. If investment entities are less compliant than banks when reporting under the CRS, this means that a large share of deposits held offshore by individuals from CRS-participating countries would still be escaping reporting.

Investment entities in tax havens. Are clients of CNB more likely to be investment entities compared to other Isle of Man banks? Figure 11 presents the number of Isle of Man financial institutions reporting financial accounts under the CRS in 2021, and the number of banks based in the Isle of Man this same year. While there were more than 9,000 financial institutions reporting information under the CRS, the Isle of Man only hosted 11 active bank this year. Thus, all the other reporting entities are different types of financial institutions, a large share of which is likely to correspond to investment entities. This figure shows that if investment entities are even slightly less compliant with their reporting obligations than banks, a high number of accounts are not going to be reported under the CRS.

This pattern holds for other tax havens as well. Figure 12 presents the number of financial institutions per country (weighted by population) according to its GNP per capita. Data for the number of financial institutions per country is taken from the OECD peer-reviews on Automatic Exchange of Financial Information. Tax havens (according to the list of Zucman (2017)) are represented in red, while other countries are in blue. This figure shows that there is a very clear correlation between GNP per capita and number of financial institutions. In addition, tax havens almost always have more financial institutions than what their GNP per capita would predict. As investment entities account for the bulk of financial institutions in a country, this means that tax havens host relatively more investment entities. This suggests that the fact that investment entities are potentially less compliant than banks is not an issue that is specific to CNB or to the Isle of Man: this issue is important for all the other offshore financial centers, and studies of the effectiveness of the CRS should pay a particular attention to investment entities.

4.2 Coverage estimates for the CRS for company and individual accounts

Estimates of w^T, $w*$, w^R and their evolution depend heavily on our assumptions as to the (unobserved) reporting rate of investment entities. If these entities were completely compliant, then for e.g. the year 2018,

$\frac{w^R}{w^T} = 0.91$. That is, the CRS has a coverage of about 91%, net of wealth 'lost' due to reporting requirements or possible errors in reporting. 5% of the wealth is not reported due to the design of the CRS (e.g. entities below eligibility thresholds or active companies in non-reportable jurisdictions). A further 4% of w^T is lost due to underreporting.

However, this estimate is heavily skewed by the presence of investment entities, who would have less incentives to be compliant than a medium-sized bank, in cases where e.g. they are closely-held. If we remove IEs from the estimates, our estimate of $\frac{w^R}{w^T}$ falls to 52%, with 29% of the wealth not reported due to the design of the CRS (for year 2018). A further 19% of w^T is lost due to underreporting. Thus there are significant gains to be made in CRS coverage if the rules were revised to remove exemptions to reporting, relative to improving the quality of reporting.

Abstracting from non-reporting due to the design of the CRS, we can also compute estimates of the share of eligible wealth actually reported on by CNB, $\frac{w^R}{w^*}$. When focusing on individuals and companies, for which we have direct access to reporting made by the bank, we observe that the bank correctly reported between 73% and 83% of the assets that we identify as reportable. These rates hide significant heterogeneity between clients, with individual accounts between correctly reported on in between 89% and 97% of cases, and company accounts only between 59% and 81% of cases.

5 Behavioral responses to AEOI treaties

The coverage of AEoI treaties is going to directly circumscribe the nature and the magnitude of the behavioral responses of offshore users to these agreements. While the announcement of AEoI treaties could be a source of surprise for individuals, countries typically negotiate the details of these regimes, ratify them, then announce the specific timeline of their introduction months before reporting requirements kick in. This undoubtedly reduces the technical and logistical hurdles of their introduction, but it also gives those looking to evade these agreements ample time to organize their affairs so as to minimize their chance of detection.

Generally, we expect two different kinds of behavioral responses. First, potentially reportable clients who already have an account at CNB when AEoI agreements enter into force could try to find ways to avoid being reported on. These would mainly entail closing the account, draining it of its assets or ensure that the bank does not have access to enough information to report on them.

Second, the overall composition of accounts held offshore could shift overtime, with a relative decrease of deposits and investments held through reportable accounts relative to assets held through non-reportable accounts. This could be the case if residents of countries adopting AEoI close their accounts and repatriate their offshore holdings. But offshore users could also switch to opening more non-reportable accounts after the

implementation of AEoI agreements. We would observe a displacement of offshore assets towards structures that are not reportable, such as active companies incorporated in non-CRS jurisdictions, or non reportable assets such as real estate. These new accounts could be held by new CNB clients, or by old clients who closed down their old reportable account to open a new non reportable one.

In other words, the first type of behavioral responses includes only clients with an account at CNB, while the second type considers overall changes in offshore account structures, particularly shifts towards non-reportable accounts. In this section, we will examine whether we observe 1) a reaction of CNB customers to the announcement and implementation of AEoI 2) a shift of CNB-held assets towards non-reportable accounts.

5.1 Empirical method

Behavioral response of current clients of CNBIOM. To estimate the effect of AEoI agreements on current clients of CNB, we follow Cengiz et al. (2019) and run a stacked event-study regression. In this specification, each new wave of AEoI treaty corresponds to a different event (e.g. announcement of FATCA, announcement of UK CDOT and then the different waves of countries committing to the CRS). This approach tackle the issue of staggered treatment by studying each event independently. We create a dataset for each AEoI treaty and wave of exchange by selecting a window spanning 1 year prior to and following the treatment event. Individuals who are never-treated or not yet treated during this period constitute the control group for each event. In other words, we construct a dataset for the announcement of FATCA, another one for the announcement of the UK CDOT and several others for the different waves of countries committing to the CRS. Then, we stack these datasets together to estimate the behavioral responses to AEoI treaties.

We estimate the following equation, for individual i, quarter q and AEoI event e:

$$Y_{iqe} = \alpha_{ie} + \eta_{qe} + \sum_{k \neq -1} \beta_k \cdot Quarter_{k=q} \cdot AEoI_{ie} + v_{iqe} \quad (2)$$

where outcome of interest Y_{iqe} is either the probability that the account is open, to capture pre-emptive account closures, or the net worth of the clients as calculated by the bank, to capture pre-emptive draining of offshore accounts. $AEoI_{ie}$ is a dummy capturing whether the account holder is reportable under one of the AEoI regimes, while $Quarter_{k=q}$ is a quarter dummy. We also include client-AEoI event fixed effects

α_{ie}, and quarter-AEoI event fixed effects η_{qe}. These fixed effects control for both time trends and individuals fixed-effects, taking into account that individuals are sometimes in the treatment group and sometimes in the control group according to the stacked dataset we consider. The specification is clustered at the client level. The coefficient β_q captures the average difference in e.g. the probability that an account is still open between CRS account holders and non-CRS account holders in quarter q compared to the quarter just before the announcement of AEoI agreements.

We estimate this specification separately for directly-held accounts and indirectly-held accounts, to allow for these groups of clients to react differently to the introduction of AEoI.

We use two different treatment windows for our estimation. First, we study behavioral responses of CNB clients around the announcement of AEoI treaties. Announcements of such agreements are salient and greatly publicized events, which could have triggered a direct response among offshore users to re-organize their assets ahead of exchanges of information. In particular, one way to avoid such exchange of information is to close their accounts in participating jurisdictions or in financial institutions that are likely to be compliant. When using the announcement date as the treatment date, we use the quarter before the announcement as the reference period.

After the announcement and once AEoI agreements are fully negotiated, the timeline of their introduction specifies the date past which accounts still open will have to be reported. We also test specification 5.1 using this reporting cut-off as the treatment date. Because this cut-off is the last day before which offshore users can take action if they want to avoid being reported on, we use an earlier reference period when using the account-date as the treatment date: we use a reference period of two quarters before the cut-off for individual accounts, and three quarters before the cut-off for company accounts as we empirically observe that they react quicker than individual clients. This allows offshore users time to take action before this deadline.

Structural changes in offshore accounts following AEoI. The second effect we investigate is whether there are structural changes in the behavior of offshore users following the implementation of Automatic Exchange of Information (AEoI). Specifically, we analyze whether there was a relative decrease of reportable accounts compared to non-reportable accounts as a response to AEoI agreements. This could be the case if clients affected by AEoI close their accounts and repatriate their holdings, or if they shift towards opening more non-reportable accounts as a response to AEoI agreements. While the previous estimation only focused on the behavior of clients who already had accounts open at the time AEoI agreements are announced and implemented, this specification focuses on the evolution of the stock of all reportable vs. non reportable accounts held at CNBIOM. In other words, while the previous analysis holds the set of clients fixed for each AEoI event, tracking their behavior over time, this analysis considers the full population of clients, allowing,

for instance, new entrance after the implementation of an AEoI agreement. Non-reportable accounts include accounts held by individuals or by company owners who are not resident of countries adopting AEoI.[29]

To investigate the effect of AEoI on structural changes in the type of accounts held in offshore banks, we estimate a dynamic staggered difference-in-differences model for country c, quarter q and AEoI event e:

$$Y_{cq} = \alpha_c + \eta_q + \sum_{k \neq -1} \beta_k \cdot D_{cq}^k + v_{cq}$$

(3)

where Y_{cq} is the number of accounts maintained at the bank in quarter q by either individuals or beneficial owners from country c, α_c is a country-fixed effect and η_q a time fixed-effect. The treatment is defined as country c enters AEoI agreements at quarter q. D_{cq}^k is equal to one for treated countries in year k of the AEoI event, and equal to zero for countries that are never or yet to exchange information with other countries. As before, we use two treatment windows for our estimation, either at the time of the announcement of AEoI agreements by country c, or at the reporting cut-off date. We estimate equation 5.1 using the staggered difference-in-differences estimator developed by Callaway and Sant'Anna (2021). The parameter β_k compares the number of accounts maintained at the bank by individuals or beneficial owners from countries adopting AEoI agreements compared to countries that are never or yet to be adopting AEoI agreements.

We estimate this specification for two different groups of clients: either individuals, holding accounts in their own name, or beneficial owners holding accounts through a company.

5.2 Behavioral response to AEoI agreements.

Figure 13 shows the results of the stacked event-study regression around the announcement of AEoI agreements, for companies. Panel A shows that the probability that an account held by a company owned by a CRS-reportable owner is open compared to a company owned by a non-CRS reportable owner decreases sharply after the announcement of AEoI agreements. Company owners more at risk of being reported on are around 10% more likely to close their account one quarter after the announcement of an AEoI treaty, and this effect is long-lasting. The net worth of these company owners falls significantly compared to non-CRS reportable owners one month after the announcement, but the effect become insignificant over time.

[29] In theory, non-reportable accounts also include account held by company owners from countries adopting AEoI, but which fall in one of the loopholes studied in section 4 e.g. accounts held through an active company incorporated in a non-participating country. We are in the process of gathering comprehensive data on types of companies, and will study this type of non-reportable accounts in further analysis.

Individuals at risk of being reported, on the other hand, do not seem to close their account more than their non reportable counterparts (Panel B). Their net worth held at the bank decreases significantly compared to non reportable individuals though, and this decrease becomes significant about one year after the announcement.

The picture is different when looking at the event-study results around the cut-off reporting dates of the different AEoI agreements. Figure 14 shows that company owners more at risk of being reported are not more likely to close their account after the cut-off date (Panel A). However, they seem to take action before this date: reportable company owners are about 3-5% more likely to close their account in the six months before the cut-off date. This indicates that company owners take action before the cut-off date for reporting, likely so as to avoid the exchange of information. The picture is similar for the net worth of these company owners, but the estimated effect is less significant. On the other hand, individuals affected by AEoI agreements are about 5% more likely to close their accounts than other individuals three months before the cut-off date (Panel B), and this effect is long lasting. Their net worth, as calculated by the bank, also decreases significantly.

Taken together, Figure 13 and Figure 14 indicate that reportable company owners and reportable individuals do not react at the same time to automatic exchange of information agreements: company owners take action to ensure their deposits are not reportable as soon as the agreements are announced, and seem to have already closed their account months before the cut-off reporting dates. Individuals on the other hand seem to react relatively late, only closing their account a few months before the cut-off reporting date. There are at least two potential reasons why company owners and individuals with accounts in their own names would not react to AEoI agreements at the same time. First, it might be more difficult and lengthier to reorganize a company account compared to an individual account, because of the additional structural layer present in companies accounts. For example, it would be necessary to close the company after the closure of the account, maybe in order to create another company with a non-reportable account. This would explain why companies react before individuals to the announcement of AEoI agreements. Second, people using companies to hold their offshore assets are likely to be more sophisticated than people owning offshore assets in their own names. Adding a layer of secrecy between the assets and their real owner increases the complexity of a structure and makes identifying the ownership of offshore assets more difficult. It signals that the owners are either better at hiding their assets than people owning them in their own name, or that they benefit from professional advice regarding their offshore investments. In both cases, we would then expect company owners to react directly to the announcement of AEoI treaties, rather than to wait until just before the cut-off reporting date to reorganize their offshore portfolio.

Appendix figures A.7 and A.8 test the robustness of these results to alternative ways to compute the

effect of AEoI on clients opened at CNB at the time. We use estimators accounting for heterogeneous treatment effects and staggered roll-out of treatments (De Chaisemartin and d'Haultfoeuille, 2020; Callaway and Sant'Anna, 2021; Borusyak et al., 2024). Our main results are qualitatively unchanged when using these alternative estimators, with Figure A.7 showing the estimates for the probability that a company account is open around the announcement of AEoI, and Figure A.8 showing the estimates for the probability that an individual account is open around the cut-off reporting date of AEoI.

Heterogeneity. Because of different designs, or different target populations, it could be the case that FATCA, the UK-CDOT and the CRS have heterogeneous effects on tax evaders. To investigate this heterogeneity, we turn to estimating behavioral effects of each of the AEoI treaties separately. We construct the same datasets than in equation 5.1, comparing outcomes of the target population (US residents for FATCA, UK residents for the UK-CDOT and CRS adopters for the CRS) to outcomes of units that are never-treated, or not-yet treated over the period. We run static difference-in-differences, for each of the AEoI treaties. As company owners react more strongly to AEoI when the treaties are announced, while individuals seem to respond mostly around the cut-off reporting date threshold, we focus on these two events. Additional results for company owners around the cut-off reporting date and for individuals around the announcement date are reported in Appendix Tables A.1 and A.2, respectively.

Table 2 shows the results of the difference-in-differences for companies, around the announcement of the three AEoI treaties. While the overall effect of AEoI agreements on the probability to keep an account at the bank is negative and significant, it seems to be led mostly by UK taxpayers reacting to the UK-CDOT. The effect for CRS-account holders is negative but not significant, while the effect for US account holders reacting to FATCA is positive and significant. Consistent with the results of the previous section, the overall effect of AEoI agreements on the net worth of reportable company owners is negative, but unsignificant.

Table 3 reports the same difference-in-difference estimates for individuals, around the cut-off reporting date. Because some treaties have the same cut-off, and the CRS was adopted in several waves, we present the results by year of cut-off date. For affected individuals, there is a significant decrease in the probability to have an account open and the net-worth, for almost all waves of AEoI. One exception is individuals more at risk of being reported if they have an account open in 2017, who do not close their accounts more than others. Similarly, the net worth of individuals as computed by the bank relatively decreases overall for affected individuals. This is the case for each wave of exchange, apart from the cut-off date of 2017.

5.3 Structural changes among clients of the bank.

Individual clients. Figure 15 shows the result of estimation of equation 5.1 for individual account holders i.e. people who hold accounts in their own name. Panel (a) shows the evolution of the number of reportable clients vs. never or not-yet reportable clients around the announcement of AEoI agreements. While both groups evolve similarly over the 7-year period before the announcement, the relative number of reportable individual clients decline quickly after AEoI agreements are announced and continues to drop until three years after the announcement. Combined with previous results, this figure shows that while individual clients do not directly close their accounts in response to the announcement of AEoI agreements, reportable clients seem to be less likely to open a new account after they know about the new reporting requirements.

Panel (b) of Figure 15 shows the same evolution around the cut-off reporting date of AEoI agreements. Consistent with previous results, we observe that the relative number of reportable clients drops again slowly around the cut-off reporting date, even though this decrease is not as important as around the announcement of AEoI agreements.

Taken together, these results show that AEoI agreements have a significant effect on clients of offshore institutions: in response to the implementation of exchange of information, the relative number of clients from reportable countries drop. This shows that AEoI agreements constitute a credible threat to detecting directly-held foreign accounts, thus leading offshore users holding accounts in their own name to adjust their holdings. This is consistent with results of studies of CRS showing that it led to substantial repatriations of assets, for directly-held accounts (**?**).

Entity clients. Figure 16 shows the results of estimation of equation 5.1 for indirectly-held accounts i.e. people who hold accounts through an entity. In this case, we compare the number of accounts held by beneficial owners from countries announcing/implementing AEoI agreements to beneficial owners from countries never adopting or yet to adopt these agreements.

Contrary to what we observe for directly-held accounts, there is no relative decrease of the number of reportable clients compared to non-reportable ones around the announcement of AEoI agreements (Panel (a)) or their cut-off reporting date (Panel (b)). This pattern has at least three potential explanations. First, it could be the case that reportable company owners are unaffected by AEoI because because they are already compliant with their reporting obligations. Second, they could react to the implementation of AEoI by starting to declare their offshore financial assets, without restructuring their offshore holdings. Third, company owners who would be reportable could also exploit alternative strategies to keep their offshore assets hidden, which would not lead to a relative decrease of the number of reportable company owners among clients of CNBIOM.

As we observe in section 5.2 that company owners react to the announcement and cut-off reporting date of AEoI by closing their accounts and draining part of their offshore assets, it is not likely that most company owners were not compliant with their reporting obligations to start with. While it possible that a share of company owners start to self-report offshore accounts to the tax authorities because of AEoI (**?**), we show in section 4 that AEoI agreements leave out of scope a large share of entity-held financial wealth. The absence of decrease in the relative number of reportable company owners thus likely reflects the incomplete coverage of indirectly-held accounts we document in this paper, as company owners from countries adopting AEoI agreements can still find ways to structure their offshore holdings to avoid being reported to their country of residence.

This section shows that while AEoI creates a credible detection threat for directly-held accounts, it does not seem to affect the umber of indirectly-held accounts held by reportable company owners. Our results are in line with our analysis in section 4, in which we show that while AEoI covers almost all directly-held accounts, it leaves a large share of indirectly-held accounts out of the reporting requirements.

6 Conclusion

This paper exploits a unique dataset leaked from an offshore bank, allowing us to pierce the veil of secrecy that is usually synonymous with offshore holdings. We show that AEoI agreements, even if they constitute a very powerful tool to crack down on tax evasion, are still leaving a large proportion of offshore assets out of their scope. In particular, large closely-held private entities can still report directly on their clients even if they hold accounts in third-party banking institutions. The effectiveness of AEoI agreements also ultimately relies on offshore institutions being trust-worthy information providers. We find that CNBIOM seemed to correctly identify and report its reportable individual clients. Their company reporting was of a lesser quality, with a sizeable proportion of reportable assets that were left out of the reports sent by the bank. Finally, we also show that individuals and company owners reacted to the announcement and to the implementation of AEoI agreements by pre-emptively closing their accounts, probably in order to avoid reporting. Company owners, who are using more sophisticated offshore structures to hold their assets, reacted first. This indicates that they either needed more time to restructure their offshore portfolio, or that they benefited from professional advice that allowed them to react quickly to changes in the international taxation environment. However, overall we find that AEoI agreements led to the decrease of the relative number of reportable clients with directly-held accounts, while it didn't affect the relative number of reportable clients with indirectly-held accounts. Combined with our coverage analysis, this result suggests that AEoI agreements constitute a credible threat of detection for directly-held accounts as they are wholly covered by AEoI. On the other

hand, incomplete coverage of indirectly-held accounts weakens the power of AEoI for this category of clients, who are likely still able to find ways to structure their offshore holdings without being reported.

This paper provides a new insight into the implementation of automatic exchange of information agreements. It shows that the effectiveness of AEoI crucially relies on the breadth of its coverage, as limited scope may leave room for alternative strategies to avoid compliance. As such, AEoI agreements should cover all types of assets, as many countries as possible but also all types of offshore structures to gather reliable information about offshore holdings. As a first step, this paper shows that reporting should at least be extended to active companies in all countries, with exchange of beneficial ownership information, and to all accounts – even relatively smaller value accounts.

We also show that banks are legally not responsible of reporting for a large share of accounts they maintain if they are held by investment entities. We show evidence that investment entities are more common in tax havens, and that they seem to be in charge of reporting for a sizeable number of accounts. As for closely-held investment entities this is akin to changing third-party reporting into self-reporting, AEoI agreements could likely be made more effective if banks were responsible for reporting all the accounts they maintain. Most of the information necessary for preparing AEoI reports should already be accessible by the banks under anti-money laundering regulations, so that this additional reporting requirement should not be too costly. This would even reduce overall compliance costs, as it would decrease the number of financial institutions in charge of reporting. This would in turn make it easier for tax authorities receiving information under AEoI to monitor the quality of information they get, and to ensure compliance of foreign financial institutions if needed.

References

Alstadsæter, A., Casi, E., Miethe, J., and Stage, B. (2023a). Lost in information: National implementation of global tax agreements. Technical report.

Alstadsæter, A., Godar, S., Nicolaides, P., and Zucman, G. (2023b). Global tax evasion report 2024.

Alstadsæter, A., Johannesen, N., and Zucman, G. (2018). Who Owns the Wealth in Tax Havens? Macro Evidence and Implications for Global Inequality. *Journal of Public Economics*, 162:89–100.

Alstadsæter, A., Johannesen, N., and Zucman, G. (2019). Tax Evasion and Inequality. *American Economic Review*, 109(6):2073–2103.

Beer, S., Coelho, M. D., and Leduc, S. (2019). Hidden Treasure: The Impact of Automatic Exchange of Information on Cross-border Tax Evasion.

Boas, H., Kreiner, C., Larsen, L., and Zucman, G. (2023a). Taxing capital in a globalized world: The effects of automatic information exchange. Technical report.

Boas, H. F., Johannesen, N., Kreiner, C. T., Larsen, L. T., and Zucman, G. (2023b). Taxing capital in a globalized world: The effects of automatic information exchange. Technical report.

Bomare, J. and Herry, S. L. G. (2023). Avoiding transparency through offshore real estate: Evidence from the uk. *EU Tax Observatory Working Paper n4*.

Borusyak, K., Jaravel, X., and Spiess, J. (2024). Revisiting event-study designs: robust and efficient estimation. *Review of Economic Studies*, page rdae007.

Callaway, B. and Sant'Anna, P. H. (2021). Difference-in-differences with multiple time periods. *Journal of econometrics*, 225(2):200–230.

Caruana-Galizia, P. and Caruana-Galizia, M. (2016). Offshore Financial Activity and Tax Policy: Evidence from a Leaked Data Set. *Journal of Public Policy*, 36(3):457–88.

Casi, E., Spengel, C., and Stage, B. M. (2020). Cross-border Tax Evasion After the Common Reporting Standard: Game Over? *Journal of Public Economics*, 190:1–22.

Cengiz, D., Dube, A., Lindner, A., and Zipperer, B. (2019). The effect of minimum wages on low-wage jobs. *The Quarterly Journal of Economics*, 134(3):1405–1454.

Collin, M. (2021a). What Lies Beneath. Evidence from Leaked Account Data on How Elites Use Offshore Banking. Brookings Global Working Paper 156.

Collin, M. (2021b). What Lies Beneath: Evidence from Leaked Account Data on How Elites Use Offshore Banking. Brookings global working paper series.

De Chaisemartin, C. and d'Haultfoeuille, X. (2020). Two-way fixed effects estimators with heterogeneous treatment effects. *American economic review*, 110(9):2964–2996.

De Simone, L., Lester, R., and Markle, K. (2020). Transparency and Tax Evasion: Evidence from the Foreign Account Tax Compliance Act (FATCA). *Journal of Accounting Research*, 58(1):105–153.

Faye, S., Godar, S., and Zucman, G. (2023). Global Offshore Wealth, 2001–2021. Eu tax observatory working paper.

Goodman-Bacon, A. (2021). Difference-in-differences with variation in treatment timing. *Journal of Econometrics*, 225(2):254–277.

Gravelle, J. G. (2009). Tax Havens: International Tax Avoidance and Evasion. *National Tax Journal*, 62(4):727–753.

Guyton, J., Langetieg, P., Reck, D., Risch, M., and Zucman, G. (2021). Tax Evasion at the Top of the Income Distribution: Theory and Evidence. Working paper, National Bureau of Economic Research.

Henry, J. (2012). The Price of Offshore Revisited: New Estimates for Missing Global Private Wealth, Income, Inequality, and Lost Taxes. Tax justice network working paper.

Hines, J. R. and Rice, E. M. (1994). Fiscal Paradise: Foreign Tax Havens and American Business. *The Quarterly Journal of Economics*, 109(1):149–182.

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

Johannesen, N., Langetieg, P., Reck, D., Risch, M., and Slemrod, J. (2020). Taxing Hidden Wealth: The Consequences of U.S. Enforcement Initiatives on Evasive Foreign Accounts. *American Economic Journal: Economic Policy*, 12(3):312–46.

Johannesen, N., Reck, D., Risch, M., Slemrod, J., Guyton, J., and Langetieg, P. (2023). The offshore world according to fatca: New evidence on the foreign wealth of us households. Technical report, National Bureau of Economic Research.

Johannesen, N. and Zucman, G. (2014). The End of Bank Secrecy? An Evaluation of the G20 Tax Haven Crackdown. *American Economic Journal: Economic Policy*, 6(1):65–91.

Kleven, H. J., Knudsen, M. B., Kreiner, C. T., Pedersen, S., and Saez, E. (2011). Unwilling or Unable to Cheat? Evidence from a Tax Audit Experiment in Denmark. *Econometrica*, 79(3):651–692.

Langenmayr, D. and Zyska, L. (2023). Escaping the exchange of information: Tax evasion via citizenship-by-investment. *Journal of Public Economics*, 221:104865.

Leenders, W., Lejour, A., Rabaté, S., and van t Riet, M. (2023). Offshore tax evasion and wealth inequality: Evidence from a tax amnesty in the Netherlands. *Journal of Public Economics*, 217:104785.

Londoño Vélez, J. and Ávila-Mahecha, J. (2021). Enforcing Wealth Taxes in the Developing World: Quasi-experimental Evidence from Colombia. *American Economic Review: Insights*, 3(2):131–48.

Londoño Vélez, J. and Ávila-Mahecha, J. (2022). Behavioral Responses to Wealth Taxation: Evidence from Colombia. Working paper.

Martínez-Toledano, C. and Roussille, N. (2023). Tax evasion and the "swiss cheese" regulation.

Menkhoff, L. and Miethe, J. (2019). Tax Evasion in New Disguise? Examining Tax Havens' International Bank Deposits. *Journal of Public Economics*, 176:53–78.

Noked, N. (2018). Tax Evasion and Incomplete Tax Transparency. *Laws*, 7(3):31.

Noked, N. and Marcone, Z. (2023). Closing the" shell bank" loophole. *Virginia Journal of International Law*, 64:119.

Omartian, J. D. (2017). Do Banks Aid and Abet Asset Concealment: Evidence from the Panama Papers. Working paper ssrn 2836635.

O' Reilly, P., Ramirez, K. P., and Stemmer, M. A. (2021). Exchange of Information and Bank Deposits in International Financial Centres. *Review of Public Economics*, 239(4):27–69.

Pellegrini, V., Sanelli, A., and Tosti, E. (2016). What Do External Statistics Tell Us about Undeclared Assets Held Abroad and Tax Evasion? *Bank of Italy Occasional Paper*, (367).

Pomeranz, D. (2015). No taxation without information: Deterrence and self-enforcement in the value added tax. *American Economic Review*, 105(8):2539–2569.

Slemrod, J. (2019). Tax Compliance and Enforcement. *Journal of Economic Literature*, 57(4):904–54.

Tørsløv, T., Wier, L., and Zucman, G. (2023). The missing profits of nations. *The Review of Economic Studies*, 90(3):1499–1534.

Vellutini et al. (2019). Estimating International Tax Evasion by Individuals. Technical report, Directorate General Taxation and Customs Union, European Commission.

Zucman, G. (2013). The missing wealth of nations: Are europe and the us net debtors or net creditors? *The Quarterly journal of economics*, 128(3):1321–1364.

Zucman, G. (2017). La richesse cachée des nations. *Enquête sur les paradis fiscaux. Seuil; La république des idées*.

Figures and Tables

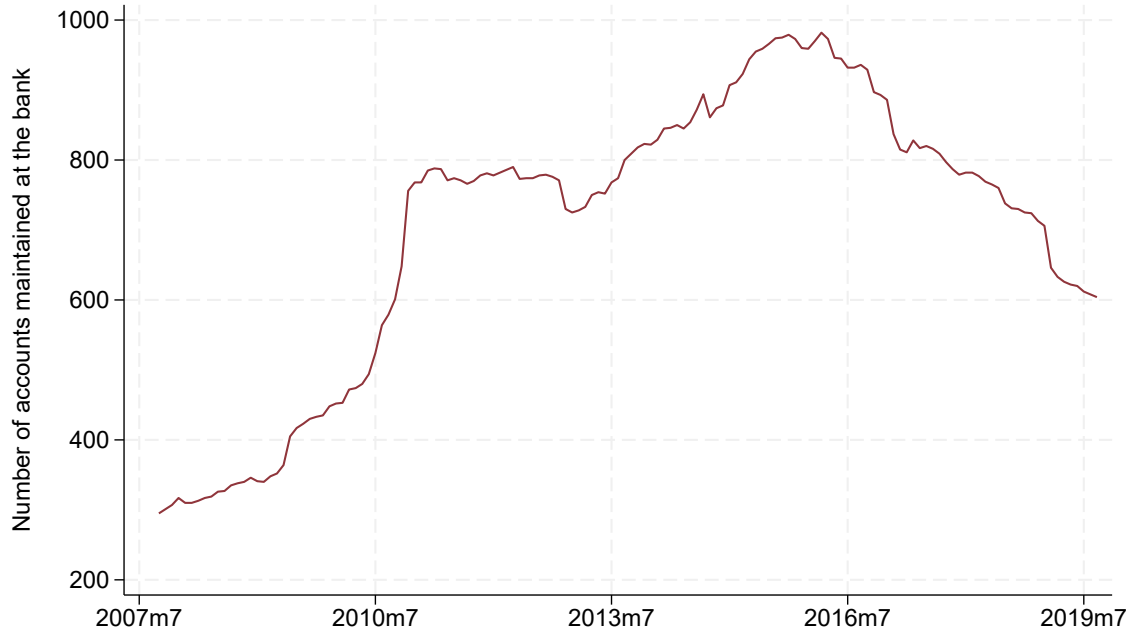


Figure 1: Number of clients with at least one account at the bank, over the period 2007-2019

Note: This figure shows the number of clients who have at least one account at the Cayman National Bank in the Isle of Man over the period spanning from the end of 2007 to mid-2019. It includes clients that are individuals, companies, foundations, funds and partnerships. It excludes accounts maintained by trusts, as trusts linked to UK persons are subject to specific policies over the period of analysis. Appendix figure A.1 shows the number of clients over time, including trusts.

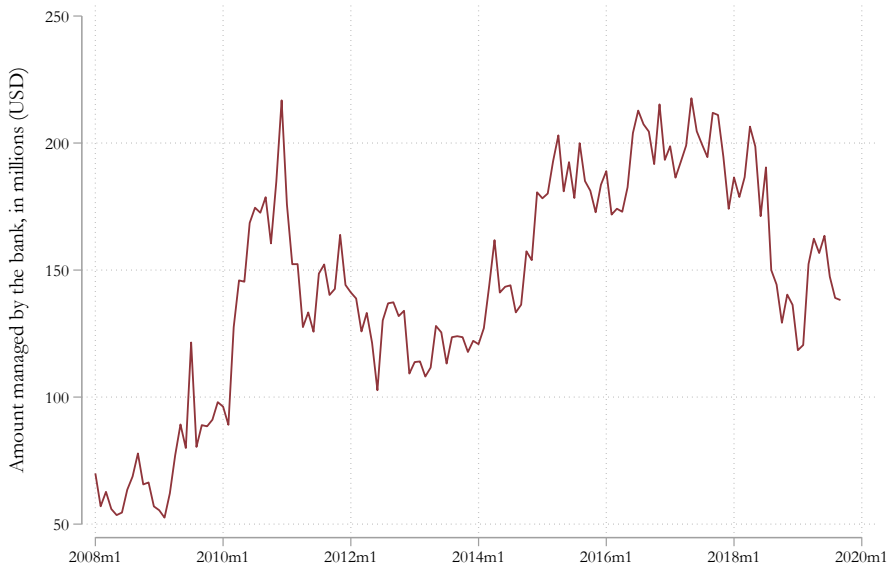


Figure 2: Total amount deposited at the bank, over the period 2007-2017

Note: This figure shows the total amount of deposits managed by the Cayman National Bank in the Isle of Man over the period spanning from the end of 2007 to mid-2019. It includes deposits by all types of clients (Individuals, Companies, Trusts, Foundations, Funds and Partnerships). It excludes investment accounts managed by the bank. Appendix figure A.2 shows the amount managed by the bank over time, including investment accounts.

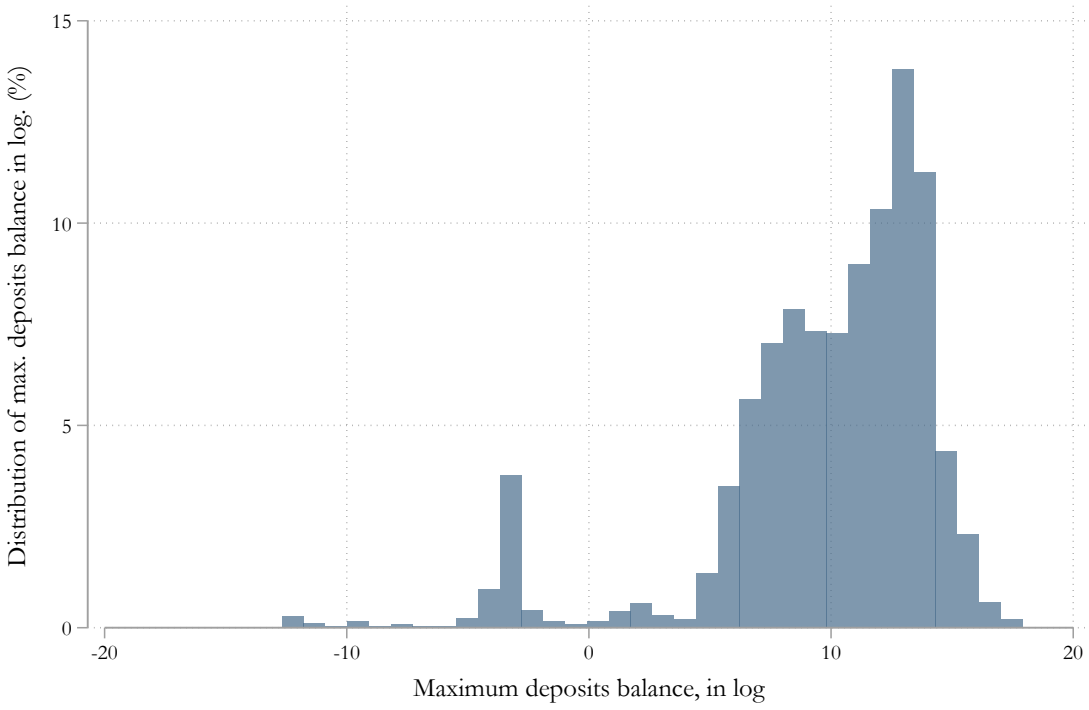
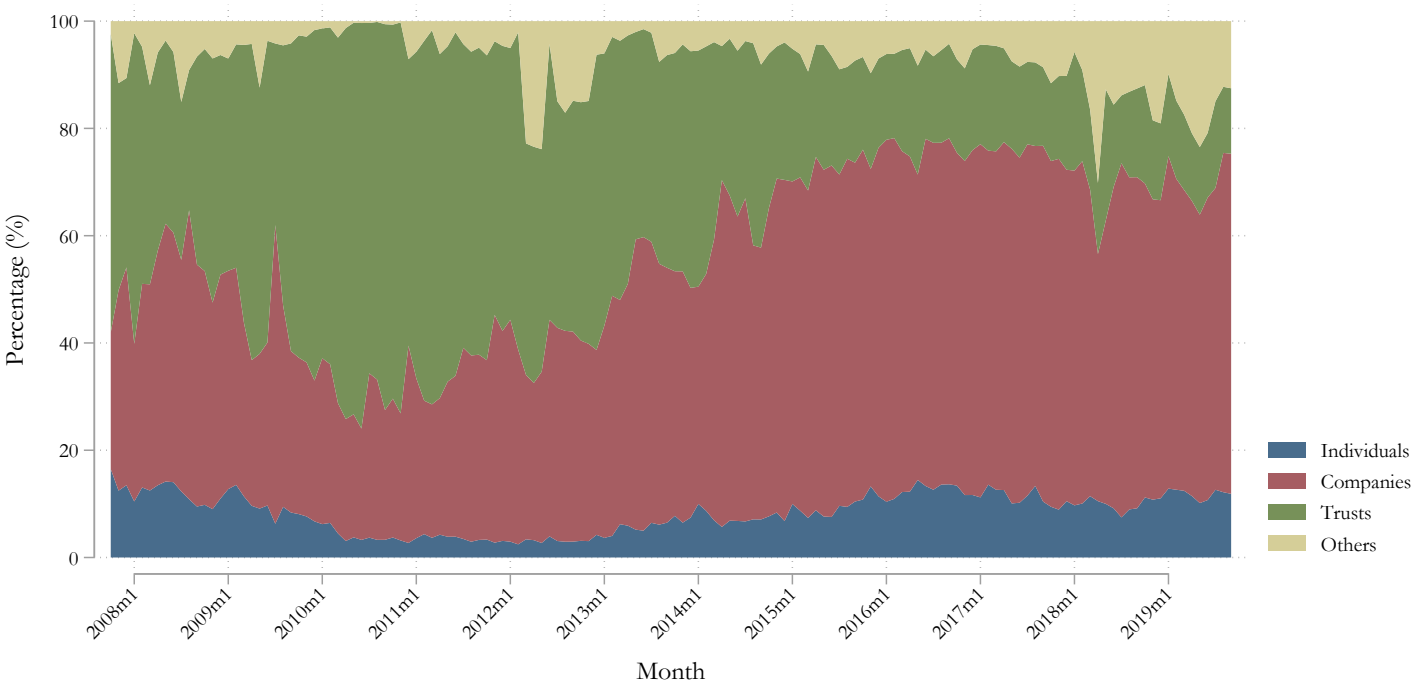


Figure 3: Distribution of maximum balance of deposit accounts over the period, in log

Note: This figure shows the distribution of the maximum balance of deposits accounts over the 2007-2019 period, in logarithm. The maximum balance is calculated over the whole period, and all account balances are calculated in USD at current prices, using CNBIOM's own exchange rates.

Figure 4: Deposits by client type over time



Note: This figure shows, for deposit accounts only, the proportion of deposits held by individual clients, companies clients, trust clients or other types of clients (funds, foundations and partnerships). All balances are calculated in USD at current prices.

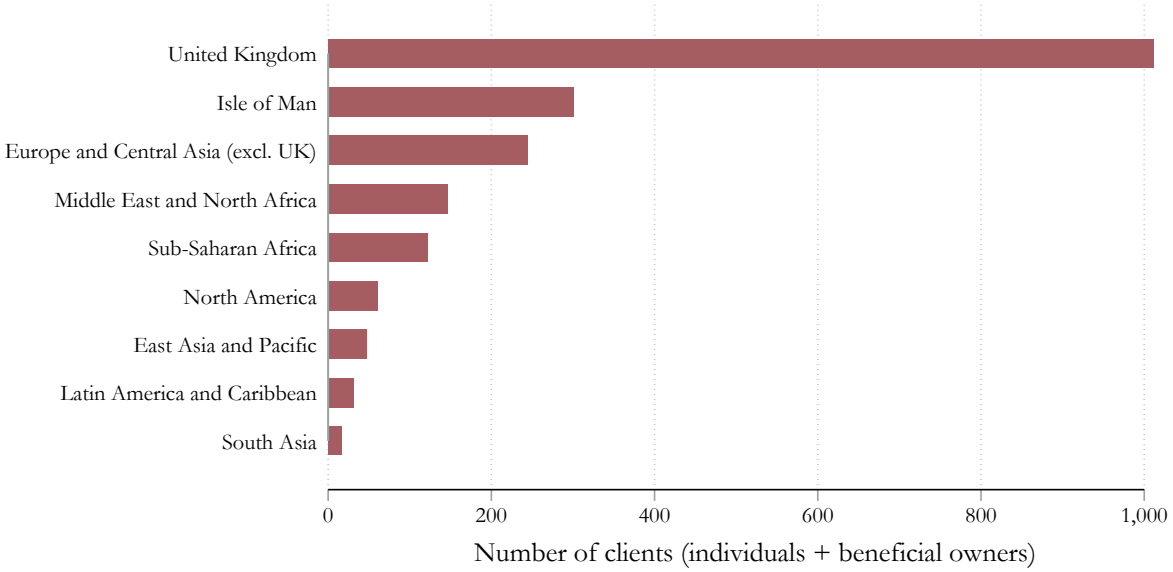
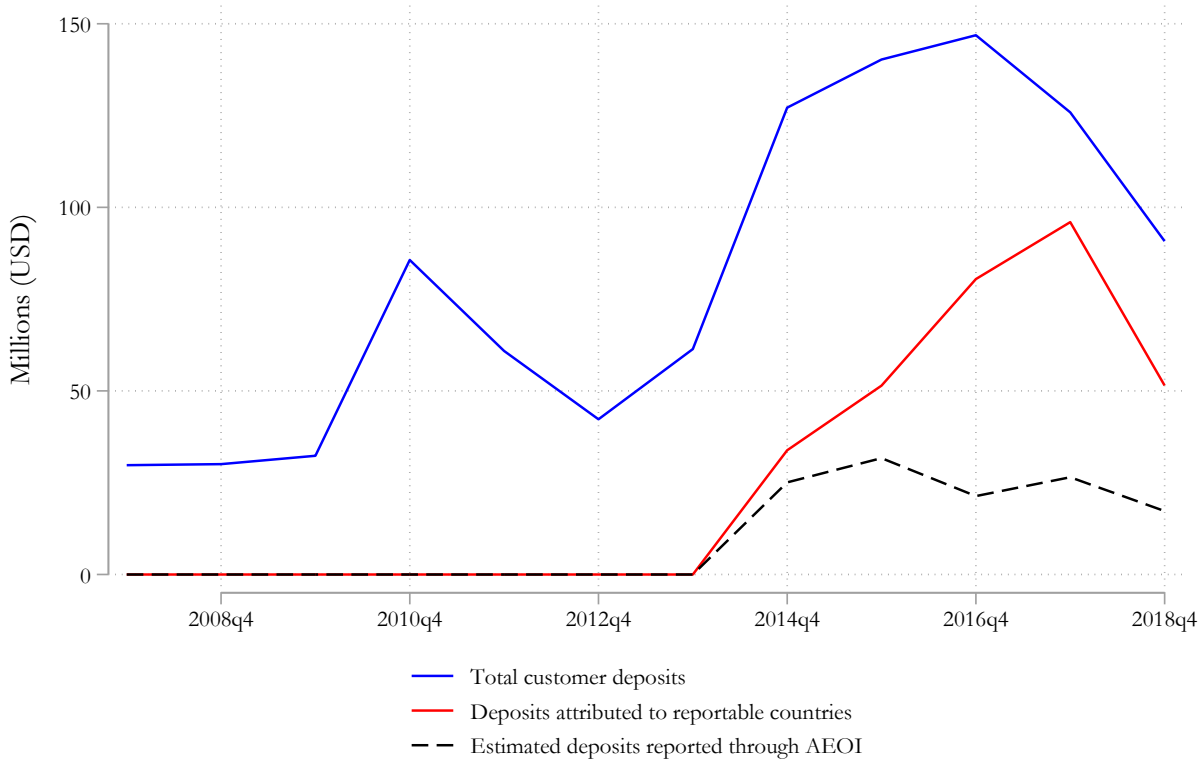


Figure 5: Number of clients, by region of origin

Note: This figure shows the number of unique clients owning an account at the Cayman National Bank and Trust at the Isle of Man, either in their own name or through a company. Clients are grouped by tax residence country, and we show the results by region of the world. The UK and the Isle of Man constitute their own category because there are the largest groups in our sample. This figure is based on data that is still incomplete, as we are still gathering information on the country of residence of about 15% of the beneficial owners of companies in our sample. The figure also includes beneficiaries of trusts' for whom information is available.

Figure 6: Amounts reported through AEOI, for individuals and companies with accounts at the bank



Note: Data shows estimates of the total customer deposit balance for customers of CNB who are either Individuals or Companies. It shows (i) total deposit balance, (ii) balance of customers whose primary recorded jurisdiction (that of the individual or the beneficial owner) is a *currently*-reportable jurisdiction and (iii) balance of customers who in the following year were actually reported on as part of a FATCA/UK CDOT/CRS regime. Balances are taken in the fourth quarter to reflect the end-of-year balances reported to authorities. If a customer is reported in year T, the reportable balance is taken from quarter four of year T-1. Note that the balance attributed to reportable countries is likely to be a lower-bound, as part of the attribution to countries is done manually, with information available through the Sherwood leaks and through external files.

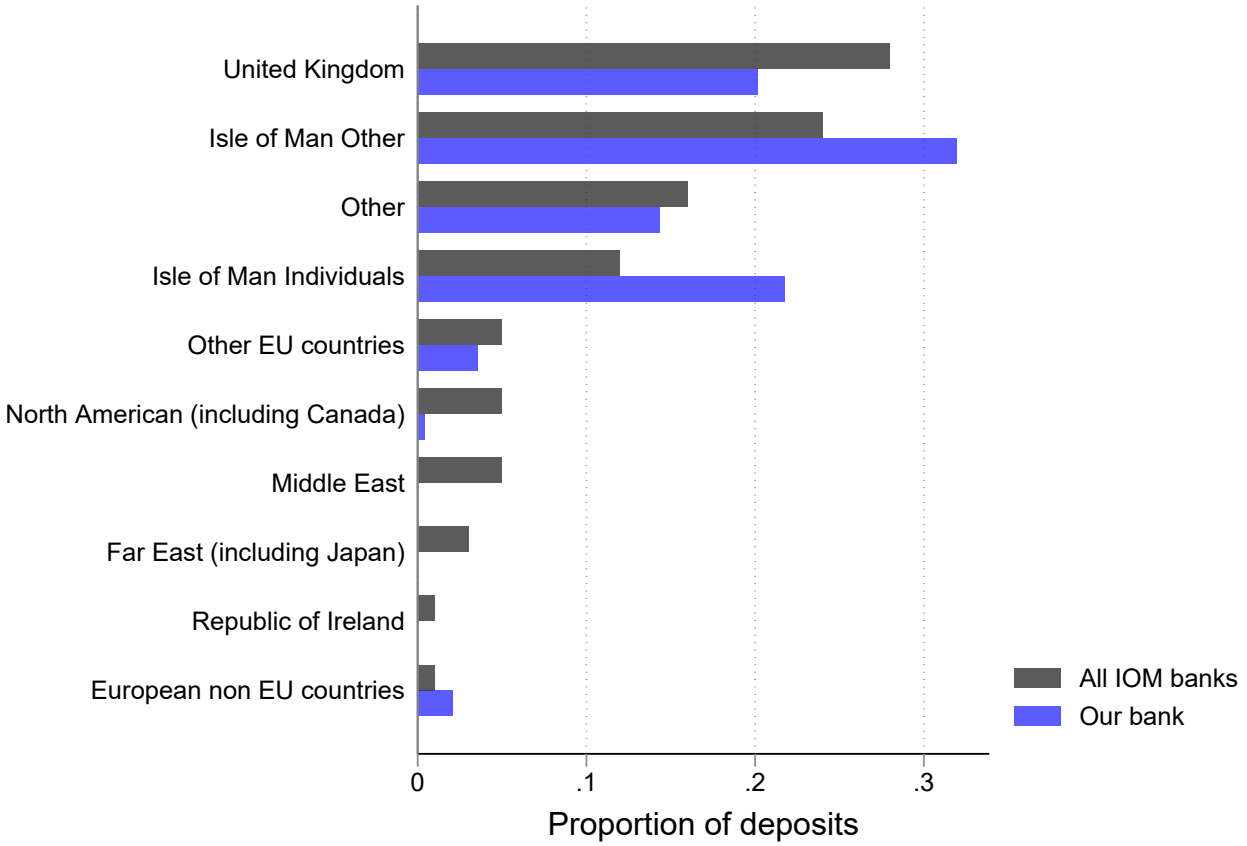
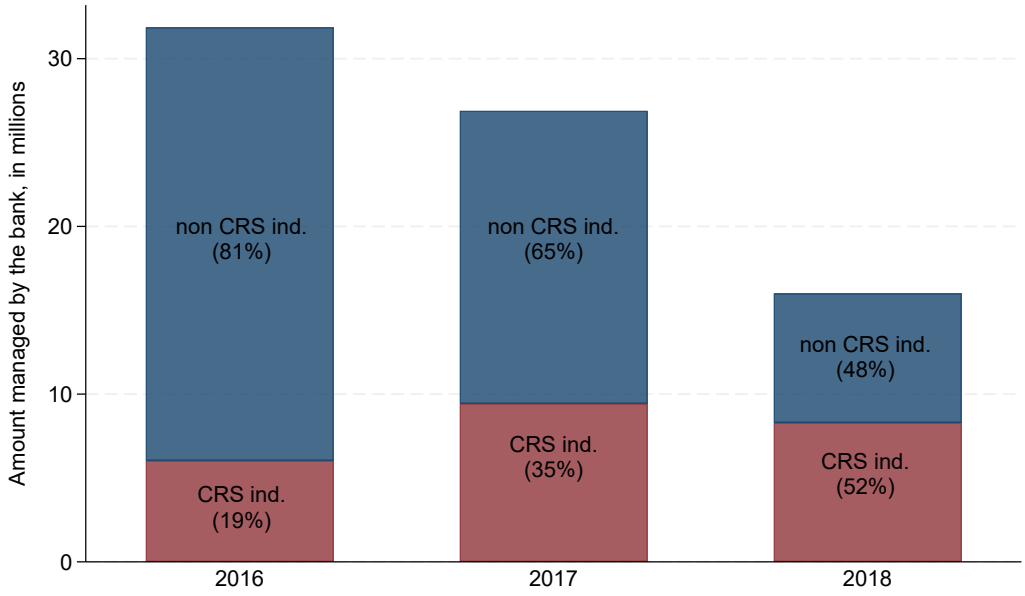
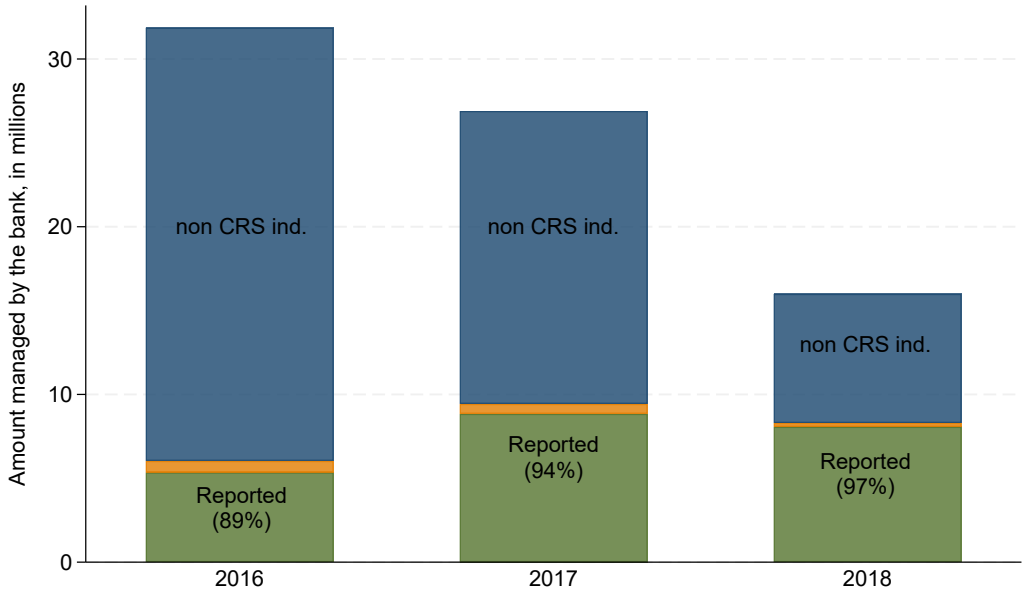


Figure 7: Direct origin of deposits at CNBIOM vs all banks based in the Isle of Man

Note: This graph shows the percentage of deposits by origin of the direct holder held at the Cayman National Bank in the Isle of Man (in blue) and in all banks based in the Isle of Man (in black). Data for all Isle of Man banks comes from the Isle of Man Financial Services Authority: in its Bankin Statistical Bulletin, the Isle of Man Financial Services Aythority reports aggregate of the geographical source of non-bank customer deposits in the Isle of Man, prepared as part of the Basel prudential standards. Data for CNBIOM comes from a document prepared by the bank, for the same Basel prudential reporting. Data is different from Figure 5 which shows the number of clients by ultimate region of origin, while this figure shows the direct origin of deposits. This means that e.g. for a company incorporated in the United Kingdom and ultimately owned by a French individual, this figure will attribute the deposits to the United Kingdom while it will be attributed to France in figure 5.



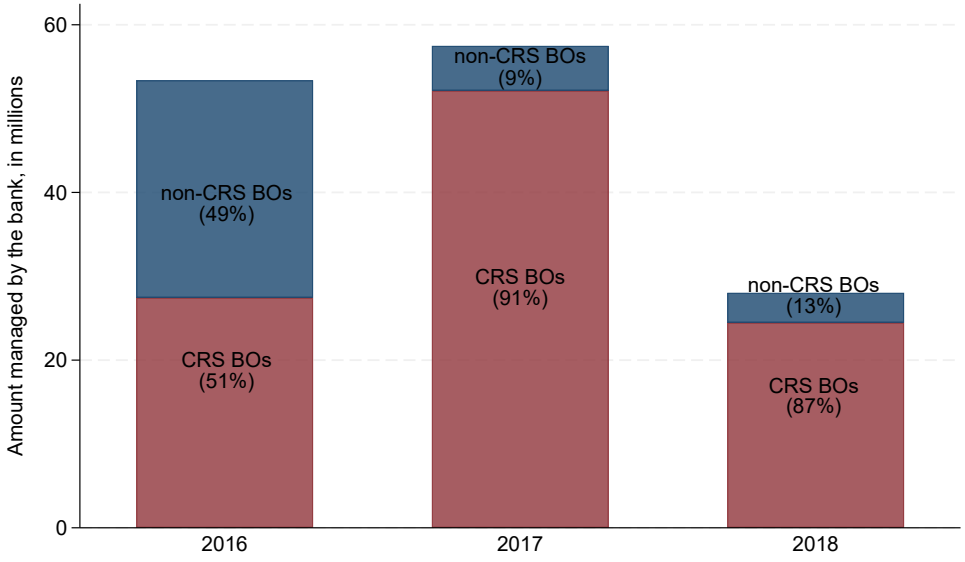
(a) CRS breakdown



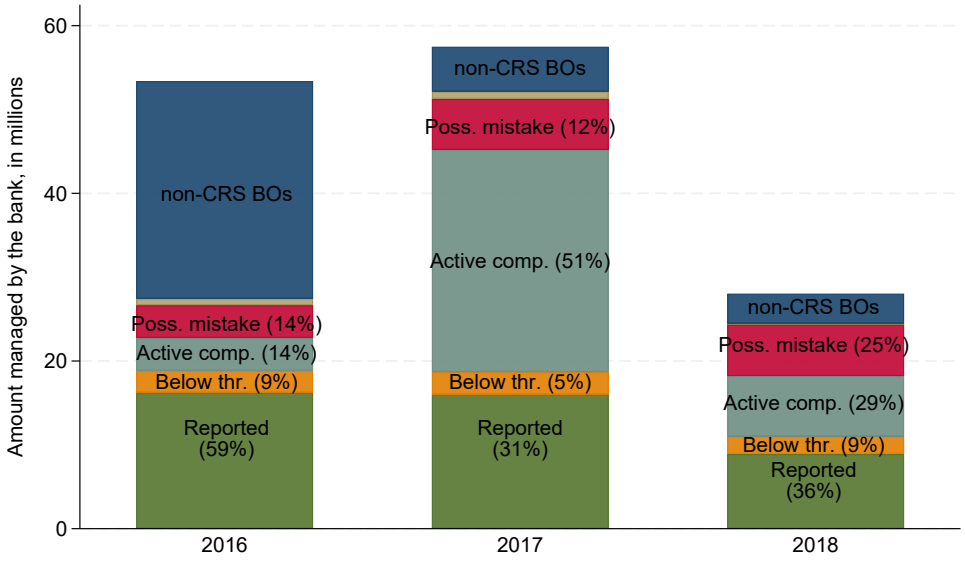
(b) Reporting breakdown

Figure 8: CRS coverage for accounts held by individuals, 2016 - 2018

Note: This figure shows the amount of deposits held by individuals at CNB on December 31, for years 2016 to 2018. Panel A breaks down the deposits by the country of tax residency of the individual, who can be either from a CRS-participating country or from a country to which the Isle of Man does not send information under the CRS, which includes i) Isle of Man individuals or ii) other countries either non participating to the CRS, or participating to the CRS, but to which the Isle of Man is not required to send information such as the UAE. Panel B shows the percentage of assets owned by CRS reportable individuals that were actually reported in by the bank.



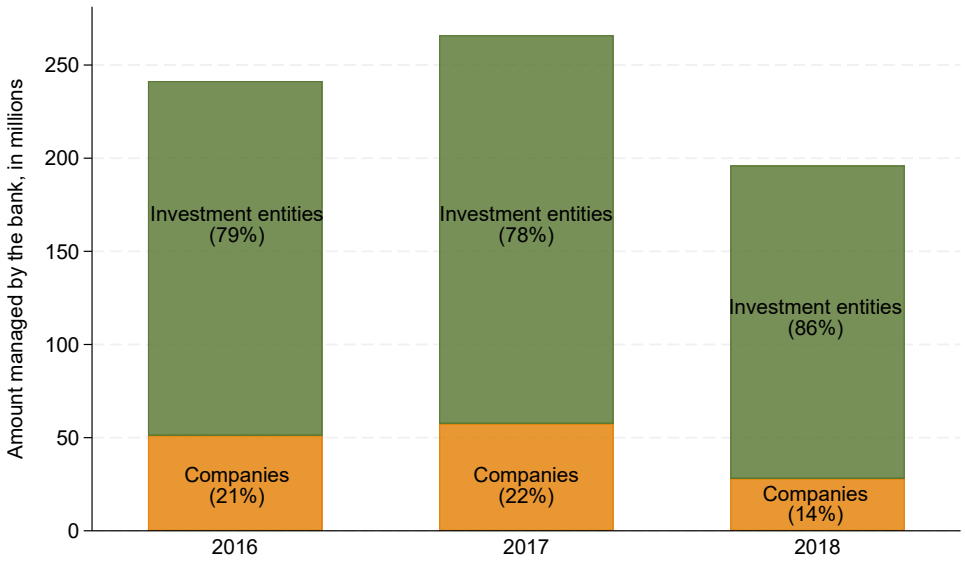
(a) CRS breakdown



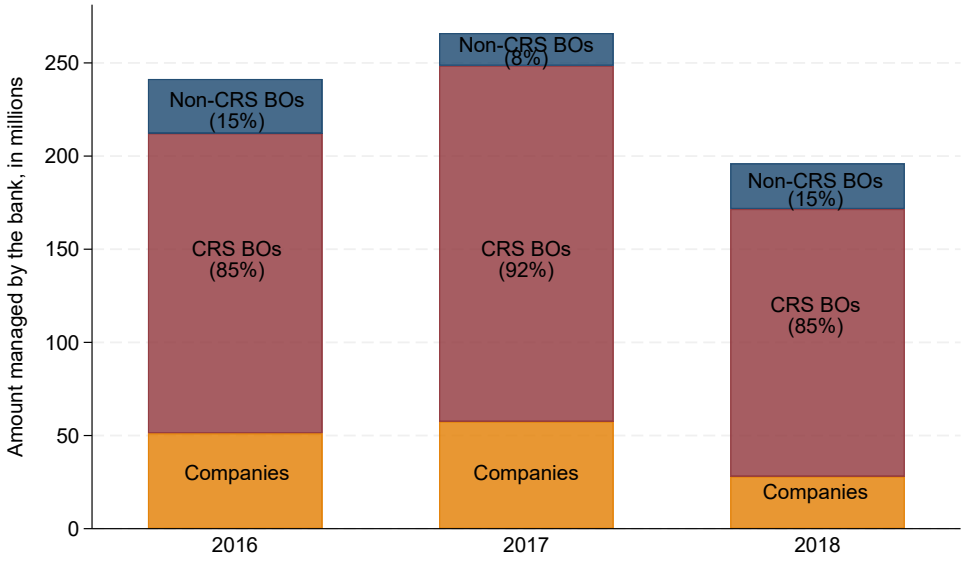
(b) Reporting breakdown

Figure 9: CRS coverage for company-held accounts, 2016 - 2018

Note: This figure shows the amount of deposits held by companies at CNB on December 31, for years 2016 to 2018. Panel A breaks down the deposits by the country of tax residency of the beneficial owner of the company, according to whether the Isle of Man is sending information to the country under the CRS. Non-CRS beneficial owners include individuals from countries participating to the CRS, but to which the Isle of Man is not required to send information such as the United Arab Emirates. Panel B breaks down the assets owned by CRS-reportable beneficial owners according to their reporting status, and is based on reports likely sent by the bank for the CRS over the period 2017-2019. Between 36% and 59% of these assets were actually reported by the bank, while 12-25% of them were not reported for reasons we cannot determine (Possible mistake). 14-51% of them were not reported because they were held by active companies based countries to which the Isle of Man does not send information under the CRS. 5-9% of the assets were not reported because they were held in accounts that did not reach the $250,000 reporting threshold.



(a) Entity breakdown



(b) CRS breakdown

Figure 10: CRS coverage for company-held accounts, 2016 - 2018

Note: This figure shows the amount of deposits held by companies at CNB on December 31, for years 2016 to 2018, for investment entities and for other companies. Panel A breaks down the deposits by the type of entity. Panel B breaks down the investment entity deposits by the country of tax residency of the beneficial owners, according to whether the Isle of Man is sending information to the country under the CRS.

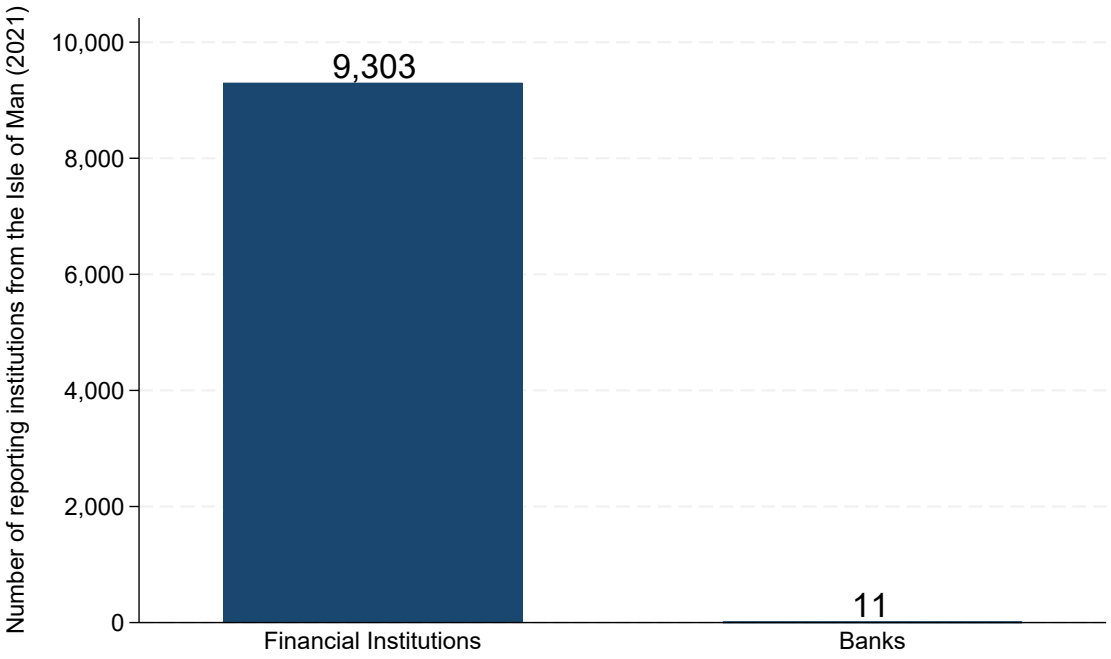


Figure 11: Number of Isle of Man Financial Institutions reporting under the Common Reporting Standard, and number of banks in the Isle of Man - 2021

Note: This figure shows the number of Financial Institutions registered in the Isle of Man reporting financial accounts under the Common Reporting Standard (left-hand side) and the number of banks registered in the Isle of Man (right-hand side), both for 2021. Data on the number of financial institutions reporting under the CRS comes from the OECD peer reviews of the Automatic Exchange of Financial Account Information. Data for the number of banks in the Isle of Man comes from the Isle of Man Financial Authorities' Banking Statistical Bulletin.

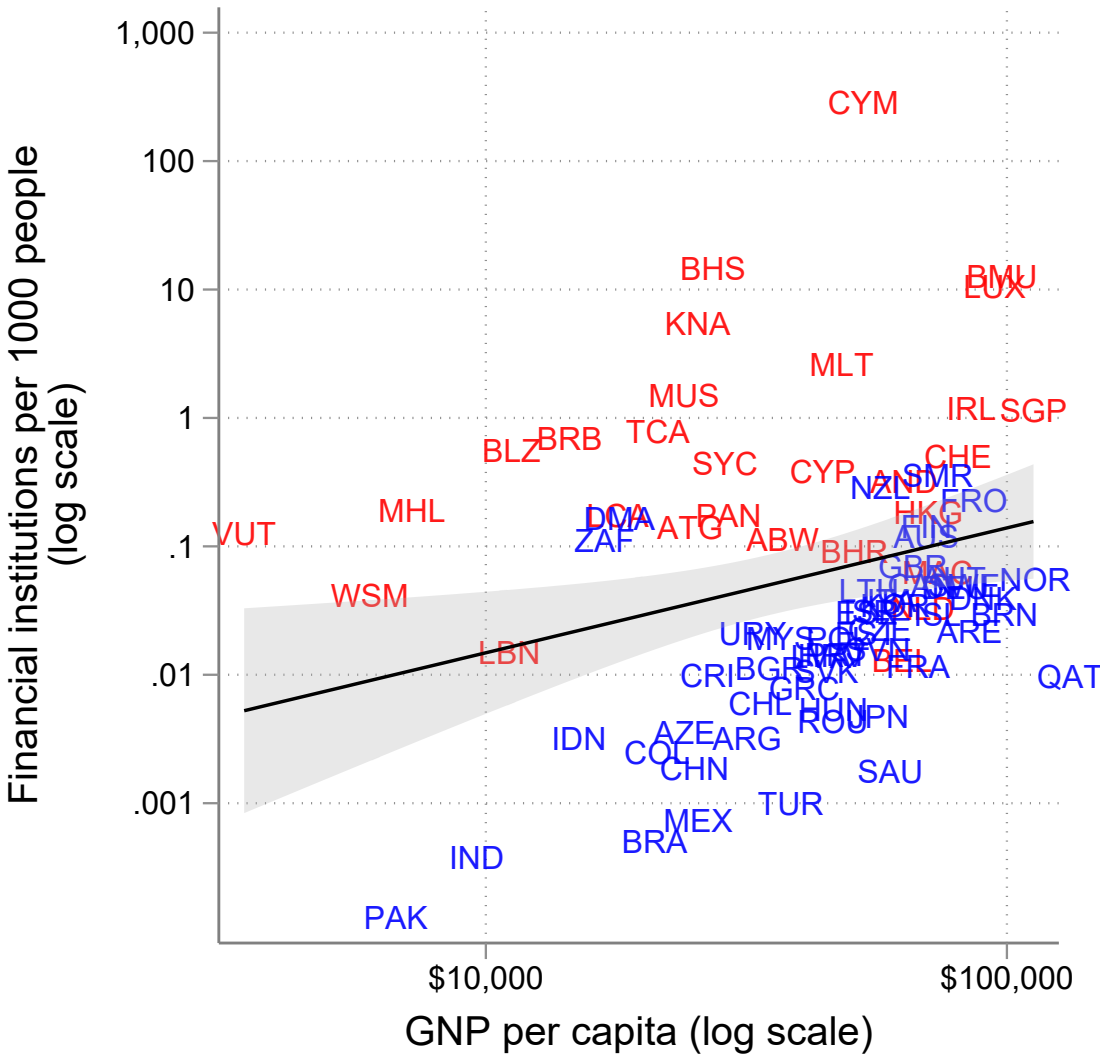
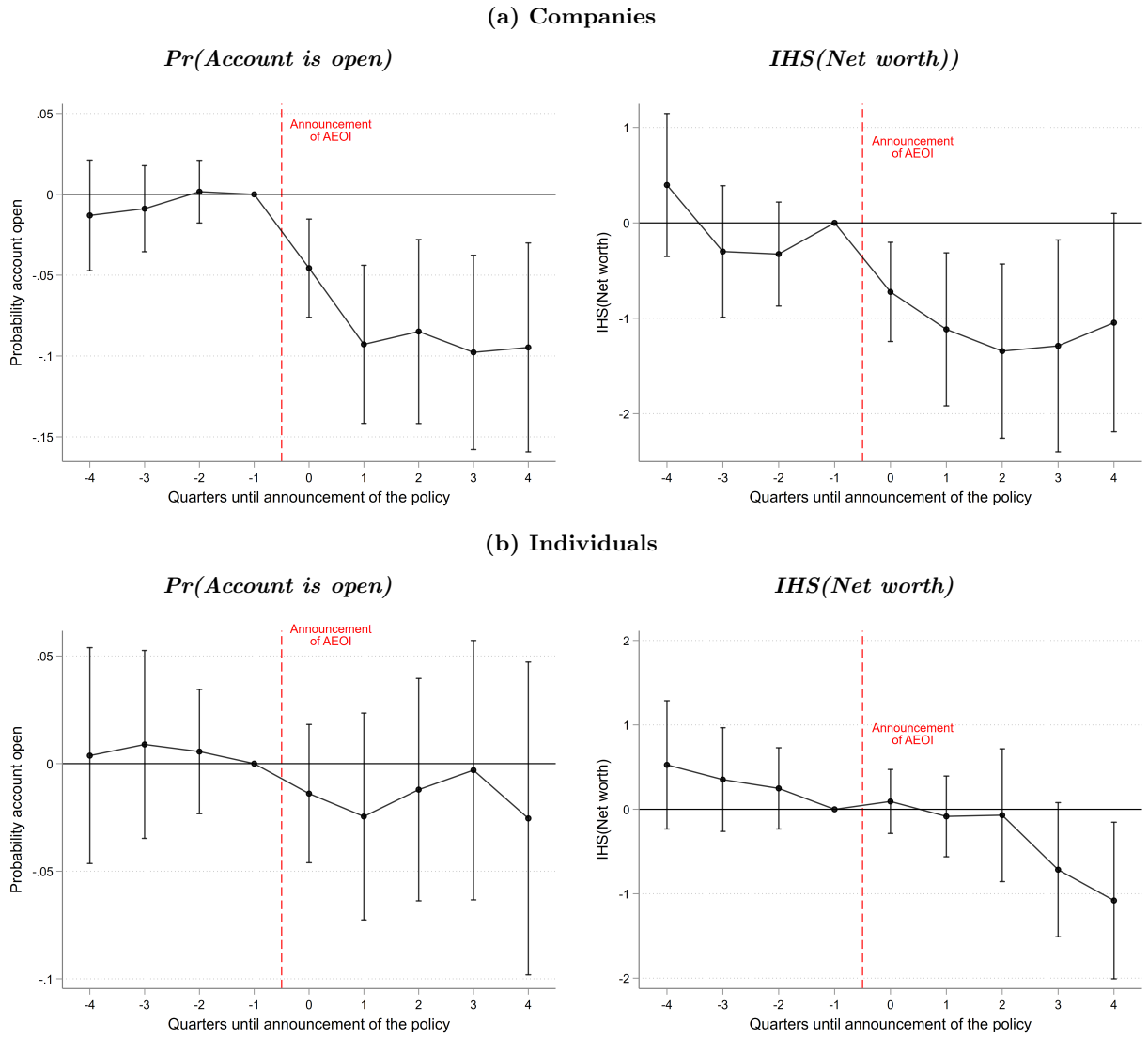


Figure 12: Number of financial institutions according to GNP (weighted by population)

Note: This figure shows for each country, the number of financial institutions per 1,000 people on the y-axis and the value of GNP per capita on the x-axis. Tax havens (according to Zucman (2017) are represented in red, while other countries are represented in blue. Data for the number of financial institutions come from the OECD peer-reviews of the Automatic Exchange of Financial Information.

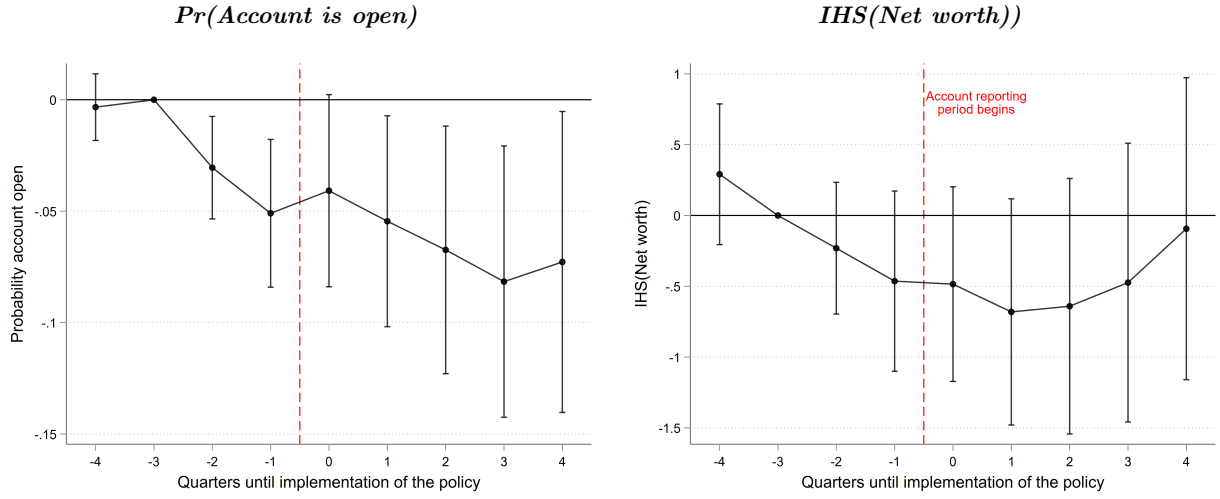
Figure 13: Stacked event-study estimates of impact of *announcement* of AEOI agreements on likely reportable customer accounts



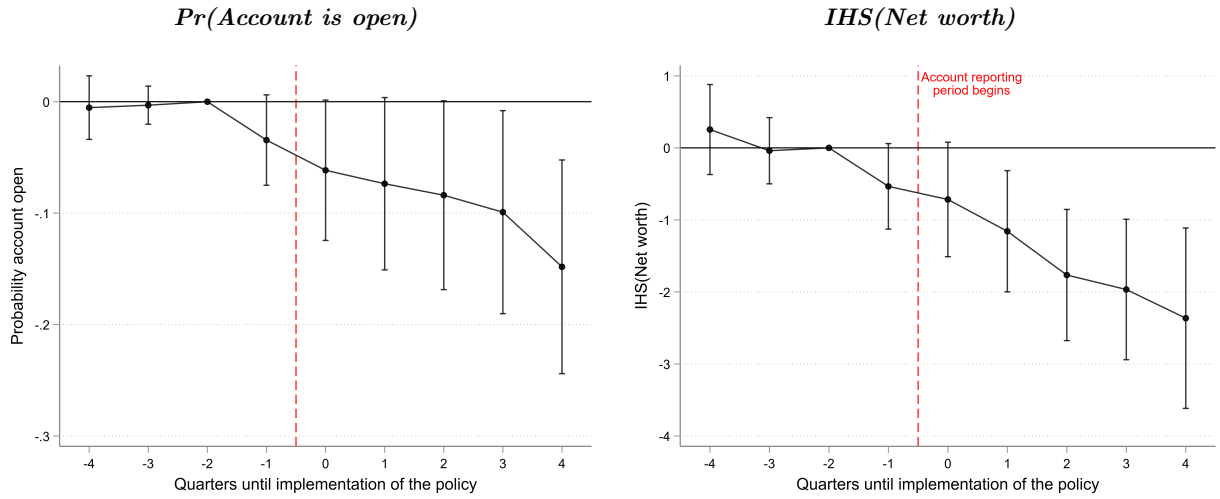
Note: Graphs show stacked event-study estimates of impact of announcement of automatic exchange of information treaties on (a) company accounts with a primary address - or - beneficial owner in a reportable jurisdiction and (b) individual accounts with a primary address in a reportable jurisdiction. Event study dummies are relative to one month *prior* to the start of reporting requirements. Standard errors are clustered at the client level. 95% Confidence intervals.

Figure 14: Stacked event-study estimates of impact of *imminent* account reporting requirements on likely reportable customer accounts

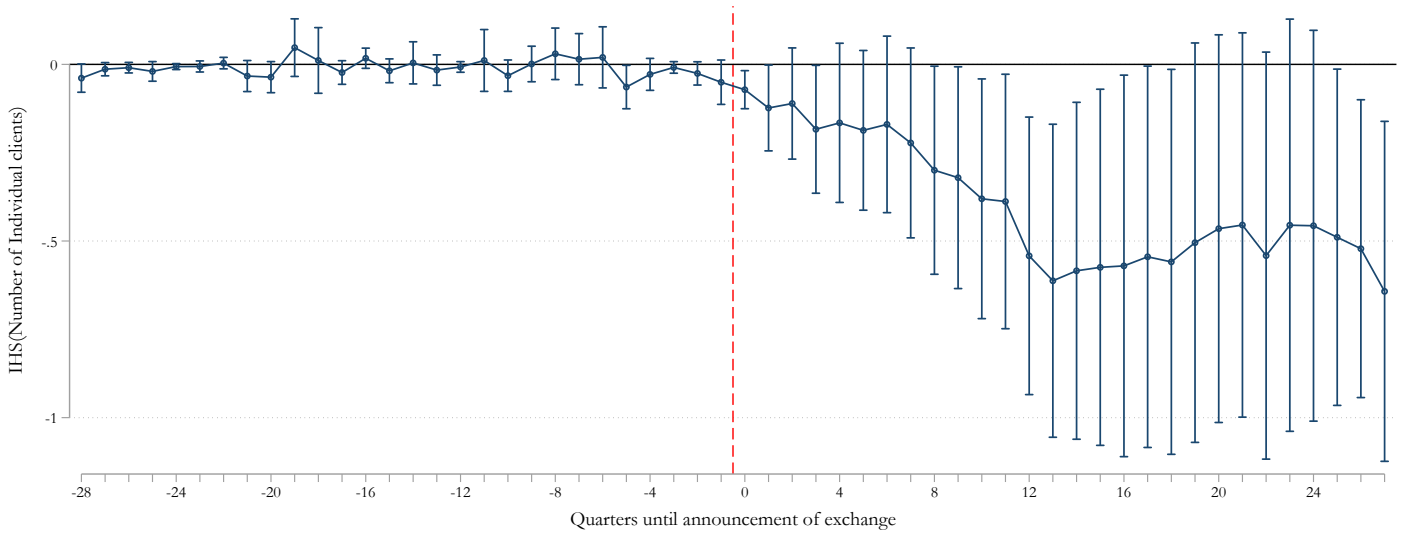
(a) Companies



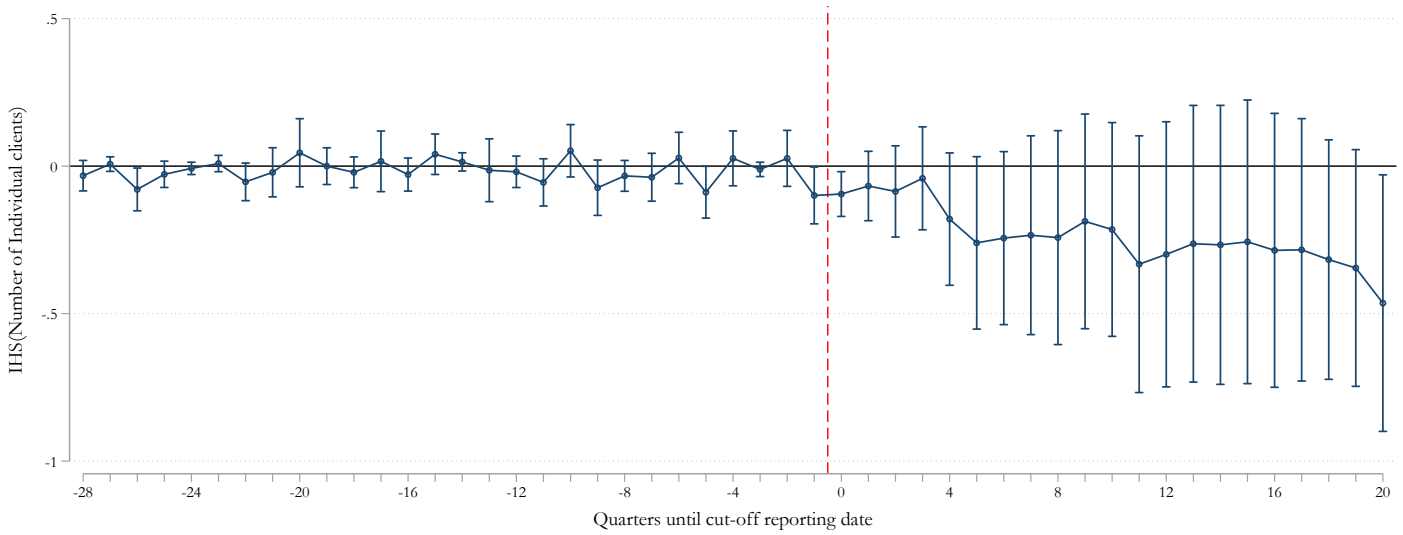
(b) Individuals



Note: Graphs show stacked event-study estimates of impact of impending account reporting requirements on (a) company accounts with a primary address - or - beneficial owner in a reportable jurisdiction and (b) individual accounts with a primary address in a reportable jurisdiction. Event study dummies are relative to three months *prior* to the start of reporting requirements. Standard errors are clustered at the client level. 95% Confidence intervals.



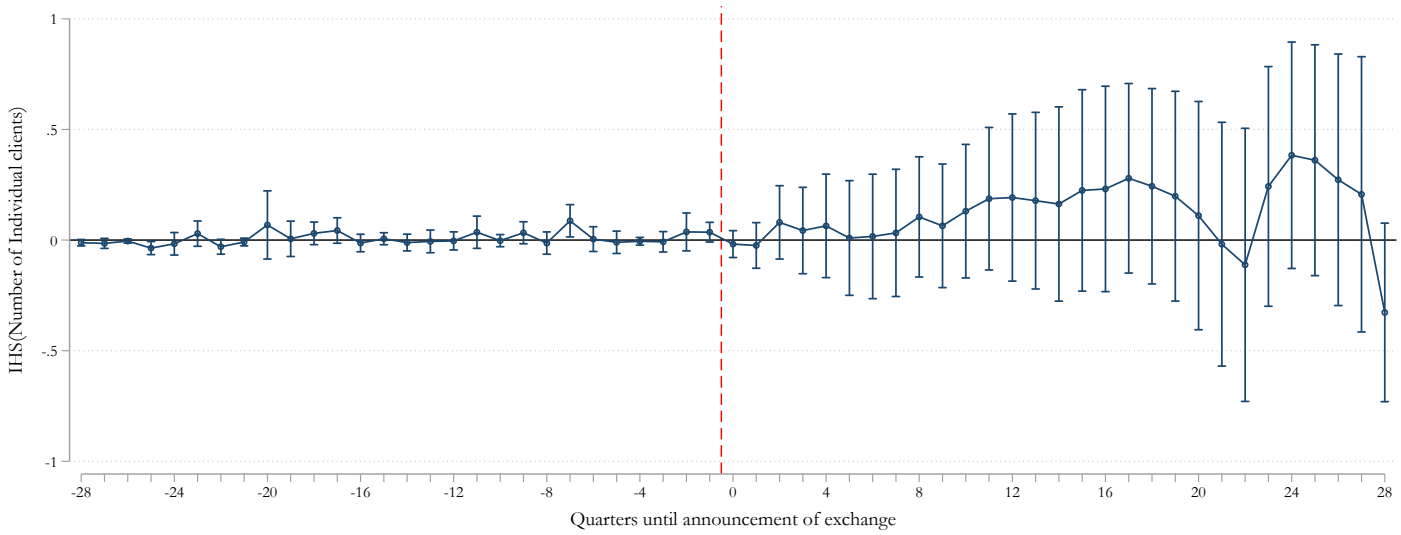
(a) Announcement date



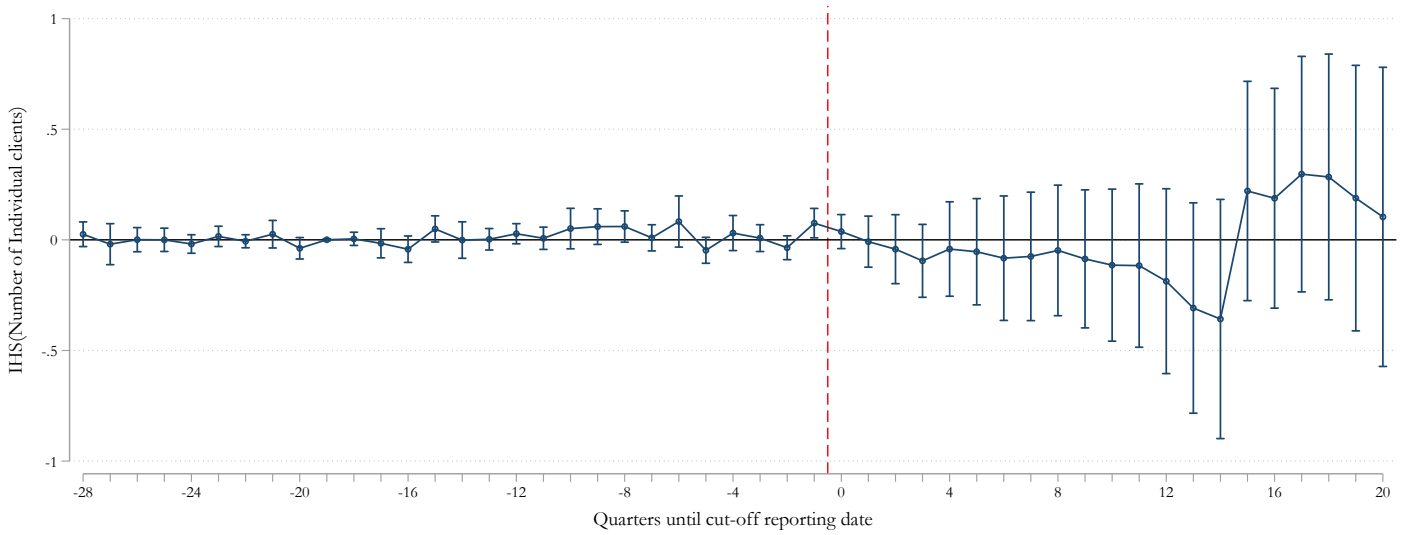
(b) Reporting cut-off date

Figure 15: Difference-in-differences estimates of impact of AEOI on likely reportable individual clients at CNBIOM

Notes: This figure shows the staggered difference-in-difference estimates of the impact of AEOI on the stock of likely reportable individual clients at the Cayman National Bank in the Isle of Man. It plots the path of estimated β^q and their 95 percent confidence interval band from the difference-in-differences model summarized by equation 5.1. Likely reportable individuals include individual accounts with a primary address in a reportable jurisdiction. The outcome variable is the IHS transformation of the number of clients in each group. The model is estimated using Callaway and Sant'Anna (2021) staggered difference-in-differences estimator. Panel A shows the impact of the *announcement* of AEOI, while Panel B shows the impact of the *cut-off reporting date* of AEOI, for FATCA, the UK-IGA and the CRS.



(a) Announcement date



(b) Reporting cut-off date

Figure 16: Difference-in-differences estimates of impact of AEOI on likely reportable companies at CNBIOM

Notes: This figure shows the staggered difference-in-difference estimates of the impact of AEOI on the stock of likely reportable company owners at the Cayman National Bank in the Isle of Man. It plots the path of estimated β^q and their 95 percent confidence interval band from the difference-in-differences model summarized by equation 5.1. Likely reportable company owners include company accounts with a beneficial owner in a reportable jurisdiction. The outcome variable is the IHS transformation of the number of clients in each group. The model is estimated using Callaway and Sant'Anna (2021) staggered difference-in-differences estimator. Panel A shows the impact of the *announcement* of AEOI, while Panel B shows the impact of the *cut-off reporting date* of AEOI, for FATCA, the UK-IGA and the CRS.

Table 1: Descriptive Statistics - Type and origin of clients of CNBIOM

Clients:	All	Individuals	Companies	Trusts	Other
Total	4,534	441	1,406	2,601	86
Percentage	-	10%	31%	57%	2%
By direct origin:					
British Virgin Islands	2%	0%	5%	0%	0%
Cayman Islands	3%	1%	1%	4%	10%
Cyprus	12%	1%	2%	19%	0%
Isle of Man	70%	43%	68%	76%	88%
United Kingdom	7%	24%	16%	0%	0%
Other	6%	31%	8%	1%	1%
By ultimate origin:					
Ireland	-	-	5%	-	-
Isle of Man	-	-	9%	-	-
Israel	-	-	4%	-	-
South Africa			3%	-	-
United Arab Emirates	-	-	3%	-	-
United Kingdom	-	-	50%	-	-
Other	-	-	3%	-	-

Note: This table sums characteristics of clients with at least one account at Cayman National Bank (Isle of Man) over the 2007-2019 period. The first panel shows the decomposition of unique clients by type. The category "Other" (column (5)) includes foundations, funds and partnerships. The second panel further disaggregate these figures by direct origin i.e. the country of residence for individuals, and the country of incorporation for entities. The third panel shows the same statistics but for country of ultimate origin for entities i.e. the country of residence of the ultimate owner of entities. It is only available for companies, as we do not have full data on beneficiaries of trusts, partnerships and funds yet.

Table 2: Static difference-in-differences for company owners, around the announcement of AEOI treaties.

	Probability account open				IHS(Net worth)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	All	FATCA	UK-IGA	CRS	All	FATCA	UK-IGA	CRS
Post x Treated	-0.091***	0.056***	-0.145***	-0.044	-0.453	0.087	-0.173	-0.601
	(0.027)	(0.020)	(0.046)	(0.039)	(0.383)	(0.424)	(0.512)	(0.607)
Post	-0.100***	-0.056***	-0.082***	-0.108***	-0.681***	-0.615***	-0.175	-0.800***
	(0.015)	(0.020)	(0.021)	(0.018)	(0.234)	(0.224)	(0.424)	(0.288)
Observations	35225	2425	5300	27500	35225	2425	5300	27500
Client FE	YES	YES	YES	YES	YES	YES	YES	YES

Note: This table shows the results of a static difference-in-differences equation around the announcement of an automatic exchange of information treaty, for different treaties. Columns (1) to (3) present the results for the probability to have an account open, respectively for FATCA, the UK-CDOT and the CRS. Columns (4) to (6) show the results for the IHS of the net worth of the company owners.

Table 3: Static difference-in-differences for individuals, around the cut-off reporting dates of AEOI treaties.

	Probability account open					IHS(Net worth)				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	All	2014	2015	2016	2017	All	2014	2015	2016	2017
Post x Treated	-0.099***	-0.043**	-0.067***	-0.078***	0.037	-1.146***	-1.169***	-0.950***	-1.553***	5.992***
	(0.010)	(0.017)	(0.019)	(0.028)	(0.071)	(0.141)	(0.238)	(0.272)	(0.385)	(1.010)
Post	-0.088***	-0.066***	-0.090***	-0.119***	-0.170***	0.213***	0.037	0.404***	0.426***	-0.891***
	(0.006)	(0.008)	(0.010)	(0.011)	(0.014)	(0.082)	(0.108)	(0.144)	(0.148)	(0.197)
Observations	13200	4175	3375	2900	1975	13200	4175	3375	2900	1975
Client FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Note: This table shows the results of a static difference-in-differences equation around automatic exchange of information cut-off reporting dates, for different years. The 2014 cut-off include both FATCA and the UK-CDOT, while the subsequent years correspond to different waves of CRS reporting. Columns (1) to (4) present the results for the probability to have an account open, for 2014 to 2017. Columns (5) to (8) show the results for the IHS of the net worth of the company owners.

A Additional Figures and Tables



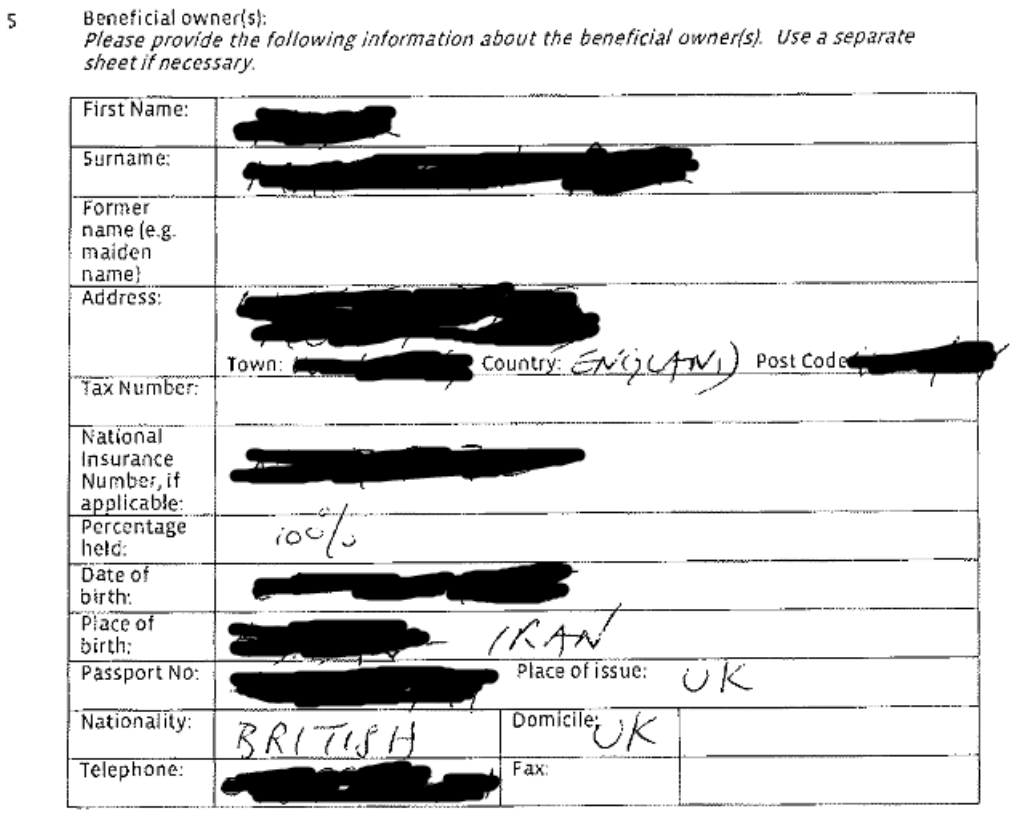
Figure A.1: Number of clients with at least one account at the bank, over the period 2007-2019 - including trusts

Note: This figure shows the number of clients who have at least one account at the Cayman National Bank in the Isle of Man over the period spanning from the end of 2007 to mid-2019. It includes accounts maintained by trusts, and other types of clients at the bank: individuals, companies, foundations, funds and partnerships.



Figure A.2: Total amount in deposits and investments accounts maintained at the bank, over the period 2007-2017

Note: This figure shows the total amount in deposit accounts and investments accounts managed by the Cayman National Bank in the Isle of Man over the period spanning from the end of 2007 to mid-2019. It includes deposits by all types of clients (Individuals, Companies, Trusts, Foundations, Funds and Partnerships).



5 Beneficial owner(s):
Please provide the following information about the beneficial owner(s). Use a separate sheet if necessary.

First Name:	[redacted]		
Surname:	[redacted]		
Former name (e.g. maiden name)			
Address:	[redacted] Town: [redacted] Country: ENGLAND Post Code: [redacted]		
Tax Number:			
National Insurance Number, if applicable:	[redacted]		
Percentage held:	100%		
Date of birth:	[redacted]		
Place of birth:	[redacted] IRAN		
Passport No:	[redacted]	Place of issue: UK	
Nationality:	BRITISH	Domicile: UK	
Telephone:	[redacted]	Fax:	

Figure A.3: Example of document in the Sherwood leak used for identification of beneficial owner identity

Note: This figure shows an example of document found in the Sherwood leak, that we used to identify the identity of beneficial owners of companies maintaining accounts at the Cayman National Bank in the Isle of Man.

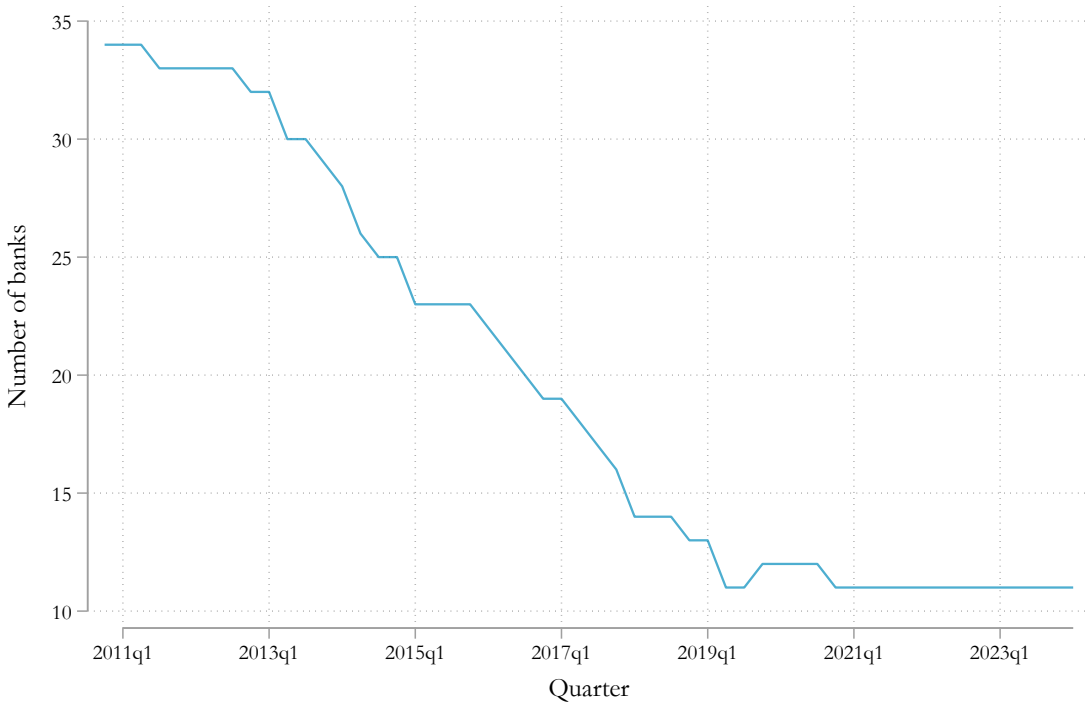


Figure A.4: Number of banks in activity in the Isle of Man by quarter, over the 2010-2024 period

Note: This graphs shows the number of banks in activity in the Isle of Man by quarter, over the 2010-2024 period. Data comes from the Isle of Man Financial Authorities' Banking Statistical Bulletin.

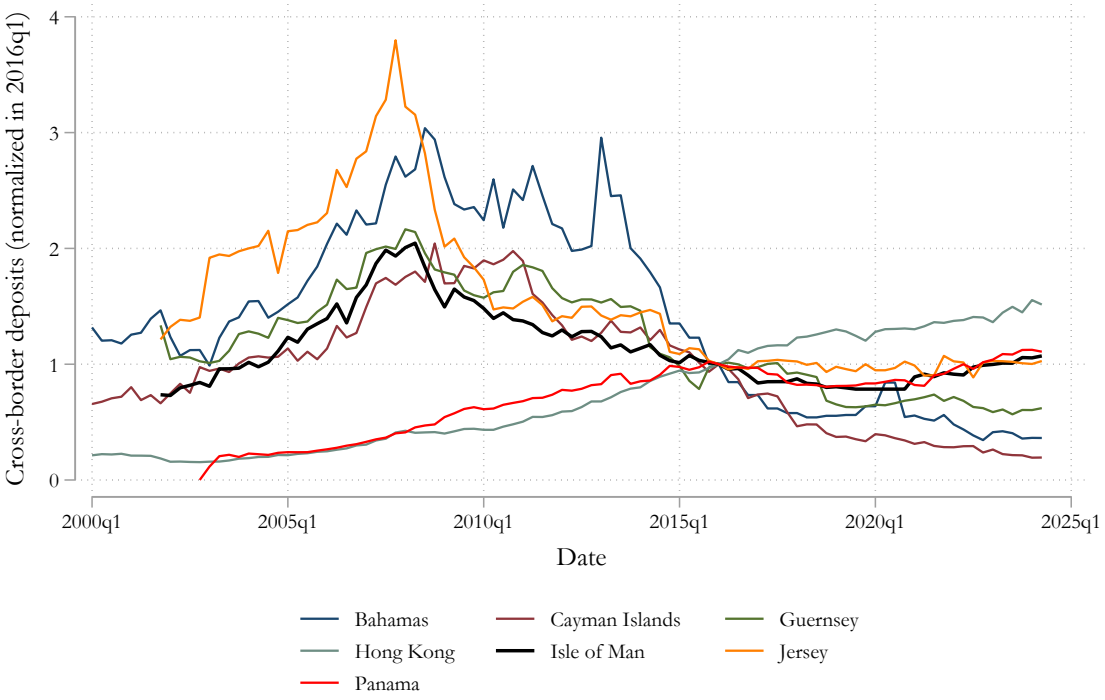


Figure A.5: Evolution of cross-border deposits in main tax havens, over the period 2000-2024

Note: This figure shows the total amount of non-bank cross-border liabilities recorded by the Bank of International Settlements in its Locational Banking Statistics for the main tax havens reporting to the BIS. The totals are normalized to 1 in 2016q1.

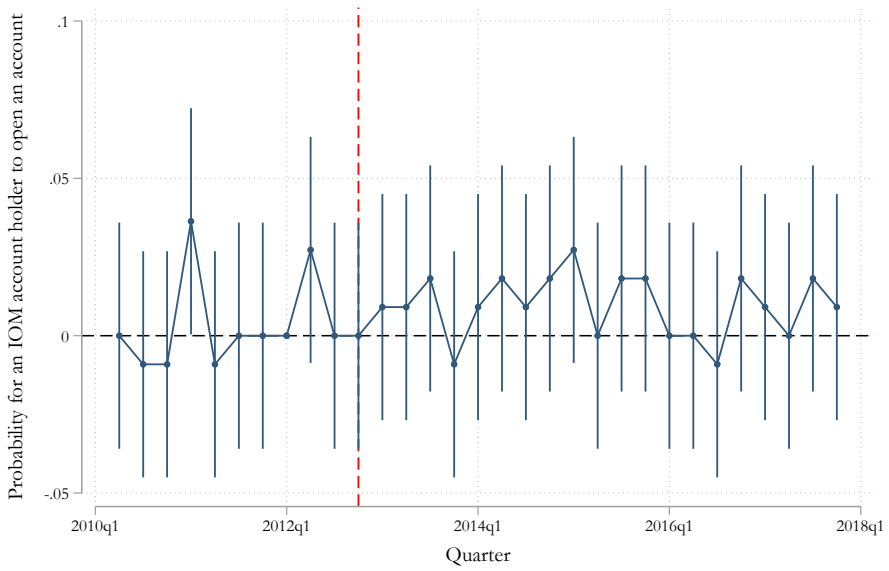
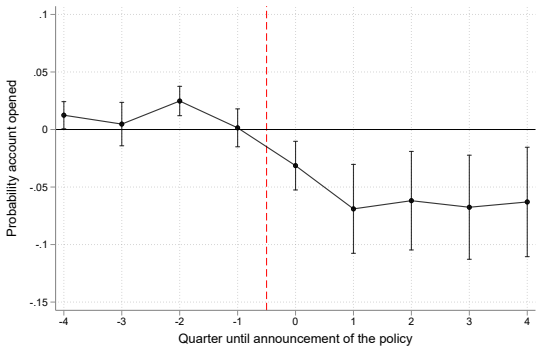


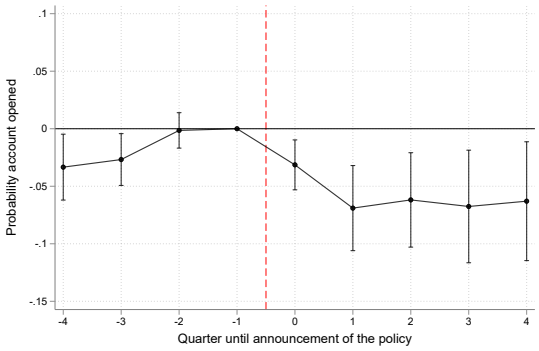
Figure A.6: Probability for an Isle of Man client to open an account over time

Note: This figure shows the probability for an Isle of Man client to open an account at the Cayman National Bank in the Isle of Man, over the 2010-2017 period. It plots the results of a regression of the probability for an Isle of Man client to open an account over time dummies. The coefficients are normalized to 0 in 2012q1, so that the estimates can be interpreted relative to before the commitment to exchange of information between the Isle of Man and the United Kingdom.

(a) Callaway and Sant'Anna (2021)



(b) De Chaisemartin and d'Haultfoeuille (2020)



(c) Borusyak et al. (2024)

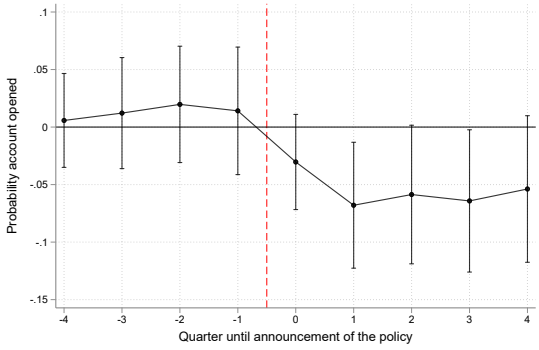
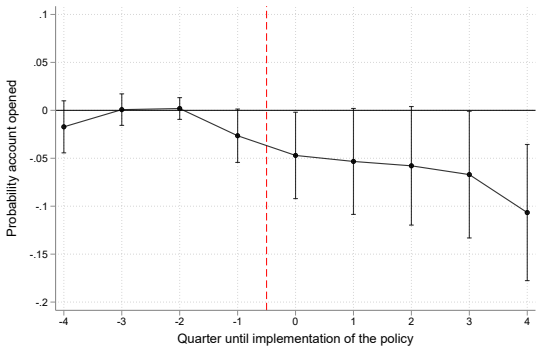


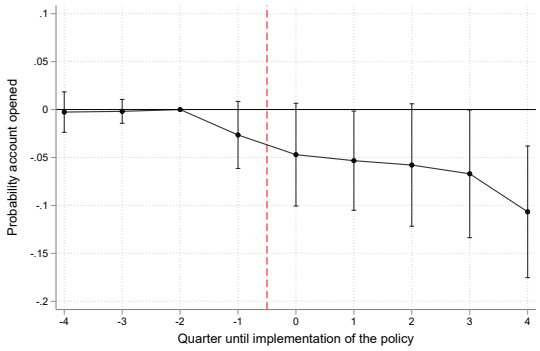
Figure A.7: Robustness analysis - Estimates of the impact of announcement of AEoI agreements on likely reportable company owners

Note: This figure presents results of a difference-in-difference estimation of the probability that treated company owners have an account opened at CNB, around the announcement of AEoI agreements. In these specifications, the treatment is defined at the country-level and company owners identified as residing in AEoI participating countries become treated when their country announces its participation to an automatic exchange of information agreement with the Isle of Man. This figure plots the path of the estimated coefficients corresponding 95 percent confidence interval band from variations of the difference- in-differences model summarized by equation 5.1. These variations proposes different ways to tackle the issue of heterogeneous treatment effects and staggered roll-out of treatment in dynamic difference-in-differences: Callaway and Sant'Anna (2021) (Panel (a)), De Chaisemartin and d'Haultfoeuille (2020) (Panel (b)) and Borusyak et al. (2024) (Panel (c)).

(a) Callaway and Sant'Anna (2021)



(b) De Chaisemartin and d'Haultfoeuille (2020)



(c) Borusyak et al. (2024)

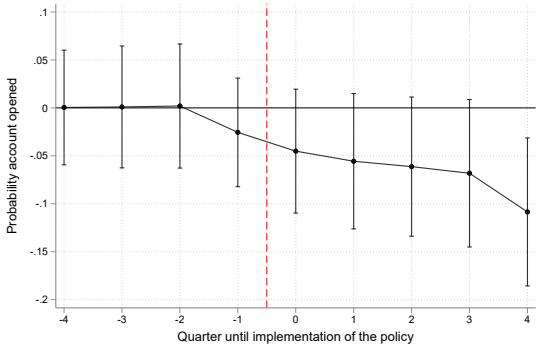


Figure A.8: Robustness analysis - Estimates of the impact of imminent account reporting through AEoI on likely reportable individual owners

Note: This figure presents results of a difference-in-difference estimation of the probability that treated individuals owners have an account opened at CNB, around the start of the account reporting period under AEoI agreements. In these specifications, the treatment is defined at the country-level and individuals identified as residing in AEoI participating countries become treated when their country announces its participation to an automatic exchange of information agreement with the Isle of Man. This figure plots the path of the estimated coefficients corresponding 95 percent confidence interval band from variations of the difference- in-differences model summarized by equation 5.1. These variations proposes different ways to tackle the issue of heterogeneous treatment effects and staggered roll-out of treatment in dynamic difference-in-differences: Callaway and Sant'Anna (2021) (Panel (a)), De Chaisemartin and d'Haultfoeuille (2020) (Panel (b)) and Borusyak et al. (2024) (Panel (c)).

Table A.1: Static difference-in-differences for company owners, around the cut-off reporting dates of AEOI treaties.

	Probability account open					IHS(Net worth)				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	All	2014	2015	2016	2017	All	2014	2015	2016	2017
Post x Treated	-0.073***	-0.011	-0.071***	-0.103***	0.037	-0.993***	-1.238***	0.089	-0.351	5.992***
	(0.007)	(0.011)	(0.016)	(0.020)	(0.071)	(0.112)	(0.216)	(0.247)	(0.289)	(1.010)
Post	-0.086***	-0.075***	-0.058***	-0.122***	-0.170***	-0.143	0.567***	-1.317***	-0.559***	-0.891***
	(0.005)	(0.007)	(0.012)	(0.014)	(0.014)	(0.092)	(0.146)	(0.196)	(0.203)	(0.197)
Observations	15425	5675	4225	3550	1975	15425	5675	4225	3550	1975
Client FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Note: This table shows the results of a static difference-in-differences equation around automatic exchange of information cut-off reporting dates, for different years. The 2014 cut-off include both FATCA and the UK-CDOT, while the subsequent years correspond to different waves of CRS reporting. Columns (1) to (5) present the results for the probability to have an account open, for all waves of exchange and then for 2014 to 2017. Columns (6) to (10) show the results for the IHS of the net worth of the company owners.

Table A.2: Static difference-in-differences for individuals, around the announcement of AEOI treaties.

	Probability account open				IHS(Net worth)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	All	FATCA	UK-IGA	CRS	All	FATCA	UK-IGA	CRS
Post x Treated	-0.037	0.055***	-0.066	0.008	-1.361***	0.813***	-0.590	-0.842*
	(0.031)	(0.015)	(0.049)	(0.040)	(0.389)	(0.214)	(0.443)	(0.492)
Post	-0.099***	-0.055***	-0.042***	-0.109***	0.271	-0.823***	-0.401*	0.390
	(0.013)	(0.015)	(0.014)	(0.016)	(0.206)	(0.214)	(0.214)	(0.246)
Observations	45275	3175	3825	38275	45275	3175	3825	38275
Client FE	YES	YES	YES	YES	YES	YES	YES	YES

Note: This table shows the results of a static difference-in-differences equation around the announcement of an automatic exchange of information treaty, for different treaties. Columns (1) to (4) present the results for the probability to have an account open, for all AEOI treaties and then respectively for FATCA, the UK-CDOT and the CRS. Columns (5) to (8) show the results for the IHS of the net worth of the company owners.

B Data construction

Gathering Beneficial Ownership information for entities account holders.

The Sherwood files are made of copies of the hard-drives of employees of the Cayman National Bank and Trust (Isle of Man), a bank in the Isle of Man. This is an unstructured leak, as opposed to structured leaks such as the Offshore Leaks database which has been processed by the International Consortium of Investigative Journalists before being put online.

The Sherwood files offer extensive data on the assets held by their clients at CNBIOM over time, as well as comprehensive information on the direct owner of accounts held at the bank. This means that we know the identity of the legal persons holding the accounts: their full name, as well as the country of residence for individuals, and the country of incorporation for entities. In addition, the employees of the bank were maintaining some spreadsheets on their clients, which were sometimes including precise information on the identity of the beneficial owners of indirectly-held accounts. However, this information is readily available for only about 60% of the companies in our sample. For the rest of the companies with an account at CNBIOM, we have to complete data on the identity of the beneficial owners ourselves. This is a necessary step to be able to distinguish the accounts held by owners from countries adopting the CRS from account owners not affected by the policy.

In order to determine the origin of beneficial owners whose information is missing in the leaks, we proceed in several ways. First, we rely on secondary internal documents maintained by the employees of CNBIOM, such as reports prepared ahead of AEoI reporting in which employees attempt to identify which of their clients they should report. We also found documents compiling the structures of some of the entities maintaining accounts at the bank, with information in the identity of their intermediaries, shareholders, beneficial owners and when applicable settlors and beneficiaries. Sometimes, we are also able to rely on raw documents such as incorporation certificates of a company, mentioning the identity of their owners. Appendix Figure A.3 shows an anonymized example of such a document found in the bank's files. Finally, the Sherwood leaks also contain documents with lists of addresses of clients of the banks, which we sometimes use when the address is not likely to be the one of an intermediary.

In cases in which there is no internal bank document giving indications on the identity of the ultimate owners of entities, we turn to external sources. One of our main sources of information is the United Kingdom Beneficial Ownership Registry, which is public and freely accessible. As CNBIOM caters primarily to UK clients, we often find information about the owners of UK companies directly on the register. The UK BO registry also contains information about overseas companies holding properties in the UK, meaning we can retrieve the identity of the owners of such real estate holdings.

When we still cannot find out who the owners of a company are, we rely on secondary external sources that can give information on countries of residence: professional social networks such as LinkedIn which often mentions a country of residence, or newspaper articles mentioning the entity and their owners.

At the end of this process, we obtain reliable information on the identity of the owners of more than 84% of the companies with an account at CNBIOM over the 2007-2019 period.