



Hide-seek-hide? On the effects of financial secrecy

TAX JUSTICE NETWORK WORKING PAPER #2024-03
OCTOBER 2024

Petr Janský

Institute of Economic Studies, Faculty of Social Sciences, Charles University, Prague, Czech Republic. E-mail: petr.jansky@fsv.cuni.cz.

Tereza Palanská

Institute of Economic Studies, Faculty of Social Sciences, Charles University, Prague, Czech Republic. E-mail: tereza.palanska@gmail.com.

Miroslav Palanský

Institute of Economic Studies, Faculty of Social Sciences, Charles University, Prague, Czech Republic; Tax Justice Network, London, United Kingdom. E-mail: miroslav.palansky@gmail.com.

For the most up-to-date version, supplemental data and code, and other information, see here: [10.17605/OSF.IO/9HDUS](https://doi.org/10.17605/OSF.IO/9HDUS)

Hide-seek-hide? The effects of financial secrecy on cross-border financial assets*

Petr Janský[†], Tereza Palanská[‡], Miroslav Palanský[§]

October 2024

Abstract

Excessive financial secrecy facilitates illicit financial flows, including via anonymous ownership of cross-border financial assets. We study the reaction of such investment to recent increases in financial transparency using a new dataset of financial secrecy for 2011—2019. We find that investors reacted by relocating their assets to jurisdictions that remain, or have recently become, relatively more financially secretive than other countries. These effects are highly non-linear and stronger for assets originating from lower-income countries. Our results suggest that recent advances in information exchange are toothless if not accompanied by improved information collection and full corporate beneficial ownership transparency.

Keywords — financial secrecy; financial transparency; secrecy jurisdictions; tax havens; offshore financial centers

JEL — F36, F65, G28, H26, H87

*This research has been supported by the Czech Science Foundation (CORPTAX, 21-05547M); Miroslav Palanský and Tereza Palanská acknowledge support provided by the Charles University Grant Agency (848517 and 1154418) and the H2020-MSCA-RISE project GEMCLIME-2020 GA No. 681228. We also acknowledge support from the Cooperatio Program at Charles University, research area Economics. Miroslav Palanský acknowledges support from the Horizon Europe project ‘DemoTrans’ (grant 101059288). The authors are grateful to Martín Besfamille, Bruno Casella, Alex Cobham, Daniel Haberly, Martin Hearson, Evžen Kočenda, Markus Meinzer, Jakob Miethe, Ronen Palan, Emmanuel Saez, Jason Sharman, Michal Šoltés, Dariusz Wójcik, Gabriel Zucman, and seminar participants at the University of Sussex, Charles University, Tax Justice Network Conference, International Institute of Public Finance, European Economic Association, and Copenhagen Business School for useful comments and discussions. We have also benefited from discussions with members of the Financial Secrecy Index author team at the Tax Justice Network.

[†]Institute of Economic Studies, Faculty of Social Sciences, Charles University, Prague, Czechia. E-mail: petr.jansky@fsv.cuni.cz

[‡]Institute of Economic Studies, Faculty of Social Sciences, Charles University, Prague, Czechia. E-mail: tereza.palanska@gmail.com

[§]Institute of Economic Studies, Faculty of Social Sciences, Charles University, Prague, Czechia, and Tax Justice Network, London, United Kingdom. E-mail: miroslav.palansky@gmail.com

1 Introduction

Financial secrecy supplied by secrecy jurisdictions enables individuals and companies to escape their home country’s legislation, thereby enabling cross-border illicit financial flows. Recent leaks of confidential documents such as Panama Papers have provided a glimpse of the world behind the veil of secrecy and highlighted the magnitude of use of secrecy jurisdictions for illegal purposes. Tackling financial secrecy—or, in other words, improving financial transparency—has thus risen high on the agendas of governments and international organisations, resulting in promising progress. The most prominent example of that progress is information exchange (including with previously highly secretive jurisdictions) which has been widely adopted throughout the developed world, albeit with mixed evidence on its effectiveness (Casi et al., 2020; Johannesen and Zucman, 2014; Menkhoff and Miethe, 2019). Meanwhile, lower-income countries find themselves falling behind with respect to the achieved progress, even though illicit financial flows fuelled by financial secrecy affect them at least as harshly as developed countries, if not more (Andersen, Johannesen, and Rijkers, 2022; Johannesen, Tørsløv, et al., 2020).

In this paper, we ask how the recent push for financial transparency in several areas affected cross-border financial assets. To that objective we combine existing historical measures of financial secrecy and harmonize them to derive a novel panel dataset of financial secrecy. This data shows that progress has been heterogeneous across countries: while some countries have become more transparent, others have remained highly secretive, and some have become relatively more secretive over time (Janský et al., 2023). This heterogeneity allows us to empirically estimate the semi-elasticity of cross-border financial assets to changes in financial secrecy. In particular, we focus on portfolio investment and bank deposits—two variables that together capture most of the cross-border financial assets that can be exploited for illegal purposes using regulatory arbitrage (Johannesen and Zucman, 2014). At the same time, comprehensive data is available for many countries, including most secrecy jurisdictions of the world as well as low- and lower-middle income countries, which are often left out of similar analyses due to lack of data. In contrast to most existing literature, we thus focus specifically on the differences between the observed semi-elasticities across investors from countries with various levels of income.

In principle, any regulatory arbitrage opportunity related to financial secrecy offered by secrecy jurisdiction j to the residents of country i may potentially be exploited by the residents of country i to escape their home legislation. We develop a model of the locational decision of an

asset holder from country i who stands to benefit from using financial secrecy offered by secrecy jurisdictions j and k , but faces the cost of establishing an offshore investment structure and a positive probability of being revealed and sanctioned. Our model provides three empirically testable predictions: (i) only high-secrecy jurisdictions can be used for hiding one's identity and the related thresholds are identifiable and detectable; (ii) the effect of changes in secrecy is highly non-linear; and (iii) an investor will only relocate their investment if the changes in relative secrecy are large enough. Additionally, we hypothesise that the response observed in the data (which include illicit as well as legitimate financial assets) will be higher for investors from lower-income countries, where, as suggested by previous research, the share of the illicit component is likely to be higher.

Our results show that the locational choice of investors is significantly influenced by financial secrecy. We document this effect and its details with three main findings. First, we show that investors follow the behaviour predicted by our locational choice model. In our preferred specification, we find that, on average, if a country as secretive as the United Arab Emirates in 2011 became as transparent as Luxembourg by 2019, approximately 13% of cross-border portfolio assets owned by investors from third countries would be relocated to secrecy jurisdictions that remained highly secretive. We find this effect to be highly non-linear, with larger changes in relative secrecy inducing larger volumes of relocated cross-border financial assets.

Our second main finding relates to the heterogeneity of the relocation effect between countries with varying levels of income. Specifically, we find that for investors from low-income countries, the semi-elasticity of response to changes in relative financial secrecy is significantly higher than for those originating from higher-income countries. This result is consistent with the notion that cross-border financial assets originating from lower-income countries have a relatively larger illicit component.

Third, we corroborate the findings of previous literature (such as [Casi et al. \(2020\)](#) and [Menkhoff and Miethe \(2019\)](#)) that the advent of information exchange has had a significant negative impact on bank deposits in high-secrecy jurisdictions. However, we find that the same does not apply to portfolio investment. In fact, portfolio investment has not reacted to information exchange innovations, but reacted strongly to more substantive changes in financial secrecy, mainly in the area of ownership registration secrecy. Our findings highlight that information exchange scheme policies are only effective in mitigating illicit financial flows when relevant

information is collected in the first place.

In our empirical specifications, we use a trilateral panel setting to track the investments of residents of country i in secrecy jurisdictions j and k , and use the change in relative secrecy offered by jurisdictions j and k between 2011 and 2019. We thereby improve the field’s understanding of the effects of financial secrecy in several ways. First, by using a comprehensive measure of financial secrecy across various areas, we mitigate the risk of not capturing the potential circumvention of individual policies. Second, our observation unit is a triad of countries in a given year, which allows to directly identify relocation behaviour. Third, our fixed-effects empirical strategy ensures that there are no compounding factors at the bilateral level that would drive the results.

With this paper we contribute to the growing body of literature on the effects of increased financial transparency on wealth held in secrecy jurisdictions. Published studies have focused on individual policies which have helped improve financial transparency in various areas. For example, in the area of capital income taxation, one policy aimed at international coordination towards transparency is the Savings Taxation Directive in the European Union, established to ensure the taxation of foreign interest income of domestic households according to domestic tax rules. Effectively, while not harmonising tax rates as such, the system provides a means to reduce tax evasion by enabling residence-based taxation of part of households’ capital income by obliging cooperating jurisdictions to withhold tax or report on interest on income earned by entities whose beneficial owner is an EU resident (Hemmelgarn and Nicodème, 2009). However, the evidence of the effects of this policy is mixed—while some studies do find a significant effect in certain settings, others do not, arguing that the existence of loopholes makes it easy for investors to circumvent taxation on foreign-source interest. Johannesen and Zucman (2014), for example, report that Swiss bank deposits by EU residents declined by 30–40% relative to other Swiss bank deposits in two quarters immediately before and after the tax was introduced, and Rixen (2011) find that countries engaged in information exchange lost capital relative to third countries outside the scope of the directive. Conversely, Hemmelgarn and Nicodème (2009) report that the Directive had no measurable effects on the development of different investments that fall within its scope, and P. Caruana-Galizia and M. Caruana-Galizia (2016) find that the growth of EU-owned entities declined immediately after the Directive’s implementation, whereas that of non-EU-owned entities remained stable, pointing to one important channel

through which the Directive could be circumvented—by transferring ownership to a non-EU resident or company or by transferring the entity to a non-cooperative jurisdiction.

During the studied 2011–2019 period, arguably the most significant progress in transparency took place in the area of information exchange. Following the G20’s threat of economic sanctions in 2009 against jurisdictions that have not signed at least 12 information exchange treaties, many politicians have declared the newly established, albeit incomplete, exchange of information upon request network to be the end of bank secrecy. In an empirical assessment of the effect of the policy, [Johannesen and Zucman \(2014\)](#) do indeed find that international bank deposits react to information exchange treaties being signed. However, their results show that the nature of the upon request information exchange, together with the incompleteness of the network and its relatively easy circumvention, merely led to a relocation of deposits to jurisdictions that have refused to become part of the network. As an example of a way to circumvent the policy, [Hanlon et al. \(2015\)](#) detail the widespread practice of round-tripping tax evasion whereby US individuals hide funds in entities located in offshore tax havens and then invest those funds in US securities markets. [Hakelberg and Rixen \(2020\)](#) argues that only the subsequent automatic information exchange, triggered by the US Foreign Account Tax Compliance Act and the OECD’s Common Reporting Standard, represents a significant step towards financial transparency. This is supported by recent empirical evidence, although the estimates of the size of the effect vary: [Ahrens and Bothner \(2020\)](#) show that bank deposits in tax havens decreased by an estimate of 67% following the adoption of the US Foreign Account Tax Compliance Act and the OECD’s Common Reporting Standard; [Casi et al. \(2020\)](#) find that the CRS induced a reduction of 14% in cross-border deposits parked in offshore locations for tax evasion purposes; and [Beer, Coelho, et al. \(2019\)](#) report a 25% reduction in foreign-owned deposits in offshore jurisdictions following the implementation of automatic information exchange.

In contrast with previously published research, this paper takes a more general look at the development of financial secrecy. Using a panel dataset of financial secrecy which covers multiple areas, we assess whether a relative change in secrecy (both overall and in specific areas) between two jurisdictions has had an effect on the investment location decisions made by investors from third countries. We thereby take into account the changing landscape of the global provisioning of financial secrecy—the most secretive jurisdictions of today would have been seen as relatively transparent a decade ago. Nevertheless, despite this general trend toward

financial transparency, methods and loopholes which enable individuals to escape regulation by hiding in high-secrecy jurisdictions still exist—however different they may be, geographically or from those used in the past.

We contribute to existing literature which estimates the effects of increased transparency in offshore jurisdictions in at least the following three aspects. First, we focus on multiple areas of secrecy simultaneously instead of on individual policies (such as automatic information exchange) which are circumventable. Second, using a trilateral approach we are capable of directly measuring the relocation effects. The previous literature has suggested these effects only indirectly. For example, [Casi et al. \(2020\)](#) find that automatic information exchange was followed by decreases in bank deposits and simultaneously report that an increase was observed in some jurisdictions which did not exchange information, especially the United States. Third, we focus on a broader range of cross-border financial assets: bank deposits as well as portfolio investment. Both datasets are available for many countries, including tax havens, on a bilateral basis, and both have been shown to be highly correlated with secrecy opportunities offered by the destination countries ([Andersen, Johannesen, Lassen, et al., 2017](#); [Andersen, Johannesen, and Rijkers, 2022](#)).

The remainder of this paper is structured as follows. Section 2 outlines the theoretical locational choice model of an investor seeking secrecy and the hypotheses that we derive from the model. In Section 3 we describe how we construct variables which measure financial secrecy over time and the data sources we use to measure the value of cross-border financial assets at the bilateral country level. Section 4 presents our empirical strategy to test the hypotheses we set out and in Section 5 we present our results. Section 6 concludes the paper.

2 Model and hypotheses

To better understand the dynamics of the locational choice of an investor seeking financial secrecy, we adapt the standard model of tax evasion at the individual level ([Allingham and Sandmo, 1972](#)) to the case of financial secrecy. Let us assume a representative investor from country i who wishes to invest their assets abroad to earn a return while remaining anonymous to domestic authorities in order to escape domestic tax or other legislation. Using a secrecy jurisdiction (as opposed to not investing or investing domestically or in a non-secretive juris-

diction) in year t brings investor i a return of $r_{jt} \cdot A_{it}$ where r_{jt} is the additional rate of return on investment of value A_{it} which the investor gains by using secrecy jurisdiction j at time t . The investor faces a choice of using one of the secrecy jurisdictions $j \in (1, \dots, J)$ which offers, at time t , a set of secrecy opportunities S_{jt} . There is a positive (expected) cost or disutility associated with using secrecy jurisdiction j at time t :

$$E(v(S_{jt}, D_{ij}, I_{jt}, A_{it})) = c(D_{ij}, I_{jt}) + \theta(S_{jt}) \cdot A_{it}(r_{jt} + \alpha_{it}) \quad (1)$$

where c is the cost of setting up and maintaining an offshore investment in jurisdiction j and depends on (geographical and cultural) distance D_{ij} between jurisdictions i and j and country characteristics I_{jt} of secrecy jurisdiction j at time t . θ is the probability of the investor's identity to be revealed and it is a monotonic and (weakly) decreasing step function of S_{jt} (see Figure A1 in the Appendix). α is the fine an investor will face if revealed, and it is modelled as a proportion of the value of the assets. An investor from country i chooses j so as to maximise expected benefit:

$$E[U] = r_{jt} \cdot A_{it} - v(S_{jt}, A_{it}, D_{ij}, I_{jt}) = A_{it} \cdot (r_{jt} - \theta(S_{jt}) \cdot (r + \alpha_{it})) - c(D_{ij}, I_{jt}) \quad (2)$$

Investor i uses a secrecy jurisdiction to invest at time t as long as at least one secrecy jurisdiction j exists where $r \cdot A_{it} > E(v(S_{jt}, A_{it}, D_{ij}, I_{jt}))$; if there is no such j , the investor exits the secrecy-protected investment position.

In each period t the investor solves this maximisation problem by choosing to locate their investment in secrecy jurisdiction j . S_{jt} develops over time $t \in \{2011, \dots, 2019\}$ as secrecy jurisdictions alter their legislation. We operationalise S_{jt} with relative secrecy scores as defined in Equation (3). The model yields several predictions relevant for our understanding of the behaviour of investors with assets in jurisdiction j once there is a change in secrecy in jurisdiction j relative to jurisdiction $k, k \neq j$. At that point the investor has three choices: (i) do nothing or circumvent the policy, if possible (will only be chosen if the change in S_{jt} induces a change in θ that is small enough not to change the maximisation problem); (ii) relocate the investment to jurisdiction k ; or (iii) exit the cross-border investment position altogether (will only be chosen if $E[U]$ is no longer positive for any j).

We derive three testable hypotheses from this model. First, we hypothesise that cross-border

investment is only responsive to changes in secrecy if $E[U]$ is positive, i.e. that only high-secrecy jurisdictions can be used for hiding one’s identity. It is not clear what secrecy level constitutes the threshold for each investor, and we thus use several thresholds to ensure the robustness of the results. We also hypothesise that the evolving institutional quality in secrecy jurisdictions (I_{jt}) has a positive effect on relocation, because it affects the maximisation problem through $c(D_{ij}, I_{jt})$. This hypothesis is motivated by prior literature pointing to an outsized effect of institutional quality on tax haven attractiveness [Dharmapala and Hines \(2009\)](#); [Hines \(2010\)](#). In consequence, this hypothesis predicts that a change in relative secrecy between jurisdictions j and k might potentially be offset by a corresponding opposite change in relative institutional quality. At the same time, changes in relative institutional quality between jurisdictions j and k can themselves affect the maximisation problem and result in relocation.

Second, we hypothesise that the effect of changes in secrecy is highly non-linear. This is because when investors choose to relocate, they are all faced with solving a similar maximisation problem, which leads a large number of them to the same solution.

Third, we hypothesise that investor i will only relocate the investment if the first option is unavailable, i.e. that we will observe an effect of changes in secrecy only if the changes are large enough. Overall, the model helps us better understand the dynamics of the locational choice of an investor seeking financial secrecy. We empirically test the model’s predictions using a combination of data on financial secrecy and on cross-border investment which we describe in the next section.

3 Data

We use four main data sources to operationalise the four variables used in the model above: S_{jt} , A_i , D_{ij} , and I_{jt} . First, to track the development of financial secrecy in secrecy jurisdictions over time (variable S_{jt}), we harmonise and combine five editions (published between 2011 and 2020) of the so-called secrecy scores from the Financial Secrecy Index, published biannually since 2009¹ by the Tax Justice Network. Secrecy scores are a qualitative measure of the opportunities for hiding one’s identity and are calculated as the arithmetic average of 20 indicators with values ranging from 0 (full transparency) to 100 (full secrecy). The individual indicators may

¹The first edition of the index, published in 2009, has been excluded from our analysis due to the use of a methodology significantly different from the subsequent editions.

be divided into four groups corresponding to different financial secrecy areas: 1) ownership registration; 2) legal entity transparency; 3) integrity of tax and financial regulations; and 4) international standards and cooperation (Tax Justice Network, 2020). Due to the evolving financial transparency standards (and consequently also the secrecy scores methodology itself), the secrecy scores are not directly comparable over time in their absolute form.

These methodological changes in the construction of the secrecy scores over time pose a challenge when the individual editions are combined. We describe our approach to harmonising and combining the subsequent editions of each of the 20 Key Financial Secrecy Indicators in Appendix B and we visualise the process in Figure A2 in Appendix A. Specifically, we argue that the assessment within each secrecy indicator has become stricter over time, as the financial transparency standards have improved. To make the indicators comparable over time, we construct a relative measure of financial secrecy for a balanced panel of 71 jurisdictions j as a ratio to sample mean in year t :

$$S_{jt} = \frac{SS_{jt}}{\frac{\sum_{k=1}^{71} SS_{kt}}{71}} \quad (3)$$

Our sample of countries serving as destinations of cross-border assets (i.e. countries j and k in the above equation) consists of 71 countries with available data across all five FSI editions from 2011 to 2020.² In 2019, these countries together supplied 93.9% of global cross-border financial services and they host 87.2% of global cross-border portfolio assets and 88.1% of global cross-border bank deposits. We provide details of the constructed dataset of financial secrecy in Tables A3 and A4 and Figures A3, A4 and A5 in the Appendix.

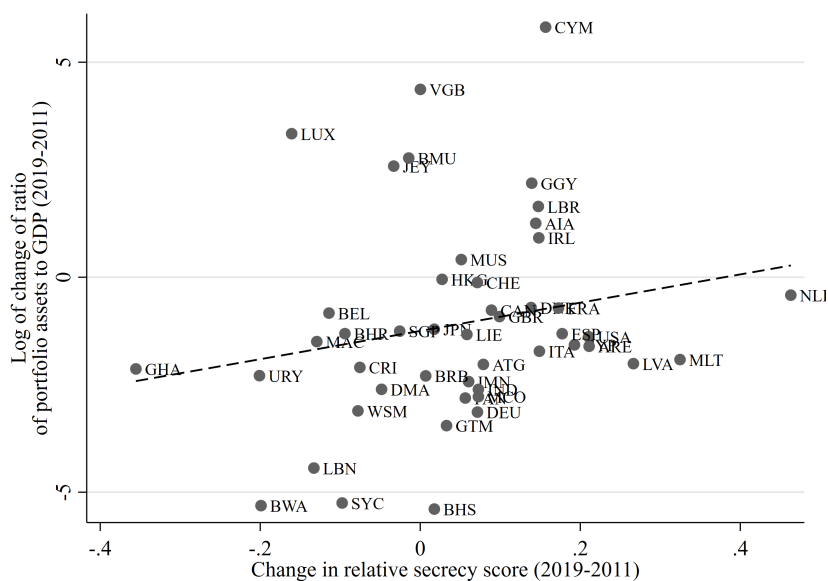
Second, we use data on cross-border financial assets from two sources: data on bank account deposits from the Locational Banking Statistics (LBS) from the Bank for International Settlements and data on portfolio investment assets from the International Monetary Fund's Coordinated Portfolio Investment Survey (CPIS). These two sources together represent a large share of cross-border financial assets that could potentially benefit from financial secrecy (al-

²Prior to 2018, the Financial Secrecy Index was published in the fall of the corresponding year of that edition. For editions 2018 and 2020, the Financial Secrecy Index was published in the beginning of the corresponding year and thereby the numbering of the editions switched from odd years to even. The cut-off date for the data remained the same, i.e. 30 September of the corresponding odd year: for the 2018 edition, the cut-off date was 30 September 2017, for the 2020 edition, the cut-off date was 30 September 2019. For this reason, in this paper, we combine data on financial secrecy from the Financial Secrecy Index 2018 and 2020 editions with data on cross-border financial assets in 2017 and 2019, respectively.

though not all of them, e.g., cryptocurrency assets, real estate or art work are not included) and have previously been widely used in studying cross-border tax evasion (Ahrens and Bothner, 2020; Andersen, Johannesen, Lassen, et al., 2017; Andersen, Johannesen, and Rijkers, 2022; Casi et al., 2020; Johannesen, 2014; Johannesen and Zucman, 2014; Menkhoff and Miethe, 2019). Using a combination of reported and derived data, they both cover the whole studied period and most countries of the world, including low- and lower-middle income countries and high-secrecy jurisdictions. Both are reported at the immediate ownership level (rather than ultimate) which represents an important caveat for our analysis: if an investor from Germany holds financial assets in a Swiss bank via a shell company in the Cayman Islands, this will be recorded in the Cayman-Swiss rather than in the German-Swiss relationship. Therefore, if Switzerland becomes more transparent but the Cayman Islands do not, there may not be any reason for the German investor to change the offshore set-up. In this sense, our results may underestimate the sensitivity of cross-border financial assets to changes in financial secrecy.

Figure 1 shows the positive relationship between relative secrecy scores and the intensity of portfolio assets: countries that increased their secrecy relative to other countries have attracted more portfolio assets as a share of their GDP between 2011 and 2019. This highlights the important role of financial secrecy during the observed period.

Figure 1: Relationship between changes in relative secrecy score and intensity of portfolio assets



Note: The intensity of portfolio assets is calculated as the ratio of inward portfolio assets to GDP.

Third, we use data on geographical distance between capital cities and on cultural distance

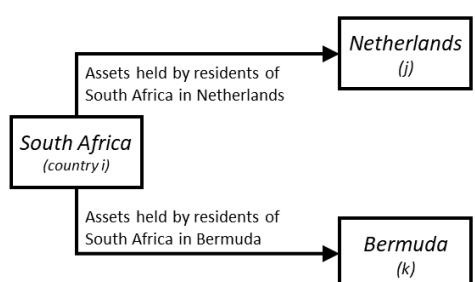
(which we proxy by a dummy variable indicating a common language) which we source from the CEPII dataset (Mayer and Zignago, 2011). Last, to control for time-varying country characteristics, we collect data on population from the World Bank, data on GDP from the World Bank, the United Nations and the CIA, and data on institutional quality from the World Governance Indicators.

4 Methodology

The core of our empirical methodology builds on the notion that when a secrecy jurisdiction (used by foreigners to hide their identity) becomes relatively more transparent, such a change negatively impacts the volume of inward cross-border financial assets. This effect for specific policies has been well-documented in recent empirical contributions (Ahrens and Bothner, 2020; Beer, Coelho, et al., 2019; Cusi et al., 2020; Johannesen, 2014; Menkhoff and Miethe, 2019).

In this paper we add to this literature by developing a methodological approach that allows us to analyse not only whether, but *how* these assets are affected. In our empirical specification, we develop a trilateral setting which utilises a triad of countries as the primary unit of analysis: we track the relationship between (i) the relative assets of the residents of country i in secrecy jurisdictions j and k and (ii) changes in the relative secrecy offered by jurisdictions j and k . Figure 2 presents the trilateral setting on a specific example of three countries covered in the dataset.

Figure 2: Trilateral approach scheme with example data

	2011	2019	
	Portfolio Assets (USD mn)	Secrecy	Portfolio Assets (USD mn)	Secrecy
	102.2	0.6	12,480	1.07
	Δ Assets = - 13,037.8		Δ Assets = 4,453	
	Δ Secrecy = - 0.56		Δ Secrecy = - 0.08	
	13,140	1.16	8,027	1.15

This allows us to study the sensitivity of investors to the changing landscape of financial secrecy. In order to do so, we estimate the following baseline specification:

$$\ln(A_{ijt} - A_{ikt}) = \alpha_{ijk} + \beta \cdot (S_{jt} - S_{kt}) + \gamma \cdot (X_{jt} - X_{kt}) + \epsilon \quad (4)$$

where the dependent variable represents the difference between cross-border financial assets in jurisdictions j and k held by residents of country i at time t . α_{ijk} captures the country triad-level fixed effects. The main explanatory variable $(S_{jt} - S_{kt})$ is the difference between jurisdictions j and k in relative secrecy at time t . $(X_{jt} - X_{kt})$ represents a vector of country-level controls and ϵ is the error term. In the final dataset, we include each triad only once, regardless of the order of jurisdictions j and k .

We carry out the analysis in two stages. First, we test the first two hypotheses outlined in Section 2 to ascertain that (i) changes in secrecy only affect assets in high-secrecy jurisdictions; and that (ii) this effect is highly non-linear—we introduce a set of binary variables indicating whether S_j and S_k were higher than a given threshold (which we vary to test the robustness of the result). We then interact these dummy variables with the main explanatory variable and its quadratic form (to test for the non-linearity) and use a fixed-effects model to estimate the following equation:

$$\begin{aligned} \ln(A_{ijt} - A_{ikt}) = & \alpha_{ijk} + \beta_1 \cdot (S_{jt} - S_{kt}) + \beta_2 \cdot (S_{jt} - S_{kt})^2 + \\ & + \beta_3 \cdot (S_{jt} - S_{kt}) \cdot High + \beta_4 \cdot (S_{jt} - S_{kt})^2 \cdot High + \gamma \cdot (I_{jt} - I_{kt}) + \epsilon \end{aligned} \quad (5)$$

where the term $(I_{jt} - I_{kt})$ represents time-varying country-level controls which can affect cross-border assets in secrecy jurisdictions (GDP, population, and institutional quality). We further add a third variable, LI (a dummy variable indicating whether the source country is classified as low income), to the two interaction terms, which tests for the heterogeneity of the effects of changes in secrecy on the behaviour of investors from lower income countries, our second hypothesis.

This specification identifies the investors' semi-elasticity to relocate their assets from jurisdictions that were highly secretive in 2011 and have since become relatively more transparent compared to countries that remain highly secretive. Conversely, we identify the semi-elasticity to relocate from previously transparent jurisdictions that have become highly secretive. In addi-

tion, we allow for the non-linearity of the effect. We estimate Equation (5) using a fixed effects model and we assess the effect separately for source countries at different levels of income. Our main coefficients of interest are β_3 and β_4 which we both expect to be positive.

In the second stage, we turn to our third hypothesis, i.e. that small changes in the difference in secrecy between two jurisdictions do not have a significant effect on cross-border assets. To test this hypothesis we build a long-difference model as follows (using similar notation as above, with Δ indicating the change between 2019 and 2011):

$$\begin{aligned} \ln(A_{ijt} - A_{ikt}) = & \alpha_{ijk} + \beta_1 \cdot (S_{jt} - S_{kt}) + \beta_2 \cdot (S_{jt} - S_{kt})^2 + \beta_3 \cdot (S_{jt} - S_{kt}) \cdot High \cdot T_{ijk} + \\ & + \beta_4 \cdot (S_{jt} - S_{kt})^2 \cdot High \cdot T_{ijk} + \gamma \cdot (I_{jt} - I_{kt}) + \delta \cdot (D_{ij} - D_{ik}) + \epsilon \end{aligned} \quad (6)$$

where T_{ijk} is a binary variable equal to 1 if the difference in relative secrecy scores between 2019 and 2011 is higher than a given threshold, and 0 otherwise. $D_{ij} - D_{ik}$ represents the difference between geographical distance (measured as the distance between capital cities) and cultural distance (measured by whether the countries share a common language) between countries i and j and countries i and k .

This specification allows us to isolate the effect of larger changes in relative secrecy. In the example from Figure 2, this change in relative secrecy between the Netherlands and Bermuda is relatively large at $abs(-0.56 + 0.08) = 0.48$. We run the analysis for five thresholds between 0.1 and 0.5 (i.e. with increments of 0.1).

5 Results

We present our results in two stages. First, for the first two hypotheses, we focus on the trilateral panel setting and run a series of fixed-effects models. Next, for the third hypothesis, we run a long-differences model controlling for geographical and cultural distance between the destination jurisdictions j and k .

Table 1 presents the results of the fixed-effects model specified in Eq. (5) at the triadic level, i.e. with each triad of countries representing one observation unit. The first two columns present the results for the baseline specifications. Column (1) suggests a small positive effect of

change in relative secrecy between jurisdictions j and k . However, column (2) shows that the coefficient for an added quadratic term is statistically significant and negative, highlighting that the effect is likely different for jurisdictions with varying levels of secrecy while also emphasising the need to control for non-linear effects.

To test our first two hypotheses, columns (3)–(6) feature interactions with dummy variables indicating whether countries j and k were highly secretive in 2011 (columns (3) and (4)) or in 2019 (columns (5) and (6)). In our main specification, reported in column (4), we find that the effect of changes in relative secrecy is positive, non-linear and highly statistically significant. We run a series of robustness checks on the threshold that determines high-secrecy jurisdictions (see Table A1 in the Appendix) and find similar results. These results broadly confirm our first two hypotheses: for highly secretive jurisdictions, the changes in secrecy play an important role in the relocation of foreign financial assets, and this effect is highly non-linear. In Figure 3(a) we plot the estimated effect of changes in secrecy on portfolio assets. We find that, on average, if a country as secretive as the United Arab Emirates in 2011 became as transparent as Luxembourg by 2019, approximately 13% of cross-border portfolio assets owned by investors from third countries would be relocated to secrecy jurisdictions that remained highly secretive.³

In column (7) of Table 1 we add a dummy variable indicating low-income countries in an interaction term with our two main explanatory variables for changes in secrecy. We find that for investors from low-income countries, the effect is much larger, and this estimate of a premium to the semi-elasticity in the case of low-income country investors is statistically significant. This corroborates previous literature showing that low-income countries exhibit larger shares of illicit financial flows in overall cross-border economic activity. One possible explanation for this finding is that investors from low income countries may have a larger motivation to remain hidden from their home government authorities (for various reasons, including escaping criminal prosecution in authoritarian regimes).

We further dissect our main result from column (4) of Table 1 by splitting the main explanatory variable (i.e. the change in the difference in relative secrecy scores) along its four dimensions: ownership registration, legal entity transparency, integrity of tax and financial regulation, and international standards and cooperation. There is a conceptual divide between

³The change in the relative secrecy between the United Arab Emirates and Luxembourg between 2011 and 2019 is 0.1264, which is associated with a change of the log of inward portfolio assets from 20.79734 to 20.65872. The effect can then be expressed as a share of the initial amount as: $(e^{20.79734} - e^{20.65872})/e^{20.79734} = 0.129$.

Table 1: Results of the fixed-effects model with portfolio investment as the outcome variable

	(1)	(2)	(3) <i>High:</i> $S_{2011}^{j,k} > 1$	(4) <i>High:</i> $S_{2011}^{j,k} > 1$	(5) <i>High:</i> $S_{2019}^{j,k} > 1$	(6) <i>High:</i> $S_{2019}^{j,k} > 1$	(7) <i>High:</i> $S_{2011}^{j,k} > 1$
$(I_j - I_k)$	0.416*** (0.035)	0.423*** (0.035)	0.416*** (0.035)	0.418*** (0.035)	0.404*** (0.035)	0.410*** (0.035)	0.417*** (0.035)
$(S_j - S_k)$	0.269*** (0.024)	0.042 (0.027)	0.269*** (0.025)	-0.022 (0.029)	0.220*** (0.026)	-0.010 (0.029)	-0.022 (0.029)
$(S_j - S_k)^2$		-0.833*** (0.040)		-0.972*** (0.040)		-0.849*** (0.041)	-0.972*** (0.040)
$(S_j - S_k) * High$			-0.000 (0.074)	0.606*** (0.084)	0.366*** (0.068)	0.465*** (0.104)	0.555*** (0.084)
$(S_j - S_k)^2 * High$				3.881*** (0.227)		0.396** (0.189)	3.718*** (0.225)
$(S_j - S_k) * High * LI$							2.351*** (0.514)
$(S_j - S_k)^2 * High * LI$							7.995*** (1.801)
Constant	20.377*** (0.016)	20.433*** (0.016)	20.377*** (0.016)	20.428*** (0.016)	20.377*** (0.016)	20.434*** (0.016)	20.428*** (0.016)
Observations	203194	203194	203194	203194	203194	203194	203194
R^2	0.007	0.010	0.007	0.013	0.007	0.011	0.013

Note: Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. The dependent variable is the log of the difference between the portfolio assets of investors from country i in countries j and k ; S_c and WGI_c are, respectively, the relative secrecy score and the mean of the six World Governance Indicators (Kaufmann et al., 2011) of country c , $c \in (j, k)$. *High* is a binary variable indicating whether the relative secrecy scores of countries j and k are higher than a given threshold in a given year, as specified in the column headings. *LI* is a dummy variable indicating that the source country is classified by the World Bank as low-income. All regressions include controls for changes in GDP and population (not reported here).

the first three categories and the fourth, as explained by Janský et al. (2023). While the first three categories track financial secrecy in its substantive sense—in simplistic terms, the home government not collecting certain information—the fourth category focuses on the extent to which the collected information is shared with the rest of the world. The nature of these two types of secrecy hints at the expected effects of reforms in each area. Specifically, we expect that information exchange schemes will only be effective if there the sending country collects the relevant information. This is more likely to be the case for information on owners of bank accounts than on owners of portfolio investment due to the differing regulatory frameworks and the varying complexity involved in tracking ownership. Ownership of bank accounts typically requires more direct, personal identification, making it easier for authorities to track and report under information exchange schemes. In contrast, portfolio investments often involve layers of ownership through intermediaries such as investment funds, trusts, or holding companies, which can obscure the ultimate beneficial owner.

As a result, information exchange is likely to have a significant impact on bank deposits but not on portfolio investment. Even if a jurisdiction is compliant with information-sharing agreements, the impact on portfolio investments may be limited if the information being shared does not fully capture the ownership chain due to the complexity of these investments. Therefore, while AIE and similar reforms are likely to reduce the opacity surrounding bank deposits, they may be less effective in uncovering hidden ownership in portfolio investments unless accompanied by more robust reforms that address the multi-layered structures used to hold these assets.

We report results consistent with this explanation in Table 2. While the first three categories show a positive coefficient for $(S_j - S_k) * High$, the fourth category shows a weaker and negative effect.

Table 2: Results of the fixed-effects model with portfolio investment as the outcome variable, by type of secrecy

	(1) Ownership registration	(2) Legal entity transparency	(3) Integrity of tax and financial regulation	(4) International standards and cooperation
$(I_j - I_k)$	0.371*** (0.035)	0.424*** (0.035)	0.345*** (0.035)	0.431*** (0.035)
$(S_j - S_k)$	0.181*** (0.019)	-0.007 (0.029)	-0.041*** (0.013)	0.004 (0.009)
$(S_j - S_k)^2$	0.360*** (0.043)	-0.269*** (0.047)	-0.373*** (0.012)	-0.001 (0.006)
$(S_j - S_k) * High$	1.360*** (0.158)	0.594*** (0.196)	1.006*** (0.114)	-0.182** (0.088)
$(S_j - S_k)^2 * High$	-8.724*** (0.571)	-4.840*** (0.602)	-8.442*** (0.457)	-2.818*** (0.189)
Constant	20.369*** (0.016)	20.362*** (0.016)	20.475*** (0.016)	20.346*** (0.016)
Observations	203194	203194	203194	203194
R^2	0.013	0.009	0.020	0.009

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.10. The dependent variable is the log of the difference between the portfolio assets of investors from country i in countries j and k ; S_c and WGI_c are, respectively, the relative secrecy score and the mean of the six World Governance Indicators (Kaufmann et al., 2011) of country c , $c \in (j, k)$. $High$ is a binary variable indicating whether the relative secrecy scores of countries j and k are higher than 1 in 2011 (corresponding to column (4) in Table 1). LI is a dummy variable indicating that the source country is classified by the World Bank as low-income. All regressions include controls for changes in GDP and population (not reported here).

In Tables 3 and 4 we report the results for the same specifications but with bank deposits as the outcome variable. While we do find positive estimates of the coefficients of interest in columns (3) and (4) in Table 3, they are not statistically significant at the 5% level. Overall, bank deposits do not seem to react as strongly to changes in financial secrecy, as confirmed by our robustness checks presented in Table A2 in the Appendix. Furthermore, in line with our

Table 3: Results of the fixed-effects model with bank deposits as the outcome variable

	(1)	(2)	(3) <i>High:</i> $S_{2011}^{j,k} > 1$	(4) <i>High:</i> $S_{2011}^{j,k} > 1$	(5) <i>High:</i> $S_{2019}^{j,k} > 1$	(6) <i>High:</i> $S_{2019}^{j,k} > 1$	(7) <i>High:</i> $S_{2011}^{j,k} > 1$
$(I_j - I_k)$	0.297*** (0.061)	0.294*** (0.061)	0.292*** (0.061)	0.289*** (0.061)	0.303*** (0.061)	0.301*** (0.061)	0.289*** (0.061)
$(S_j - S_k)$	-0.025 (0.062)	-0.026 (0.062)	-0.032 (0.062)	-0.034 (0.062)	-0.008 (0.065)	-0.007 (0.065)	-0.034 (0.062)
$(S_j - S_k)^2$		-0.232*** (0.087)		-0.246*** (0.088)		-0.235*** (0.090)	-0.246*** (0.088)
$(S_j - S_k) * High$			0.357 (0.394)	0.231 (0.452)	-0.303** (0.151)	-0.377** (0.157)	0.234 (0.458)
$(S_j - S_k)^2 * High$				1.399 (0.947)		-0.173 (0.309)	1.621* (0.959)
$(S_j - S_k) * High * LI$							-0.031 (2.430)
$(S_j - S_k)^2 * High * LI$							-5.318 (5.238)
Constant	19.099*** (0.152)	19.159*** (0.154)	19.097*** (0.152)	19.161*** (0.154)	19.107*** (0.153)	19.170*** (0.155)	19.161*** (0.154)
Observations	65777	65777	65777	65777	65777	65777	65777
R^2	0.001	0.001	0.001	0.001	0.001	0.001	0.001

Note: Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. The dependent variable is the log of the difference between the bank deposits of investors from country i in countries j and k ; S_c and WGI_c are, respectively, the relative secrecy score and the mean of the six World Governance Indicators (Kaufmann et al., 2011) of country c , $c \in (j, k)$. *High* is a binary variable indicating whether the relative secrecy scores of countries j and k are higher than a given threshold in a given year, as specified in the column headings. *LI* is a dummy variable indicating that the source country is classified by the World Bank as low-income. All regressions include controls for changes in GDP and population (not reported here).

expectations, Table 4 shows that while information exchange significantly affects bank deposits, the first three categories of secrecy do not (with either a non-significant or negative coefficients). This finding is in agreement with the fact that ownership of bank deposits is generally more transparent than portfolio investments due to the high regulatory standards required by banks; information exchange is thus effective, but enhanced information collection is not.

One way to reconcile this finding with the findings of previous studies which had documented significant decreases in bank deposits following implementations of automatic information exchange treaties is that investors do not choose to relocate their assets to jurisdictions that remain secretive (possibly because they simply expect that automatic information exchange for bank deposits will soon cover the entire world). Instead, investors might choose to invest their assets using different types of investment (such as portfolio investment) or exiting their offshore investment position altogether, thus foregoing the previously-earned additional returns.

Table 4: Results of the fixed-effects model with bank deposits as the outcome variable, by type of secrecy

	(1) Ownership registration	(2) Legal entity transparency	(3) Integrity of tax and financial regulation	(4) International standards and cooperation
$(I_j - I_k)$	0.244*** (0.060)	0.265*** (0.061)	0.259*** (0.061)	0.288*** (0.064)
$(S_j - S_k)$	0.130*** (0.049)	-0.143** (0.058)	0.019 (0.030)	-0.050** (0.023)
$(S_j - S_k)^2$	0.615*** (0.113)	0.222** (0.091)	-0.308*** (0.038)	-0.069*** (0.014)
$(S_j - S_k) * High$	3.812 (2.760)	-0.177 (0.553)	-16.440** (7.439)	3.995** (1.965)
$(S_j - S_k)^2 * High$	-113.319*** (32.853)	-4.352*** (1.552)	-172.874*** (60.315)	-40.895*** (11.555)
Constant	19.089*** (0.149)	19.134*** (0.149)	19.312*** (0.150)	19.085*** (0.161)
Observations	65777	65777	65777	65777
R^2	0.004	0.001	0.006	0.004

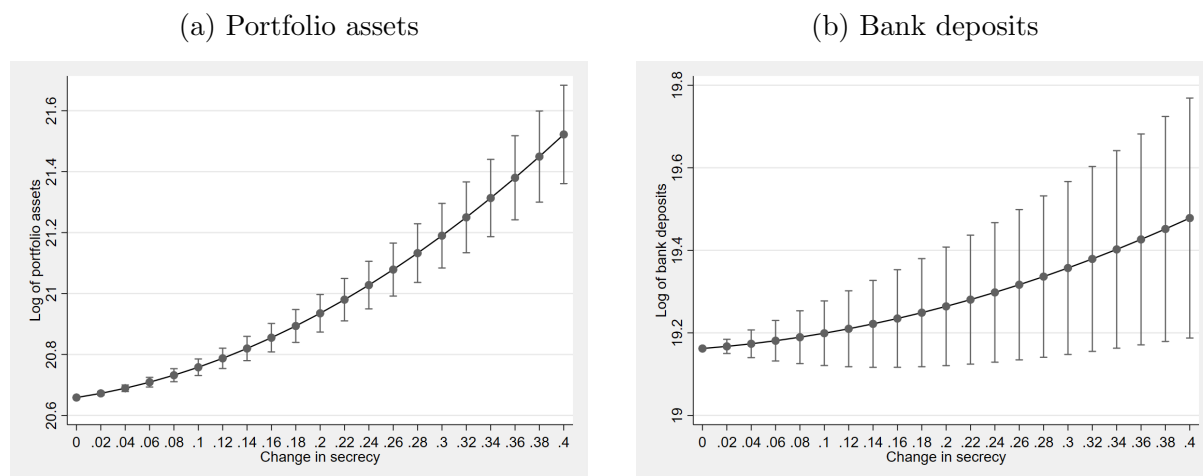
Note: Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. The dependent variable is the log of the difference between the bank deposits of investors from country i in countries j and k ; S_c and WGI_c are, respectively, the relative secrecy score and the mean of the six World Governance Indicators (Kaufmann et al., 2011) of country c , $c \in (j, k)$. *High* is a binary variable indicating whether the relative secrecy scores of countries j and k are higher than a given threshold in a given year, as specified in the column headings. *LI* is a dummy variable indicating that the source country is classified by the World Bank as low-income. All regressions include controls for changes in GDP and population (not reported here).

5.1 Long-differences approach

The third prediction of our theoretical model is that investors will only relocate their investment if the change in relative secrecy is large enough. We present the results for the long-differences approach for portfolio investment and bank deposits in Tables 5 and 6, respectively. The models include controls for the level of institutional development and geographical as well as cultural distance. This allows us to control for other factors that could influence the change in cross-border financial assets in one country relative to another. We thereby seek to isolate and identify the relocation effect of changes in financial secrecy between 2011 and 2019.

The results broadly support our hypothesis for portfolio investment: large changes in relative secrecy have had a higher impact on the relocation of assets among high-secrecy jurisdictions. In Table 5, the main coefficients of interest, β_3 and β_4 from Equation (6), are positive and statistically significant only for the largest changes in secrecy (columns (6) and (7)), with a significant quadratic effect only observable for the very largest changes of over 0.5. The base quadratic effect of 1.137 (column (2)) is driven mainly by these larger changes, as suggested by the increase in the combined effect of the quadratic term and the interaction variable as

Figure 3: Effects of changes in relative secrecy on relocation of cross-border portfolio assets and bank deposits



we increase the studied change in secrecy (from 0.6 for changes of more than 0.1 to 1.501 for changes of more than 0.5).

For the case of bank deposits (Table 6), the findings of the long-differences model suggest that over the 2011-2019 period, there was a strong relocation effect of changes in secrecy, regardless of the initial levels of secrecy (columns (1) and (2)). The specifications that contain the interaction with the binary variables indicating high initial secrecy and larger changes in relative secrecy do not suggest a statistically significant effect above the 0.1 threshold for change in secrecy.⁴ One possible interpretation of this result, which would be in line with previous literature, is that bank deposits react strongly to automatic information exchange but not necessarily to other changes in financial secrecy that are tracked by our data. Therefore, changes in overall secrecy above a certain threshold are not as relevant for the relocation of bank deposits, but smaller changes caused by increased information exchange are.

⁴Note that for bank deposits, there are no triads with the corresponding data on bank deposits with changes in secrecy between 2011 and 2019 in the range of 0.4 to 0.5, and we, therefore, do not estimate the regression for that group of triads.

Table 5: Results of the long-differences model with portfolio investment as the outcome variable

	(1)	(2)	(3) $T_{ijk}:$ $\Delta S_{19-11}^{j,k} > 0.1$	(4) $T_{ijk}:$ $\Delta S_{19-11}^{j,k} > 0.2$	(5) $T_{ijk}:$ $\Delta S_{19-11}^{j,k} > 0.3$	(6) $T_{ijk}:$ $\Delta S_{19-11}^{j,k} > 0.4$	(7) $T_{ijk}:$ $\Delta S_{19-11}^{j,k} > 0.5$
$(S_j - S_k)$	0.021 (0.090)	0.011 (0.090)	-0.030 (0.189)	0.335** (0.154)	0.074 (0.127)	-0.110 (0.109)	-0.061 (0.099)
$(I_j - I_k)$	-0.054 (0.088)	-0.052 (0.088)	-0.023 (0.089)	-0.026 (0.089)	-0.045 (0.089)	-0.056 (0.088)	-0.054 (0.088)
$Distance_{ijk}$	-0.019*** (0.003)	-0.019*** (0.003)	-0.020*** (0.003)	-0.019*** (0.003)	-0.019*** (0.003)	-0.019*** (0.003)	-0.019*** (0.003)
$Language_{ijk}$	0.189*** (0.040)	0.191*** (0.040)	0.191*** (0.040)	0.191*** (0.040)	0.191*** (0.040)	0.193*** (0.040)	0.191*** (0.040)
$(S_j - S_k)^2$		1.137*** (0.259)	6.357*** (0.635)	4.643*** (0.631)	2.049*** (0.573)	1.573*** (0.456)	0.715** (0.363)
$(S_j - S_k) * T_{ijkt} * High$			0.091 (0.210)	-0.435** (0.183)	-0.116 (0.170)	0.405** (0.180)	0.431* (0.221)
$(S_j - S_k)^2 * T_{ijkt} * High$			-5.757*** (0.645)	-3.739*** (0.628)	-1.017* (0.574)	-0.637 (0.493)	0.786* (0.464)
Constant	19.889*** (0.019)	19.841*** (0.022)	19.820*** (0.022)	19.802*** (0.023)	19.824*** (0.024)	19.830*** (0.024)	19.853*** (0.024)
Observations	36,753	36,753	36,753	36,753	36,753	36,753	36,753
R^2	0.037	0.038	0.039	0.039	0.038	0.038	0.038

Note: Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. The dependent variable is the log of the difference-in-differences between the portfolio investment of investors from country i in countries j and k between 2019 and 2011; S_c and I_c are, respectively, the relative secrecy score and the mean of the six World Governance Indicators (Kaufmann et al., 2011) of country $c, c \in (j, k)$. Distance is the difference in distances between capitals of two country pairs: i and j , and i and k . Language is a dummy variable: one if all three countries i, j and k , share a common language, and zero otherwise. High is a binary variable indicating whether the relative secrecy score of countries j and k in 2011 was over 1; T_{ijk} is a binary variable indicating whether the change in relative secrecy was higher than a given threshold, as specified in the column headings. All regressions include controls for GDP and population (not reported here).

Table 6: Results of the long-differences model with bank deposits as the outcome variable

	(1)	(2)	(3) $T_{ijk}:$ $\Delta S_{19-11}^{j,k} > 0.1$	(4) $T_{ijk}:$ $\Delta S_{19-11}^{j,k} > 0.2$	(5) $T_{ijk}:$ $\Delta S_{19-11}^{j,k} > 0.3$	(6) $T_{ijk}:$ $\Delta S_{19-11}^{j,k} > 0.5$
$(S_j - S_k)$	1.226*** (0.199)	1.514*** (0.202)	1.196*** (0.230)	1.397*** (0.224)	1.488*** (0.217)	1.539*** (0.204)
$(I_j - I_k)$	2.062*** (0.344)	2.187*** (0.344)	2.272*** (0.345)	2.231*** (0.346)	2.192*** (0.346)	2.168*** (0.345)
$Distance_{ijk}$	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)
$Language_{ijk}$	0.325*** (0.104)	0.318*** (0.104)	0.314*** (0.104)	0.317*** (0.104)	0.318*** (0.104)	0.316*** (0.104)
$(S_j - S_k)^2$		3.232*** (0.617)	3.510*** (0.721)	3.400*** (0.735)	3.133*** (0.731)	2.911*** (0.686)
$(S_j - S_k) * T_{ijkt} * High$			1.911*** (0.558)	0.987 (0.666)	0.601 (0.703)	-1.156 (0.728)
$(S_j - S_k)^2 * T_{ijkt} * High$			2.342* (1.419)	1.263 (1.552)	1.383 (1.519)	0.000 (.)
Constant	20.077*** (0.038)	19.974*** (0.045)	19.973*** (0.045)	19.975*** (0.045)	19.976*** (0.045)	19.983*** (0.046)
Observations	4313	4313	4313	4313	4313	4313
R^2	0.023	0.027	0.030	0.028	0.027	0.028

Note: Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. The dependent variable is the log of the difference-in-differences between the portfolio investment of investors from country i in countries j and k between 2019 and 2011; S_c and I_c are, respectively, the relative secrecy score and the mean of the six World Governance Indicators (Kaufmann et al., 2011) of country $c, c \in (j, k)$. High is a binary variable indicating whether the relative secrecy score of countries j and k in 2011 was over 1; T_{ijk} is a binary variable indicating whether the change in relative secrecy was higher than a given threshold, as specified in the column headings. All regressions include controls for GDP and population (not reported here).

6 Conclusion

Secrecy jurisdictions allow the residents of other countries to invest their assets without their home authorities' knowledge. This enables many of them to hide the proceeds of corruption, launder money, and evade taxation. To mitigate this issue, governments and international organisations around the world have worked with increased intensity throughout the past two decades to increase financial transparency in tax havens, achieving significant progress in a variety of areas.

In this paper we ask how these improvements have since translated into real cross-border economic activity in secrecy jurisdictions. To answer this research question, we construct the first panel dataset on financial secrecy by combining and harmonising the five existing editions of the Financial Secrecy Index as published biannually between 2011 and 2020 by the Tax Justice Network. We develop a model of the locational decision of an asset holder who stands to benefit from using financial secrecy offered by secrecy jurisdictions, but faces the cost of setting up an offshore investment and a positive probability of being revealed and sanctioned. We then empirically test three predictions of the model, specifically to show that: (i) only high-secrecy jurisdictions are used for illicit purposes; (ii) the effect of changes in secrecy is highly non-linear; and (iii) an investor will only relocate their investment if the changes in relative secrecy are large enough. We also hypothesise that the response observed in the data (which include illicit as well as legitimate financial flows) will be higher for investors from lower-income countries.

We find that investors very closely follow the behaviour predicted by our locational choice model: in our preferred specification, we report that, on average, if a country as secretive as the United Arab Emirates in 2011 became as transparent as Luxembourg by 2019, approximately 13% of cross-border portfolio assets owned by investors from third countries would be relocated to secrecy jurisdictions that remained highly secretive. Our results clearly indicate that these relocation effects are highly non-linear, highlighting the mechanisms underlying our model: as relative secrecy changes, investors face the same optimization problem of choosing of a secrecy jurisdiction for their assets. Our results for bank deposits as the outcome variable are in line with the previous literature: we find evidence of some limited relocation, however, changes in areas of secrecy other than automatic information exchange likely do not play a significant role, highlighting the success of the policy in curbing anonymously held offshore bank deposits.

Overall, our results are thus consistent with the emerging consensus of the existing literature that automatic information exchange is an effective tool to discourage investors from holding money in offshore bank accounts. At the same time, however, our results show alarming sensitivity of portfolio investment to changes in secrecy, consistent with the fact that portfolio investment data covers many of the strategies that are used by investors to circumvent emerging transparency policy initiatives, as argued by [Beer, Mooij, et al. \(2020\)](#).

Our second main finding relates to the heterogeneity of the relocation effect between countries with varying levels of income. In particular, we document that the semi-elasticity of portfolio assets to changes in relative secrecy is much higher for low-income countries. We argue that one potential explanation for this finding is that investment originating from low-income countries exhibits a larger share of the illicit component, and thus reacts more intensively to increasing transparency in secrecy jurisdictions. One hypothesis why this share might be larger for investment from low-income countries is that the control mechanisms in these countries are weaker, making it easier for investors to remain hidden even at the immediate ownership level at which data on cross-border financial assets is reported. In contrast, in more developed countries, investors more frequently make use of more complex structures that involve several offshore jurisdictions, making it more difficult for authorities to track their identity. While this hypothesis could be tested for example with the use of data from offshore leaks, we leave that for future research.

A growing body of literature is currently dedicated to exploring the effects of increased financial transparency on wealth held in secrecy jurisdictions. This paper adds to it by developing and using the first panel dataset of financial secrecy which tracks the heterogeneous progress in financial transparency achieved during the course of the past decade. In contrast to existing literature, this paper's methodological approach explicitly focuses on the relocation hypothesis: that following an increase in financial transparency in a secrecy jurisdiction (relative to other countries), investors will relocate their assets to countries that remain secretive.

Our semi-elasticity estimates could be used in future research to measure the costs of financial secrecy, i.e. how much countries are losing in tax revenue foregone due to hidden investment returns being left untaxed. The detailed panel dataset of financial secrecy developed in this paper could also be used to investigate the effects of changes in individual areas of financial secrecy; for example, the interplay between the areas of international cooperation and of owner-

ship registration seems to be of particular interest—our exploratory work on the panel dataset of financial secrecy suggests that some countries, while agreeing to exchange information, remain highly secretive in the area of ownership registration, making it possible for foreigners to circumvent information exchange schemes via corporate structures. Closing such gaps in the progress of financial transparency will be crucial to effectively mitigate illicit financial flows facilitated by financial secrecy.

References

- Ahrens, L. and Bothner, F. (2020). “The Big Bang: Tax Evasion after Automatic Exchange of Information under FATCA and CRS”. *New Political Economy*, 25(6).
- Allingham, M. G. and Sandmo, A. (1972). “Income Tax Evasion: A Theoretical Analysis”. *Journal of Public Economics*, 1(3-4).
- Andersen, J. J., Johannesen, N., Lassen, D. D., and Paltseva, E. (2017). “Petro Rents, Political Institutions, and Hidden Wealth: Evidence from Offshore Bank Accounts”. *Journal of the European Economic Association*, 15(4).
- Andersen, J. J., Johannesen, N., and Rijkers, B. (2022). “Elite Capture of Foreign Aid: Evidence from Offshore Bank Accounts”. *Journal of Political Economy*, 130(2).
- Beer, S., Coelho, M., and Leduc, S. (2019). “Hidden Treasure: The Impact of Automatic Exchange of Information on Cross-Border Tax Evasion”. *IMF Working Paper*, (286).
- Beer, S., Mooij, R., Hebous, S., Keen, M., and Liu, L. (2020). “Exploring Residual Profit Allocation”. *IMF Working Papers*, 20.
- 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).
- 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.
- Dharmapala, D. and Hines, J. R. (2009). “Which Countries Become Tax Havens?” *Journal of Public Economics*, 93(9).
- Hakelberg, L. and Rixen, T. (2020). “Is Neoliberalism Still Spreading? The Impact of International Cooperation on Capital Taxation”. *Review of International Political Economy*, 0(0).
- Hanlon, M., Maydew, E. L., and Thornock, J. R. (2015). “Taking the Long Way Home: US Tax Evasion and Offshore Investments in US Equity and Debt Markets”. *The Journal of Finance*, 70(1).

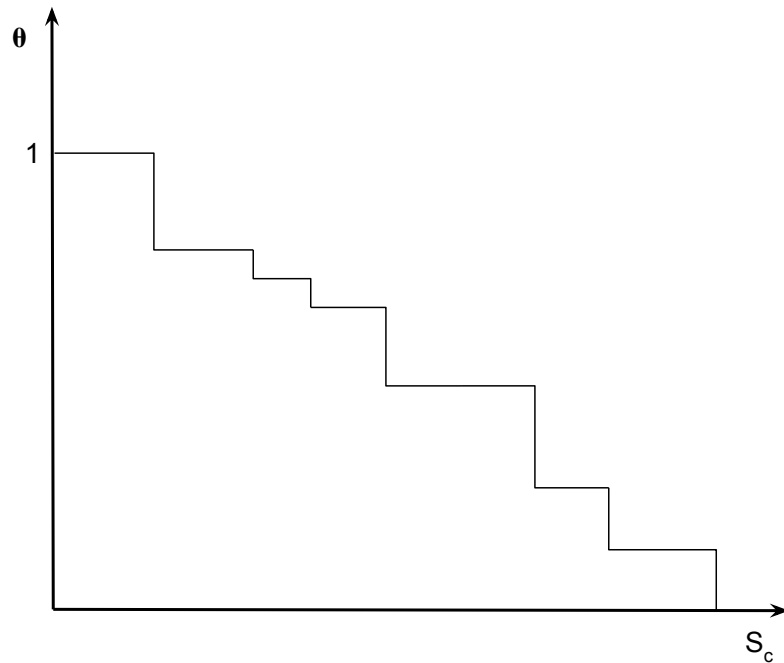
- Hemmelgarn, T. and Nicodème, G. J. (2009). *Tax-Co-Ordination in Europe: Assessing the First Years of the EU-savings Taxation Directive*. CESifo Working Paper 2675.
- Hines, J. R. (2010). “Treasure Islands”. *Journal of Economic Perspectives*, 24(4).
- Janský, P., Palanský, M., and Wójcik, D. (2023). “Shallow and Uneven Progress towards Global Financial Transparency: Evidence from the Financial Secrecy Index”. *Geoforum*, 141.
- Johannesen, N. (2014). “Tax Evasion and Swiss Bank Deposits”. *Journal of Public Economics*, 111.
- Johannesen, N., Tørsløv, T., and Wier, L. (2020). “Are Less Developed Countries More Exposed to Multinational Tax Avoidance? Method and Evidence from Micro-Data”. *The World Bank Economic Review*, 34(3).
- 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).
- Kaufmann, D., Kraay, A., and Mastruzzi, M. (2011). “The Worldwide Governance Indicators: Methodology and Analytical Issues”. *Hague Journal on the Rule of Law*, 3(02).
- Mayer, T. and Zignago, S. (2011). *Notes on CEPII’s Distances Measures: The GeoDist Database*. Working Papers 2011-25. CEPII.
- Menkhoff, L. and Miethe, J. (2019). “Tax Evasion in New Disguise? Examining Tax Havens’ International Bank Deposits”. *Journal of Public Economics*, 176.
- Rixen, T. (2011). “Tax Competition and Inequality: The Case for Global Tax Governance”. *Global governance*, 17.
- Tax Justice Network (2009). *Financial Secrecy Index 2009 Methodology*.
- (2011). *Financial Secrecy Index 2011 Methodology*.
- (2013). *Financial Secrecy Index 2013 Methodology*.
- (2015). *Financial Secrecy Index 2015 Methodology*.

Tax Justice Network (2018). *Financial Secrecy Index 2018 Methodology*.

— (2020). *Financial Secrecy Index 2020 Methodology*.

7 Appendix A: Additional tables and figures

Figure A1: An illustration of the step function $S(\theta)$ of the probability θ that an investor's identity is revealed by domestic authorities



Note: This illustrated shape of the step function $\theta(S_{ct})$ is assumed based on the notion that the relative secrecy score (on the horizontal axis) affects the probability of detection in steps. Each investor with assets in country c can be placed on such a function, and as this country becomes more transparent, they move to the left, up the step function, and their probability of being detected increases in steps as individual policies increase that probability.

Figure A2: Development of individual indicators of financial secrecy that formed the secrecy scores in the 2011-2020 editions of the Financial Secrecy Index

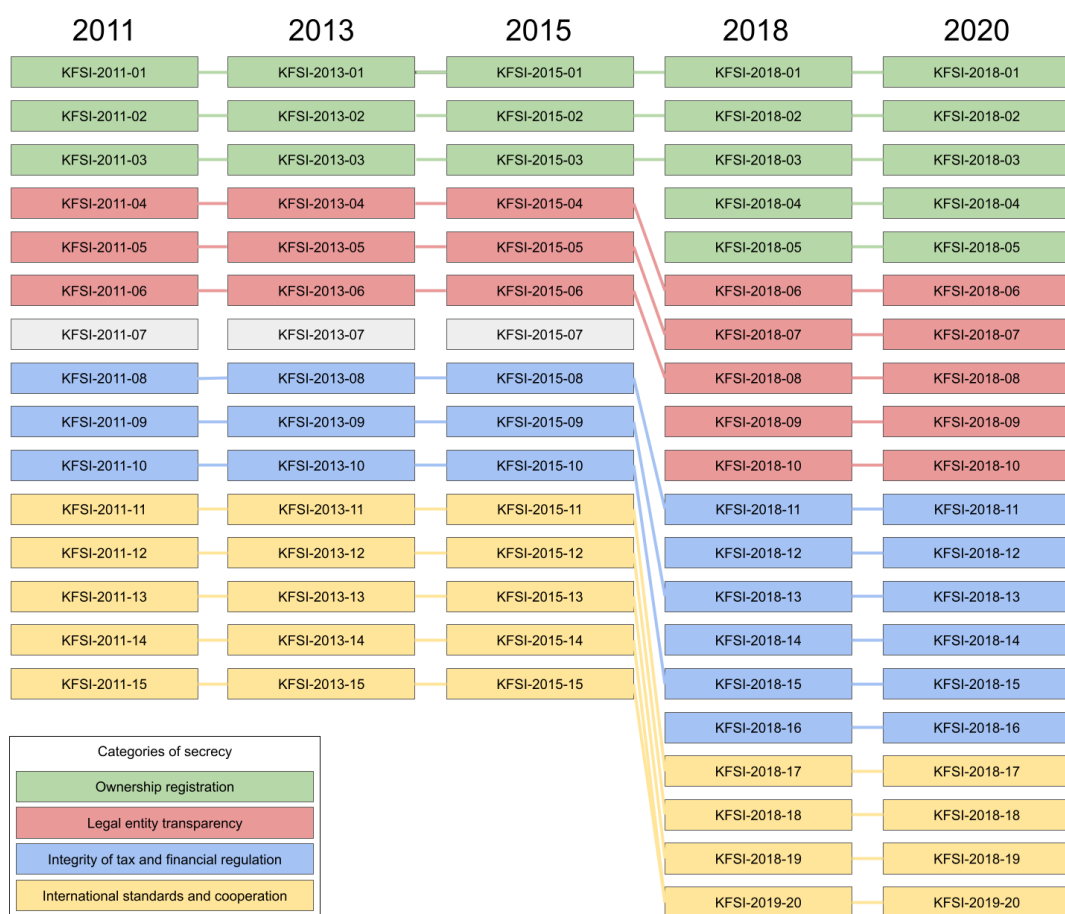


Table A1: Robustness checks for the results of the fixed-effects model with portfolio investment as the outcome variable

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	$High: S_{2011}^{j,k} > 1.05$	$High: S_{2011}^{j,k} > 1.05$	$High: S_{2011}^{j,k} > 1.1$	$High: S_{2011}^{j,k} > 1.1$	$High: S_{2019}^{j,k} > 1.05$	$High: S_{2019}^{j,k} > 1.05$	$High: S_{2019}^{j,k} > 1.1$	$High: S_{2019}^{j,k} > 1.1$
$(I_j - I_k)$	0.414*** (0.065)	0.415*** (0.063)	0.414*** (0.065)	0.420*** (0.063)	0.405*** (0.065)	0.413*** (0.064)	0.410*** (0.065)	0.417*** (0.063)
$(S_j - S_k)$	0.288*** (0.049)	0.032 (0.054)	0.279*** (0.047)	0.040 (0.052)	0.230*** (0.050)	0.008 (0.054)	0.245*** (0.048)	0.012 (0.052)
$(S_j - S_k) * High$	-0.259 (0.159)	0.208 (0.153)	-0.364 (0.283)	0.178 (0.251)	0.419*** (0.114)	0.405** (0.198)	0.689*** (0.213)	0.697** (0.281)
$(S_j - S_k)^2$		-0.888*** (0.070)		-0.861*** (0.069)		-0.831*** (0.070)		-0.841*** (0.069)
$(S_j - S_k)^2 * High$		4.176*** (0.521)		6.356*** (0.975)		0.097 (0.338)		-0.999 (0.861)
Constant	20.380*** (0.035)	20.432*** (0.034)	20.379*** (0.035)	20.432*** (0.034)	20.378*** (0.035)	20.433*** (0.034)	20.377*** (0.035)	20.433*** (0.034)
Observations	203,194	203,194	203,194	203,194	203,194	203,194	203,194	203,194
R^2	0.007	0.012	0.007	0.011	0.007	0.011	0.007	0.011

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.10. The dependent variable is the log of the difference between portfolio assets of investors from country i in countries j and k ; S_c and WGI_c are, respectively, the relative secrecy score and the mean of the six World Governance Indicators (Kaufmann et al., 2011) of country $c, c \in (j, k)$. $High$ is a binary variable which indicates whether the relative secrecy scores of countries j and k are higher than a given threshold in a given year, as specified in the column headings. All regressions include controls for GDP and population (not reported here).

Table A2: Robustness checks for the results of the fixed-effects model with bank deposits as the outcome variable

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	$High: S_{2011}^{j,k} > 1.05$	$High: S_{2011}^{j,k} > 1.05$	$High: S_{2011}^{j,k} > 1.1$	$High: S_{2011}^{j,k} > 1.1$	$High: S_{2019}^{j,k} > 1.05$	$High: S_{2019}^{j,k} > 1.05$	$High: S_{2019}^{j,k} > 1.1$	$High: S_{2019}^{j,k} > 1.1$
$(I_j - I_k)$	0.289*** (0.089)	0.285*** (0.087)	0.297*** (0.089)	0.294*** (0.087)	0.307*** (0.089)	0.304*** (0.087)	0.297*** (0.089)	0.294*** (0.087)
$(S_j - S_k)$	-0.031 (0.098)	-0.032 (0.098)	-0.025 (0.097)	-0.026 (0.098)	0.000 (0.100)	-0.000 (0.101)	-0.025 (0.097)	-0.026 (0.098)
$(S_j - S_k) * High$	2.034*** (0.200)	3.466* (1.846)	1.295*** (0.381)	1.244 (0.971)	-0.768*** (0.185)	-0.807*** (0.154)	0.000 (.)	0.000 (.)
$(S_j - S_k)^2$		-0.236 (0.143)		-0.232 (0.143)		-0.238 (0.146)		-0.232 (0.143)
$(S_j - S_k)^2 * High$		-6.592 (8.458)		0.552 (4.673)		-0.077 (0.222)		0.000 (.)
Constant	19.098*** (0.202)	19.160*** (0.205)	19.098*** (0.202)	19.159*** (0.205)	19.114*** (0.203)	19.178*** (0.205)	19.099*** (0.202)	19.159*** (0.205)
Observations	65777	65777	65777	65777	65777	65777	65777	65777
R^2	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.10. The dependent variable is the log of the difference between bank deposits of investors from country i in countries j and k ; S_c and WGI_c are, respectively, the relative secrecy score and the mean of the six World Governance Indicators (Kaufmann et al., 2011) of country $c, c \in (j, k)$. $High$ is a binary variable which indicates whether the relative secrecy scores of countries j and k are higher than a given threshold in a given year, as specified in the column headings. All regressions include controls for GDP and population (not reported here).

Figure A3: Countries with high relative secrecy score in 2011, their absolute secrecy scores by type of secrecy for 2011 and 2019, part I

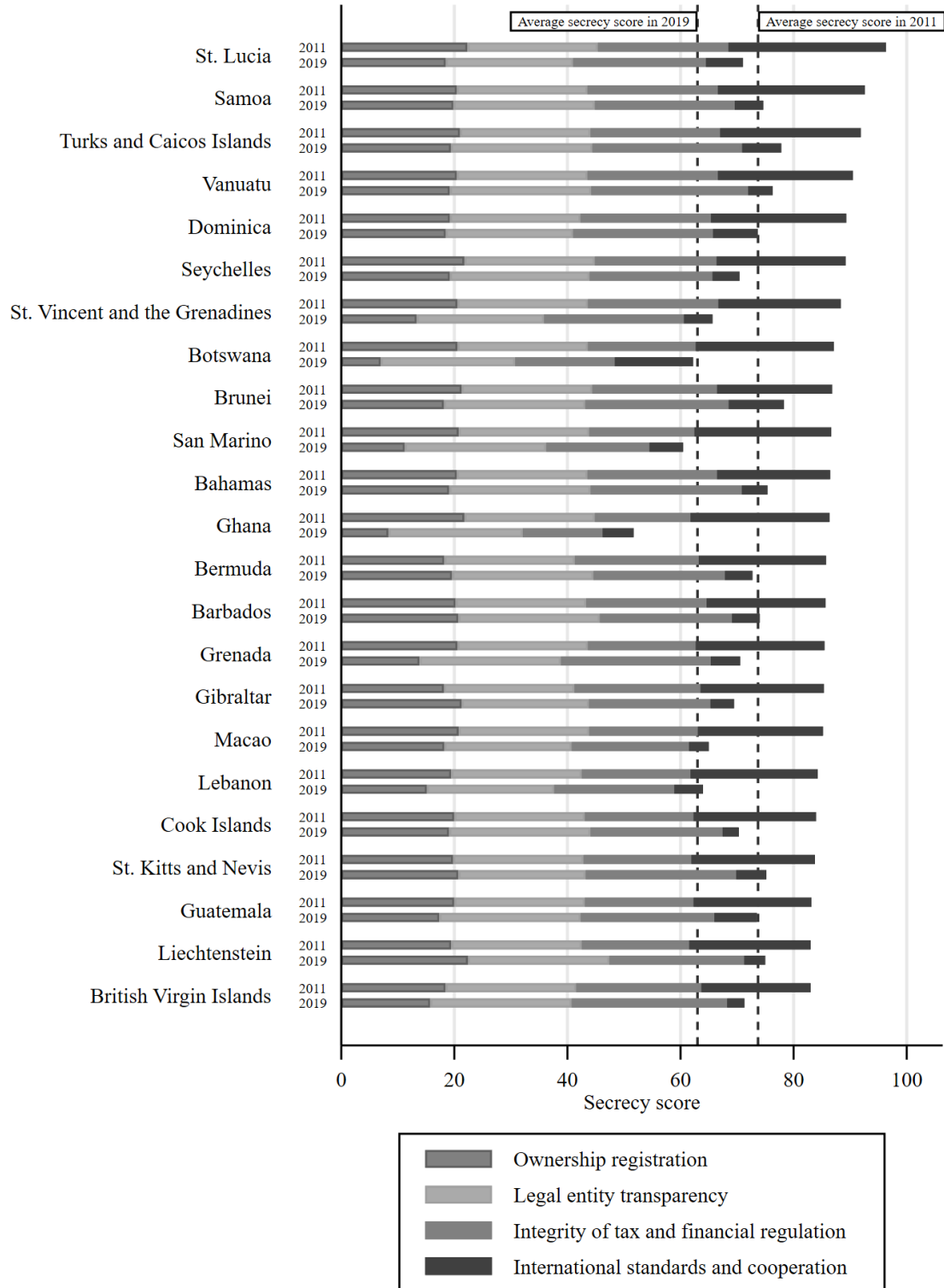


Figure A4: Countries with high relative secrecy score in 2011, their absolute secrecy scores by type of secrecy for 2011 and 2019, part II

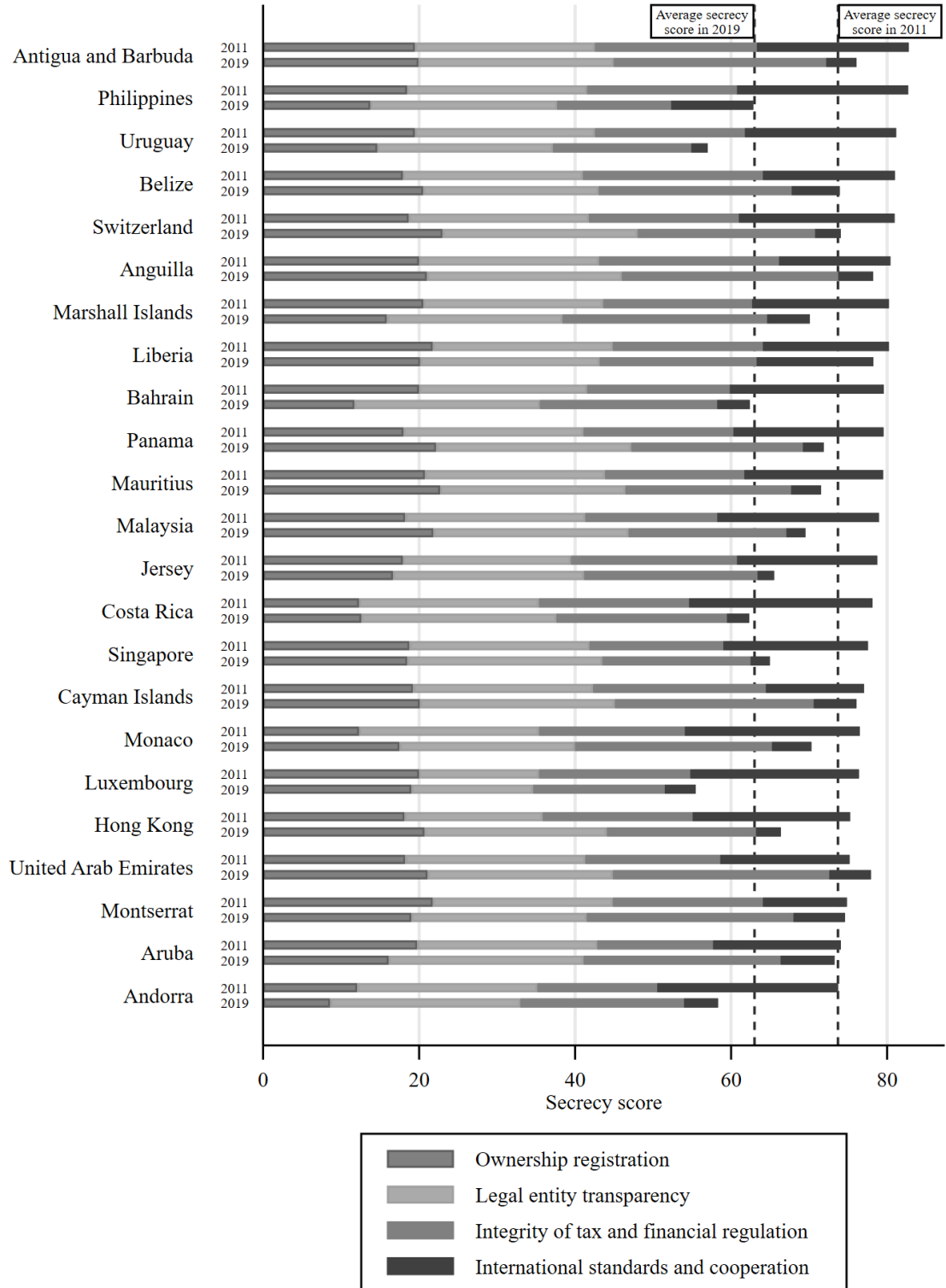


Figure A5: Countries with low relative secrecy score in 2011, their absolute secrecy scores by type of secrecy for 2011 and 2019

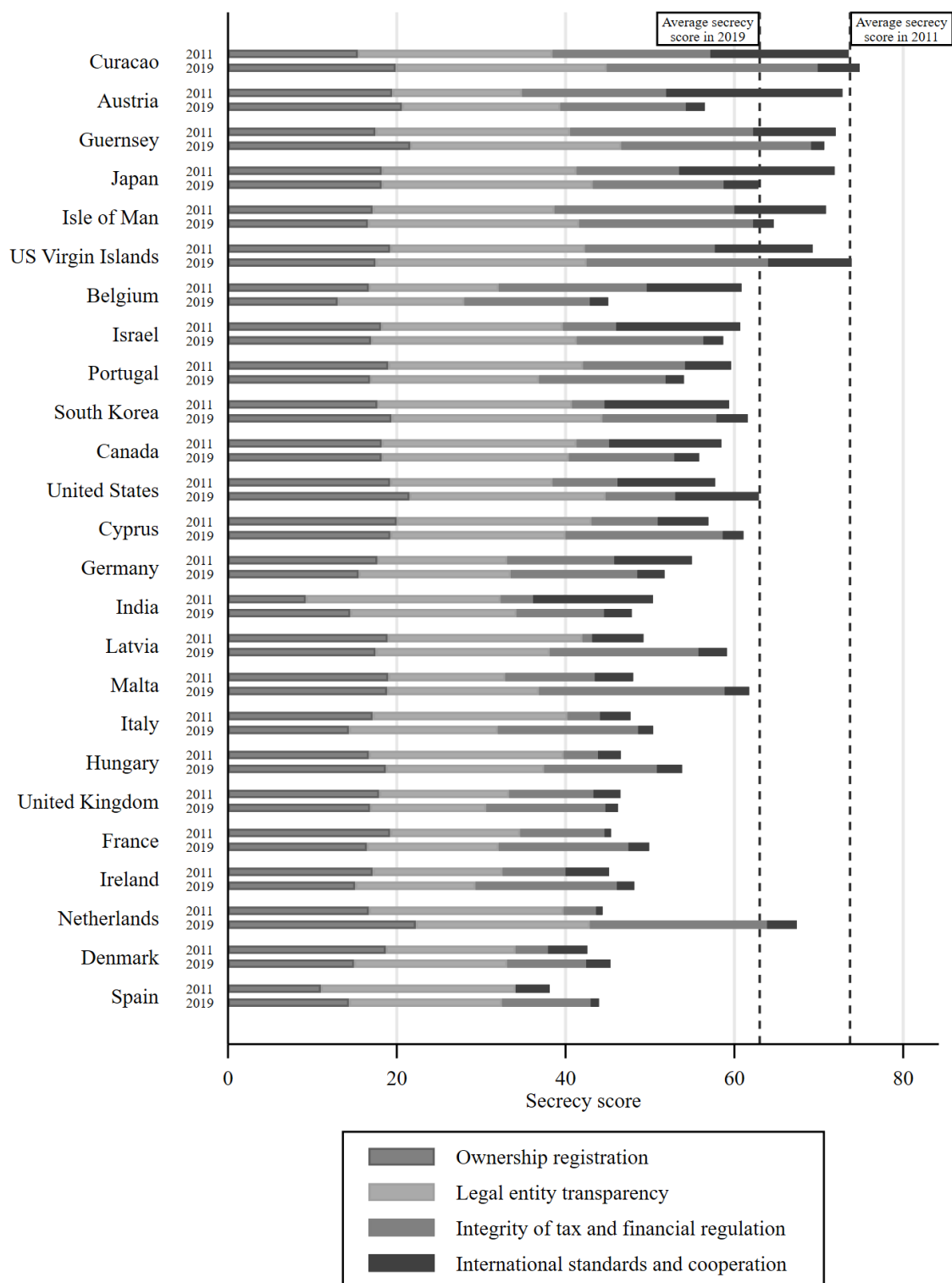


Table A3: List of countries with high relative secrecy score in 2011, their relative secrecy scores, absolute secrecy scores, and absolute secrecy scores by type of secrecy for 2011 and 2019

Country	Relative secrecy score		Secrecy score		Ownership registration		Legal entity transparency		Integrity of tax and financial regulation		International standards and cooperation	
	2011	2019	2011	2019	2011	2019	2011	2019	2011	2019	2011	2019
St. Lucia	1.31	1.12	96	71	97	74	100	90	100	78	91	33
Samoa	1.26	1.18	93	75	89	79	100	100	100	83	85	25
Turks and Caicos Islands	1.25	1.23	92	78	91	78	100	100	99	88	81	35
Vanuatu	1.23	1.21	91	76	89	77	100	100	100	93	78	22
Dominica	1.21	1.17	89	74	83	74	100	90	100	83	78	40
Seychelles	1.21	1.11	89	70	94	77	100	99	93	73	74	24
St. Vincent and the Grenadines	1.20	1.04	88	66	89	53	100	90	100	83	70	25
Botswana	1.18	0.98	87	62	89	28	100	95	83	59	79	69
Brunei	1.18	1.24	87	78	92	73	100	100	96	85	66	49
San Marino	1.18	0.96	87	60	90	45	100	100	81	61	79	30
Bahamas	1.17	1.19	86	75	89	76	100	100	99	89	65	23
Ghana	1.17	0.82	86	52	94	33	100	95	73	47	80	27
Bermuda	1.16	1.15	86	73	79	78	100	100	95	78	73	24
Barbados	1.16	1.17	86	74	88	83	100	100	92	78	68	25
Grenada	1.16	1.12	85	71	89	55	100	100	83	88	74	26
Gibraltar	1.16	1.10	85	69	79	85	100	90	97	72	71	21
Macao	1.16	1.03	85	65	90	73	100	90	83	69	72	18
Lebanon	1.15	1.01	84	64	84	61	100	90	83	71	73	25
Cook Islands	1.14	1.11	84	70	87	76	100	100	83	78	70	14
St. Kitts and Nevis	1.14	1.19	84	75	86	83	100	90	83	89	71	27
Guatemala	1.13	1.16	83	74	87	69	100	100	83	79	68	38
British Virgin Islands	1.13	1.13	83	71	80	63	100	100	96	92	63	15
Liechtenstein	1.13	1.19	83	75	84	90	100	100	82	80	70	19
Antigua and Barbuda	1.12	1.20	83	76	84	80	100	100	90	91	63	19
Philippines	1.12	0.99	83	63	80	55	100	96	83	49	71	53
Uruguay	1.10	0.90	81	57	84	59	100	90	83	59	63	11
Belize	1.10	1.17	81	74	78	82	100	90	100	83	55	31
Switzerland	1.10	1.17	81	74	81	92	100	100	83	76	65	16
Anguilla	1.09	1.24	80	78	87	84	100	100	100	93	46	22
Marshall Islands	1.09	1.11	80	70	89	64	100	90	83	88	57	27
Liberia	1.09	1.24	80	78	94	81	100	92	83	67	53	75
Bahrain	1.08	0.99	80	62	87	47	93	95	79	76	64	21
Panama	1.08	1.14	80	72	78	89	100	100	83	73	63	13
Mauritius	1.08	1.13	80	72	90	91	100	95	77	71	58	19
Malaysia	1.07	1.10	79	70	79	87	100	100	73	68	67	12
Jersey	1.07	1.04	79	66	78	67	93	98	92	74	58	11
Costa Rica	1.06	0.99	78	62	53	50	100	100	83	73	76	14
Singapore	1.05	1.03	78	65	81	74	100	100	74	63	60	12
Cayman Islands	1.05	1.20	77	76	83	80	100	100	96	85	41	27
Monaco	1.04	1.11	77	70	53	70	100	90	81	84	73	25
Luxembourg	1.04	0.88	76	55	87	76	67	63	84	56	70	20
Hong Kong	1.02	1.05	75	66	79	83	77	94	83	64	66	16
United Arab Emirates	1.02	1.23	75	78	79	84	100	95	75	93	54	27
Montserrat	1.02	1.18	75	75	94	76	100	90	83	88	35	33
Aruba	1.01	1.16	74	73	86	64	100	100	64	84	53	35
Andorra	1.00	0.92	74	58	52	34	100	98	67	70	75	22

Table A4: List of countries with low relative secrecy score in 2011, their relative secrecy scores, absolute secrecy scores, and absolute secrecy scores by type of secrecy for 2011 and 2019

Country	Relative secrecy score		Secrecy score		Ownership registration		Legal entity transparency		Integrity of tax and financial regulation		International standards and cooperation	
	2011	2019	2011	2019	2011	2019	2011	2019	2011	2019	2011	2019
Curacao	0.99	1.18	74	75	67	80	100	100	81	83	53	25
Austria	0.99	0.89	73	57	84	83	67	75	74	50	68	11
Guernsey	0.98	1.12	72	71	76	86	100	100	94	75	32	8
Japan	0.98	0.99	72	63	79	73	100	100	53	52	60	21
Isle of Man	0.96	1.02	71	65	74	66	93	100	92	69	35	12
US Virgin Islands	0.94	1.17	69	74	83	70	100	100	67	72	38	49
Belgium	0.83	0.71	61	45	72	52	67	60	76	50	37	11
Israel	0.82	0.93	61	59	79	68	93	98	27	50	48	12
Portugal	0.81	0.85	60	54	82	67	100	80	52	50	18	11
South Korea	0.81	0.97	59	62	77	78	100	100	17	45	48	19
Canada	0.79	0.88	58	56	79	73	100	89	17	42	43	15
United States	0.78	0.99	58	63	83	86	83	93	33	28	38	49
Cyprus	0.77	0.97	57	61	87	77	100	83	34	62	20	12
Germany	0.75	0.82	55	52	77	62	67	72	55	50	30	16
India	0.68	0.76	50	48	40	58	100	79	17	35	46	16
Latvia	0.67	0.94	49	59	82	70	100	83	5	59	20	17
Malta	0.65	0.98	48	62	82	75	60	72	46	73	15	15
Italy	0.65	0.80	48	50	74	57	100	71	17	55	12	9
Hungary	0.63	0.85	47	54	72	75	100	75	18	45	9	15
United Kingdom	0.63	0.73	47	46	78	67	67	55	43	47	10	7
France	0.62	0.79	45	50	83	66	67	63	43	51	2	12
Ireland	0.61	0.76	45	48	74	60	67	57	32	56	17	10
Netherlands	0.60	1.07	44	67	72	89	100	83	17	70	2	18
Denmark	0.58	0.72	43	45	81	60	67	73	17	31	15	14
Spain	0.52	0.70	38	44	48	57	100	73	0	35	13	5

8 Appendix B: Creating a panel dataset on the development of financial secrecy

In this section, we describe in detail the development of each of the 20 Key Financial Secrecy Indicators (KFSIs) used to calculate secrecy scores. In doing so, we rely on the detailed methodologies published with each FSI edition (Tax Justice Network, 2009, 2011, 2013, 2015, 2018, 2020). In accordance with the FSI methodology, the KFSIs discussed below are subdivided into four categories: Ownership registration, Legal entity transparency, Integrity of tax and financial regulation, and International standards and cooperation.

Before introducing each indicator in detail, it is essential to describe our approach to notation. We will refer to the individual indicators as ‘KFSI-year-indicator number’ where ‘year’ refers to the FSI edition which the indicator comes from, and ‘indicator number’ refers to the number assigned to the indicator within the FSI edition published in a given year. Please note that in some cases the numbers assigned to a single indicator have changed from one FSI edition to the next.

8.1 Ownership registration

The first category of indicators, Ownership registration, comprises five KFSIs: Bank secrecy, Trust and foundations register, Recorded company ownership, Other wealth ownership, and Limited partnership transparency. Together, these indicators quantify the extent to which individuals’ wealth can be hidden from authorities.

The first indicator, Bank secrecy (KFSI-2020-1), has been part of the SS from the beginning, although originally in a much simpler form. In the 2009 edition, the indicator was composed of a simple binary question asking whether a jurisdiction has formal, legally enforced banking secrecy. In 2011, the indicator was newly constructed as a combination of six different questions in order to accommodate a more gradual assessment. In 2013, KFSI-2013-1 components remained the same, with the sole exception of one question, specifically rephrased to address new and improved source data. The indicator did not change in 2015, and only small-scale changes were made to two of the six questions in 2018, making it more difficult for jurisdictions to obtain a full transparency score. No changes to the indicator were made between the 2018 and 2020 editions. Overall, we consider KFSI-2020-1 to be mostly backward compatible with

KFSI-2018-1, KFSI-2015-1, KFSI-2013-1, and KFSI-2011-1, but significantly less compatible with KFSI-2009-1.

The second indicator, Trust and foundations register (KFSI-2020-2), has changed dramatically between the 2011 and 2013 editions. While KFSI-2009-2 and KFSI-2011-2 were identical, asking a binary question on whether all trusts and foundations formed in a jurisdiction are required to register with a central agency to become legally effective, a significantly more complex methodology was introduced in 2013. Additional detail and precision were provided by splitting the indicator in half, i.e. separately for trusts and private foundations, and allowing for a partial score within these halves based on additional details, such as public online data disclosure. KFSI-2015-2 remained identical to KFSI-2013-2 and KFSI-2018-2 introduced only minor changes towards a slightly stricter methodology. KFSI-2020-2 improved the assessment further by adding a focus on two more situations related to trusts. We thus consider KFSI-2020-2 as relatively compatible since the 2013 edition, but significantly less so for KFSI-2011-2 and KFSI-2009-2.

The third indicator, Recorded company ownership (KFSI-2020-3), has been part of the SS since 2009, remaining largely the same until 2015, with improvements only made to data sources used to answer the two indicator questions: whether the registration of a company necessitates the disclosure of the owner's identity information, and whether providing updates of this information is mandatory. As the vast majority of jurisdictions had already achieved a zero score on this indicator by 2011, KFSI-2018-3 introduced significant changes towards a stricter methodology. In particular, full beneficial ownership disclosure is now, along with legal ownership disclosure, among the criteria required for a zero score on this indicator. No changes to the indicator were made between the 2018 and 2020 editions. We therefore assess the KFSI-2020-3 indicator as fully compatible with KFSI-2018-3 but only partially compatible with the previous editions.

The last two indicators (KFSI-2020-4 and KFSI-2020-5) were first introduced in the 2018 edition to track how secretive individual jurisdictions are with respect to the ownership of certain types of wealth. No changes to these two indicators were made between the 2018 and 2020 editions. Other wealth (KFSI-2020-4) assesses the ownership transparency of real estate and of valuable assets stored in freeports, with a zero score assigned to jurisdictions which require the reporting of complete beneficial and legal ownership of real estate and either fully

transparent freeport ownership or the non-existence thereof.

Limited partnership transparency (KFSI-2020-5) focuses on two aspects of secrecy relevant to limited partnerships. First, it asks whether a jurisdiction requires all limited partnership types to publish beneficial and legal ownership information. Second, it assesses whether all limited partnerships are required to file their annual accounts with a government agency.

8.2 Legal entity transparency

The second category of indicators, Legal entity transparency, is composed of five indicators: Public company ownership, Public company accounts, Country-by-country reporting, Corporate tax disclosure, and Legal entity identifier. Prior to the 2018 edition, this category was designated as Key aspects of corporate transparency regulation.

The Public company ownership indicator (KFSI-2020-6) assesses whether a jurisdiction requires that all available forms of limited liability companies publish updated beneficial ownership and/or legal ownership information and, for a zero score, whether a jurisdiction makes such information accessible online for free in an open data format. This indicator thus constitutes something of an extension to KFSI-2020-3 in the sense that it asks similar questions; however, to obtain a low score, KFSI-2020-3 only requires that the requisite company ownership information is collected by a relevant government agency whereas KFSI-2020-6 requires this information to be publicly available. Although this indicator has been present in the FSI since 2009, it has been listed under different numbers: originally listed as fifth in 2009, it was renumbered to fourth in 2011–2015. In terms of methodology, the indicator questions have gradually become more specific. In 2009, the indicator simply asked a binary question, i.e. whether or not access to beneficial ownership information is possible at a fixed cost below USD 10 and whether it does or does not require the establishment of complex payment arrangements. In 2011, the methodology newly allowed to score 0.8 on the indicator in case legal ownership information was published (but not beneficial ownership information). An additional level of detail was introduced in 2015: a score of 0.5 was assigned to jurisdictions providing information on beneficial ownership for a fee lower than USD 10 rather than for free while a score of 0.9 was assigned to jurisdictions which provided information on legal ownership for a fee rather than for free. While the increased granularity of indicator criteria may have introduced slight external variation over the years—with criteria specified even further in 2018 and no change between

2018 and 2020—we perceive KFSI-2020-6 as being overall relatively compatible over time since the 2009 edition.

The Public company accounts indicator (KFSI-2020-7) focuses on whether a jurisdiction publishes information from firms’ annual accounts online for free. The indicator was included already in 2009 as KFSI-2009-4 in the form of a binary question, and has not undergone any changes other than acquiring a new numerical designation before becoming KFSI-2011-5 and then KFSI-2013-5. For KFSI-2015-5, a new score of 0.5 was awarded to jurisdictions which provided the information for a small fee (less than USD 10) rather than for free. In 2018, a zero score on this indicator could newly only be obtained by jurisdictions which not only provide the data for free, but which do so using an open data format; any other format, albeit published for free, now produces a score of 0.25. Conditions for obtaining a score of 0.5 or 1 have not changed. No changes to the indicator were made between the 2018 and 2020 editions. Overall, we assess KFSI-2020-7 as well comparable across all FSI editions.

The Country-by-country reporting indicator (KFSI-2020-8), also abbreviated as CbCR, measures whether companies listed on stock exchanges or incorporated in a given jurisdiction are required to publicly publish worldwide financial reporting data on a country-by-country basis. The indicator was first introduced in the 2011 edition as KFSI-2011-6 and awarded a score of 0.5 to jurisdictions which required a limited version of CbCR in accordance with principles elaborated by the Extractive Industries Transparency Initiative. In 2013, the indicator was redefined in greater detail with a score of 0.9 newly assigned to jurisdictions which required an industry-specific CbCR for corporations active in the extractive industries. A score of 0.75 was assigned in case annual CbCR was required at least for corporations active either in banking or in the extractive industries, and a score of 0.5 in case both of these sectors were covered by the requirement. The indicator has not changed between 2013 and 2020. Overall, we assess KFSI-2020-8 as well comparable from 2011 to 2020.

The remaining two indicators in this category, i.e. Corporate tax disclosure (KFSI-2020-9) and Legal entity identifier (KFSI-2020-10), were only introduced in 2018. The Corporate tax disclosure indicator is split into two parts, each of which contributes to one half of the indicator. The first half assesses whether a jurisdiction has gone beyond the legal framework proposed by the OECD and requires a local filing of CbCR in cases where it cannot obtain such information via automatic exchange with other countries. The second half of the indicator depends on

whether a country has a substantive extractive sector. If it does (and this was the case for 50 countries in the 2020 edition), this half of the indicator (worth up to 50 per cent of KFSI-2020-9) has two parts: up to 25 points in this indicator is awarded to countries that don't make their cross-border tax rulings publicly available and to countries that do not apply income tax, and a further 25 points are awarded if the country does not publish any extractive industries contracts. For countries that do not have a substantive extractive sector, the whole second half of KFSI-2020-9 is composed of the unilateral cross-border tax rulings criterion. The split of the second half of the indicator was only introduced in 2020. Overall, we assess KFSI-2020-9 as well comparable from 2018 to 2020.

The Legal entity identifier indicator (KFSI-2020-10) reviews the extent to which a jurisdiction requires domestic legal entities to use the Legal entity identifier, a global company identification framework developed under the guidance of the Financial Stability Board. The indicator facilitates a detailed examination of the current state of framework implementation, assigning one of five possible values (0, 0.25, 0.5, 0.75, and 1). The indicator has not changed between 2018 and 2020.

8.3 Integrity of tax and financial regulation

The Integrity of tax and financial regulation category includes six indicators: Tax administration capacity, Consistent personal income tax, Avoids promoting tax evasion, Tax court secrecy, Harmful structures, and Public statistics. From 2011 to 2015, the category was labelled Efficiency of tax and financial regulation and included four indicators which remained similar in these three editions. In 2018, however, one of these indicators was dropped entirely (KFSI-2015-7), two were adjusted (newly designated KFSI-2018-11 and KFSI-2018-15), one remained the same (KFSI-2018-13), and three new ones were added (KFSI-2018-12, KFSI-2018-14, and KFSI-2018-16). Between the 2018 and 2020 editions, two indicators underwent changes (KFSI-2020-13 and KFSI-2020-14) and we describe these changes, as well as all other changes to the indicators in this category, in the rest of this subsection.

The Tax administration capacity indicator (KFSI-2020-11) assesses the capacity of a jurisdiction's tax administration to collect and process data for investigating, and ultimately taxing, wealthy people and companies likely to have the means, motivation and opportunities to escape their tax obligations. The indicator has five components, each of which focuses on a specific

anti-tax avoidance feature of the tax system. First introduced in the 2011 edition as Efficiency of tax administration (KFSI-2011-8), the indicator was initially designed to establish whether the tax authority of a jurisdiction makes use of taxpayer identifiers for financial institutions and companies and whether it has a dedicated large taxpayer unit within the tax administration. No changes to the indicator were made until the 2018 edition, when stricter rules were introduced: a zero-SS now requires having a high-net-worth individual unit in addition to a large taxpayer unit, using taxpayer identification numbers for both natural persons and legal entities, and obliging taxpayers to report on tax avoidance schemes and uncertain tax positions. The indicator has not changed between 2018 and 2020. Overall, we assess KFSI-2020-11 as well comparable from 2011 to 2020.

The Consistent personal income tax indicator (KFSI-2020-12) was only introduced in 2018. It assesses a jurisdiction's personal income tax regime, with a zero score assigned to regimes which use a single uniform personal income tax which taxes worldwide income and with an increasing score for less transparent regimes. The indicator has not changed between 2018 and 2020.

The Avoids promoting tax evasion indicator (KFSI-2020-13) was introduced in 2011 as the ninth indicator, i.e. KFSI-2020-13 corresponds to KFSI-2011-9, KFSI-2013-9, and KFSI-2015-9, before being renumbered to KFSI-2018-13. It assesses whether a jurisdiction includes worldwide capital income in its income tax base and whether it grants unilateral tax credits for foreign tax paid on certain foreign capital income. There were no changes to the indicator between 2011 and 2018, however, for the 2020 edition, it was amended to no longer differentiate interest between related and independent parties, since withholding tax rates on interest payments do not differ between these two types of parties. Overall, we assess KFSI-2020-13 as well comparable from 2011 to 2020.

The Tax court secrecy indicator (KFSI-2020-14) was only introduced in 2018. It evaluates the openness of a jurisdiction's judicial system in tax matters by analysing two relevant aspects: (i) openness of court proceedings, lawsuits, and trials, and (ii) public online availability of verdicts, judgements, and sentences. In both areas, the indicator methodology allows for a degree of granularity based on the extent to which this information is available to the public. Between 2018 and 2020, the assessment was tightened to newly consider that there is no court transparency when public access to documents may be restricted due to "private information"

and this term is not properly defined so as to exclude the possibility of using this rule as a loophole to conceal information related to tax matters. Overall, we assess KFSI-2020-14 as well comparable from 2018 to 2020.

The Harmful structures indicator (KFSI-2020-15) has been included in the FSI already since 2009, but new features have been added over time. Initially, the indicator was numbered as KFSI-2009-12 and consisted of a binary question asking whether a jurisdiction allows the existence of protective cell companies (PCCs), i.e. corporate entities which contain a number of cells which behave as companies in their own right—which in fact they are not. Subsequently, to accommodate the development of the Harmful legal devices indicator (KFSI-2011-10), the indicator was split in half to account in similar fashion also for trusts with flee clauses. In 2015, limited liability companies (LLCs) were added along with protected cell companies, and in 2018, the indicator was split further into four parts: large bank notes, bearer shares, series LLCs/PCCs, and trusts with flee clauses. The availability of each of these tools in a jurisdiction results in a 0.25 increase in score for this indicator. Overall, we assess the indicator as relatively comparable, with precision and detail increasing over time.

Public statistics (KFSI-2020-16), the last indicator in the Integrity of tax and financial regulation category, was only introduced in 2018. It is split into ten equally weighed sub-components, each of which asks whether a jurisdiction makes publicly available one of the selected statistical data sets related to its international financial, trade, investment, and tax positions.

8.4 International standards and cooperation

International standards and cooperation, the fourth and final indicator category, comprises four indicators: Anti-money laundering, Automatic information exchange, Bilateral treaties, and International legal cooperation.

The Anti-money laundering indicator (KFSI-2020-17) has been present in the assessment since 2009 and focuses on compliance with anti-money laundering recommendations issued by the Financial Action Task Force (FATF). Initially, the indicator’s predecessor, numbered KFSI-2009-3, was defined as a binary indicator equal to 0 in case at least 90% of the 49 FATF recommendations of a jurisdiction’s anti-money laundering regime were rated either as “compliant” or as “largely compliant” and no recommendation were rated as “non-compliant”;

a value of 1 was assigned otherwise. In 2011, the indicator (KFSI-2011-11) was transformed into a continuous measure of compliance with the FATF recommendations. The indicator has since changed only slightly to include an updated list of recommendations taken into consideration in accordance with changes in FATF methodology. An important caveat related to this indicator is that its comparability over time is implicitly limited due to the long intervals in which compliance with the listed recommendations is actually assessed by the FATF (whose reports constitute the data source for this indicator). In a majority of cases, no new assessments of the actual state of compliance with the recommendations were carried out between consecutive versions of the secrecy scores. Therefore, while we assess the indicator as relatively comparable over time, in practice, not much development in the value of this indicator has occurred.

The Automatic exchange of information indicator (KFSI-2020-18) takes into account the extent to which a jurisdiction is committed to automatically exchanging information with other countries' tax authorities. Introduced in 2009, the indicator has undergone major changes over time as the standards of cooperation regarding automatic information exchange improved. The initial indicator (KFSI-2009-10) asked whether a jurisdiction's authorities have effective access to bank information for the purposes of information exchange for both criminal and civil tax matters. In 2011, this question was moved to the Bank secrecy indicator and KFSI-2011-12 newly assessed whether a jurisdiction participates in multilateral automatic information exchange on tax matters. In 2011 and 2013, the assessment was carried out using the European Savings Tax Directive as a proxy for this indicator, as no global mechanism implementing automatic information exchange was in existence at this point. In 2015, the indicator changed to reflect the gradual implementation of the OECD's Common Reporting Standard. KFSI-2015-12 thus newly asked whether a jurisdiction had signed the Multilateral Competent Authority Agreement (MCAA) which provides the legal framework to engage in automatic information exchange. Some granularity was introduced by assessing a less formal commitment to begin exchanging information, while the proposed automatic information exchange launch year was also taken into account. The 2018 edition further improved the methodology and now uses detailed data on which countries engage in automatic information exchange and under what conditions, as published by the OECD. Overall, we find that changes to the definition of this indicator made over time have appropriately reacted to the development of automatic information exchange standards, and we thus assess the indicator as relatively well comparable across

all FSI editions.

The Bilateral treaties indicator (KFSI-2020-19) examines the extent to which a jurisdiction participates in effective information exchange relationships. The indicator is defined as $\max(0; 1 - (\text{number of active treaties} / 108))$. The denominator in the fraction, 108, represents the number of countries that have adhered to the multilateral Amended Council of Europe/OECD Convention on Mutual Administrative Assistance in Tax Matters in 2019. Therefore, the more relationships a country has activated, the lower its score for this indicator, with a zero score assigned to countries which have activated at least 108 relationships. While the indicator has been part of the secrecy scores since 2009, KFSI-2009-9 was initially a binary variable indicating whether a jurisdiction has activated at least 60 bilateral treaties with broad tax information exchange clauses for both civil and criminal tax matters. Following an innovation made in 2011, the newly numbered KFSI-2011-13 was redesigned to take the average number of information exchange relationships of G20 countries as the baseline number of treaties used in the denominator and evaluated other jurisdictions relative to this number. Therefore, KFSI-2011-13 was defined similarly to KFSI-2018-19, but using 60 in the denominator. The baseline number of treaties (i.e., the average of the number of relationships of G20 countries) was then recalculated for KFSI-2013-13 to 46 (where the drop was caused by a stricter evaluation of treaties that qualify as active), for KFSI-2015-13 to 53 relationships, for KFSI-2018-19 to 98 relationships, and finally for KFSI-2020-19 to 108 relationships. Overall, we assess the indicator as relatively comparable, with strictness of the assessment increasing over time in line with the general progress in this area.

Finally, the International legal cooperation indicator (KFSI-2020-20) measures the extent to which a jurisdiction participates in international transparency commitments and engages in international judicial cooperation on money laundering and other criminal matters. This KFSI includes nine sub-indicators, each of which focuses on a specific commitment of a jurisdiction to internationally cooperate in legal matters. Similar questions were first introduced in the secrecy score methodology in 2011, with two indicators formerly in existence: International transparency commitments (KFSI-2011-14) and International judicial cooperation (KFSI-2011-15). These indicators then remained unchanged until 2015. We thus compute an arithmetic average of indicators 14 and 15 from the 2011–2015 editions of the SS and consider the resulting values as largely compatible with KFSI-2018-20 and KFSI-2020-20.