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

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Abstract: Excessive financial secrecy facilitates illicit financial flows, which constitute a major developmental challenge for low-income economies and cause significant tax revenue losses for governments around the world. In this paper we estimate the semi-elasticity of cross-border financial assets to changes in financial secrecy and how it differs for countries at various income levels. We develop a new financial secrecy dataset for the 2011–20 period, which covers many specific policies in addition to the previously studied automatic information exchange. We then combine this with data on cross-border financial assets and find that investors do indeed react to changes in financial transparency by relocating their assets to offshore financial centres, which remain, or have recently become, more financially secretive than other countries (here, secrecy jurisdictions). In agreement with our theoretical predictions, we document that this effect is highly non-linear and stronger for portfolio investment than for bank deposits. Overall, we find a much stronger relocation effect for assets originating from lower-income countries.

Key words: financial secrecy, financial transparency, secrecy jurisdictions, tax havens, offshore financial centres

JEL classification: F36, F65, G28, H26

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1 Introduction

Financial secrecy supplied by secrecy jurisdictions enables individuals and companies to escape their home countries' legislation, thereby enabling cross-border illicit financial flows. Recent leaks of confidential documents, such as the 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 become high on the agendas of governments and international organizations, resulting in promising progress. For example, information exchange (including with highly secretive jurisdictions) has been widely adopted throughout the developed world, albeit with mixed evidence of its effectiveness (Casi et al. 2020; Johannesen 2014; Menkhoff and Miethe 2019). However, developing countries find themselves falling behind with respect to this progress, even though illicit financial flows fuelled by financial secrecy affect them at least as harshly as developed countries, if not more (Andersen et al. 2021; Johannesen et al. 2020).

In this paper we ask how the recent push for financial transparency in several areas affected real cross-border financial assets. In pursuit of this objective we combine existing historical measures of financial secrecy and harmonize them to derive a panel dataset of financial secrecy that 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. This heterogeneity allows us to empirically estimate the semi-elasticity of cross-border financial investment 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 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 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 the offshore investment and a positive probability of being revealed and sanctioned. Our model provides three empirically testable predictions: (1) only high-secrecy jurisdictions can be used for hiding one's identity and the related thresholds are identifiable and detectable; (2) the effect of changes in secrecy is highly non-linear; and (3) an investor will only relocate their investment if the changes in relative secrecy are large enough. We also hypothesize that the response observed in the data (which includes illicit as well as legitimate financial flows) will be higher for investors from lower-income countries, where, as suggested by previous research, the share of illicit financial flows is likely to be higher.

Our results show that the locational choice of investors is significantly influenced by financial secrecy. We document this effect with two main findings. First, we report that investors follow the behaviour predicted by our locational choice model very closely. 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 2020, approximately 13 per cent 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 increasing 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 in higher-income countries. This result is in agreement with the notion that cross-border financial assets originating from lower-income countries have a relatively larger illicit component.

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 2020. 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 personal wealth held in secrecy jurisdictions. Published studies have focused on individual policies that 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 of the European Union, established to ensure the taxation of foreign interest income of domestic households according to domestic tax rules. Effectively, while not harmonizing 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 Nicodéme 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 (2014), for example, reports that Swiss bank deposits by EU residents declined by 30–40 per cent relative to other Swiss bank deposits in two quarters immediately before and after the tax was introduced, and Rixen and Schwarz (2011) find that countries engaged in information exchange lost capital relative to third countries outside the scope of the directive. Conversely, Hemmelgarn and Nicodéme (2009) report that the Directive had no measurable effects on the development of different investments that fall within its scope, and Caruana-Galizia and 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 2011–20 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 (2014) does 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 (2016) argues that only the subsequent automatic information exchange, triggered by the US Foreign Account Tax Compliance Act and the OECD's Common Reporting Standard (CRS), 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 estimated 67 per cent following the adoption of the US Foreign Account Tax Compliance Act and the OECD's CRS; Casi et al. (2020) find that the CRS induced a reduction of 14 per cent in cross-border deposits parked in offshore locations for tax evasion purposes; and Beer et al. (2019) report a 25 per cent 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 that 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 towards financial transparency, methods and loopholes that enable individuals to escape regulation by hiding in high-secrecy jurisdictions still exist—however different they may be from those used in the past.

We contribute to the existing literature that 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) that can be circumvented. 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 that 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 et al. 2017, 2021).

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 that 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 jurisdiction) 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 $j \in (1,\ldots,J)$ 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:

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

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 being revealed; it is a monotonic and (weakly) decreasing step function of S_{jt} (see Figure A1 in Appendix A). α is the fine an investor will face if revealed; it is modelled as a proportion of the value of the assets. An investor from country i chooses jurisdiction j so as to maximize the expected benefit:

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

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 maximization problem by choosing to locate their investment in secrecy jurisdiction j. S_{jt} develops over time $t \in \{2011, \ldots, 2020\}$ as secrecy jurisdictions alter their legislation. We operationalize 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: (1) do nothing or circumvent the policy, if possible (this will only be chosen if the change in S_{jt} induces a change in θ that is small enough not to change the maximization problem); (2) relocate the investment to jurisdiction k; or (3) exit the cross-border investment position altogether (this will only be chosen if $E[U]$ is no longer positive for any j).

We derive three testable hypotheses from this model. First, we hypothesize that cross-border investment is only responsive to changes in secrecy if $E[U]$ is positive—that is, 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 hypothesize that the evolving institutional quality in secrecy jurisdictions (I_{jt}) has a positive effect on relocation, because it affects the maximization 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 maximization problem and result in relocation.

Second, we hypothesize 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 maximization problem, which leads a large number of them to the same solution. Several recent contributions to our understanding of the locational choice of multinational corporations seeking low taxation have demonstrated that this is indeed likely the case (e.g. Dowd et al. 2017; Garcia-Bernardo and Janský 2021).

Third, we hypothesize that investor i will only relocate the investment if the first option is unavailable—that is, 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 operationalize 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 harmonize and combine five editions (published between 2011 and 2020) of the so-called secrecy scores from the Financial Secrecy Index, published biannually since 2009 by the Tax Justice Network.[1] 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 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 harmonizing and combining the subsequent editions of each of the 20 Key Financial Secrecy Indicators (KFSIs) in Appendix B, and we visualize 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:

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

Our sample of countries serving as destinations for cross-border assets (i.e. countries j and k Equation (3)) consists of 71 countries with available data across all five Financial Secrecy Index editions from 2011 to 2020.[2] In 2019, these countries together supplied 93.9 per cent of global cross-border financial services and hosted 87.2 per cent of global cross-border portfolio assets and 88.1 per cent of global cross-border bank deposits.

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 the bulk of cross-border financial assets that could potentially benefit from financial secrecy and have previously been widely used in studying cross-border tax evasion (Ahrens and Bothner 2020; Andersen et al. 2017, 2021; 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,

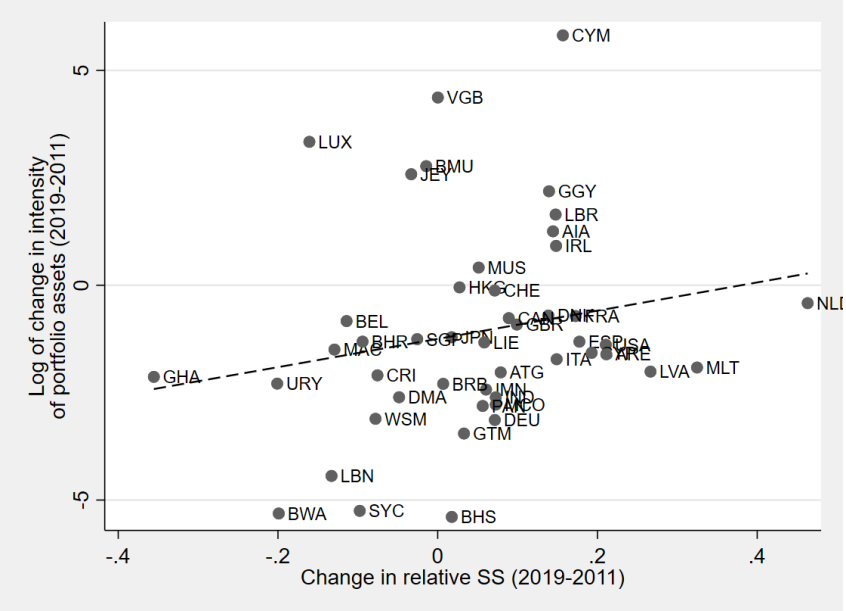
[1] The first edition of the index, published in 2009, has been excluded from our analysis due to the use of a methodology significantly different from the subsequent editions, as described in the text.

[2] Prior to 2018, the Financial Secrecy Index was published in the autumn of the corresponding year of that edition. Starting in 2018, 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 years. The cut-off date for the data remains the same: 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.

this will be recorded in the Cayman–Swiss relationship 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.

Source: authors' compilation based on data from IMF's Coordinated Portfolio Investment Survey, data on GDP from the World Bank and other sources (as described in the text), and Financial Secrecy Index (FSI) data.

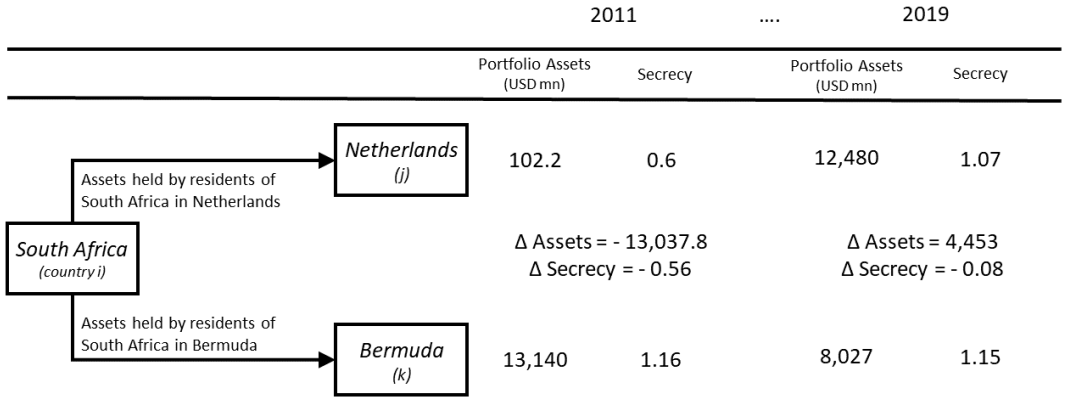
Third, we use data on geographical distance between capital cities and on cultural distance (which we proxy by a dummy variable indicating a common language) which we source from the CEPII dataset (Mayer and Zignago 2011). Last, to control for time-varying country characteristics, we collect data on 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 et al. 2019; Casi 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 that utilizes a triad of countries as the primary unit of analysis: we track the relationship between (1) the relative assets of the residents of country i in secrecy jurisdictions j and k, and (2) changes in the relative secrecy offered by jurisdictions j and k. Figure 2 presents the trilateral setting for a specific example of three countries covered in the dataset.

Figure 2: Trilateral approach scheme with example data



Source: authors' compilation.

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:

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

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 (1) changes in secrecy only affect assets in high-secrecy jurisdictions; and (2) 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:

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

where the term $(I_{jt} - I_{kt})$ represents time-varying country-level controls that 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 a low-income country), 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.

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 addition, 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, where we expect both to be positive.

In the second stage we turn to our third hypothesis—that is, 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 2020 and 2011):

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

where T_{ijk} is a binary variable equal to 1 if the difference in relative secrecy scores between 2020 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.

The 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.

5.1 Panel approach

Table 1 presents the results of the fixed-effects model specified in Equation (5) at the triadic level—that is, 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 emphasizing 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 2020 (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 Appendix A) 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 2020, approximately 13 per cent 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 highlights previously published findings that indicate 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).

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

	(1)	(2)	(3) $High$: $S^{j,k}_{2011} > 1$	(4) $High$: $S^{j,k}_{2011} > 1$	(5) $High$: $S^{j,k}_{2019} > 1$	(6) $High$: $S^{j,k}_{2019} > 1$	(7) $High$: $S^{j,k}_{2011} > 1$
$(I_j - I_k)$	0.416***	0.423***	0.416***	0.418***	0.404***	0.410***	0.417***
	(0.035)	(0.035)	(0.035)	(0.035)	(0.035)	(0.035)	(0.035)
$(S_j - S_k)$	0.269***	0.042	0.269***	–0.022	0.220***	–0.010	–0.022
	(0.024)	(0.027)	(0.025)	(0.029)	(0.026)	(0.029)	(0.029)
$(S_j - S_k)^2$		–0.833***		–0.972***		–0.849***	–0.972***
		(0.040)		(0.040)		(0.041)	(0.040)
$(S_j - S_k) \times High$			–0.000	0.606***	0.366***	0.465***	0.555***
			(0.074)	(0.084)	(0.068)	(0.104)	(0.084)
$(S_j - S_k)^2 \times High$				3.881***		0.396**	3.718***
				(0.227)		(0.189)	(0.225)
$(S_j - S_k) \times High \times LI$							2.351***
							(0.514)
$(S_j - S_k)^2 \times High \times LI$							7.995***
							(1.801)
Constant	20.377***	20.433***	20.377***	20.428***	20.377***	20.434***	20.428***
	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)
Observations	203,194	203,194	203,194	203,194	203,194	203,194	203,194
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 a low-income country. All regressions include controls for changes in GDP and population (not reported here).

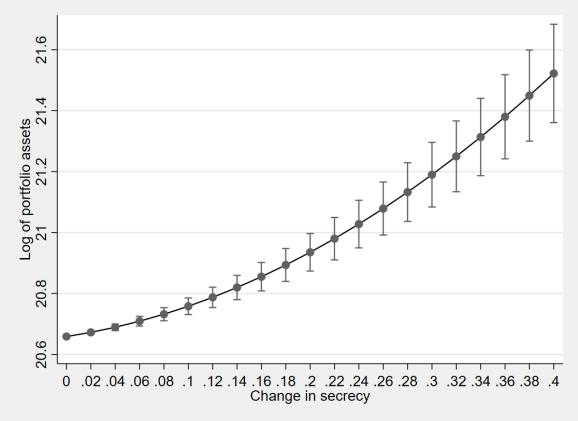
Source: authors' compilation.

In Table 2 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), they are not statistically significant at the 5 per cent 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 Appendix A. This finding is in agreement with the fact that bank deposits are generally much more transparent than portfolio investments due to the high regulatory standards required by banks.

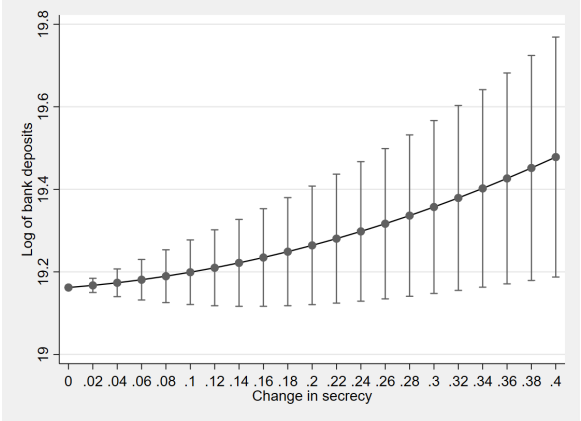
[3] The change in the relative secrecy between the United Arab Emirates and Luxembourg between 2011 and 2020 is 0.1264, which is associated with a change of the log of inward portfolio assets from 20.79734 to 20.65872. The effect can then be expressed as a share of the initial amount as: $(e^{20.79734} - e^{20.65872})/e^{20.79734} = 0.129$.

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

(a) Portfolio assets



(b) Bank deposits



Source: authors' compilation.

Table 2: Results of the fixed-effects model with bank deposits as the outcome variable

	(1)	(2)	(3) $High$: $S^{j,k}_{2011} > 1$	(4) $High$: $S^{j,k}_{2011} > 1$	(5) $High$: $S^{j,k}_{2019} > 1$	(6) $High$: $S^{j,k}_{2019} > 1$	(7) $High$: $S^{j,k}_{2011} > 1$
$(I_j - I_k)$	0.297***	0.294***	0.292***	0.289***	0.303***	0.301***	0.289***
	(0.061)	(0.061)	(0.061)	(0.061)	(0.061)	(0.061)	(0.061)
$(S_j - S_k)$	–0.025	–0.026	–0.032	–0.034	–0.008	–0.007	–0.034
	(0.062)	(0.062)	(0.062)	(0.062)	(0.065)	(0.065)	(0.062)
$(S_j - S_k)^2$		–0.232***		–0.246***		–0.235***	–0.246***
		(0.087)		(0.088)		(0.090)	(0.088)
$(S_j - S_k) \times High$			0.357	0.231	–0.303**	–0.377**	0.234
			(0.394)	(0.452)	(0.151)	(0.157)	(0.458)
$(S_j - S_k)^2 \times High$				1.399		–0.173	1.621*
				(0.947)		(0.309)	(0.959)
$(S_j - S_k) \times High \times LI$							–0.031
							(2.430)
$(S_j - S_k)^2 \times High \times LI$							–5.318
							(5.238)
Constant	19.099***	19.159***	19.097***	19.161***	19.107***	19.170***	19.161***
	(0.152)	(0.154)	(0.152)	(0.154)	(0.153)	(0.155)	(0.154)
Observations	65,777	65,777	65,777	65,777	65,777	65,777	65,777
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 a low-income country. All regressions include controls for changes in GDP and population (not reported here).

Source: authors' compilation.

One way to reconcile this finding with the findings of previous studies that 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 exit their offshore investment position altogether, thus foregoing the previously earned additional returns.

5.2 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 3 and 4, 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 2020.

The results are broadly in support of our hypothesis for the case of portfolio investment: large changes in relative secrecy have had a higher impact on the relocation of assets among high-secrecy jurisdictions. In Table 3, 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 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 4), the findings of the long-differences model suggest that over the 2011–20 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 that would be in line with the 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.

[4] Note that for bank deposits there are no triads with the corresponding data on bank deposits with changes in secrecy between 2011 and 2020 in the range 0.4–0.5, and we therefore do not estimate the regression for that group of triads.

Table 3: Results of the long-differences model with portfolio investment as the outcome variable

	(1)	(2)	(3) T_{ijk}: $\Delta S^{j,k}_{19-11} > 0.1$	(4) T_{ijk}: $\Delta S^{j,k}_{19-11} > 0.2$	(5) T_{ijk}: $\Delta S^{j,k}_{19-11} > 0.3$	(6) T_{ijk}: $\Delta S^{j,k}_{19-11} > 0.4$	(7) T_{ijk}: $\Delta S^{j,k}_{19-11} > 0.5$
$(S_j - S_k)$	0.021	0.011	–0.030	0.335**	0.074	–0.110	–0.061
	(0.090)	(0.090)	(0.189)	(0.154)	(0.127)	(0.109)	(0.099)
$(I_j - I_k)$	–0.054	–0.052	–0.023	–0.026	–0.045	–0.056	–0.054
	(0.088)	(0.088)	(0.089)	(0.089)	(0.089)	(0.088)	(0.088)
Distance between capitals	–0.019***	–0.019***	–0.020***	–0.019***	–0.019***	–0.019***	–0.019***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Common language	0.189***	0.191***	0.191***	0.191***	0.191***	0.193***	0.191***
	(0.040)	(0.040)	(0.040)	(0.040)	(0.040)	(0.040)	(0.040)
$(S_j - S_k)^2$		1.137***	6.357***	4.643***	2.049***	1.573***	0.715**
		(0.259)	(0.635)	(0.631)	(0.573)	(0.456)	(0.363)
$(S_j - S_k) \times T_{ijkt} \times High$			0.091	–0.435**	–0.116	0.405**	0.431*
			(0.210)	(0.183)	(0.170)	(0.180)	(0.221)
$(S_j - S_k)^2 \times T_{ijkt} \times High$			–5.757***	–3.739***	–1.017*	–0.637	0.786*
			(0.645)	(0.628)	(0.574)	(0.493)	(0.464)
Constant	19.889***	19.841***	19.820***	19.802***	19.824***	19.830***	19.853***
	(0.019)	(0.022)	(0.022)	(0.023)	(0.024)	(0.024)	(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 2020 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).

Source: authors' compilation.

Table 4: Results of the long-differences model with bank deposits as the outcome variable

	(1)	(2)	(3) T_{ijk}: $\Delta S^{j,k}_{19-11} > 0.1$	(4) T_{ijk}: $\Delta S^{j,k}_{19-11} > 0.2$	(5) T_{ijk}: $\Delta S^{j,k}_{19-11} > 0.3$	(6) T_{ijk}: $\Delta S^{j,k}_{19-11} > 0.5$
$(S_j - S_k)$	1.226***	1.514***	1.196***	1.397***	1.488***	1.539***
	(0.199)	(0.202)	(0.230)	(0.224)	(0.217)	(0.204)
$(I_j - I_k)$	2.062***	2.187***	2.272***	2.231***	2.192***	2.168***
	(0.344)	(0.344)	(0.345)	(0.346)	(0.346)	(0.345)
Distance between capitals	–0.000***	–0.000***	–0.000***	–0.000***	–0.000***	–0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Common language	0.325***	0.318***	0.314***	0.317***	0.318***	0.316***
	(0.104)	(0.104)	(0.104)	(0.104)	(0.104)	(0.104)
$(S_j - S_k)^2$		3.232***	3.510***	3.400***	3.133***	2.911***
		(0.617)	(0.721)	(0.735)	(0.731)	(0.686)
$(S_j - S_k) \times T_{ijkt} \times High$			1.911***	0.987	0.601	–1.156
			(0.558)	(0.666)	(0.703)	(0.728)
$(S_j - S_k)^2 \times T_{ijkt} \times High$			2.342*	1.263	1.383	0.000
			(1.419)	(1.552)	(1.519)	(.)
Constant	20.077***	19.974***	19.973***	19.975***	19.976***	19.983***
	(0.038)	(0.045)	(0.045)	(0.045)	(0.045)	(0.046)
Observations	4,313	4,313	4,313	4,313	4,313	4,313
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 2020 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).

Source: authors' compilation.

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 organizations around the world have worked with increased intensity throughout the past two decades to improve 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 harmonizing 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: (1) only high-secrecy jurisdictions are used for illicit purposes; (2) the effect of changes in secrecy is highly non-linear; and (3) an investor will only relocate their investment if the changes in relative secrecy are large enough. We also hypothesize that the responses 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 2020, approximately 13 per cent 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 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, but 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 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 identities. 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 that tracks the heterogeneous progress in financial transparency achieved during the course of the past decade. In contrast to the 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—that is, 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 ownership 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 pursuit of financial transparency will be crucial to effectively mitigate illicit financial flows facilitated by financial secrecy.

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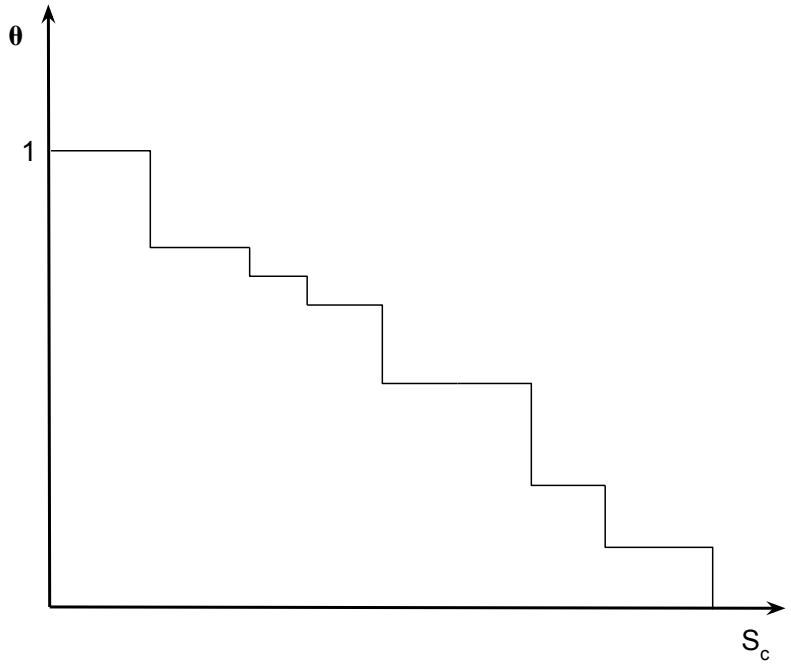
Appendix A: Additional tables and figures

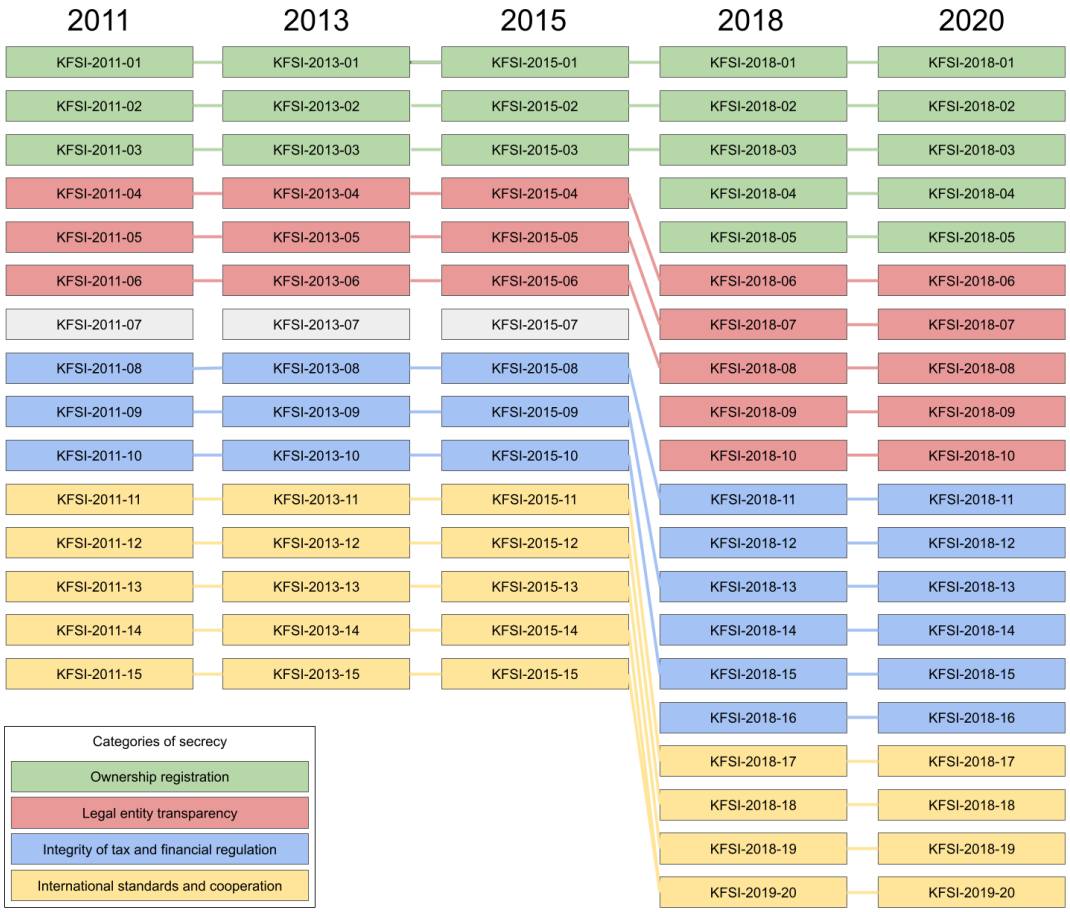
Figure A1: An illustration of the step function $S(\theta)$ of the probability θ that an investor's identity is revealed by domestic authorities



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.

Source: authors' compilation.

Figure A2: Development of individual indicators of financial secrecy that formed the secrecy scores in the 2011–20 editions of the Financial Secrecy Index



Source: authors' compilation.

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

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

Source: authors' compilation.

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

	(1) $High$: $S^{j,k}_{2011} > 1.05$	(2) $High$: $S^{j,k}_{2011} > 1.05$	(3) $High$: $S^{j,k}_{2011} > 1.1$	(4) $High$: $S^{j,k}_{2011} > 1.1$	(5) $High$: $S^{j,k}_{2019} > 1.05$	(6) $High$: $S^{j,k}_{2019} > 1.05$	(7) $High$: $S^{j,k}_{2019} > 1.1$	(8) $High$: $S^{j,k}_{2019} > 1.1$
$(I_j - I_k)$	0.289***	0.285***	0.297***	0.294***	0.307***	0.304***	0.297***	0.294***
	(0.089)	(0.087)	(0.089)	(0.087)	(0.089)	(0.087)	(0.089)	(0.087)
$(S_j - S_k)$	–0.031	–0.032	–0.025	–0.026	0.000	–0.000	–0.025	–0.026
	(0.098)	(0.098)	(0.097)	(0.098)	(0.100)	(0.101)	(0.097)	(0.098)
$(S_j - S_k) \times High$	2.034***	3.466*	1.295***	1.244	–0.768***	–0.807***	0.000	0.000
	(0.200)	(1.846)	(0.381)	(0.971)	(0.185)	(0.154)	(.)	(.)
$(S_j - S_k)^2$		–0.236		–0.232		–0.238		–0.232
		(0.143)		(0.143)		(0.146)		(0.143)
$(S_j - S_k)^2 \times High$		–6.592		0.552		–0.077		0.000
		(8.458)		(4.673)		(0.222)		(.)
Constant	19.098***	19.160***	19.098***	19.159***	19.114***	19.178***	19.099***	19.159***
	(0.202)	(0.205)	(0.202)	(0.205)	(0.203)	(0.205)	(0.202)	(0.205)
Observations	65,777	65,777	65,777	65,777	65,777	65,777	65,777	65,777
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 that 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).

Source: authors' compilation.

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 KFSIs used to calculate secrecy scores. In doing so, we rely on the detailed methodologies published with each Financial Secrecy Index (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 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.

B1 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 secrecy score 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, the 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, the trust and foundations register (KFSI-2020-2), 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—that is, 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 secrecy score 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 that 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.

B2 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 2011–15. In terms of methodology, the indicator questions have gradually become more specific. In 2009, the indicator simply asked a binary question: whether or not access to beneficial ownership information is possible at a fixed cost below US$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 if 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 US$10 rather than for free, while a score of 0.9 was assigned to jurisdictions that 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 that provided the information for a small fee (less than US$10) rather than for free. In 2018, a zero score on this indicator could newly only be obtained by jurisdictions that not only provide the data for free, but 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 that 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 that required an industry-specific CbCR for corporations active in the extractive industries. A score of 0.75 was assigned if annual CbCR was required at least for corporations active either in banking or in the extractive industries, and a score of 0.5 if 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—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 are 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 did not change between 2018 and 2020.

B3 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 secrecy score 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 did not change 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 that use a single uniform personal income tax that taxes worldwide income, with an increasing score for less transparent regimes. The indicator did not change between 2018 and 2020.

The avoids promoting tax evasion indicator (KFSI-2020-13) was introduced in 2011 as the ninth indicator—that is, 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 does 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: (1) openness of court proceedings, lawsuits, and trials; and (2) public online availability of verdicts, judgments, 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 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)—that is, corporate entities that contain a number of cells that 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 datasets related to its international financial, trade, investment, and tax positions.

B4 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 if at least 90 per cent of the 49 FATF recommendations of a jurisdiction's anti-money laundering regime were rated either as 'compliant' or 'largely compliant' and no recommendations 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 at 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 CRS. 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 $max(0; 1 - (number\ of\ active\ treaties/108))$. 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 that 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 as 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, for KFSI-2018-19 to 98, and finally for KFSI-2020-19 to 108. Overall, we assess the indicator as relatively comparable, with the 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 2011–15 editions of the secrecy score and consider the resulting values as largely compatible with KFSI-2018-20 and KFSI-2020-20.