On the Effects of Financial Secrecy

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Abstract

Secrecy jurisdictions allow residents of other countries to hide their identity and thereby escape their home legislation. Recent leaks of documents from offshore legal firms have underlined the harmful effects of financial secrecy in facilitating corruption, tax evasion, and money laundering. Progress towards financial transparency has been recently made on several fronts – most markedly in the areas of automatic information exchange and beneficial ownership registries. In this paper, we use a newly compiled panel dataset of financial secrecy to examine the effects of its heterogeneous development across countries. Using a trilateral setting, we hypothesize that investors will react to the changing landscape of financial secrecy by relocating their assets to jurisdictions that remain, or newly become, more financially secretive relative to other countries. We indeed find evidence of a significant positive effect of a change in relative secrecy on the value of third-country investors' assets. Importantly and in line with our theoretical predictions, we find that the elasticity is higher the higher is the change in relative secrecy, pointing to the heterogeneous benefits that different investors gain from using financial secrecy.

Keywords: offshore finance; financial transparency; financial secrecy; secrecy jurisdictions; tax havens

JEL classification: F36, F65, G28, H26, H87

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1 Introduction

Financial secrecy supplied by secrecy jurisdictions enables individuals and companies to escape their home country's regulations and legislation, thereby undermining the ecosystems in which these agents generate their income and wealth. More specifically, secrecy jurisdictions allow the existence of cross-border illicit financial flows – illegal movements of money or capital related to, among others, corruption, money laundering, tax evasion, tax avoidance, and the financing of terrorism. Recent leaks of confidential documents have provided a glimpse of the world behind the veil of secrecy and highlight the magnitude of use of secrecy jurisdictions for illegal purposes. Tackling financial secrecy – or, in other words, improving financial transparency – has thus recently risen high on the agendas of governments and international organizations. Policy initiatives such as automatic information exchange, beneficial ownership registries, or public country-by-country reporting are now gaining ground around the world, including in jurisdictions that have traditionally served as the most secretive ones.

In this paper, we ask how this recent push for financial transparency in several areas affected real cross-border economic activity. To track the development of financial secrecy, we use a recently compiled panel dataset of financial secrecy compiled by Janský and Palanský (2019) using the five existing editions of the Financial Secrecy Index (FSI) published by the Tax Justice Network. This dataset shows that the progress of financial transparency has been heterogenous across countries – while many countries improved in some areas, others became more secretive. This allows us to investigate the responsiveness of international economic activity to overall improvements in financial transparency. In particular, we are interested in portfolio investment and bank deposits – two variables that together capture most of the cross-border economic activity 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 tax havens and high-secrecy jurisdictions of the world.

There is a broad range of empirical evidence consistent with the notion that international deposits and investments are in part intended to facilitate tax evasion, corruption, and money laundering (Huizinga and Nicodème 2004; Caruana-Galizia and Caruana-Galizia 2016; Desai and Dharmapala 2011; Hemmelgarn and Nicodème 2009; Johannesen 2014; Johannesen and Zucman 2014). Any regulatory arbitrage related to secrecy between country i and a secrecy

jurisdiction j may potentially be exploited by the residents of country i to escape their home legislation. In this paper, we develop a simple 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. In our empirical specification, we use a trilateral setting in which we 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 2017, as measured by an adjusted version of the Financial Secrecy Index which is comparable over time. Our specification thus identifies the elasticity of investors to relocate their assets to countries that remain relatively more secretive. Our model predicts that, since there is a cost to the investor of the relocation and the benefits from investing in a secrecy jurisdiction are heterogeneous across agents, the elasticity will be higher as the change in relative secrecy increases.

We present three main findings. First, using a linear model we do not find significant evidence of an impact of changes in secrecy on the relocation of financial assets. In our model of the investor's locational choice, however, an investor who seeks secrecy does not relocate her assets unless the benefit of relocation exceeds the relocation's costs. In our second result, we thus move from a linear specification to nonlinear models and find robust evidence of the response of investors, which is more pronounced as the change in relative secrecy increases. Using a quadratic specification to capture the non-linearity of the relationship, we estimate that a change in the difference in relative secrecy scores from 10 to 20 per cent of the mean secrecy score between two countries results in a 2.6 % increase in the change in cross-border financial assets, while a change in the difference in relative secrecy scores from 50 to 60 per cent of the mean secrecy score increases the difference in reported foreign financial assets by 23.7 %.

Third, we decompose the secrecy scores into their four categories: (1) ownership registration; (2) legal entity transparency; (3) integrity of the tax and financial regulation; and (4) international standards and cooperation. We find that legal entity transparency affects the relocation of financial assets far more than the remaining three groups, suggesting that the elasticity of corporate investment relocation is more responsive than that of private investment by individuals. This is in line with the notion that, with the advent of automatic information exchange in the recent years, hiding one's identity using corporate structures has become the go-to strategy. The impact of change in secrecy scores in the category of legal entity transparency on the change in cross-border assets is substantial and steeply increasing as the

difference in scores in this category increases. We estimate that the change in the difference in relative secrecy scores for legal entity transparency from 50 to 60 per cent of the mean secrecy score is associated with an increase of 63 per cent in the difference in reported foreign financial assets.

With this paper we contribute to the growing literature on the effects of increased financial transparency. There are studies that focus on individual policies that helped improve financial transparency in various areas. First, in the area of capital income taxation, an example of international coordination towards transparency is the Savings Taxation Directive in the European Union, set up to ensure taxation of foreign interest income of domestic households according to domestic tax rules. Effectively, while not harmonizing the tax rates, 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 income earned by entities whose beneficial owner is an EU resident (Hemmelgarn and Nicodème 2009). However, the evidence on the effects of this policy is mixed – while some studies do find a significant effect in certain settings, others do not, arguing 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% 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 Nicodème (2009) report that the Directive had no measurable effects on the development of different investments that fall under 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.

Second, in the area 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, network of exchange of information upon request 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 caused merely 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, Maydew, and Thornock (2015) detail the widespread practice of round-tripping tax evasion in which 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 (FATCA) and the OECD's Common Reporting Standard (CRS), represents a significant step towards financial transparency. This is supported by recent empirical evidence – for example, Ahrens and Bothner (2019) show that household assets in tax havens decreased by an estimate of 67 per cent following the adoption of FATCA and CRS, and Casi, Spengel, and Stage (2019) find that the CRS induced a reduction of 14% in cross-border deposits parked in offshore locations for tax evasion purposes.

Third, country-by-country reporting (CbCR) requirements have been recently introduced for many multinational corporations (MNCs). MNCs in the extractive sector and banks were the first to report this data, followed by all MNCs with turnover above 750 million EUR that are active in the EU (these reports are, however, not yet publicly available). In the US, the Internal Revenue Service has published data from country-by-country reports of US multinational corporations (MNCs) for the first time in 2018. The existence of profit shifting to tax havens by MNCs has been extensively documented in the economics literature (Janský and Palanský 2019b; Tørsløv, Wier, and Zucman 2018; Clausing 2016; Zucman 2014). However, the effects of this increase in transparency (in the form of country-by-country reporting on economic activity of MNCs) are not clear. Among the first studies to focus on this topic, De Simone and Olbert (2019) find evidence consistent with firms affected by the disclosure mandate reducing ownership in tax haven subsidiaries relative to unaffected firms and thereby increasing transparency in their previously opaque organizational structure. They also observe that affected firms increasingly allocate economic activity to subsidiaries in low-tax European countries rather than offshore tax havens.

In contrast to this literature, in this paper we take 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 investment location decision of investors from third countries. We thereby take into account the changing landscape of global provision 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, there still exist ways and loopholes that enable people to escape regulation by hiding in high-secrecy jurisdictions – however different they may be, geographically or t from those used in the past.

The remainder of this paper is structured as follows. Section 2 outlines the two types of data that we use in the empirical analysis – the dataset on the development of financial secrecy and data on cross-border economic activity. In Section 3, we describe our methodology that identifies the effects of financial transparency. In Section 4 we present out results, and Section 5 concludes.

2 Data

We use two main sources of data in this paper and we use this section to describe them in detail. First, we exploit a recently constructed panel dataset on financial secrecy (Janský and Palanský 2019a) to track the secrecy offered by individual secrecy jurisdictions, relative to other countries and over time. Second, we use data on international economic activity which we hypothesize that is affected by the changing landscape of global provision of financial secrecy.

2.1 Financial secrecy

The dataset on financial secrecy that we use in this paper relies on data from the four editions of the Financial Secrecy Index (FSI). The FSI is a ranking that estimates which jurisdictions most contribute to the global problem of financial secrecy. The Tax Justice Network (TJN), a UK-based non-governmental organization, first published the index in 2009 and has updated it biannually since then. The FSI represents a unique and arguably the most comprehensive source of information on financial secrecy and is available for a large number of countries. The index consists of two parts – secrecy scores (SS) and global scale weights (GSW). The secrecy scores

represent a qualitative measure of financial secrecy – they measure the extent to which each jurisdiction provides opportunities to non-residents to hide behind the veil of secrecy and thus escape their home regulation. The secrecy score of each jurisdiction is calculated as the arithmetic average of a number of the so-called key financial secrecy indicators (KFSIs) with values ranging between 0 (full transparency) and 100 (full secrecy). Each of these KFSIs focuses on a different area of financial secrecy, such as banking secrecy, trusts and foundations registers, recorded company ownership, country-by-country reporting, consistency of personal income tax regime, or automatic information exchange. The individual indicators can be divided into four primary groups, or areas of financial secrecy: 1) ownership registration; 2) legal entity transparency; 3) integrity of the tax and financial regulation; and 4) international standards and cooperation (Tax Justice Network 2018).

The second part of the FSI, the global scale weights, measure the share of each jurisdiction in the global total value of cross-border financial services. The reason the GSW are included in the index is that to measure a country's contribution to global financial secrecy, one needs to combine the regulatory arbitrage opportunities that a country provides with the scale of usage of these opportunities by non-residents – a country that is very secretive does not pose risk to other countries as long as not a lot of people use that secrecy. In this paper we focus on secrecy scores only – and we use them to measure the opportunities offered by each jurisdiction to non-residents to hide their assets and identity.

So far, TJN has published five editions of the FSI: 2009, 2011, 2013, 2015 and 2018. Using these five editions to track the development of secrecy over time poses two main challenges (Janský and Palanský 2019a). First, the number of countries that were assessed by the FSI has increased gradually over time. Therefore, with each edition that we retrospectively use to compare the secrecy scores over time, we lose from our sample the countries that had not been assessed in the preceding edition of the FSI. In this paper we use the four latest editions (and we explain the reasons for omitting the 2009 edition below), i.e. starting with the one published in 2011, which brings our sample to 71 secrecy jurisdictions.

The second challenge when combining secrecy scores from individual editions of the FSI is that the methodology used to construct them has evolved over time. The methodological changes can be grouped into two types: first, some KFSIs used to construct the SS have been dropped and others added. While the three editions published between 2011 and 2015 had 15

indicators, for the 2018 edition, two KFSIs were dropped and 7 new ones added. Janský and Palanský (2019a) report that the new indicators were on average stricter than the existing ones, increasing the average SS in 2018 as compared to 2015. Second, the definition of some of the existing indicators has also evolved over time to reflect newly arising challenges and developments. The change of this type is particularly large between the editions 2009 and 2011, which is why we only use the editions 2011-2018 in this paper.

The methodological changes of both these types reflect the notion that over time, the standard of what we consider transparent increases. It would thus not make sense to subject jurisdictions to criteria that don't evolve in time accordingly. However, this poses an empirical challenge in comparing the secrecy scores over time. One way to deal with this challenge which was proposed by Janský and Palanský (2019a) and which we build on in this paper is to use relative measures of secrecy. In particular, we use the ratio of each jurisdiction i's SS to the sample mean in each edition t of the SS:

$$SSRel_{it} = \frac{SS_{it}}{\frac{\sum_{i=1}^{N} SS_{it}}{N}}$$

where N is the number of jurisdictions in the sample. In this paper, we construct these relative secrecy scores for the sample of 71 countries for which there is available data from the editions 2011-2018.

2.2 Cross-border financial assets

To study the effects of financial secrecy, we rely on two data sources which provide bilateral data on cross-border financial assets. The first data source is the Locational banking statistics (LBS) from the Bank for International Settlements (BIS), which capture international banking activity from a residence perspective, focusing on the location of the banking office. The data provide information about the outstanding financial assets and liabilities of internationally active banks located in 47 reporting countries against counterparties from more than 200 countries. The bilateral data enables us to observe, for example, the financial assets and liabilities held by all French residents in all active banks in Luxembourg.

The statistics published by the BIS are a unique source of information about the activity in the global financial system and are widely used in international economics. In particular, as

mention above, a number of studies focusing on cross-border tax evasion explore the effects of increased transparency using the BIS LBS (Johannesen and Zucman 2014; Ahrens and Bothner 2019; Casi, Spengel, and Stage 2019). The coverage of the data is extensive – as of 2016, the LBS has covered approximately 93% of all cross-border banking activities.[2] We use annual data on non-bank's bank deposits from 2011 to 2017 to match the data availability of financial secrecy scores.

Johannesen and Zucman (2014) pointed out several drawbacks of BIS locational banking statistics. Regarding our subject of research, at least three limitations of this data are important. First, the LBS data are based on immediate, rather than beneficial, ownership. Thus, we might associate the impact of a change in SS between two different countries with a change in financial assets held in these two countries by residents of a third country, while it could be caused by a change in SS of this third country relative to another one. Second, the BIS data include only bank deposits and debentures, and disregard other substantive forms of capital, such as portfolio securities. Third, the BIS data lack statistics on some very secretive jurisdictions.

Our second source of data is the Coordinated Portfolio Investment Survey (CPIS) conducted by the International Monetary Fund (IMF) across a wide range of economies. This data overcomes some of the limitations of the BIS data. The CPIS represents a unique tool in capturing the world's total and the geographical distribution of the holdings of portfolio investment assets. The survey is conducted simultaneously by all voluntarily participating economies, uses consistent definitions, and encourages best practices in data collection. The primary purpose of the CPIS is to improve the quality of portfolio investment statistics in the international investment position and thus to contribute to a better understanding of capital flows (IMF 2018). The CPIS data contains yearly bilateral data on holdings of portfolio investment assets in the form of equity and investment fund shares, long-term debt securities, and short-term debt securities. Thus, comparing to BIS data, the CPIS data also cover other forms of capital than bank deposits and debentures. Another advantage of CPIS data is its

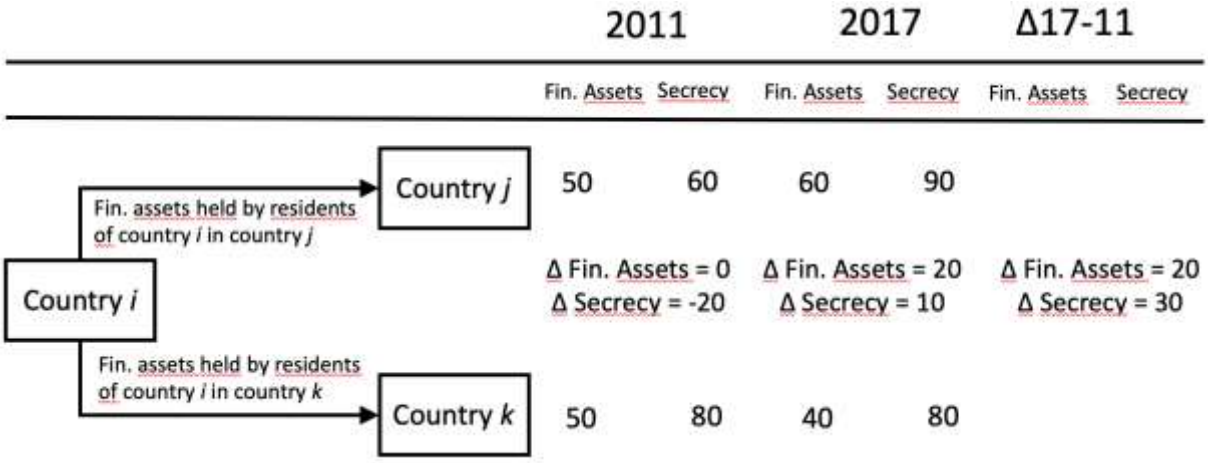
[2] https://www.bis.org/statistics/about_banking_stats.htm

superior country coverage. Over 80 reporting economies provide information on cross-border investment positions in over 220 counterpart countries.

3 Methodology

Our central hypothesis in this paper stands on the notion that when a country becomes more transparent – i.e., a jurisdiction gives up some of its financial secrecy – such change will negatively impact the volume of financial assets held by foreigners in that country. This concept is based on a simple model of an asset holder from country *i* facing a locational decision for her financial assets, taking into account possible benefits from using financial secrecy offered by secrecy jurisdictions. Any regulatory arbitrage related to secrecy between country i and a secrecy jurisdiction j may potentially be exploited by residents of country i to escape home legislation. In our empirical specification, we use a trilateral setting. We track the cross-border 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 years 2011 and 2017, as measured by the secrecy scores of the Financial Secrecy Index.

Figure 1: Scheme of the trilateral analysis



Source: Authors.

To apply the trilateral approach, we expand the data from a bilateral basis to a trilateral one. Following **Error! Reference source not found.**, we first calculate the difference between cross-border financial assets in countries j and k held by residents of jurisdiction i in year 2011 and then in 2017. Second, we calculate the change between the differences in the two time

periods. The same applies to secrecy scores with a minor simplification – the SS of country j and k are independent of country i. We thus calculate the differences between SS in two countries in both time periods (2011 and 2017), and then we calculate the difference between the differences in these two periods.

The double difference is given by comparing time and place, which allows for controlling for more factors that could bias the average effect of the relative change in financial secrecy. Essentially, such an approach comes from difference-in-difference estimation, which is one of the most fundamental identification methods in applied economics (Bertrand, Duflo, and Mullainathan 2004; Athey and Imbens 2006). Let the true equation to be estimated be as follows:

$$lnA_{(int)} = \alpha + \beta * SSRel_{(nt)} + \gamma * \chi_{(\mathrm{nt})} + \epsilon_{\mathrm{int}}, \quad (1)$$

where $lnA_{(int)}$ stands for a logarithm of the volume of cross-border financial assets between residence country i and a receiving country n at time t; $SSRel_{(nt)}$ is the relative secrecy score of country n at time t. Country-level controls, $\chi_{(\mathrm{nt})}$, are GDP, population and an average of the available World Governance Indicators.

We set Δ to be the difference operator. By differencing out in space (by countries) and time we get following equation:

$$\ln \Delta_{nt} A_{int} = \alpha + \beta \Delta_{nt} * SSRel_{(nt)} + \gamma \Delta_{nt} * \chi_{(\mathrm{nt})} + \epsilon_{\mathrm{int}}, \quad (2)$$

where $t \in \{2017, 2011\}$ and $n \in \{i, j\}$, $i \neq j$. Spelling out the difference operators in Eq. (2) yields:

$$ln\left[\left(A_{ij2017} - A_{ik2017}\right) - \left(A_{ij2011} - A_{ik2011}\right)\right] = \alpha + \beta * \left[\left(SSRel_{j2017} - SSRel_{k2017}\right) - \left(SSRel_{j2011} - SSRel_{k2011}\right)\right] + \gamma\left[\left(\chi_{j2017} - \chi_{k2017}\right) - \left(\chi_{j2011} - \chi_{k2011}\right)\right] \quad (3)$$

This specification identifies the investors' semi-elasticity to relocate their assets to countries that remain most secretive or have become more secretive relative to other countries. However, we hypothesize that there are nonlinearities in the elasticity of reported cross-border financial assets with respect to secrecy. The nonlinearity arises because the benefit of relocating financial assets from one secrecy jurisdiction to another is higher if the country provides greater secrecy relative to other countries. Since there is a cost to the investor of the relocation of her assets, we hypothesize that her elasticity to relocate will be higher as the change in relative secrecy

increases. Similarly to Dowd, Landefeld, and Moore (2017), we first account for this non-linear relationship by including dummy variables for the size of the difference in relative SS and their interactions with the real change in relative secrecy scores. Our discontinuous specification thus takes the following form:

$$ln\Delta_{17-11}(\mathrm{A_{ij}} - \mathrm{A_{ik}}) = \alpha + \beta_1 * \Delta_{17-11}(\mathrm{SSRel_j} - \mathrm{SSRel_k}) + \beta_2 \mathrm{D_{ija}} + \beta_3 \mathrm{D_{ija}} * \Delta_{17-11}(\mathrm{SSRel_j} - \mathrm{SSRel_k}) + \gamma \Delta_{17-11}(\chi_j - \chi_k) \quad (4)$$

where D_{ija} is a dummy variable equal to one if the change in relative secrecy scores between jurisdictions j and k and years 2017 and 2011 is higher than $a > 0$, and zero otherwise. We let a vary to examine the shape of the elasticity.

Second, we estimate a continuous nonlinear functional form by including a quadratic term for the main dependent variable. This specification allows for capturing the increasing marginal effect of change in relative SS. In this approach we estimate the following model:

$$ln\Delta_{17-11}(\mathrm{A_{ij}} - \mathrm{A_{ik}}) = \alpha + \beta_1 * \Delta_{17-11}(\mathrm{SSRel_j} - \mathrm{SSRel_k}) + \beta_2 * [\Delta_{17-11}(SSRel_j - SSRel_k)]^2 + \gamma \Delta_{17-11}(\chi_j - \chi_k) \quad (5)$$

The quadratic term allows for taking into account the possible curvature in the relationship between the change in reported cross-border financial assets and the change in relative secrecy scores. In Eq. (5), β_1 and β_2 are the parameters of interest, and we expect β_2 to be positive to indicate that there is an increasing marginal effect of change in relative secrecy on cross-border financial assets. We assume that β_1 might take both negative and positive values.

4 Results

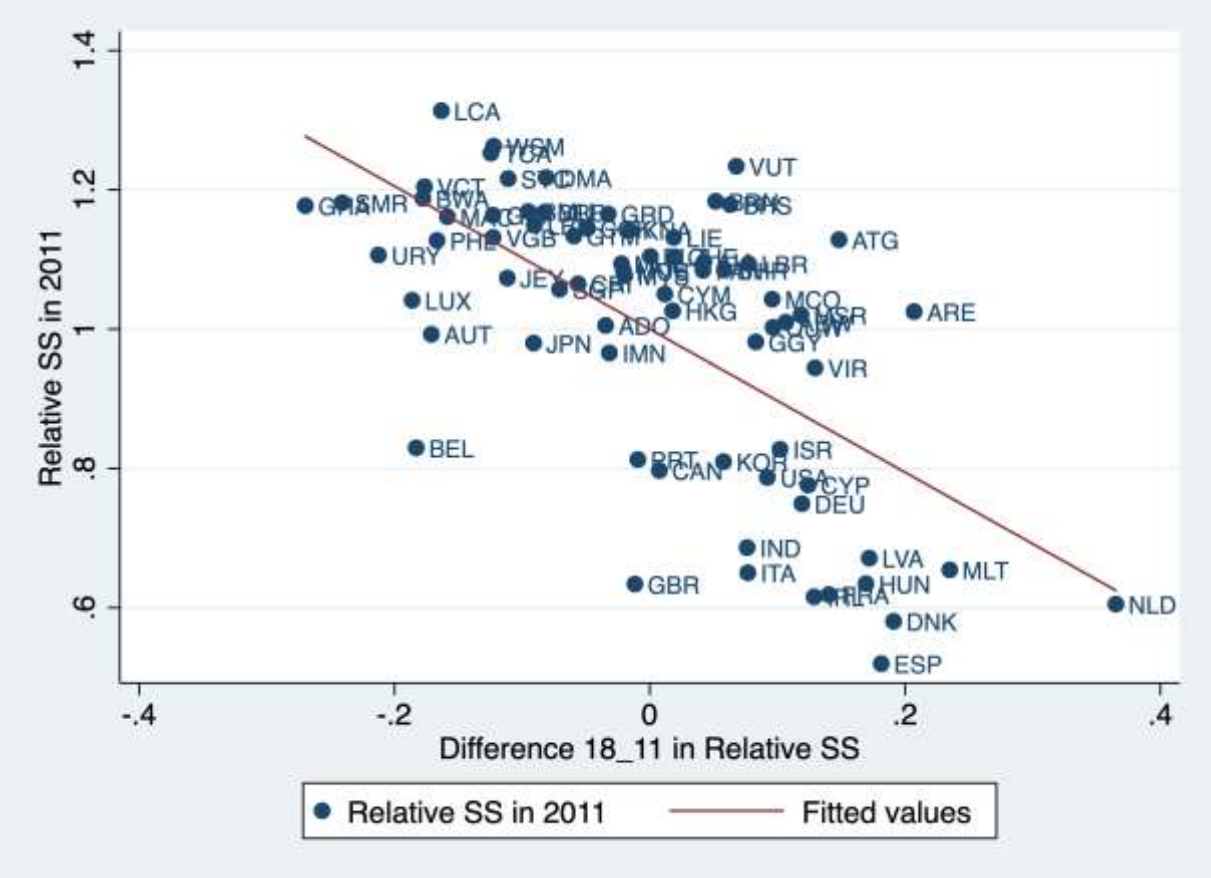
In this section, we first present descriptive results which provide suggestive evidence of a significant relationship between financial secrecy and financial assets held by foreigners. Then,

we present results of the trilateral analysis which answer our main research question: What is the effect of changes in financial secrecy on cross-border financial assets?

4.1 Descriptive results

Error! Reference source not found. shows the development of relative secrecy scores between the years 2011 and 2018. More precisely, the figure depicts how the relative SS in 2011 is related to the change in SS between 2011 and 2018. The negative correlation indicates that, in general, countries with a higher level of secrecy in 2011 contributed less to the overall improvement in financial transparency. Many high-secretive jurisdictions even intensified their financial secrecy relatively to other countries over the 2011-2018 period.

Figure 2: Development of financial secrecy



Source: Authors; data from FSI (Janský and Palanský, 2019)

Error! Reference source not found. shows the top 15 countries in terms of the Inward assets/GDP ratio. Most of these countries report a disproportionate amount of inward foreign financial assets relative to the size of their economy. Most of these countries are notoriously

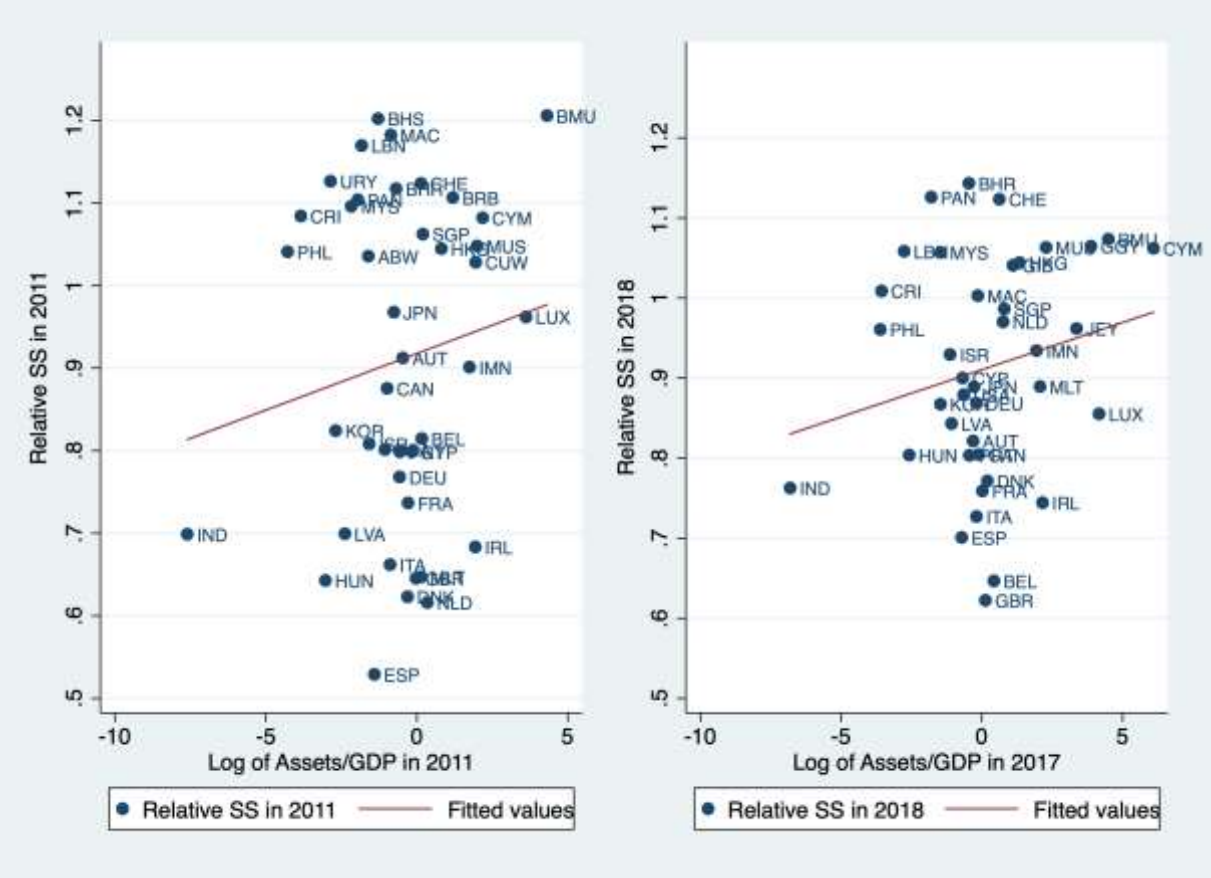
known for providing favorable business conditions, and many of these jurisdictions are among the most prominent tax havens. We aim to reveal how significant is the role that financial secrecy plays in such excessive allocation of financial assets.

Table 1: CPIS Inward assets/GDP Ratio

	2011		2017	
	Country	Ratio (Inward assets/GDP)	Country	Ratio (Inward assets/GDP)
1	Bermuda	7 450%	Cayman Islands	44 496%
2	Luxembourg	3 718%	Bermuda	8 956%
3	Cayman Islands	883%	Luxembourg	6 443%
4	Mauritius	735%	Guernsey	4 816%
5	Curacao	703%	Jersey	2 888%
6	Ireland	692%	Mauritius	979%
7	Isle of Man	572%	Ireland	864%
8	Barbados	328%	Malta	787%
9	Hong Kong	225%	Isle of Man	694%
10	Netherlands	142%	Hong Kong	382%
11	Singapore	122%	Gibraltar	302%
12	Belgium	118%	Singapore	222%
13	Switzerland	114%	Netherlands	212%
14	Malta	114%	Switzerland	186%
15	United Kingdom	97%	Belgium	153%

The two scatter plots below show the relationship between the relative SS and the natural logarithm of inward assets relative to GDP. In both figures, we observe a similar positive but insignificant correlation between these two measures. **Error! Reference source not found.** indicates that some countries with high secrecy scores such as Bermuda, Cayman Islands, Mauritius, Curacao, or Guernsey are associated with excessive amounts of foreign financial assets relative to the size of their economies. However, other rather low-secretive jurisdictions such as Luxemburg or Ireland also attract large amounts of households and companies from abroad to hold their financial assets there.

Figure 3: Relative Secrecy Scores and Financial Assets relative to GDP in 2011 and in 2017.



Source: Authors; data on SS from FSI; data on cross-border financial assets from CPIS (IMF) and data on GDP from World Bank and CIA.

Nevertheless, these results are only descriptive, and even though they might paint a nice picture that the allocation of foreign financial assets is allocated suspiciously and disproportionately, we cannot draw any accurate conclusions based on these findings. To thoroughly study the effects of financial secrecy, we move to regression-based analysis.

4.2 Portfolio assets

We now report the results from our double-difference estimations. First, we present the results for regressions in which the dependent variable is based on cross-border portfolio assets sourced from the IMF's CPIS. **Error! Reference source not found.** presents results from a semi-log specification given by Eq. (3). While in column (1), the estimated parameter is positive and significant, as we add more control variables, the estimate becomes negative and insignificant

until we add the last control variable, population, where the estimate has the opposite sign than we would expect. This result suggests that when country j becomes more secretive relative to country k, the volume of cross-border assets in country j may relatively decrease to those in country k. This may be caused by the fact that for many observations, the changes in relative SS are marginal (see Table 16 in Appendix). Looking at the estimated coefficients for GDP (in billions of USD) and population (in millions), they appear to have the expected sign and a rather small effect on the change in cross-border financial assets. The negative sign of the estimate for an average of WGI may seem surprising at first. However, it is essential to keep in mind that all control variables are also captured as changes between two countries and between two periods, which makes the interpretation of these coefficients quite complex.

Table 2: CPIS Assets - Results of the linear model

	(1)	(2)	(3)	(4)
VARIABLES			$\Delta_{17-11}(A_{ij} - A_{ik})$	
dif 18-11(SSRel j-SSRel k)	0.244***	-0.0175	-0.122	-0.207***
	(0.0682)	(0.0677)	(0.0743)	(0.0761)
dif 17-2011(GDP j-GDP k)		0.000624***	0.000602***	0.000584***
		(1.50e-05)	(1.59e-05)	(1.69e-05)
dif 17-11(WGI j-WGI k)			-0.114*	-0.239***
			(0.0670)	(0.0739)
dif 17-2011(Pop j-Pop k)				0.00250***
				(0.000821)
Constant	19.69***	19.63***	19.75***	19.77***
	(0.0124)	(0.0124)	(0.0139)	(0.0143)
Observations	72,452	72,452	58,149	54,833
R-squared	0.000	0.024	0.024	0.025

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Source: Authors.

The results in **Error! Reference source not found.** restrict only to a linear relationship between changes in relative SS and changes in foreign financial assets. However, the assumption about the linearity of the relationship might be misleading if we assume that there are some fixed costs related to relocation financial assets or if we suppose that benefits from having financial assets are greater as the secrecy in these countries increases. We hypothesize that investors would not move their assets unless the benefit of relocation exceeds a certain threshold related to the relocation's costs.

To further study this hypothesis, we move from a linear specification to a discontinuous model with binary variables, as presented in Eq. (4). In this model, we allow the level of responsiveness of change in assets to vary with the size of the change in relative SS. We test

the responsiveness to 5 different sizes of change, starting with binary Dummy 1 which takes the value of 1 in case the difference over time in relative SS between countries *j* and *k* exceeds 0.1 and at the same time the SS in 2011 was above the sample mean for at least on of the countries *j* and *k*. Dummies 2 - 5 are set in the same way, but the change in relative SS is greater than 0.2 – 0.5, respectively. Table 3 presents the results of the discontinuous model. In column (1), we present the linear model for comparison, and columns (2) – (6) contain results for regressions with specific dummy variables and their interactions with the variable for change in relative SS. The point estimates for change in relative SS remain negative. However, the interactions between dummies and the change in relative SS is positive and significant. Moreover, the bigger the size of the change in SS represented by dummies, the higher the impact on the shift in cross-border assets. These findings confirm our hypothesis that a linear approximation of the studied relationship is not accurate.

Table 3: CPIS Assets – Discontinuous model with dummy variables

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	$\Delta_{17-11}(A_{ij} - A_{ik})$					
dif_18-11(SSRel_j-SSRel_k)	-0.207***	-0.677***	-0.462***	-0.399***	-0.329***	-0.252***
	(0.0761)	(0.167)	(0.124)	(0.0959)	(0.0820)	(0.0781)
Dummy_01		-0.288***				
		(0.0283)				
dif_18-11(SSRel_j-SSRel_k)*D01		0.665***				
		(0.187)				
dif_17-11(GDP_j-GDP_k)	0.000584***	0.000581***	0.000585***	0.000588***	0.000588***	0.000586***
	(1.69e-05)	(1.69e-05)	(1.69e-05)	(1.69e-05)	(1.69e-05)	(1.69e-05)
dif_17-11(WGI_j-WGI_k)	-0.239***	-0.250***	-0.247***	-0.240***	-0.243***	-0.240***
	(0.0739)	(0.0738)	(0.0739)	(0.0739)	(0.0739)	(0.0739)
dif_17-11(Pop_j-Pop_k)	0.00250***	0.00251***	0.00252***	0.00258***	0.00260***	0.00256***
	(0.000821)	(0.000821)	(0.000821)	(0.000822)	(0.000822)	(0.000821)
Dummy_02			-0.0730**			
			(0.0334)			
dif_18-11(SSRel_j-SSRel_k)*D02			0.427***			
			(0.157)			
Dummy_03				0.177***		
				(0.0499)		
dif_18-11(SSRel_j-SSRel_k)*D03				0.473***		
				(0.158)		
Dummy_04					0.389***	
					(0.0989)	
dif_18-11(SSRel_j-SSRel_k)*D04					0.758***	
					(0.223)	
Dummy_05						1.276***
						(0.186)
dif_18-11(SSRel_j-SSRel_k)*D05						0.786**
						(0.342)
Constant	19.77***	19.91***	19.79***	19.75***	19.76***	19.76***
	(0.0143)	(0.0201)	(0.0164)	(0.0150)	(0.0145)	(0.0144)
Observations	54,833	54,833	54,833	54,833	54,833	54,833
R-squared	0.025	0.027	0.025	0.025	0.025	0.026

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Source: Authors.

The discontinuous model allows for different slope of the relationship as changes in relative SS increase. However, the choice of dummies in the model is somewhat arbitrary, and thus we move to a non-linear continuous model with the quadratic term for the variable of interest. Table 4 shows this specification with column (5) containing results, including all control variables. The coefficients for controls remain mostly unchanged comparing to previous models (column (4) in **Error! Reference source not found.** and column (2-6) in Table 3).

Table 4: CPIS Assets – Non-linear continuous model with quadratic specification

	(1)	(2)	(3)	(4)	(5)
VARIABLES			$\Delta_{17-11}(A_{ij} - A_{ik})$		
dif_18-11(SSRel_j-SSRel_k)	0.244***	0.186***	-0.0880	-0.181**	-0.264***
	(0.0682)	(0.0684)	(0.0679)	(0.0745)	(0.0763)
dif_18-11(SSRel_j-SSRel_k)^2		2.945***	3.391***	2.781***	2.632***
		(0.275)	(0.272)	(0.292)	(0.297)
dif_17-11(GDP_j-GDP_k)			0.000631***	0.000609***	0.000590***
			(1.50e-05)	(1.59e-05)	(1.69e-05)
dif_17-11(WGI_j-WGI_k)				-0.0956	-0.225***
				(0.0670)	(0.0738)
dif_17-11(Pop_j-Pop_k)					0.00255***
					(0.000821)
Constant	19.69***	19.59***	19.52***	19.66***	19.68***
	(0.0124)	(0.0154)	(0.0153)	(0.0173)	(0.0177)
Observations	72,452	72,452	72,452	58,149	54,833
R-squared	0.000	0.002	0.026	0.026	0.026

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Source: Authors.

All coefficients are significant at the 1 % level, with the two coefficients of interest having opposite signs. While the coefficient on change in relative SS is negative and rather small (-0.264), the coefficient on its quadratic term shows to be positive and about ten times larger (2.634). These results imply that when the change in relative SS is marginal, the effect on change in foreign financial assets is minimal but negative. However, at some point, the effect becomes positive, and the more substantial the change, the higher the effect. The quadratic shape means that the semi-elasticity of change in cross-border assets with respect to change in relative SS is increasing as the difference in SS increases. Based on Eq. (5), we calculate the turning point at which the effect becomes positive as followed:

$$\left|\frac{\beta_1}{2\beta_2}\right| = \left|\frac{-0.264}{2x2.632}\right| = 0.05 \quad (6)$$

Therefore, when the change in relative SS exceeds this value, the effect on the change in cross-border assets is positive. Table 5 shows how the percentage changes in $\Delta_{17-11}(A_{ij} - A_{ik})$ vary with the magnitude of change in relative secrecy scores. While when the change in relative SS goes from 0.1 to 0.2, the financial assets in country *j* increase only by 2.6 % relative to country k, a change from 0.5 to 0.6 results in a 23.7 % increase.

Table 5: Marginal effect of change in difference in relative SS by 0.1 on change in foreign financial assets

Change in $\Delta_{17-11}(SSRel_j - SSRel_k)$ by 0.1	Percentage change in $\Delta_{17-11}(A_{ij} - A_{ik})$
From -0.5 to -0.4	-29.0%
From -0.4 to -0.3	-23.7%
From -0.3 to -0.2	-18.4%
From -0.2 to -0.1	-13.2%
From -0.1 to 0	-7.9%
From 0 to - 0.1	-2.6%
From 0.1 to 0.2	2.6%
From 0.2 to 0.3	7.9%
From 0.3 to 0.4	13.2%
From 0.4 to 0.5	18.4%
From 0.5 to 0.6	23.7%
From 0.6 to 0.7	28.9%

Source: Authors.

These results suggest that the linear approximation underestimates the sensitivity of cross-border financial assets to secrecy when the changes in SS become larger. The quadratic specification allows for more heterogeneity and shows that financial secrecy indeed plays a substantial role in the relocation of foreign financial assets.

To further explore the relationship of foreign financial assets and secrecy, we run regressions with the relative secrecy scores decomposed into the four major groups (1) ownership registration; (2) legal entity transparency; (3) integrity of the tax and financial regulation; and (4) international standards and cooperation. The decomposition into four subcategories allows for identifying which type of secrecy plays the most crucial role. Table 6 reveals the results. Columns (1) and (2) provide results for linear approximation, and columns (2) – (6) show the sensitivity analysis for the non-linear model. The quadratic specification again allows for

heterogeneity in the responsiveness to the changes of different sizes. The estimates for control variables remain somewhat unchanged. However, the coefficients of interest vary substantially. In column (1), the forecasts for changes in SS groups 1, 3, and 4 are positive and significant, while in column (2), which includes all control variables, the coefficients for groups 2, 3, and 4 show to be negative. Nevertheless, we will not pay much attention to the linear model, as we suggested that its approximation is incorrect. We will focus on column (6), which reveals results for quadratic specifications and includes all control variables.

Table 6: CPIS Assets – Non-linear continuous for separate groups of SS

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES			$\Delta_{17-11}(A_{ij} - A_{ik})$			
dif_18-11(SSg1Rel_j-SSg1Rel_k)	0.233***	0.153**	0.458***	0.316***	0.462***	0.390***
	(0.0507)	(0.0616)	(0.0513)	(0.0508)	(0.0575)	(0.0621)
dif_18-11(SSg1Rel_j-SSg1Rel_k)^2			-1.830***	-1.853***	-1.925***	-1.924***
			(0.123)	(0.121)	(0.131)	(0.133)
dif_18-11(SSg2Rel_j-SSg2Rel_k)	0.598***	-0.276***	0.785***	-0.0158	-0.146	-0.120
	(0.0904)	(0.103)	(0.0897)	(0.0909)	(0.0985)	(0.103)
dif_18-11(SSg2Rel_j-SSg2Rel_k)^2			11.04***	9.160***	8.098***	7.993***
			(0.372)	(0.371)	(0.391)	(0.395)
dif_18-11(SSg3Rel_j-SSg3Rel_k)	-0.0445	-0.145***	-0.0691*	-0.0382	-0.163***	-0.155***
	(0.0357)	(0.0392)	(0.0355)	(0.0351)	(0.0383)	(0.0389)
dif_18-11(SSg3Rel_j-SSg3Rel_k)^2			0.641***	0.811***	0.718***	0.698***
			(0.0585)	(0.0580)	(0.0624)	(0.0632)
dif_18-11(SSg4Rel_j-SSg4Rel_k)	0.108***	-0.148***	0.0684***	-0.119***	-0.152***	-0.196***
	(0.0194)	(0.0230)	(0.0194)	(0.0197)	(0.0220)	(0.0231)
dif_18-11(SSg4Rel_j-SSg4Rel_k)^2			-0.126***	-0.230***	-0.240***	-0.273***
			(0.0189)	(0.0188)	(0.0212)	(0.0223)
dif_17-2011(GDP_j-GDP_k)		0.000623***		0.000639***	0.000622***	0.000614***
		(1.83e-05)		(1.59e-05)	(1.69e-05)	(1.84e-05)
dif_17-11(WGI_j-WGI_k)		-0.301***			-0.157**	-0.298***
		(0.0753)			(0.0677)	(0.0746)
dif_17-2011(Pop_j-Pop_k)		0.000627				0.00189**
		(0.000907)				(0.000902)
Constant	19.69***	19.76***	19.52***	19.51***	19.65***	19.68***
	(0.0125)	(0.0144)	(0.0202)	(0.0200)	(0.0229)	(0.0236)
Observations	72,452	54,833	72,452	72,452	58,149	54,833
R-squared	0.001	0.026	0.024	0.045	0.045	0.047

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Source: Authors

Table 7 summarizes the most relevant results of the regression in column (6), showing the marginal effect of change in the difference in relative SS for each subgroup by 0.1 on change in foreign financial assets. As it turns out, the secrecy scores in category Legal entity transparency affect the relocation of financial assets far more than the remaining three groups. The impact of change in SS in this subgroup on change in cross-border assets reveals to be substantial. Moreover, the semi-elasticity of this relationship increases as the difference in SS for Legal entity transparency increases.

Table 7: Marginal effect of change in difference in relative SS for each group by 0.1

Change by 0.1 in:	Percentage change in $\Delta_{17-11}(A_{ij} - A_{ik})$			
	Ownership registration	Legal entity transparency	Integrity of the tax and fin. regulation	International standards and cooperation
From -0.5 to -0.4	23%	-81%	-9%	1%
From -0.4 to -0.3	19%	-65%	-7%	0%
From -0.3 to -0.2	15%	-49%	-6%	0%
From -0.2 to -0.1	12%	-33%	-4%	-1%
From -0.1 to 0	8%	-17%	-3%	-1%
From 0 to - 0.1	4%	-1%	-2%	-2%
From 0.1 to 0.2	0%	15%	0%	-3%
From 0.2 to 0.3	-4%	31%	1%	-3%
From 0.3 to 0.4	-8%	47%	3%	-4%
From 0.4 to 0.5	-11%	63%	4%	-4%
From 0.5 to 0.6	-15%	79%	5%	-5%
From 0.6 to 0.7	-19%	95%	7%	-5%

Source: Authors.

4.3 Bank deposits

In this section, we briefly present the principal results for BIS data. We emphasize that the coverage of these data is way lower comparing to CPIS data (only 30 % in terms of the number of observations) and that we believe that CPIS data are more appropriate for studying the effects of financial secrecy. The models are designed in the same way as the ones for CPIS assets. The only difference is thus that the dependent variable is now the change in cross-border claims.

Table 8: BIS Claims - Non-linear continuous model with quadratic specification

	(1)	(2)	(3)	(4)	(5)
VARIABLES	$\Delta_{17-11}(C_{ij} - C_{ik})$				
dif_18-11(SSRel_j-SSRel_k)	-0.834***	-0.827***	-0.944***	-0.930***	-0.944***
	(0.0929)	(0.0929)	(0.0930)	(0.0993)	(0.102)
dif_18-11(SSRel_j-SSRel_k)^2		1.132***	1.177***	0.855**	0.830**
		(0.365)	(0.364)	(0.383)	(0.393)
dif_17-2011(GDP_j-GDP_k)			0.000241***	0.000241***	0.000262***
			(1.94e-05)	(2.03e-05)	(2.17e-05)
dif_17-11(WGI_j-WGI_k)				-0.436***	-0.371***
				(0.105)	(0.112)
dif_17-2011(Pop_j-Pop_k)					-0.00298***
					(0.00105)
Constant	6.526***	6.488***	6.475***	6.543***	6.525***
	(0.0172)	(0.0212)	(0.0212)	(0.0230)	(0.0237)
Observations	19,172	19,172	19,172	16,544	15,920
R-squared	0.004	0.005	0.013	0.013	0.014

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 8 provides results for a quadratic specification with column (5) showing the estimates for regression with all control variables. The estimates for change in GDP and WGI have the same sing and are of similar magnitude as in the non-linear model for CPIS assets. However, the

change in population has a negative but minimal effect on change in cross-border claims. Both coefficients of interest have the same signs as in the non-linear model for foreign assets. However, their magnitudes are significantly different. Table 9 summaries the most relevant results and shows that the change in relative SS has a positive effect on change in cross-border financial assets only when the difference in SS is very high. Otherwise, the impact is negative.

Table 9: Marginal effect of change in difference in relative SS by 0.1 on change in cross-border claims

Change in $\Delta_{17-11}(\mathrm{SSRel_j} - \mathrm{SSRel_k})$ by 0.1	Percentage change in $\Delta_{17-11}(C_{\mathrm{ij}} - C_{\mathrm{ik}})$
From -0.5 to -0.4	-18%
From -0.4 to -0.3	-16%
From -0.3 to -0.2	-14%
From -0.2 to -0.1	-13%
From -0.1 to 0	-11%
From 0 to - 0.1	-9%
From 0.1 to 0.2	-8%
From 0.2 to 0.3	-6%
From 0.3 to 0.4	-4%
From 0.4 to 0.5	-3%
From 0.5 to 0.6	-1%
From 0.6 to 0.7	1%

Source: Authors.

The difference between results for CPIS assets and BIS claims may be mainly caused by the fact that the availability of BIS data is somewhat limited. Therefore, we lose about 70 % of observations, and many smaller countries that reach high secrecy scores are thus excluded from the analysis. Comparing summary statistics for models including CPIS and BIS data, the mean of the change in GDP for CPIS data reveals to be three times larger (116.9 bil. USD) than for BIS data (40.2 bil. USD) which further confirms our assumption.

The results for the linear model, the discontinuous model with dummy variables, and the quadratic specification with decomposed secrecy score into four subcategories as well as summary statistics are available in the Appendix. Here, we will only underline one major point. When running a regression with the variables representing the subcategories of secrecy scores, the changes in Legal entity transparency have positive and the most significant impact on the changes in cross-border claims. The effect is substantial and gets more significant as the size of

the difference in SS for this category increases. This finding is in line with the results for CPIS assets.

5 Conclusion

Secrecy jurisdictions allow the residents of other countries to invest their assets without their home authorities to know about it. This enables many of them to hide proceeds of corruption, launder money, and avoid taxation. Following the financial crisis, governments and international organizations around the world have worked together to increase financial transparency in tax havens, and in many areas, significant progress has been achieved. In this paper we ask how these improvements translated into real cross-border economic activity. To answer this research question, we exploit a recently constructed panel dataset on financial secrecy which is based on the five existing editions of the Financial Secrecy Index, published biannually by the Tax Justice Network.

We find that when estimating the linear model, we do not find any substantial evidence about the impact of secrecy scores on the relocation of financial assets. However, we hypothesize that investors seeking secrecy would not move their assets unless the benefit of relocation exceeds a certain threshold related to relocation's costs. Thus, we move from linear specification to nonlinear models and find striking evidence that individuals and companies respond much more aggressively when the change in secrecy scores is substantial. Using a quadratic specification to capture the non-linearities, we estimate that a change in the difference in relative secrecy scores from 0.1 to 0.2 results in a 2.6 % increase in change in cross-border financial assets. However, we estimate that the change in the difference in relative secrecy scores from 0.5 to 0.6 would increase the difference in reported foreign financial assets by 23.7 %. Finally, we decompose the relative secrecy scores into the four major groups 1) ownership registration; 2) legal entity transparency; 3) integrity of the tax and financial regulation, and 4) international standards and cooperation. We find that legal entity transparency affects the relocation of financial assets far more than the remaining three groups. The impact of change in secrecy scores in this subgroup on change in cross-border assets is substantial and steeply increasing as the difference in scores in this category gets larger. We estimate that the change in the difference

in relative secrecy scores for legal entity transparency from 0.5 to 0.6 would increase the difference in reported foreign financial assets by 63 %.

With this paper we contribute to the emerging body of literature on the effects of financial transparency on international economic activity. While a number of existing studies focus on the effects of specific policies that were implemented over the recent years, we instead take into account the general level of secrecy offered by jurisdictions in various areas, which can be used via different financial instruments.

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Appendix

Table 10: BIS Claims - Results of the linear model

	(1)	(2)	(3)	(4)
VARIABLES	$\Delta_{17-11}(C_{ij} - C_{ik})$			
dif_18-11(SSRel_j-SSRel_k)	-0.834***	-0.951***	-0.935***	-0.949***
	(0.0929)	(0.0930)	(0.0993)	(0.102)
dif_17-2011(GDP_j-GDP_k)		0.000240***	0.000240***	0.000261***
		(1.94e-05)	(2.03e-05)	(2.17e-05)
dif_17-11(WGI_j-WGI_k)			-0.436***	-0.370***
			(0.105)	(0.112)
dif_17-2011(Pop_j-Pop_k)				-0.00299***
				(0.00105)
Constant	6.526***	6.516***	6.573***	6.554***
	(0.0172)	(0.0171)	(0.0186)	(0.0192)
Observations	19,172	19,172	16,544	15,920
R-squared	0.004	0.012	0.013	0.014

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 11: BIS claims – Discontinuous model with dummy variables

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	$\Delta_{17-11}(C_{ij} - C_{ik})$					
dif_18-11(SSRel_j-SSRel_k)	-0.949***	-0.717***	-0.854***	-0.988***	-0.998***	-0.992***
	(0.102)	(0.206)	(0.161)	(0.128)	(0.111)	(0.105)
Dummy_01		-0.219***				
		(0.0383)				
dif_18-11(SSRel_j-SSRel_k)*D01		-0.328				
		(0.236)				
dif_17-2011(GDP_j-GDP_k)	0.000261***	0.000261***	0.000260***	0.000262***	0.000263***	0.000262***

	(2.17e-05)	(2.17e-05)	(2.17e-05)	(2.18e-05)	(2.17e-05)	(2.17e-05)
dif_17-11(WGI_j-WGI_k)	-0.370***	-0.347***	-0.366***	-0.373***	-0.372***	-0.371***
	(0.112)	(0.112)	(0.112)	(0.112)	(0.112)	(0.112)
dif_17-2011(Pop_j-Pop_k)	-0.00299***	-0.00312***	-0.00301***	-0.00297***	-0.00296***	-0.00296***
	(0.00105)	(0.00105)	(0.00105)	(0.00105)	(0.00105)	(0.00105)
Dummy_02			-0.102**			
			(0.0459)			
dif_18-11(mssRel_j-mssRel_k)*D02			-0.172			
			(0.208)			
Dummy_03				0.106		
				(0.0687)		
dif_18-11(mssRel_j-mssRel_k)*D03				0.124		
				(0.213)		
Dummy_04					0.138	
					(0.131)	
dif_18-11(mssRel_j-mssRel_k)*D04					0.327	
					(0.294)	
Dummy_05						0.726***
						(0.243)
dif_18-11(mssRel_j-mssRel_k)*D05						0.772*
						(0.447)
Constant	6.554***	6.658***	6.577***	6.545***	6.550***	6.549***
	(0.0192)	(0.0264)	(0.0218)	(0.0201)	(0.0194)	(0.0192)
Observations	15,920	15,920	15,920	15,920	15,920	15,920
R-squared	0.014	0.016	0.014	0.014	0.014	0.015

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 12: BIS Claims – Non-linear continuous for categories of secrecy

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	$\Delta_{17-11}(C_{ij} - C_{ik})$					
dif_18-11(SSg1Rel_j-SSg1Rel_k)	-0.0977	-0.0663	-0.135*	-0.195***	-0.0942	-0.0210
	(0.0711)	(0.0870)	(0.0709)	(0.0709)	(0.0779)	(0.0868)
dif_18-11(SSg1Rel_j-SSg1Rel_k)^2			-0.887***	-0.874***	-0.860***	-0.806***
			(0.168)	(0.167)	(0.178)	(0.181)
dif_18-11(SSg2Rel_j-SSg2Rel_k)	0.652***	0.736***	0.529***	0.244**	0.292**	0.220
	(0.118)	(0.130)	(0.118)	(0.121)	(0.129)	(0.136)
dif_18-11(SSg2Rel_j-SSg2Rel_k)^2			5.622***	5.512***	4.914***	5.025***
			(0.474)	(0.473)	(0.494)	(0.502)
dif_18-11(SSg3Rel_j-SSg3Rel_k)	-0.372***	-0.362***	-0.349***	-0.340***	-0.343***	-0.353***
	(0.0472)	(0.0521)	(0.0470)	(0.0469)	(0.0505)	(0.0518)
dif_18-11(SSg3Rel_j-SSg3Rel_k)^2			-0.0428	-0.0279	-0.0648	-0.0465
			(0.0755)	(0.0753)	(0.0808)	(0.0824)
dif_18-11(SSg4Rel_j-SSg4Rel_k)	-0.0260	-0.0414	-0.0357	-0.105***	-0.110***	-0.142***
	(0.0269)	(0.0300)	(0.0268)	(0.0276)	(0.0294)	(0.0311)
dif_18-11(SSg4Rel_j-SSg4Rel_k)^2			-0.0623**	-0.0746***	-0.0690**	-0.0928***
			(0.0253)	(0.0252)	(0.0273)	(0.0289)
dif_17-11(WGI_j-WGI_k)		-0.476***			-0.469***	-0.441***
		(0.113)			(0.106)	(0.113)
dif_17-2011(Pop_j-Pop_k)		0.00165				-0.00287**
		(0.00110)				(0.00118)
dif_17-2011(GDP_j-GDP_k)				0.000213***	0.000210***	0.000238***
				(2.04e-05)	(2.14e-05)	(2.37e-05)
Constant	6.513***	6.551***	6.463***	6.462***	6.530***	6.508***
	(0.0172)	(0.0193)	(0.0281)	(0.0280)	(0.0309)	(0.0318)
Observations	19,172	15,920	19,172	19,172	16,544	15,920
R-squared	0.009	0.010	0.019	0.024	0.024	0.026

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 13: Marginal effect of change in difference in relative SS for each group by 0.1

Change by 0.1 in:	Percentage change in $\Delta_{17-11}(C_{ij} - C_{ik})$			
	Ownership registration	Legal entity transparency	Integrity of the tax and fin. regulation	International standards and cooperation
From -0.5 to -0.4	7.9%	-48.1%	-3.1%	-0.5%
From -0.4 to -0.3	6.2%	-38.0%	-3.2%	-0.7%
From -0.3 to -0.2	4.6%	-28.0%	-3.3%	-0.9%
From -0.2 to -0.1	3.0%	-17.9%	-3.3%	-1.0%
From -0.1 to 0	1.4%	-7.9%	-3.4%	-1.2%
From 0 to - 0.1	-0.2%	2.2%	-3.5%	-1.4%
From 0.1 to 0.2	-1.8%	12.3%	-3.6%	-1.6%
From 0.2 to 0.3	-3.4%	22.3%	-3.7%	-1.8%
From 0.3 to 0.4	-5.0%	32.4%	-3.8%	-2.0%
From 0.4 to 0.5	-6.7%	42.4%	-3.9%	-2.2%
From 0.5 to 0.6	-8.3%	52.5%	-4.0%	-2.3%
From 0.6 to 0.7	-9.9%	62.5%	-4.1%	-2.5%

Table 14: Correlation matrix - SS and individual categories

	dif_18-11(SSRel_j-	dif_18-11(SSg1Rel_j-	dif_18-11(SSg2Rel_j-	dif_18-11(SSg3Rel_j-	dif_18-11(SSg4Rel_j-
dif_18-11(SSRel_j-SSRel_k)	1				
dif_18-11(SSg1Rel_j-	0.465***	1			
dif_18-11(SSg2Rel_j-	-0.0765***	-0.0167***	1		
dif_18-11(SSg3Rel_j-	0.781***	0.177***	-0.381***	1	
dif_18-11(SSg4Rel_j-	0.524***	-0.122***	0.00207	0.225***	1

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

Table 15: Summary statistics for variables in regressions with dependent variable based on CPIS assets

Variable	Obs.	Mean	Std. Dev.	Min	Max
$\Delta_{17-11}(A_{ij} - A_{ik})$	180,407	19.41429	3.231467	1.33651	27.904
$\Delta_{17-11}(\mathrm{SSRel}_j - \mathrm{SSRel}_k)$	72,466	.0126694	.1818521	-0.63494	.6349411
$\Delta_{17-11}(\mathrm{SSRg1}_j - \mathrm{SSRelg1}_k)$	72,466	.0263774	.252828	-1.04086	1.040859

$\Delta_{17-11}(\mathrm{SSRg2_j} - \mathrm{SSRelg2_k})$	72,466	-.0034333	.1494916	-0.53097	.5309723
$\Delta_{17-11}(\mathrm{SSRg3_j} - \mathrm{SSRelg3_k})$	72,466	.0275155	.3971904	-1.29167	1.291668
$\Delta_{17-11}(\mathrm{SSRg4_j} - \mathrm{SSRelg4_k})$	72,466	-.0341263	.6693545	-2.27735	2.277349
$\Delta_{17-11}(GDP_j - \mathrm{GDP_k})$	180,447	116.9153	956.8938	-5889.51000	5889.51
$\Delta_{17-11}(\mathrm{WGI_j} - \mathrm{WGI_k})$	157,311	.0209061	.2221271	-0.87376	.8737602
$\Delta_{17-11}(\mathrm{pop_j} - \mathrm{pop_k})$	163,526	1.685859	15.75326	-92.99136	92.99136

Table 16: Distribution of $\Delta_{17-11}(\mathrm{SSRel_j} - \mathrm{SSRel_k})$ for regressions with dependent variable based on CPIS assets

Values	Number of observations	Percent	Cum.
<-0.5	188	0.3%	0.3%
<-0.5;-0.4>	475	0.7%	0.9%
<-0.4;-0.3>	2,426	3.4%	4.3%
<-0.3;-0.2>	5,932	8.2%	12.5%
<-0.2;-0.1>	10,49	14.5%	26.9%
<-0.1;0>	14,669	20.2%	47.2%
<0;0.1>	14,766	20.4%	67.6%
<0.1;0.2>	12,289	17.0%	84.5%
<0.2;0.3>	7,304	10.1%	94.6%
<0.3;0.4>	3,012	4.2%	98.8%
<0.4;0.5>	686	1.0%	99.7%
>0.5	229	0.3%	100.0%

Table 17: Summary statistics for variables in regressions with dependent variable based on BIS claims

Variable	Obs	Mean	Std. Dev.	Min	Max
$\Delta_{17-11}(C_{ij} - C_{ik})$	19,172	6.532267	2.381257	-4.710531	12.9942
$\Delta_{17-11}(\mathrm{SSRel_j} - \mathrm{SSRel_k})$	19,182	-0.0072607	0.1847233	-0.6349411	0.6349411
$\Delta_{17-11}(\mathrm{SSRg1_j} - \mathrm{SSRelg1_k})$	19,182	-0.000715	0.249214	-1.040859	1.040859

$\Delta_{17-11}(\mathrm{SSRg2_j} - \mathrm{SSRelg2_k})$	19,182	0.0157754	0.1582808	-0.5309723	0.5309723
$\Delta_{17-11}(\mathrm{SSRg3_j} - \mathrm{SSRelg3_k})$	19,182	-0.0215716	0.416389	-1.291668	1.291668
$\Delta_{17-11}(\mathrm{SSRg4_j} - \mathrm{SSRelg4_k})$	19,182	-0.0318727	0.663848	-2.277349	2.277349
$\Delta_{17-11}(GDP_\mathrm{j} - \mathrm{GDP_k})$	19,182	40.18592	887.0972	-5240.31	5240.31
$\Delta_{17-11}(\mathrm{WGI_j} - \mathrm{WGI_k})$	16,553	0.0098408	0.1777945	-0.6603888	0.6603888
$\Delta_{17-11}(\mathrm{pop_j} - \mathrm{pop_k})$	17,850	0.1445808	19.39539	-92.99136	92.99136

Table 18: Distribution of $\Delta_{17-11}(\mathrm{SSRel_j} - \mathrm{SSRel_k})$ for regressions with dependent variable based on BIS claims

Values	Number of observations	Percent	Cum.
<-0.5	64	0,3%	0,3%
<-0.5;-0.4>	163	0,9%	1,2%
<-0.4;-0.3>	808	4,2%	5,4%
<-0.3;-0.2>	182	9,5%	14,9%
<-0.2;-0.1>	3137	16,4%	31,2%
<-0.1;0>	3957	20,6%	51,9%
<0;0.1>	3805	19,8%	71,7%
<0.1;0.2>	2914	15,2%	86,9%
<0.2;0.3>	1602	8,4%	95,2%
<0.3;0.4>	671	3,5%	98,7%
<0.4;0.5>	168	0,9%	99,6%
>0.5	73	0,4%	100,0%