Tax Evasion through Offshore Accounts

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Abstract

This paper tests the effect of tax rate changes on tax evasion through offshore accounts. Using a dataset where the country of residence for beneficial owners of offshore accounts are observed, I estimate the effect of changing tax rates on the offshore activity of owners from that specific country. Neither lowering tax rates on dividends and top incomes, nor the abolition of tax on wealth altogether have any effect on decreasing the rate at which new offshore accounts are opened. In light of recent mixed results on the efficiency of international regulation in curbing offshore activity, this paper provides a benchmark for the efficiency of using tax policy as an alternative to regulation.

1 Introduction

In 2009, the US and other G20 countries began a campaign to put pressure on so called tax havens to cooperate with tax agencies and other authorities in order to combat money laundering, criminal activity and tax evasion that was facilitated through these jurisdictions. At the time, it is estimated that around 8 to 10 percent of the world's total financial wealth was held in tax havens (Zucman, 2013; Alstadsæter et al., 2017b). Since international enforcement require cooperation from the host countries themselves, it is hard to impose regulation that will lead to repatriation rather than switching to another strategy or a non-cooperative jurisdiction. Indeed, recent evidence on regulation to curb this problem show that switching plays a major role (Johannesen, 2014; Johannesen and Zucman, 2014; Caruana-Galizia and Caruana-Galizia, 2016; Omartian, 2017). This paper investigates the relative success of changing tax rates as an alternative to regulation.

According to economic theory, tax evasion is a response to taxation and the scope of tax evasion may depend both on the current enforcement efforts as well as on the tax rate itself (Slemrod and Yitzhaki, 2002). In the context of offshore

wealth, the effect of increased enforcement efforts through new regulation or bilateral treaties have shown some evidence of repatriation (Johannesen et al., 2018; Omartian, 2017), but also that harder regulation on one form of evasion may induce switching to other forms of evasion/avoidance. This paper offers a complementary view by looking at the effect of tax rates on offshore activity.

The tax evasion using anonymous offshore shell corporations (henceforth offshore accounts) is likely to be related to capital income for individuals in the high end of the wealth distribution. Alstadsæter et al. (2017a) match Swedish and Norwegian individuals in parts of the ICIJ data to wealth tax data, and find that the officers are almost exclusively in the top 0.01 percent of the income distribution, with observed net wealth of above $40 million. Offshore account owners are significantly higher up in the wealth distribution than individuals associated with other leaks or amnesties, suggesting that offshore accounts is an almost exclusively top income phenomena. Since offshore accounts are incorporations that hold assets, the estimates focus on capital and dividend income as well as wealth taxes.

Offshore accounts provide anonymity to the beneficial owners, causing a problem for tax authorities and researchers alike. This problem is solved in an unconventional dataset of leaked data from law firms and tax haven corporate registers that was published by the International Consortium of Investigative Journalists (ICIJ), where is possible to observe the true beneficial owners of these accounts. By linking the beneficial owners to offshore account creation and account closure, it is possible to study the effect of source country[1] tax rate changes on offshore activity in an event study.

The results of the tax rate event studies show small or no effects of tax rates on either the number of people who open new offshore accounts, or close their existing ones. There is large variation between countries, but the heterogeneity does not depend on which tax rate is changed or what political context the rate change was implemented in. There may be a slightly larger effect of corporate tax rate changes than the ones related to private individuals, but the difference is not very large. There is no correlation between the size of tax rate changes and the impact on account openings either in the short or long run. In fact, none of the largest tax cuts (in percentage points) are associated with less new account openings.

Similarly for wealth tax abolitions, there is no evidence that the end of levying this tax decreased the rate of new account openings. The estimates show an increase in the number of closures decreased in the year following abolition, but the effect is not statistically significant. Compared to the effects of new

[1] Following Zucman (2013), the country in which the beneficial owner of an offshore account has a tax liability is referred to as the source country, and the jurisdiction where the account is incorporated (usually a tax haven) is the host country. The latter is a slight deviation from Zucman's terminology, since it is unobserved where the actual assets are invested.

regulation on offshore activity estimated by Omartian (2017) using the same data, tax rate changes seem to have very little impact.

Event studies within source countries should not be affected by the risk that the ICIJ sample is unrepresentative of the offshore population other than through the general sample time trend. This is controlled for by using a double-residual method in order to ensure that the nonparametric estimates are consistent.

The rest of the paper continues as follows. Section 2 discuss the issue of tax evasion in the context of offshore accounts and previous results with respect to the effect of increased enforcement and section 3 discuss the theoretical predictions of the impact of particular taxes on openings and closures of offshore accounts specifically. In section 4, the original structure of the data is described, as well as how networks are defined and used to measure offshore activity. This section also provides some summary statistics on the beneficial owners. Section 5 discuss the empirical framework and the econometric specification, and section 6 show the results of first the tax rate changes, and then the wealth tax abolitions. Section 7 concludes.

2 Background and Previous Research

The main focus of this paper is how the users of offshore accounts respond to tax policy. Having assets controlled through a shell company registered in a non-cooperative[2] tax haven has been an effective way of avoiding taxation, since there is no third party reporting and no way for a tax authority to find the right account unless the beneficial owner reports it to the government. There are, however, other reasons than tax avoidance to set up offshore accounts in tax havens. Some are legal, such as consolidating joint ventures with investors from multiple countries under a single external country's legislation (Palan et al., 2013), and some are illegal, for example offshore accounts are often parts of drug money laundering schemes (Findley et al., 2014, p.33). While these other uses may be important, they are not expected to react to changes in tax policy, and will thus not bias the estimates.

2.1 The scope of tax evasion

Since Feldstein (1999), tax avoidance has been considered an important behavioral response to taxation as a part of the total elasticity of taxable income. Tax avoidance may itself depend on how easy it is to for example shift income out of the particular tax base. This gives the government some influence over

[2] A tax haven without an information exchange treaty with the country of residency of the beneficial owner

the elasticity of taxable income through changing the tax base (Slemrod and Kopczuk, 2002). In the context of top income taxation, the solution would be to eliminate any loopholes in order to minimize the total elasticity (Piketty et al., 2014).

Most models of the mechanism through witch tax evasion/avoidance affect taxable income elasticity consider a choice where the benefits of avoiding tax payment are weighed against some cost of sheltering. This cost is either related to the risks of getting caught and the following penalty, or some to more general cost of sheltering income (Slemrod and Yitzhaki, 2002). In the context of offshore accounts, even though the monetary cost of opening a corporation in a tax haven is fairly low (Findley et al., 2014, p.40), the cost of creating a legal no-tax structure (avoidance) or an account for which the owner is untraceable (evasion) may be significant in terms of having the right legal/consultancy team, so I will consider the more general type of cost in this framework not only related to the risk of audit.

Empirical analysis of tax evasion is intrinsically hard due to the lack of official data. The main strategy has been to use results from random audits or to compare survey and tax data. Audit data is particularly informative of evasion of wage and self-employment earnings, but may be less informative about offshore capital income (Slemrod and Yitzhaki, 2002). Apart from successful audits, estimates of tax evasion/avoidance behavior that use reported data is going only be local to those individuals who may ever comply under some conditions. The offshore account data gives a unique opportunity to observe the behavior to never-compliers as well.

2.2 Offshore wealth

Zucman (2013) estimates that around 8 percent of the world's total wealth is held in tax havens. Shell accounts in other tax havens are often the nominal owners of the assets, which is a major obstacle in the work of attributing this wealth to the right source country (Zucman, 2013; Alstadsæter et al., 2017b). Alstadsæter et al. (2017b) make the estimates on 2003-2004 data under the assumption that assets obscured through shell offshore accounts are distributed proportionally to the assets where a non-haven source country is observed. A better understanding of the demand for using shell offshore accounts could improve these estimates.

On an individual level, the demand for these accounts seem to be driven by very high-wealth individuals. Alstadsæter et al. (2017a) take the names and addresses in the Panama papers data and use it to match officers to individuals in the Norwegian and Swedish wealth tax data. They do a similar exercise for leaked data from HSBC Switzerland and find that the probability of having a Swiss bank account increase smoothly with wealth for roughly the top 1 percent

of wealth holders. The probability of being an observed officer of an offshore account, however, is almost exclusive to individuals the top 0.01 percent of the income distribution. The cutoff for the top 0.01 percent in this distribution is net wealth of above $40 million.

Offshore wealth has also been studied in the context of corporate structures. There is some evidence on how American firms use offshore accounts, which is consistent with minimizing taxes (Desai et al., 2006; Lewellen and Robinson, 2013). (See Hanlon and Heitzman (2010) for a review of this literature.)

2.3 Enforcement efforts

Piketty et al. (2014) show that the revenue-maximizing strategy for the government if top income earners can respond by avoiding taxation is to close the loopholes that make it possible. This is in line with the recent increased regulation regarding offshore accounts. The problem, however, is that closing one loophole may result in switching to a new form of evasion, rather than repatriation of funds. If the new evasion is harder to track, this may not be a costless action, as assumed by Piketty et al. (2014). In this section, I review the literature on the effect of recent increased enforcement efforts.

Attempts to enforce more strict regulation on offshore account use has been increasing since 2005. EU, G20, OECD and the US have all encouraged tax havens to enter bilateral treatments, and stricter laws have been passed, starting with the EU savings tax directive (EUSD) in 2005. The effect of these initiatives on tax evasion have been studied using official and leaked sources.

There is evidence of switching as a result of more strict regulation. EUSD was implemented in 2005, and introduced either third party reporting or tax withholding for capital income derived from foreign bank accounts in EU or participating states (including Switzerland and other large tax havens). Johannesen (2014) document a drop in EU-owned bank accounts in participating havens around the implementation of EUSD for about 30-40 percent of bilateral holdings recorded by the Bank for International Settlement (BIS). Rather than repatriation, however, there is a substantial increase in the holdings attributed to Panama. This would be consistent with switching to offshore accounts. Using the ICIJ data, Caruana-Galizia and Caruana-Galizia (2016) and Omartian (2017) both document an increase in established entities owned by Europeans (Mossak Fonseca data, Omartian (2017)) or by unknown owners (Offshore leaks data, Caruana-Galizia and Caruana-Galizia (2016)). This shows that it was possible to continue to shield income from taxation through offshore accounts, even after the EUSD.

The G20 crackdown on tax havens launched in 2009, and the OECD threatened sanctions on jurisdictions that did not sign a minimum of 12 tax information ex-

change agreements. Again using the BIS data, Johannesen and Zucman (2014) show that entering a treaty is associated with a decrease in funds held in the tax haven by owners from the source country. The evidence suggest that the source country's holdings in havens without treaties increase, which is consistent with switching. Both deposit shifting (changing which tax havens hold the money) and concealment through sham corporations (changing the source country in the BIS data) are thus possible strategies as a response.

Some government attempts at closing loopholes appear to have been more successful. The US has been able to use the weight of it's financial system as a leverage for increased enforcement by third party reporting from foreign banks directly. Omartian (2017) studies the effect of US new law FATCA on US accounts at Mossak Fonseca and find that they started to fall after January 2013. Johannesen et al. (2018) estimate the effect of increased enforcement climate in the US since 2009. Both amnesty program disclosures and new "quiet" disclosure of accounts in foreign tax havens increased. Income received on those newly disclosed accounts is primarily interest income. The new enforcement efforts increased tax revenue by about $0.7 - $1 billion. Combined with Alstadsæter et al. (2017a), this suggests that about 12 percent of offshore funds are now reported properly. Johannesen et al. (2018) find some evidence on repatriation with subsequent increases in domestic dividend income and a fall in foreign account income, in addition to the now-paid tax revenue from foreign accounts.

So far, the studies that explicitly look at offshore wealth have either been purely descriptive or focused on enforcement efforts and new regulation. Tax evasion is in general observed in audit or once previously hidden funds gets reported, but the response in terms of hidden income has not been directly observed. This paper bridges the studies of hidden wealth and the studies of tax evasion by looking at how tax rate changes directly affect behavior among the evading population.

3 Theory

Since I can only observe offshore activity through the openings and closures of accounts, the following section summarize the expected responses in those variables to tax rate changes. The unit of observation is the number of openings or closures of offshore accounts connected to individuals from a particular country. First, note that offshore accounts are used for tax evasion purposes almost exclusively by individuals with high wealth (Alstadsæter et al., 2017b), that are expected to respond to changes in tax rates on capital income, either as dividends or as top income tax rates. In a world where individuals choose to hide a share of the taxable income, everyone would increase the share of their income that was hidden, but only the ones that go from zero avoidance to some positive share would be observed in the data as an account opened. If the

decision is only binary (comply or avoid), then the current data will reflect the entire response.

For each individual, opening an account is a one-time or a rare decision that she makes when her tax liability from wealth earnings is large enough to motivate the costs and risk associated with an offshore account. For each source country, individuals will arrive to this point in their wealth distribution continuously, why we expect a constant level of new account openings.

All else equal, a higher tax rate increase tax liability, and hence decrease the threshold at which wealth/capital income level an individual has to be before she considers going offshore. In a risk-adjusted distribution of wealth, the threshold for choosing to open an offshore account has now decreased. This affects everyone who were in between the old and new cutoff, which should boost the number of openings immediately after implementation. Over time, more individuals are likely to reach this new, lower threshold which should increase the level of account openings observed in the long run relative to the pre-period. A tax rate decrease would move the threshold back up again, lowering the level, but without any short-term response in the number of openings.

Account closures should in principle be the reverse image of openings, with a higher level for lower tax rates and a lower level for higher tax rates. However, the universe of active offshore account holders is much smaller than the universe of tax payers from a given source country. Hence, if the number of new accounts increase following a tax hike, we would expect each account owner to be less likely to close their account, but since the number of accounts have increased, the level of closures may be attenuated.

In addition to the mechanical effect of the size on the offshore pool, account closures may be less responsive to tax rates if there is some lock out effect, adding a cost of repatriation once the decision to go offshore has been made. This cost could be either behavioral or rational. A hypothetical example of a rational lock out effect would be if repatriation/sudden reporting of funds, such as the first time FBAR filers observed by Johannesen et al. (2018), would be an indicator used by the IRS which increased the risk of audit.

4 Data

This section starts by a brief description of the main dataset, which is a set of leaked data published by the International Consortium of Investigative Journalism, and how the raw data is structured. Then, I highlight some of the main adjustments necessary to retrieve networks that represent beneficial ownerships. Finally, general features of the data are described and I discuss to what extent this data is representative of the offshore account owner population.

4.1 The ICIJ dataset

The International Consortium of Investigative Journalism (ICIJ) has since 2013 received and published leaked data concerning offshore incorporations. The leaks have either been records from corporate registers in tax havens, or documents from law firms that assist in setting up offshore corporations. The leaks are known under four names from the journalistic publications they are associated with: The Offshore leaks (law firm Portcullis Trustnet and Commonwealth Trust Limited, 2013), the Bahamas leaks (Bahamas corporate registry, 2016), the Panama Papers (law firm Mossak Fonseca, 2016) and the Paradise papers (law firm Appleby and a number of corporate registers, 2017. I will refer to the joint dataset as the ICIJ data.

The law firm data is unique in that beneficial owners, and their country of residency, is observed. In order to know when and where these owners opened their offshore accounts, I use the network structure in the ICIJ data.

The data consists of observations (nodes) and connections (links) between different observations. An observation is classified as either an entity, officer, intermediary or an address, each of which provide different information. The central observation is an entity, for which the name and jurisdiction of incorporation is observed, as well as the start and end date of the incorporation where applicable. Officers are usually directors or shareholders of entities, or have positions such as secretary. Officer names show that this category consists of both physical persons and corporate entities. Intermediaries may exist as a connection between officer and entity, or it may be connected to several entities without any known officer. If an officer has a direct link to an address, country of residence is known. If there is a link between an officer and an entity, I know when she opened (and closed) an offshore account. Ideally, this is all that is necessary to test the effects of source country tax policy on offshore activity. Not all cases are as straightforward, however.

More complex cases with can occur if an officer own multiple accounts directly, or if an officer is connected to one entity which in turn owns other entities. This is illustrated in panel (a) and (b) of figure 1 respectively. It is not a priori clear that these two link structures have different implications for which entity is the most important. It can also be the case that an entity can be connected to multiple officers or intermediaries. Without additional knowledge of where assets are usually located within these more complex structures, I will make the assumption that each entity is equally likely to be the relevant. This means company A and B will have equal importance to the officer in both of the example figures in 1. To allow for this, I construct ownership networks.

4.2 Measuring ownership networks

The first step in the identification of ownership networks is to identify the sets of nodes that are connected to one another, but not to any other node in the data, what is defined as the connected component in graph theory. From the connected components (henceforth ownership network) I map all possible officer-entity pairs in the network, regardless of the structure through witch they are connected. Entry and exit dates for owners are assigned by the start and end date of the entity in the pair. If an owner is connected to n entities, the owner will get an equal $\frac{1}{n}$th weight in each start date in order to keep owners the unit of observation.

Before I construct the ownership networks, I exclude all officers and intermediaries that appear to be service firms rather than beneficial owners. A service firm can be a bank, a consultancy firm or some form of corporate service provider, who sells the service of setting up or maintaining offshore companies for the beneficial owner. I define service firms as a intermediaries or officers who's name partially match a set of either well-known wealth management firms[3] or match typical names of corporate service providers[4]. All intermediaries and all large officers[5] that match either category are excluded. I do not exclude all company names from the officer list since they may represent the true beneficial owner if the company's address in the right source country. The officers that remain in the network are assumed to be the beneficial owners of entities in the network.

The service firms that are not defined by this procedure will introduce additional noise in the data, since keeping them in the network would create false owner-entity pairs. In the case where an intermediary or nominal officer have mistakenly been kept in the network this could potentially cause me to connect an officer to entities that she doesn't own, in addition to the one(s) she do. The current treatment of a case with n entities is that I give each observed start date a weight of $1/n$th of the officer. A missed service firm increase the number of false-positive opening and closure dates, but also decrease the weight for each of the dates an officer is connected to. Other types of measurement error may arise from misreporting of the start and end dates. For example, end dates may be set as a function of when routine checks of activity are made, which could bunch at the end of the year or 365 days after incorporation. Start dates may be misreported for similar reasons, or if companies are created to be put on a shelf and sold to beneficial owners later (Findley et al., 2014).

[3] Top 50 private banking firms as of *The Banker*, 2015-06-01

[4] Corporate service providers are defined as officers or intermediaries with at least two of the following words in their name: Advisor, Comp.., Corporate, Limited, LTD, Manage.., Nominee, Secretary, Service or Trustee

[5] Large officers are officers with more than 20 links. I also exclude officers with more than 100 links, regardless of their name.

4.3 Summary statistics

The cleaned data includes 232 000 officers, 14 percent of which are from China, and 28 percent from tax havens or undisclosed locations. 98 percent of all accounts in the data were opened after 1990. The evolution of active accounts since then are shown in figure 2. The vast majority of accounts with non-european owners were opened in the 2000's, and activity has been decreasing since roughly 2010 in most regions. The steady growth of offshore activity during the 2000's could either indicate a general surge of availability during the decade, perhaps due to better communication technology, or it could be specific to these particular law firms that are the source of the data. Indeed, in figure 3, where the incorporation over time is shown for each law firm separately, it is clear that there is substantial variation across firms. Portcullis Trustnet and Mossak Fonseca, from which around 85 percent of the data on officers is gathered, has a much steeper slope in the early 2000s than the data gathered from corporate registers. The latter is arguably closer to a representative sample of the offshore activity.

In addition to where officers are from, it is also important to know where they incorporate. Figure 4 show this by plotting the origin of officers on the y axis against the region where their companies are located. The size of each dot represent the share of all owners in the data. Apart from tax havens in Europe and on islands in the Caribbean and the Pacific, incorporations in the officer's own region are common, and not just for nominal officers from tax havens. Here, there is also variation across different sources. The same picture is reproduced for the two major law firms: Mossak Fonseca and Appleby in figure 5.[6] First, on the incorporation location side, own-region incorporation outside of tax havens is a phenomena that is almost exclusive to Mossak Fonseca, while Appleby costumers tend to incorporate in Caribbean and Pacific tax havens. The most interesting difference on the officer side is the much larger share of customers from the US and Canada in the Appleby data, while Mossak Fonseca has almost no US customers. Since about 65 percent of all available data is collected from Mossak, the relative small share of US officers in the data as a whole could be due to the selection of law firms.

This summary of the data has shown important differences across law firms both over time and in the regional distribution of owners. This suggests the data may not be representative, so in order to make sure the results are not driven by firm-specific time trends, I identify all effects off of within-country changes in offshore activity over time, controlling for the general time trend of the law firms. I describe the procedure in detail in the next section.

[6] The other sources are excluded for clarity. Protcullis' officers are almost exclusively from Asia and the Pacific, and corporate registers only have incorporations in that particular tax haven. The origin of most officers in the Commonwealth trust is unknown.

5 Empirical Framework

A central issue of working with data from only two law firms is that the likelihood of observing an opening/closure may depend on the law firm itself. In order to control for this, while still allowing the outcome to be an arbitrary function of time, I use a double residual estimator (Yatchew, 2003, pp 47-50). This section describes the issue of sample selection, and details the double-residual estimator used to control for the sample trends.

First, the observed growth trend may be firm-specific, not global. As seen in figure 3, growth trends differ between law firms - Mossak Fonseca and Portcullis Trustnet are much bigger than the others. Excluding officers from Asia, Mossak represents 72 percent of the observed officers. Second, the share of owners from a given country may reflect Mossak Fonseca's particular international outreach, rather than a representative sample. I therefore restrict the analysis to within source country opened in trends, and assume that the rate of accounts opened (closed) are representative of the true rate in the given country. I also restrict the cases to countries with a sufficiently high number of active officers in the beginning of the sample period.

Since an incorporation or a deactivation of an account is a rare event, I aggregate the data on a monthly level, by jurisdiction of the officer. This also gets rid of first-of-the-month effects. However, there is still noise from the various types of measurement errors left, which requires smoothing the data over time in the country-level specifications.

5.1 Semi-parametric control

For fully flexible event studies, the number of openings (closures) of accounts connected to an owner from country i in month t, Y_{it} is modeled as an arbitrary function $\theta(z_{i,(t-T)})$ of the time relative to the policy change $z_{i,(t-T)}$ as well as a parametric function of other factors X_{it}, like in equation 1. Let the vector X_{it} be the firm-specific time trend measured as the sum of all accounts opened (closed) in time t from all non-tax haven source countries except for i, as well as a linear control for time and calendar month fixed effects.[7]

$$Y_{it} = \beta X_{it} + \theta(z_{i,(t-T)}) + e_{it} \tag{1}$$

Robinson (1988) showed that a consistent estimate of $\hat{\beta}_i$ can be obtained by a double residual estimator as in equation 2, where $\hat{g}(z)$ is a local polynomial

[7] Tax haven officers are excluded since there are most likely nominal officers, who may work for officers of country i.

estimator of $E(X|z)$ and $\hat{h}(z)$ is an equivalent nonparametric estimator of Y.

$$\hat{\beta}_i = ((X - \hat{g}(z))'(X - \hat{g}(z)))^{-1}((X - \hat{g}(z))'(Y - \hat{h}(z))) \tag{2}$$

If so, $\tilde{Y}_{it} = Y_{it} - \hat{\beta}_i X_{it}$ is the residual accounts opened(closed) that are affected by home country policy changes. $\tilde{Y}_{it} = \theta_i(z_{i,(t-T)}) + \varepsilon_{it}$ is the part of the explanatory variable that is affected by the time relative to the event, and $\hat{\theta}(z_{i,(t-T)})$ is obtained by a local polynomial (Yatchew, 2003, pp. 47-50).

To get robust standard errors for the sample, I bootstrap the data 500 times at the network level. Drawing whole networks ensures there is no oversampling of data from large networks with many officers. From each redraw, officer-entity pairs are defined and collapsed to the number of openings (closures) observed for each source country.[8] All figures show the 95 percent confidence interval calculated using the standard deviation from the bootstrap.

6 Results

I look at two types of events, first the effect of rate changes for taxes related to capital income and second the abolition of wealth taxes. The first part describes the events and the econometric specification of the event studies. Then, the results for tax rate changes are discussed, and tests for heterogeneity in the type of tax rate change or in the political setting in which it is implemented is tested for. The final heterogeneity analysis treat each event separately, in an attempt to find the elasticity with respect to the size of tax rate changes. There is no evidence that the size affect responses. The final section look at wealth tax abolitions, which theoretically should be a policy change with more impact than tax rate changes. There may be an effect on account closures of this policy, but it is not consistent for all cases.

6.1 Event definition

I test the effect of tax rate changes on offshore activities in an event study framework. Events are the universe of changes to tax rates for top income, corporate dividend income or personal dividend income in the OECD 2000-2014 that are at least 1 percentage point in size. Only the largest tax rate change for each tax type and each country is considered. If there are several tax changes of equal size, the largest one is used.

[8] Note that the bootstrap will only be able to sample existing dates, never pick a counter factual date for an existing observation. This will increase the sample variation more for months in which a lot of activity is observed compared to months with low activity.

As discussed in the previous section, the model of account activity is $Y_{it} = \beta_i X_{it} + \theta(z_{i,(t-T)}) + e_{it}$. Y_{it} is the number of officers from source country i who are involved in account openings or closures (demeaned), X_{it} is a vector of control that include a linear calendar time trend, calendar months fixed effects and a control for the law-firm specific time trend. The last of these variables is constructed as the total number of officers from non-tax havens observed in the data except country i. $\hat{\theta}(z_{i,(t-T)})$ is estimated using a local polynomial. The size of these coefficients are normalized to zero at time $T-12$. The size of the coefficient estimates are the residual share of excess accounts relative to the mean in a six-year window around the event time.

The panels of figures 6 - 8 are laid out as follows. Panels (a) and (b) of each figure show the residual number of owners associated with a new account, and panel (c) and (d) show the number of owners who close an account. (a) and (c) plot the time relative to implementation of tax increases, while panel (b) and (d) are relative to tax rate decreases. The shaded area represent a 95 percent confidence interval, where the standard deviation is calculated using the bootstrap procedure described above.

6.2 Tax changes

The aggregate effect of tax rate changes on new account openings are small, both for account decreases and increases. Figures 6 (a) and (b) plot the estimated $\hat{\theta}(z)$ for all tax rate increases and decreases separately. In the short run, tax rate increases coincide with a slight increase in account openings in a 6 month window around the actual implementation date, but this is not statistically different from zero, nor is it large in magnitude compared to fluctuations earlier and later in the trend. Similarly, openings during the implementation of tax decreases are lower than just before and just after, but this is not necessarily related to the decrease. Similar estimates for account closures in figures 6 (c) and (d) show larger changes than for openings, but the estimates fluctuates more. There also seems to be an increase in closures after both tax rate increases and decreases.

I allow for elasticities of offshore account activity differ with respect to the type of tax rate in figure 7. I treat each tax type as a different event and test if the response to dividend tax rates is different to the responses for top income tax rates. Account openings, shown in figures 7 (a) and (b), doesn't appear to be more responsive to the dividend rate than to the top income rate. For closures, the variation in responses for both types of tax rates are large, and not significantly different from each other.

Figure 8 splits the events by political affiliation of the executive branch at the time of implementation, which can be important if there is a common under-

standing about what tax policy can be expected from different governments. The political affiliation can be informative to the beneficial owner if the change is politically controversial and is likely to be overturned in the next election, or if it was a centrist move that is more probable to have support from both sides and hence more likely to remain. A temporary tax rate would attenuate the incentives both to open and close new accounts.

There is no stark difference between policies implemented by different political majorities in either of the panels 8 (a) to (d) but there is more variation in the responses to policies implemented by left-wing governments (confidence intervals are too large to plot and retain the scale).

I preform robustness checks with alternative definitions of the event time and the set of events included. One concern is that sophisticated investors may learn about the planning of a tax rate change prior to implementation. Rather than anticipatory actions in the months leading up to the new rules, the tax rate changes could be proposed as early as an election campaign. In an alternative specification, I use the subset fo tax rate changes which followed within two years of an election, and use the election month as the relevant event time. There are no significant changes in offshore activity around election time (results omitted). The second concern is that large and small tax changes are bundled together as the same type of event in the main specification. Restricting the events to only above-median tax changes does not change the estimates significantly (figures omitted). In the next section, I allow the effect of a tax rate change to vary by tax rate.

6.2.1 Size of tax change

So far, the evidence of any response in offshore activity to tax rate changes has been weak. However, up to this point, small and large changes in tax rates have been bundled together, which may obscure any effect from extreme changes. Hence, this section considers the responses for each event separately, in order to see if there are differential effects based on tax rates.

The following figures plot the relative size of the pre-post difference in account openings by the size of the tax rate change. All else equal, a larger magnitude in the change of the tax rate should increase the number of individuals who respond by changing their offshore ownership status. In the figures, this would be represented by a positive sloped line with an intersection at zero. As discussed in the theory section, it is possible that tax increases have more direct effects on openings than tax decreases, and hence that there perceived line should be kinked at zero for the short run pictures. In the long run, this asymmetry should disappear for openings, as the flow into offshore activity should depend on the rate, not the reference point. Hence, I separate the short and long run as three months after implementation to three years.

Formally, the estimates are testing if the average number of accounts opened are different in the period after the tax rate change than before. I control for the general relation to the law firm as described in section 5, but I estimate the effects for each event separately. In the framework of equation 1, the estimate is equivalent to the expression in (3) for the long run (figure 9a), (4) in 9b and (5) in 9c.

$$\frac{\hat{E}[\theta_i(z_{i,(t-T)})|z>0] - \hat{E}[\theta_i(z_{i,(t-T)})]}{\hat{E}[\theta_i(z_{i,(t-T)})]} \tag{3}$$

$$\frac{\hat{E}[\theta_i(z_{i,(t-T)})|z\in[0,3]] - \hat{E}[\theta_i(z_{i,(t-T)})]}{\hat{E}[\theta_i(z_{i,(t-T)})]} \tag{4}$$

$$\frac{\hat{E}[\theta_i(z_{i,(t-T)})|z\in[-3,0]] - \hat{E}[\theta_i(z_{i,(t-T)})]}{\hat{E}[\theta_i(z_{i,(t-T)})]} \tag{5}$$

The top tax rate changes show that there are potentially large responses to tax increases in both the short and long run, shown in figures 9a and 9b. However, there are responses of similar magnitude also for minor decreases in the tax rate, and in almost half of the cases, long run effects (panel a) are lower after the tax rate increase. The most consistent result, for all tested time specifications and types of tax rate changes, is that substantial (more than five percentage point) tax rate drops does never seem to be associates with a significant decrease in the opening of offshore accounts. This is inconsistent with any elasticity interpretation, as larger and negative responses are expected for tax rate decreases. For closures, figure 10 show a similar low response for large negative effects.

Note that even though all the largest percentage rate drops are for personal dividend taxes, estimates for the largest drops in top income and corporate tax rates are also close to zero. Overall, there is no evidence that decreasing tax rates would lead to repatriation or a decrease in the number of new offshore accounts opened. Table 3 estimate linear slope coefficients for each of the tax types in figure 7 and10. The slopes are close to 0 and not statistically significant.

6.3 Wealth tax abolition

In a dynamic setting, where there are fixed costs in terms of both setting up and closing down an account, it is possible that we should expect attenuated effects for ordinary tax rate adjustments. Hence, I complement the analysis of tax rate changes with case studies of wealth tax abolition.

Broadly defined, a wealth tax is levied on the stock of assets, rather than the flow of income generated from them. The levying of wealth taxes has stopped

in most OECD countries since the 1990's (table 4 lists all wealth tax abolitions from Niemann and Sureth-Sloane (2015)).

In theory, there are three reasons for why the abolition of wealth tax should have a larger impact than a tax change where the new tax rate is larger than zero. First, a zero tax rate would imply that there are no benefits to tax avoidance. Even with capital income taxes still in place, there net decrease in tax liability for high wealth individuals is large. Second, abolishing a tax category means a discontinuation of an entire part of the tax code, along with tax data collection. This is a bureaucratic shift that in and of itself may make the change more salient and also indicate that it is unlikely to return within the foreseeable future. Third, if the risk of an audit discovery which could increase when assets are returned to the beneficial owner's name, the discontinuation of reporting an asset class itself may matter.

Replicating the tests above for the abolition of tax rates show a clear increase in closures starting just prior to the change in tax law (Panel (b) of figure 11). The point estimates indicate an increase by 1.2 times the mean closure rate for almost a year, starting two months prior to the new rule. The effect is not robustly significant to bootstrapped standard errors, however. The increase in closures is observed in implementations regardless of the political affiliation of government, as seen in figure 12. There is no evidence of a consistent effect on openings of new accounts, however.

It should be noted that most of these events occurred in settings where relatively low offshore activity is observed, either because the source countries are small or because it is too early in the sample period. Estimates for each country are shown in figure 13. The Nordic countries in the sample are driving the large standard errors, but without these countries there is no clear effect on closures, either in the short or long run.

Overall, wealth tax abolition seems to have had a larger effect on closures than tax rate changes, but it is not statistically significant, and the effect on new account creation is small. My overall conclusion is that lowering or abolishing tax rates can not be shown to have a large effect in deterring offshore activity. If anything, corporate entities may be more responsive than individuals in the choice of setting up new accounts.

7 Conclusion

The rise of anonymous offshore accounts have made tracking of international wealth hard for researchers and tax collectors alike. Early attempts to regulate tax evasion through foreign bank accounts such as the EUSD increased the use of offshore shell corporations (Johannesen, 2014; Caruana-Galizia and Caruana-

Galizia, 2016; Omartian, 2017). Since 2009, the crackdown on offshore activity using bilateral treaties and stricter information rules have had some success, but there is still evidence of switching to other tax havens (Omartian, 2017; Johannesen and Zucman, 2014; Johannesen et al., 2018).

According to most theories of tax evasion and avoidance, individuals should respond to the tax rate as well as the difficulty/cost of evasion. Here, I have attempted to estimate the elasticity of evasion in the form of offshore account activity with respect to tax rates. Over all, neither offshore account opening or closure rates appear to be affected by changes in tax rates, event not when that tax rate drops to zero.

Large rate changes in top income taxation, corporate dividend tax rates and personal dividend tax rates are examined, and regardless of the type or size of tax rate, or the political context in which the change is implemented, there is no consistent evidence of changes in the probability of either openings or closures of accounts associated with residents of the country where the change is implemented. There is a large variation in both the short and long run effects of each individual tax rate event, but overall, there is no evidence that large tax rate decreases dampen offshore activity.

The complete abolition of tax on a certain asset class is arguably a more forceful move in changing the incentives for tax evasion compared to a simple adjustment of the tax rate. There is some evidence that these more drastic events were associated with an increase in the closures of already existing offshore accounts, but the effect is not significant, neither is there any impact on the propensity of new account openings.

Even compared to the mixed results on regulation in the context of offshore activity, the potential effect of changed tax rates to limit tax avoidance through unreported offshore accounts seem even less effective.

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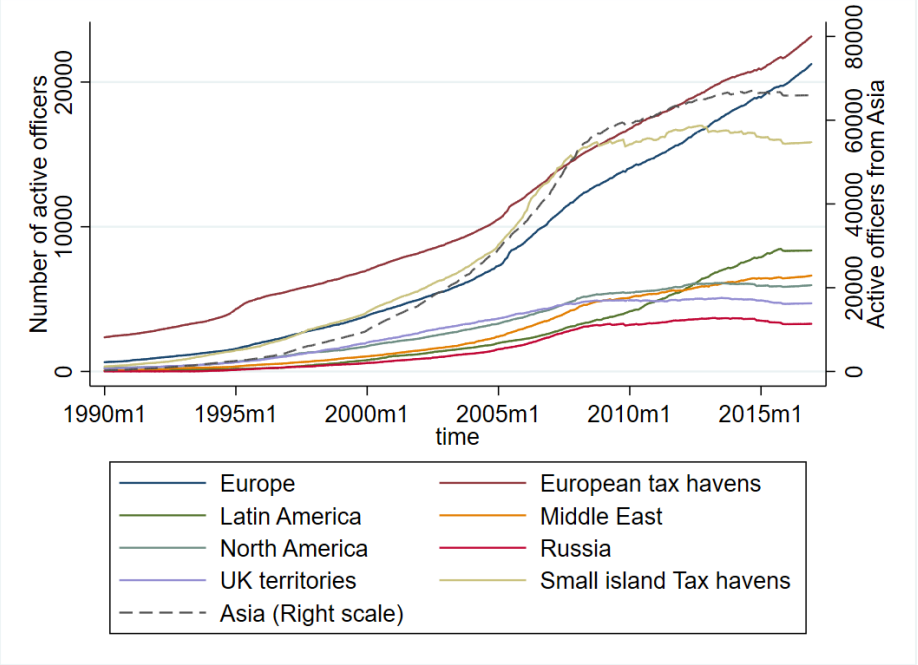
Figure 1: Examples of different ownership structures

(a) Example structure 1 (b) Example structure 2

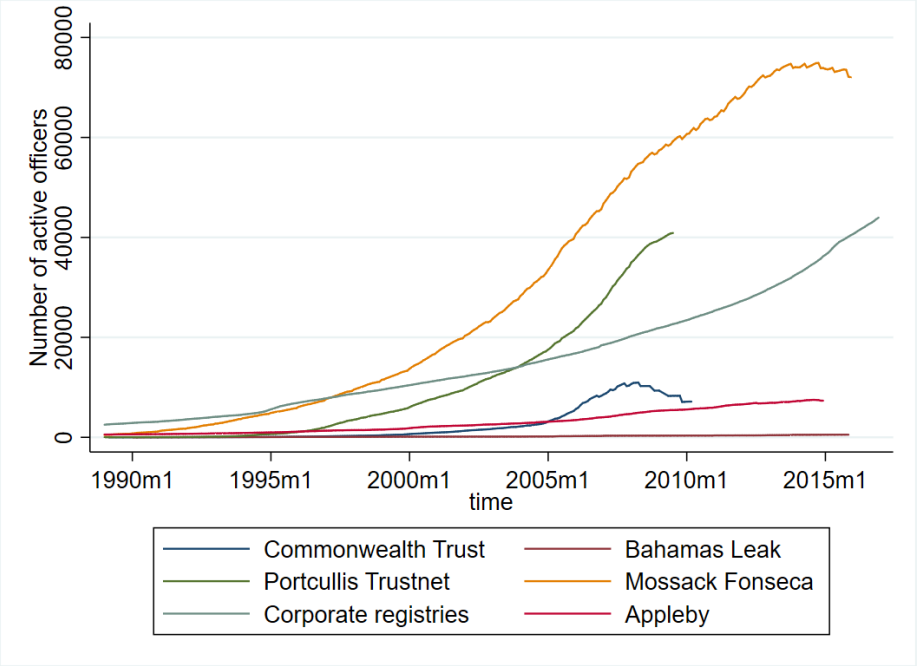
The figures are hypothetical examples of the relationship between an owner (O, in blue) and her two offshore entities, A and B (green). Since the location of any actual assets are unknown, both companies are considered equally important to the owner in both cases.

Figure 2: Number of active accounts over time



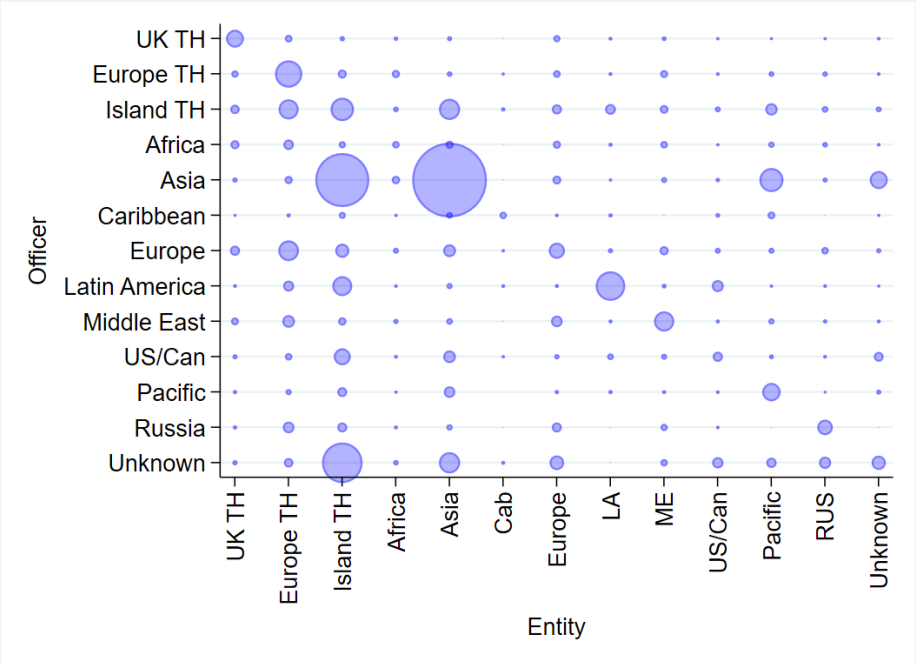
The figure shows the cumulative number of officers with active accounts by the region of the source country. Note that Asia is displayed on the right axis, with a larger scale. These are mainly Chinese officers incorporating in Hong Kong and are largely excluded from the analysis.

Figure 3: Number of accounts over time by source



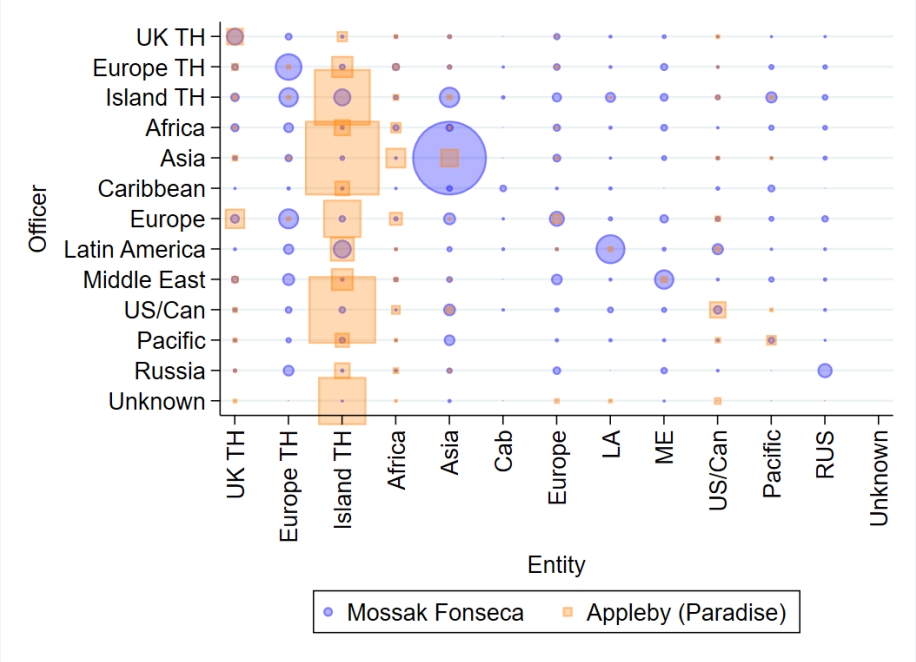
The figure shows the cumulative number of officers with active accounts by the source for the ICIJ data. The Commonwealth trust and Portcullis Trustnets are lawfirms that were the basis for the Offshore leaks. Bahamas leaks was a leak of the Bahamas corporate registry. The other corporate registers were jointly released in the Paradise papers. The jurisdictions for which officers are identified are Malta and Samoa.

Figure 4: Cross-region incorporation patterns



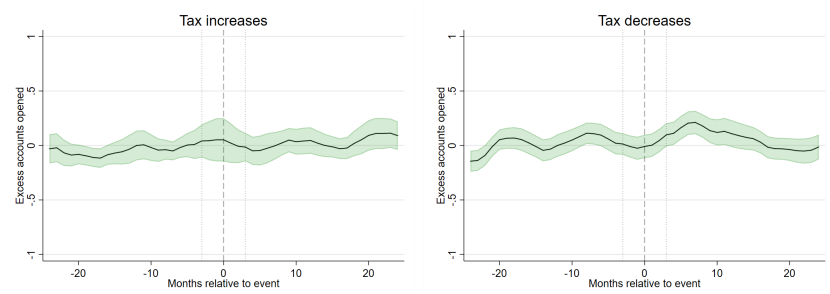
The size of the circle represent the number of owners from region y who owns accounts in region x. Island tax havens are defined as all tax havens with a population of less than 1 million and are not located in Europe or are UK territories.

Figure 5: Cross-region incorporation patterns by data source



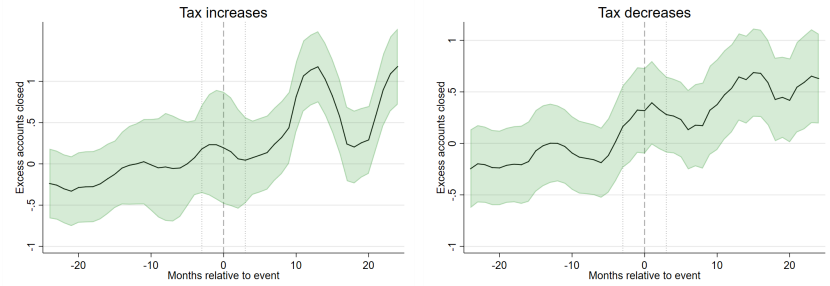
The size of the circle represent the number of owners from region y who owns accounts in region x. Each type of dot represent data from one of the two data sources with the most variation in officer origin. The size is relative to the total number of owners in each data source. Appleby represent only about 5 percent of all observed officers in the cleaned data, compared to 63 percent for Mossak Foseca. The scale is revised for visability. If each firm was a representative sample of the offshore opoulation, the size distribtuion would be equal across the two frims.

Figure 6: Offshore account activity around tax rate changes



(a) The effect of a tax increase on account openings

(b) The effect of a tax decrease on account openings

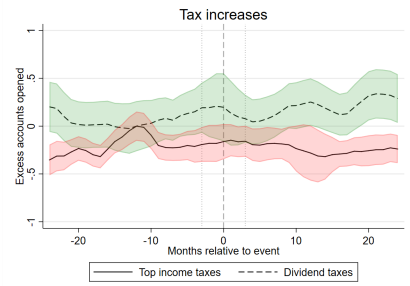


(c) The effect of a tax increase on account closures

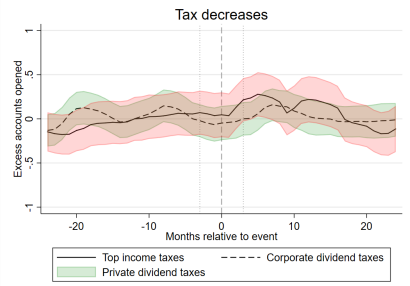
(d) The effect of a tax decrease on account closures

The event study includes all large changes in tax rates ralated to capital income in OECD over 2000-2014. All figures show $\hat{\theta}(z_{it})$ estimated by a local polynominal in a four-year window around the tax rate changes. Account activity is measured relative to the mean number of accounts opened per month in a given country over this period. The level is normalized to zero 12 months before the tax rage change goes into effect. The shaded area represent a 95 percent bootstrapped confidence interval.

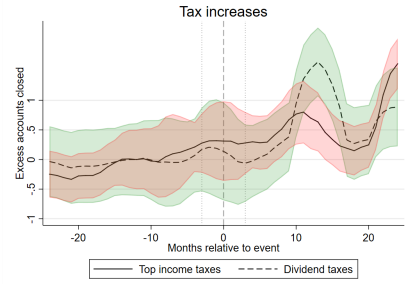
Figure 7: Offshore account activity around tax rate changes, by tax rate



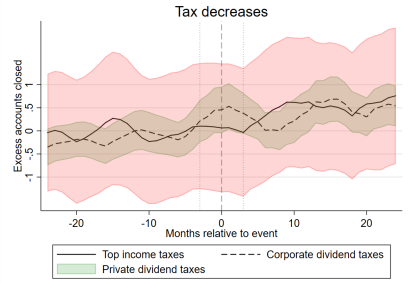
(a) The effect of a tax increase on account openings



(b) The effect of a tax decrease on account openings



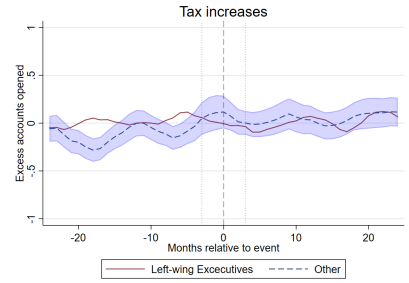
(c) The effect of a tax increase on account closures



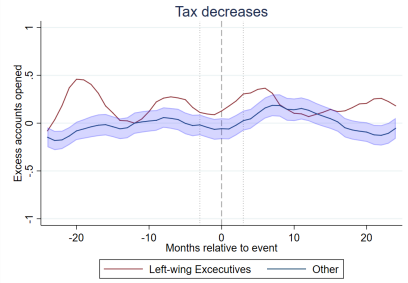
(d) The effect of a tax decrease on account closures

Here, the events are split up by type of tax rate change, either a change in the top marginal income tax rate, the tax rate on dividends levied on individuals and the tax rate on dividends levied on corporation. All figures show $\hat{\theta}(z_{it})$ estimated by a local polynominal in a four-year window around the tax rate changes. Account activity is measured relative to the mean number of accounts opened per month in a given country over this period. The level is normalized to zero 12 months before the tax rage change goes into effect. The shaded area represent a 95 percent bootstrapped confidence interval.

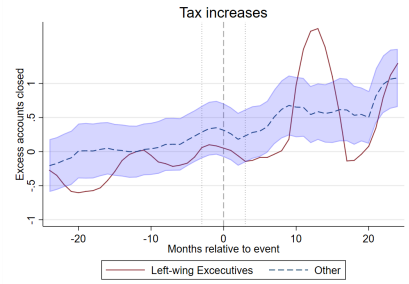
Figure 8: Offshore account activity around tax rate changes, differences in political motivation for the change



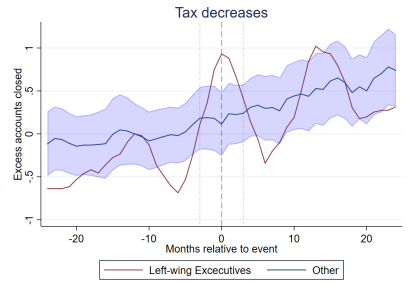
(a) The effect of a tax increase on account openings



(b) The effect of a tax decrease on account openings



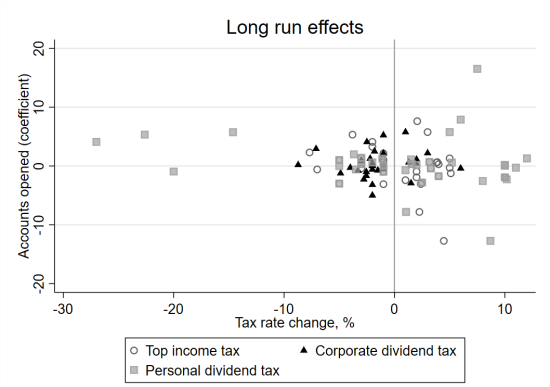
(c) The effect of a tax increase on account closures



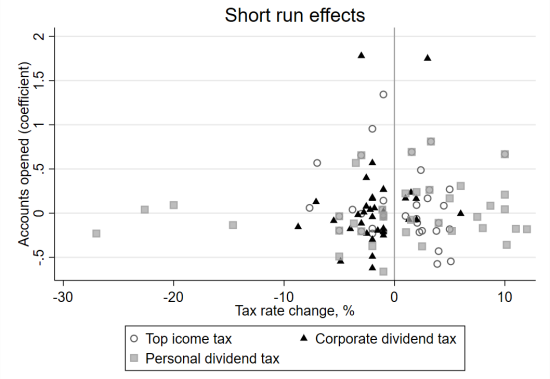
(d) The effect of a tax decrease on account closures

Here, the events are split up by what political affiliation the excecutive had when the tax rate change was enacted. The event study includes all large changes in tax rates ralated to capital income in OECD over 2000-2014. All figures show $\hat{\theta}(z_{it})$ estimated by a local polynominal in a four-year window around the tax rate changes. Account activity is measured relative to the mean number of accounts opened per month in a given country over this period. The level is normalized to zero 12 months before the tax rage change goes into effect. The shaded area represent a 95 percent bootstrapped confidence interval.

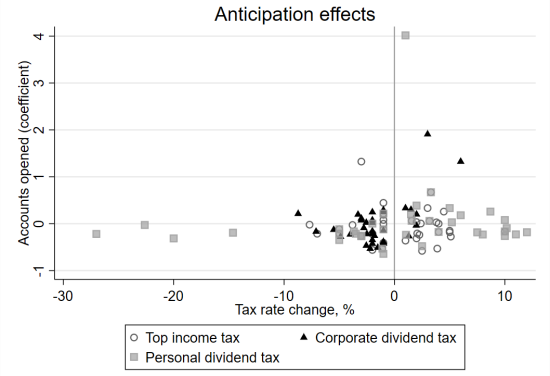
Figure 9: Effect on account openings by size of tax rate change



(a) Long run effects on account openings by tax size



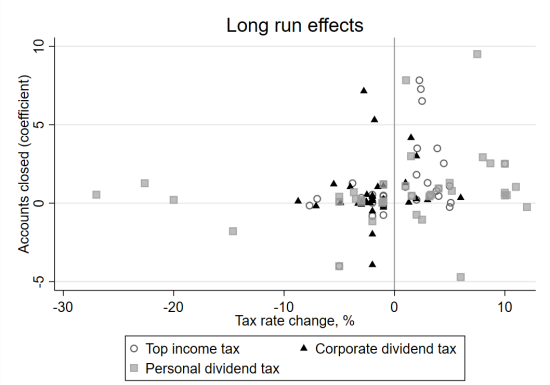
(b) Short run effects on account openings by tax size



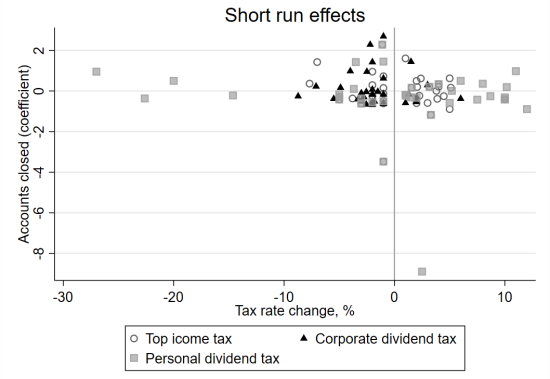
(c) Anticipatory effects on account openings by tax size

Each figure show the country-specific coefficient for the size of the treatment effect relative to the country average over a time period of six years around the event. The treatment period is defined as the three years post implementation in Panel a, three months post implementation in panel (b) and three months prior to implementation in panel (c). The coefficients are plotted against the percentage point size of the tax rate change.

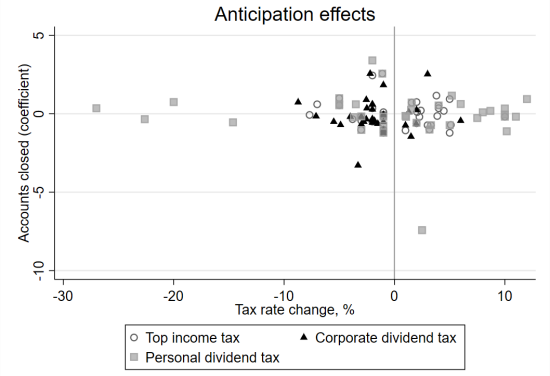
Figure 10: Effect on account closures by size of tax rate change



(a) Long run effects on account closures by tax size



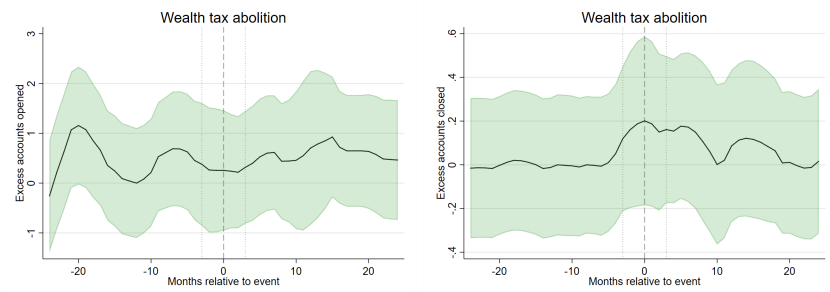
(b) Short run effects on account closures by tax size



(c) Anticipatory effects on account closures by tax size

Each figure show the country-specific coefficient for the size of the treatment effect relative to the country average over a time period of six years around the event. The treatment period is defined as the three years post implementation in Panel a, three months post implementation in panel (b) and three months prior to implementation in panel (c). The coefficients are plotted against the percentage point size of the tax rate change.

Figure 11: Offshore account activity around wealth tax abolitions

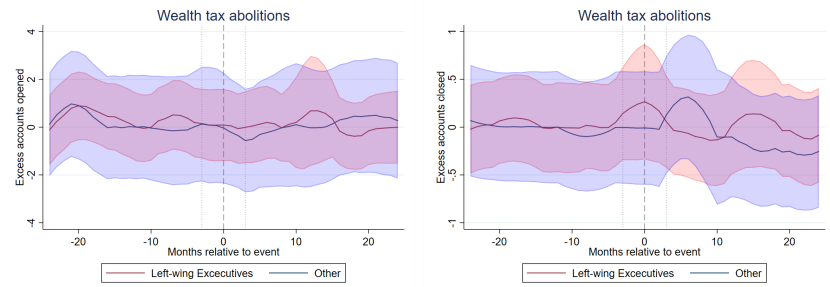


(a) The effect of wealth tax abolitions on account openings

(b) The effect of wealth tax abolitions on account closures

The events are all wealth tax abolitions listed in table 4. All figures show $\hat{\theta}(z_{it})$ estimated by a local polynominal in a four-year window around the tax rate changes. Account activity is measured relative to the mean number of accounts opened per month in a given country over this period. The level is normalized to zero 12 months before the tax rage change goes into effect. The shaded area represent a 95 percent bootstrapped confidence interval.

Figure 12: Offshore account activity around wealth tax abolitions by political affiliation of current government

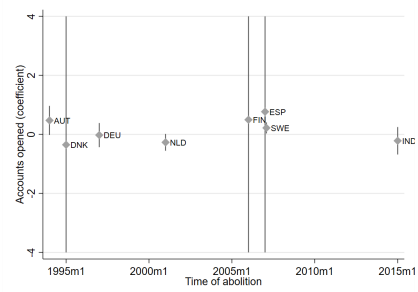


(a) The effect of wealth tax abolitions on account openings

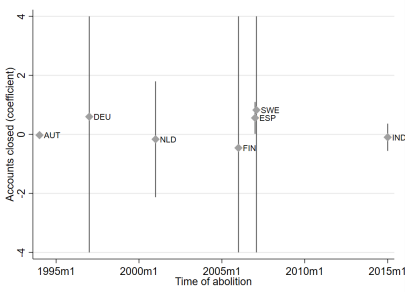
(b) The effect of wealth tax abolitions on account closures

The events are all wealth tax abolitions listed in table 4 split by the political affiliation of the excecutive during the time of implementation. All figures show $\hat{\theta}(z_{it})$ estimated by a local polynominal in a four-year window around the tax rate changes. Account activity is measured relative to the mean number of accounts opened per month in a given country over this period. The level is normalized to zero 12 months before the tax rage change goes into effect. The shaded area represent a 95 percent bootstrapped confidence interval.

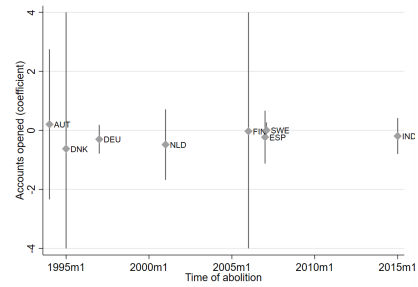
Figure 13: Country-specific effects of wealth-tax abolition



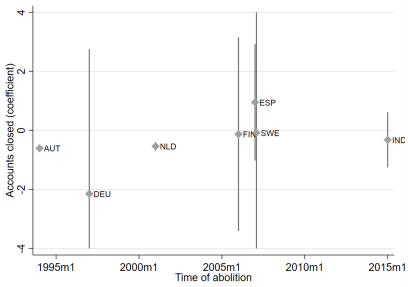
(a) Long run effects on account openings



(b) Long run effects on account closures



(c) Short run effects on account openings



(d) Short run effects on account closures

Each figure show the country-specific coefficient for the size of the treatment effect over the long run (three years post implementation) or the short run (three months post implementation) relative to the average over a six-year window. Confidence intervals are generated from bootstrapped standard deviations, and large intervals are capped at [-4,4].

Tables

Table 1: Summary statistics on network level

	Mean/sd	p10	Median	p90	Max
Panel A *Network characteristics*					
Nr of nodes	10.674	2	3	7	128241
	(806.65)				
Nr of countries	1.961	1	2	3	178
	(1.49)				
complexity	5.332	0	0	3	85154
	(534.08)				
relative complexity	0.541	0	0	1.500	1406.120
	(5.58)				
Country Assortativity	-0.820	-1	-1	-0.333	0.830
	(0.28)				
Share of entities	0.112	0	0	1	1
in tax havens	(0.31)				
N	183 612				

The table shows network characteristics for each connected component with more than a single observation. The distribution of the size of the networks are heavily skewed, so the table show the 10th and 90th percentiles, along with the mean and median. There are 6 networks with over 1000 vertexes, the largest of which is very large. This skews the mean. Complexity is defined as in Flood et al. (2017) as the additional number of jurisdiction boarder crossings in the network. Relative complexity is complexity devided by the number of countries in the network. Country assortativity measures whether a node is more likely to be connected to a node of the same country (positive assortivity) or less if there are more than one node with the same country in the network.

Table 2: Summary statistics on network level

	Mean/sd	p10	p50	p90	Mean/sd	p10	p50	p90
Panel A *Networks with EU officers*					Panel B *Norwegian or Swedish*			
Nr of nodes	43.967	2	3	9	641.107	2	4	10
	(2113.09)				(8453.18)			
Nr of Countries	2.630	2	2	4	3.645	2	2	4
	(3.42)				(13.09)			
Complexity	25.234	0	1	4	377.790	0	1	4
	(1327.59)				(5206.46)			
Relative	0.687	0	0.25	1.5	2.749	0	0.5	1.5
complexity	(7.65)				(29.80)			
Country	-0.73	-1	-0.85	-0.33	-0.72	-1	-0.67	-0.33
assortativity	(0.30)				(0.29)			
Any tax haven	0.279	0	0	1	0.378	0	0	1
Officer	(0.45)				(0.49)			
Any Anonymous	0.017	0	0	0	0.022	0	0	0
Officer	(0.13)				(0.15)			
N	14626				682			
Panel C *Networks with US officers*					Panel D *Bearer Bonds*			
Nr of nodes	123.321	2	4	18	16.612	2	3	8
	(3583.30)				(1152.54)			
Nr of Countries	3.299	2	3	5	2.221	2	2	3
	(5.80)				(1.90)			
Complexity	71.364	0	1	9	10.070	0	1	4
	(2206.55)				(781.71)			
Relative	1.295	0	0.5	2.4	0.940	0	0.5	1.6
complexity	(12.72)				(4.87)			
Country	-0.63	-1	-0.6	-0.20	-0.86	-1	-1	-0.44
assortativity	(0.31)				(0.26)			
Any tax haven	0.246	0	0	1	0.140	0	0	1
Officer	(0.43)				(0.35)			
Any Anonymous	0.085	0	0	0	0.065	0	0	0
Officer	(0.28)				(0.25)			
N	3805				28891			

Network characteristics for each ownershio network with more than a single observation. The distribution of the size of the networks are heavily skewed, so the table show the 10th and 90th percentiles, along with the mean and median. Complexity is defined as in Flood et al. (2017) as the additional number of jurisdiction boarder crossings in the network. Relative complexity is complexity devided by the number of countries in the network. Country assortativity measures whether a node is more likely to be connected to a node of the same country (positive assortivity) or less if there are more than one node with the same country in the network. Panel A includes all networks with an identified European officer, and panel C shows all networks with an identified US officer. Panel B show the special case of networks involving Swedish and Norwegian officers, the sample studied in Alstadsæter et al. (2017a). Panel D is the special case of Bearer bonds, where the identity of the owner is fully untracable.

Table 3: Slope coefficients for tax rate changes

Panel A: *Account openings*	Long run	Short Run	Anticipation
Top income tax	-0.381*	-0.010	-0.004
	(0.18)	(0.02)	(0.01)
Corporate dividend tax	0.262	0.030	0.074
	(0.36)	(0.03)	(0.04)
Private dividend tax	-0.092	0.004	0.007
	(0.07)	(0.00)	(0.00)
Panel B: *Account closures*	Long run	Short Run	Anticipation
Top income tax	0.213**	-0.022	0.145
	(0.07)	(0.15)	(0.15)
Corporate dividend tax	0.053	0.091	0.047
	(0.07)	(0.10)	(0.09)
Private dividend tax	0.052	-0.019	-0.014
	(0.03)	(0.01)	(0.01)

This table shows the slope coefficients for the plots in figure 9 and 10 between the estimated effect on offshore activity and the percentage point size of tax rate changes. There is no restriction on the intercept (constant omitted) and the slopes are estimated for each type of tax separately. The theoretical prediction would imply a positive slope for account openings and a negative slope for account closures. Standard errors are heteroskedasticity-robust.

Table 4: Wealth Tax Abolitions

Country	Year abolished	Current tax rate (highest bracket)
Austria	1994	
Denmark	1995	
Finland	2006	
France		1.5
Germany	1997	
Iceland		2
India	2015	
Ireland	1997	
Luxembourg		0.5
The Netherlands	2001	
Norway		1.1
Spain	2007	2.5
Sweden	2007	
Switzerland		0.657

Source: Niemann and Sureth-Sloane (2015). Countries that have had taxes on the stock of financial wealth, and the year of abolition when applicable. Note that Spain reintroduced a wealth tax in 2012