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The Impact of the 2016 Finance Act on Investment into Irish Real Estate Funds

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Abstract

This paper analyses the impact that the 2016 Finance Act on investment into Irish real estate investment funds (IREFs). The Act introduced a 20% tax rate on the distributions and capital gains from IREF equity for most foreign investors. To understand the impact of this change, a novel investor-level dataset is analysed using difference-in-difference and triple difference models. I find that the average investor whose tax status changed did not alter their investment behaviour, relative to investors whose tax status did not change. Investors who were the only investor in a fund (single investors) responded by reducing net subscriptions by 16.6-18.5 percentage points more than other investors who saw their tax status change. This corresponds to an elasticity of around -1. Estimating the regressions in an event study format, it becomes clear that single investors' reaction to the tax change was concentrated in Q4 2016, the period during which the tax was announced but before it came into effect. Consulting the financial statements of these funds, an explanation emerges - a substantial minority of single investor funds responded to the tax change by providing loans to fund dividends and redemptions. Constructing a series for shareholder lending from the financial statements, I am able to confirm this empirically. Therefore, the primary, but unintended, consequence of the 2016 IREF tax was the swapping of equity for shareholder loans by single investor funds, in an effort to reduce their tax liability resulting from the policy change.

Keywords: Real Estate Investment Funds, Taxation, Financial Economics

JEL Codes: H2, G18, R3

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[2] It should also be noted that any views presented within this paper represent the views of the author, and his alone. They do not represent the views of the Central Bank of Ireland.

Non-Technical Summary

This paper evaluates the impact of the 2016 Finance Act (the Act) on Irish real estate funds (IREFs) – investment funds whose assets are primarily Irish real estate. Prior to the Act, non-resident investors in IREF shares were exempt from Irish tax on their capital gains and dividend income. Instead, these investors paid tax in the country in which they were tax resident. The Act introduced a 20 per cent tax on capital gains and dividends accruing to most non-resident investors in IREF shares. The Act exempted certain non-resident investors from the tax change, and resident investors saw no change in their tax status.

Economic theory suggests an ambiguous impact of such a tax change on demand for IREF shares. A decrease in returns for an investor should reduce their demand for that asset. However, the variation of returns also decreases after the taxes' introduction, which should increase demand for the asset. The small empirical literature suggests that the former matters more than the latter, and this paper provides further evidence of an issue for which there is limited existing empirical work.

The analysis has two main findings. First, I find little evidence that the average investor responded to the tax change. The difference in investment behaviour between investors whose tax status changed and investors whose tax status remained unchanged is statistically indistinguishable from zero.

Second, the results suggest that while the average impact was zero, the effect of the tax change varied across different investor groups. Investors who were the only investor in a fund (single investors) and saw their tax status change reduced their holdings of fund shares by 16.6 to 18.5 percentage points, relative to other investors who also saw their tax status change. These results are mostly accounted for by 'anticipation effects', with single investors reacting after the tax was announced but before it came into effect. The estimates for taxed single investors are so extreme that it is difficult to comprehend how these funds remained in operation. However, the funds' financial statements provide an explanation of this behaviour – the elevated levels of dividends and redemptions were funded by shareholder loans, in an effort to reduce investors' tax liabilities, as explained below.

The swapping of equity for shareholder loans, whether via dividends or redemptions, reduced single investor's tax liabilities in two ways: firstly, it allowed them to extract unrealised gains on their investments before the tax came into effect. If they had sold their property following the tax's implementation, they would be required to pay tax on those unrealised gains. Secondly, it allowed investors to use interest payments on the shareholder loans to sweep up rental income and future unrealised gains. Providing the investors met certain conditions, the interest payment on these loans would be exempt from withholding tax. This method of tax structuring was also available to funds that began operating following the taxes introduction.

The paper has two main policy implications. First, the 2016 Finance Act was not effective in ending the non-payment of Irish tax by non-resident investors on profits from Irish property. This conclusion is validated by anti-avoidance measures introduced in the 2019 Finance Act. Second, it has also led IREFs to take more leverage on to their balance sheets, which may have financial stability implications and makes monitoring fund leverage a more complex exercise.

Introduction

The Finance Act 2016 levied a new 20% withholding tax on most foreign investors in Irish real estate funds (IREFs). The tax was introduced following controversy over the non-payment of tax by international investors on profits arising from Irish property assets (Brennan, 2016). It was introduced in tandem with other measures that intended to ensure that profits and income arising from Irish property assets were taxed in Ireland. This paper aims to analyse the impact that the IREF tax had on the investment of those it affected.

The paper is the first to analyse the impact of the 2016 Finance Act on Irish real estate fund investors, but it fits within a broader literature looking at the impact of tax changes on investment decisions. This includes Desai & Dharmapala's (2011) analysis of how the 2003 US tax reform shaped international portfolio equity investment from the US, and Cappalletti's et al.'s (2014) research on the impact of changing the taxation of Italian domestic mutual funds for Italian investors from an accruals basis to a realisations basis.

The paper analyses a novel investor-level dataset covering Q1 2014-Q4 2017 to determine what impact the IREF tax had on investors' net subscriptions. Estimates from difference-in-difference and triple difference models suggest that the tax change had a heterogeneous impact on investors. The tax change did not lead affected investors to reduce their investment on average, relative to other investors whose tax status did not change. However, the impact of the tax change was not the same for all investors. Investors who were the only investor in a fund (single investors) and saw their tax status change, reduced their net subscriptions by between 16.6 to 18.5 percentage points more than other investors who saw their tax status change.

Estimating these regressions in an event study format shows that the impact of this tax for single investors is concentrated in Q4 2016, the period after the tax change is announced but before it is implemented. Similarly, single investors who saw their tax status change also received substantial dividends in the same quarter. The parameter estimates are so large that they suggest funds would have shut down, yet they did not[3]. Reading the audited financial statements of these funds an explanation emerges for the parameter estimates: a subset of single investor funds responded to the tax change by loan funding dividends and redemptions, thus swapping their equity for shareholder loans. This is confirmed empirically using a series on shareholder loans created from the funds' audited financial statements.

Analysing the impact of this tax change is policy relevant for a number of reasons. First, the Irish property market is and will continue to be a policy issue for the foreseeable future. Irish real estate funds play a significant role in the Irish property market, holding 35% of the total professionally managed real estate stock at end 2017. They contribute to both supply and demand within the market, so understanding whether the tax change altered their behaviour is important if we want to understand the market. Second, due to the amount of property these funds hold, their sensitivity to tax changes is also relevant from a financial stability perspective. If the tax change led to significant investor redemptions, this may lead multiple funds to sell their property at the same time, putting downward pressure on commercial property prices. Finally, this change represented a significant

[3] Single investor funds saw redemptions equivalent to 95 p.p of their opening equity in Q4 2016. In comparison, Third Avenue closed their Focused Credit Fund after combined asset devaluations and redemptions of 50% (McLaughlin, 2015).

departure from Ireland's fund taxation regime, as foreign investors in Irish domiciled funds pay no Irish tax. Therefore, the response of investors to the tax change could assist policymakers in understanding the impact of further changes to the Irish funds taxation regime. Beyond its policy relevance, it also contributes to the small literature evaluating the impact of tax on financial investment.

The paper proceeds as follows: Section 1 will provide a summary of the changes in the 2016 Finance Act and an overview of IREFs. It then moves on to providing detail on how it fits in with the literature on taxation and investment funds (section 2), and runs through the model and data used for the analysis of the impact of the tax change (section 3-4). Section 5 uses a difference-in-difference model to analyse the impact of the tax change, and discuss the results from the model. Finally, section 6 will take a deeper look at the impact of the tax change on investor subgroups using triple difference estimators.

1. Irish Real Estate Funds – Taxation and Overview

1.1. Taxation

It is a generally accepted principle of taxation that profits arising from immovable property (i.e. real estate) should be taxed in the country in which said property is located (OECD, 2015). Prior to the 2016 Finance Act non-resident investors paid no Irish tax on profits from Irish real estate if they held Irish real estate through an investment fund. The 2016 Finance Act aimed to correct this exception to ensure that non-resident investors could no longer avoid Irish tax on profits arising from Irish real estate (Department of Finance, 2019).

The Act introduced a 20% withholding tax on capital gains and dividends accruing to non-resident investors in IREF equity, where said capital gains and dividends resulted from IREF profits[4][5]. Resident investors saw no change in their tax rate following the act's introduction. While the funds collect the tax, the tax is levied on investors.

The Act set out certain categories of investors who would be exempt from the tax change. Exempt foreign investors included investment funds, pension funds and life assurance companies located in the European economic area (EEA). UK charities are also exempt from the tax change. However, this exemption is conditional on the investor in question not being able to influence the decisions of the IREF in which they have invested.[6]

The legislation also created a distinction in regards to claiming relief under Irish double-taxation treaties (DTT). Investors who hold more than 10% of a fund's total equity have their income and gains classified as income from immovable property, which is not covered for relief in Irish DTTs. If an investor holds less than 10% of the fund's equity then they are designated as receiving dividend income, and can reclaim any excess withholding tax down to the rate specified in their relevant double

[4] Details on the IREF taxation regime can be found in section 739K-739X of the Tax Consolidation Act 1997.

[5] IREF profits are defined as profits and gains shown in a funds income statement excluding those arising from non-property income dividends of REITs and dividends from shares that derive their value from Irish property.

[6] If they have the ability to do so, the fund they have invested in is classified as a personal portfolio IREF. This classification is intended to ensure that funds being used as investment vehicles by other funds, pension funds and life assurance companies are not exempt from the tax change.

taxation treaty (Vale & McMahon, 2017). This feature is important, as the relevant rate in a number of double taxation treaties is zero[7] (PwC Ireland, 2017). Once this is taken into account, affected investors either pay 10%, 15% or 20%.

REITs[8] are not included in the definition of IREFs. This is because their taxation is separate to Ireland's investment fund taxation regime, so the amendment being studied did not apply to REITs. However, as noted below if an investment fund's portfolio has significant concentration in Irish REIT shares they will be classified as an IREF.

The 2016 Finance Act defined IREFs as investment undertakings whose assets derived 25% or more of their value, directly or indirectly, from 'IREF assets'. IREF assets are listed as:

- Land or mineral rights in the State [of Ireland]
- Shares in a [Irish] real estate investment trust (REIT)
- Unlisted and unquoted shares deriving their value from the prior two categories
- Specified mortgages
- Units in an IREF.

This definition leads to 168 funds over the period 2014-2017 being classified as IREFs, of which 131 are included in the sample. Funds that become active from Q4 2016 onwards are excluded from the sample.

1.2 IREFs: An Overview

Many characteristics of these 131 funds are relevant for the paper's analysis. This subsection summarises these characteristics.

Firstly, they are all unlisted. This means the tax change should not affect the value of their shares. Rather they are mechanically determined as the value of assets minus liabilities divided by the number of shares, and most variation in it should come from changes in the value of their assets or their profits/losses.

Secondly, all their shares are denominated in euro. This simplifies controlling for changes in foreign exchange (FX) rates.

Thirdly, IREFs are mostly invested in the same type of assets. This reduces concerns that investors may be responding to variation in the performance of different types of assets rather than the tax change. To determine whether this would be an issue, I constructed a property-by-property dataset from the investment funds' financial statements for the 2012-2017. I identified that out of a total of €16.8bn in total Irish property assets held by these funds at end Q4 2017, approximately €13.7bn is invested in commercial real estate. Residential real estate makes up €1.9bn, with land & development making up the remainder. Furthermore, their investments are highly concentrated in Dublin – at end-2017, 89% of their total stock of Irish property assets were located there. There are only two funds which hold

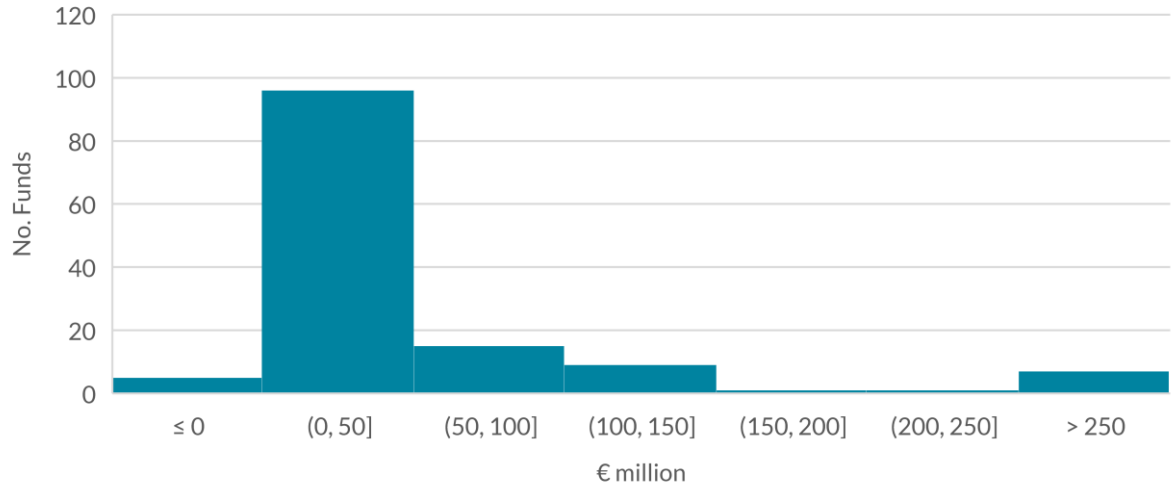
[7] This includes Australia, Austria, Belgium, Hong Kong, Denmark, Luxembourg, Singapore, Spain and Switzerland.

[8] REITs and IREFs are both vehicles through which investors can invest in property, but stricter criteria exist for qualifying as a REIT. REITs must be collective investment vehicles, invest in a variety of properties, provide annual dividends and satisfy a number of other criteria. More detail can be found in (Deloitte Ireland, 2013).

assets other than Irish property, and for only one of them does Irish property not make up the majority of their assets by value.

Fourthly, most funds are small. At end-2016 the amount of equity invested in IREFs stood at €8.1bn spread across 131 funds. Looking at the distribution of funds by total NAV (Chart 1), the majority of funds have a total NAV between €0mn and €51mn (96 of 131).

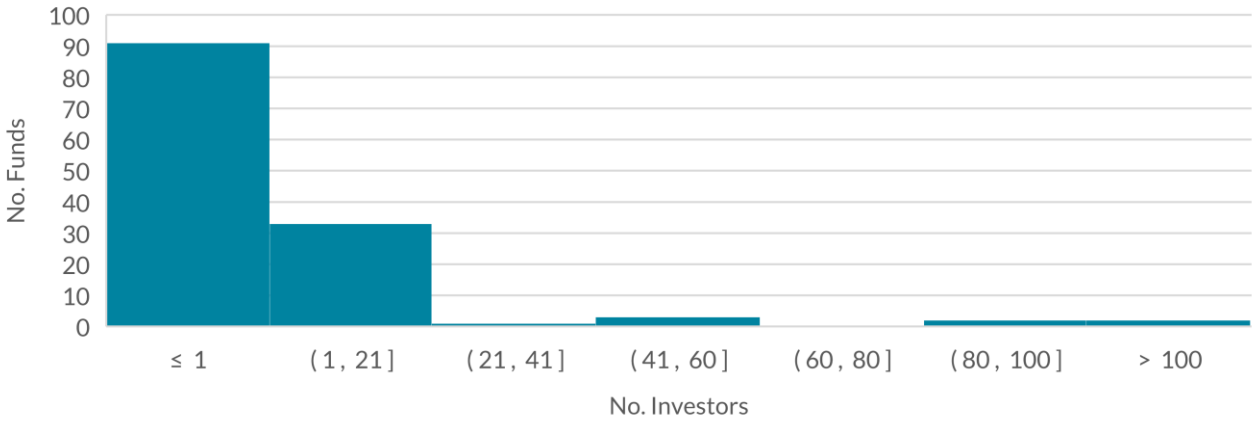
Chart 1: Distribution of IREFs by Total NAV as of End-2016 – in €Mn



Source: Central Bank of Ireland, author's calculations.

Fifthly, the ownership of IREF shares is highly concentrated within IREFs. IREFs vary along a continuum, from the classic mutual fund structure with many small investors, to structures that are more akin to investment vehicles where there is only one investor in the fund. However, most funds conform to the investment vehicle type - at end 2016, 91 of a total of 132 funds had only one investor (see Chart 2). From henceforth they will be referred to as single investor funds, and investors in them will be referred to as single investors.

Chart 2: Distribution of No. of Investors Per Fund as of End-2016 – In Units



Source: Central Bank of Ireland, author's calculations.

2. Literature Review

This paper is the first to address the question of what impact the 2016 Finance Act had on investment into Irish real estate funds, but ties in with various strands of research.

Previous research on the IREF sector is limited to McCarthy (2017), Coates et al. (2019) and market research provided by Irish real estate agents, such as Savills (2018) . McCarthy (2017) and Savills (2018) are limited to descriptions of the investment activity of investors in IREFs and of IREFs themselves, while Coates et al. (2019) takes a broader focus on all non-bank investment into commercial real estate, and explores potential financial stability risks inherent in such investment.

The research question ties in with portfolio choice theory, specifically the capital asset pricing model (CAPM). A simple CAPM would predict that a tax increase on asset would have an ambiguous effect on its demand. This is because it reduces its net return, reducing demand, but also decreases the variance of its return, increasing demand (Cappelletti, Guazzarotti, & Tommasino, 2014). Tax adjusted open economy CAPMs that study dividend taxation, such as that in Bond et al. (2007) and Desai and Dharmapala (2011), address this ambiguity by assuming that dividends are deterministic and thus have no variance. In addition, their model predicts that the value of equity will not be affected by the tax change provided tax-affected investors have wealth that is insignificant to global wealth. The IREF tax affected both capital gains and dividends. Assuming both to be deterministic is unreasonable. In the absence of such assumptions, theory predicts an ambiguous effect of taxation on demand for IREF equity. However, the empirical evidence presented below suggests that the reduction in the net return is more important than a reduction in the variance of returns. Thus, I expect the tax to have a negative effect on asset demand.

The paper is most closely related to literature evaluating the impact of tax changes on investment. One example is Desai and Dharmapala (2011), which looks at the impact of the impact of the US 2003 Jobs and Growth Tax Relief Reconciliation Act on the country composition of portfolio equity investment. The Act provided favourable tax treatment of dividends for a subset of foreign countries. Using a difference-in-difference design the authors show that holdings of equity from affected countries increased following the tax reform. They estimate a tax elasticity of equity demand of approximately -1.6. Cappalletti's et al.'s (2014) evaluation of a 2011 change in Italian taxation of mutual funds for Italian investors is also relevant. The tax change brought the taxation of investors in domestic funds from an accruals basis to a realisation basis, while investors in foreign funds saw their taxation remain on a realisation basis. Using a difference-in-difference design, the author's find that this change led to greater inflows from Italian investors into domestic funds. Both results are line with the theoretical predictions of Bond et al. (2007). This paper will use similar methods to both papers, but will differ in its use of individual investor data.

This work also relates to the literature on the impact of tax on portfolio choice, which is uniform in its evidence that taxation affects investment decisions. Alan et al. (2010) find that the ratio of income between married couples determines to which individual capital income is shifted, and the type of assets that are invested in. Zoutman (2014) exploits variation in after tax returns for financial and housing wealth introduced by a 2001 Dutch tax reform to estimate how taxation affects portfolio allocation decisions between each category of wealth. He finds that the tax had a modest impact on portfolio choice, but that there is significant heterogeneity in response between wealthy individuals

and others. Ochmann (2016) studies the impact of Germany's tax reform in the year 2000, and concludes that the reform affected demand for different asset classes according to their change in tax treatment. Poterba and Samwick (2003) investigate the relationship between marginal income tax rates and portfolio allocation, and find that holdings of tax-favourable assets increase as the marginal tax rate increases. Unlike these papers, the current study does not have an overview of whether investors have switched to alternative investments, and can only judge whether relative to tax-exempt parties newly taxed investors responded to the change in their tax rate.

Research on the relationship between returns and investment in real estate funds suggests that returns drive inflows into funds, rather than vice versa. Downs et al. (2016) examine this for German open real estate funds using a VAR model framework and find that returns predict investor flows, but that investor flows do not predict returns. Ling and Naranjo (2006) and Lin and Yung (2006) perform similar analyses with data for US REITs, and come to a similar conclusion. This is reassuring as it suggests simultaneity bias between returns and fund inflows should not be a concern.

Given that the tax was levied on foreign investors, the paper is also linked to the literature on cross border real estate investment. Baum et al. (2013) attempt to estimate institutional and regulatory cross border determinants of real estate investment. They find that the majority of the variables which they test, including measures of fiscal, government, labour and investment freedom, financial development, property rights and real estate transparency all have no effect on cross border flows. The only variable that has a statistically significant impact on cross border flows is the depth of credit information.

3. Identification Strategy and Empirical Model

3.1 Research Design

The 2016 Finance Act lends itself to being analysed with a difference-in-difference (DiD) research design. The Act lead to a change in the tax rate for some investors (treatment group), while for others their tax rate remained unchanged (control group). To estimate the causal effect of the tax change using a DiD design, differences in investment behaviour between the treatment and control group before and after the tax change are compared. The key assumption is that in the absence of the tax change, the treatment group would have followed the same trend as the control group.

For this assumption to hold, other time-varying factors that influenced investors to subscribe and redeem IREF shares must be controlled for. To this end, the analysis can be cast within an after tax portfolio choice framework, such as that of Desai and Dharmapala (2011). The theory would suggest that the decision to invest or divest in the shares of an IREF is determined by the expected return[9] of IREF equity, the expected return of alternative investments and changes in the wealth constraint (i.e. income, as proxied by RGDP growth). In addition, it would suggest that the imposition of a tax on an asset class should lead investors to reduce their holdings of that asset class.

[9] Investors' expectations are assumed to be adaptive, thus current quarter QoQ growth is a valid variable for expected returns. This same assumption is used for expected returns on alternative investment opportunities.

The remaining question is how to model the alternative investment opportunities of each investor. Assume that the set of all countries in which an investor can invest is W. There are n countries in the sample, where n is a subset of W (i.e. $n \subset W$), and W=[1,..,k]. To simplify, assume there is only one investor from each country, and that income does not influence their decision. Thus, the alternative investment opportunities of a set of investors from countries $1,2,3,4 \in n$ investing in the equity of fund j are represented as follows:

1. $Y_{1jt} = \beta_{11}X_{11t} + \beta_{W1}(X_{21t} + X_{31t} + X_{41t} + .. + X_{n1t} + X_{(n+1)1t} + .. + X_{k1t}) + u_{1jt}$
2. $Y_{2jt} = \beta_{22}X_{22t} + \beta_{W2}(X_{12t} + X_{32t} + X_{42t} + .. + X_{n2t} + X_{(n+1)2t} + .. + X_{k2t}) + u_{2jt}$
3. $Y_{3jt} = \beta_{33}X_{33t} + \beta_{W3}(X_{13t} + X_{23t} + X_{43t} + .. + X_{n3t} + X_{(n+1)3t} + .. + X_{k3t}) + u_{3jt}$
4. $Y_{4jt} = \beta_{44}X_{44t} + \beta_{W4}(X_{14t} + X_{24t} + X_{34t} + .. + X_{n4t} + X_{(n+1)4t} + .. + X_{k4t}) + u_{4jt}$

Where Y_{1jt} is an investor from country *1*'s net subscriptions in fund j for period t; X_{11} represents the return on alternative investment opportunities in investor *1*'s own country ; X_{21} represent the returns of investor from country *1* investing in country *2; * β_{11} is the cross return elasticity of investment demand for alternative domestic investments; and $\beta_{W1,2,3,4}$ are k by 1 vectors of parameter estimates for the cross return elasticity of investment demand for alternative foreign investments.

To start, let us consider that each investor faces a choice to invest domestically or internationally. This is motivated by the fact that in a world of frictions which afflict investors investing abroad the international capital asset pricing model implies that the differential elasticity of investment demand between domestic and foreign investors (Stulz, 1994). Empirical evidence of differential elasticities is found in (Kim, Lee, & Morck, 2004) and in (Bailey, Chung, & Kang, 1999).

The implication of this is that the relationship between returns and investment faced by an investor investing in their own country, country *1*, is different to that of an investor from a different country, country *2*, investing in country *1*. Letting β be the cross return elasticity of investment demand between IREF shares and returns on alternative investment opportunities, formally this can be stated as:

5. $\beta_{11} \neq \beta_{12} \qquad 1,2 \in W$

Due to this feature of investor behaviour, domestic investment is differentiated from international investment for each investor.

Regarding foreign investment, first consider that many variables that determine whether and how much an investor invests, such as language, distance, trust, legal systems etc. are fixed, or will be fixed over the short duration being analysed (4 years). Thus, these will be captured with investor fund fixed effects. FX rates are an exception to this, but can be controlled for with a nominal effective exchange rate. Therefore, the model assumes that investors investing abroad should find the fx adjusted returns for the same investment opportunity equally attractive. Formally, this can be stated as:

6. $\beta_{12} = \beta_{13} \qquad 1,2,3 \in W$

Under this assumption, alternative investment opportunities for countries between n+1 and k in equations 1-4 are common and equally attractive to all investors. Thus, their impact on demand for IREF shares is picked up by the post treatment period dummy.

What remains is investment between the set of countries present in the sample (i.e. 1 to n countries). For each investor, this represents cross sample investment. To capture the impact of alternative cross sample investment opportunities a currency adjusted weighted average return for each investor country for bond, equity and real estate returns is constructed.

Larger investors (institutional, high net worth individuals) may have different opportunities available to them relative to smaller investors. To capture this, multiple arbitrary cut offs for what maximum shareholding size denotes an investor as an institutional investor are created, and they are interacted with the post treatment period dummy to see if the average level of investment between the two groups differs over time.

Similarly, one may be concerned that investors who are the only investor in a fund (single investors) behave differently to other investors. This heterogeneity can be controlled for with an interaction between single investor status and the post-treatment period dummy. Their behaviour is given more in depth consideration in section 6.

Simultaneity bias is unlikely to be a concern in the specification. Investor covariates will not be affected by net subscriptions of IREF investors. With fund covariates, the fund's price is calculated mechanically from the value of its property assets, so the capital appreciation variable will not be affected by net subscriptions or redemptions. As for the dividend yield, it is reasonable to assume that secondary market sales and purchases of shares, and subscriptions to the fund should have no influence on a fund's dividend behaviour. While redemptions and dividends can both drawn from a fund's cash, one would imagine that from a liquidity perspective these funds would always have some cash ring-fenced for redemptions. Furthermore, where these funds are open they usually place restrictions on an investor's ability to immediately redeem shares (i.e. prior notification, preventing the redemption of the full amount).

3.2 Treatment Effect

The research design will not be able to estimate average treatment effects of the tax change. This is because the effective increase in the tax rate that an investor faces depends on the tax rate they were paying in their country of origin. If an investor paid tax in their country of origin at a rate in excess of the Irish withholding tax rate they now pay, and their country of residence has a double taxation treaty with Ireland, then the investor will likely be able to avail of double taxation relief from their own government. If the investor was paying tax at a lower rate, or resided in a country that did not share a double taxation treaty with Ireland and did not provide double taxation relief, then they will be paying an increased amount or the full amount.

To know what rate of tax an investor was paying prior to the tax change would require access to each investor's tax return, as the rate an investor pays is subject to a number of factors. Therefore, the estimates produced in this analysis for the tax variable must be viewed as intention-to-treat effects (i.e. the tax change intended to raise tax rates on affected investors by 20%-10%). This means that this paper's results are not directly comparable to the results of the literature previously cited, as the literature estimates average treatment effects.

It is expected that the results will be biased downwards (i.e. less negative) relative to the average treatment effect. This is because the degree to which an investor's tax rate increased will be overestimated if an investor is already paying tax. However, it cannot be underestimated as the change should not lead a non-resident investor to pay tax additional to the rate specified to them. Given the one-sided nature of this bias, the results can be viewed as a lower bound of the average treatment effect.

3.3 Empirical Model

The empirical model can be described by the equation:

7. $$Y_{ijt} = \delta_1 Tax_{ij} + \delta_2 Post_t + \delta_3 Tax_{ij} * Post_t + \beta X_{it} + \gamma Z_{jt} + \theta_{ij} + v_t + \pi Char_{ij} * Post_t + u_{ijt}$$

Where Y_{ijt} is net subscriptions of investor i in fund j at time t, as percentage of the opening position of that investor's equity holding.

X_{it} covers investor covariates. It includes quarter-on-quarter (QoQ) returns available from alternative domestic and cross sample investment opportunities (bonds, equity, and real estate), QoQ real GDP growth, QoQ changes in the EUR-XXX rate and QoQ changes in the nominal effective exchange rate for those countries outside the sample. The country of an investor is determined by the ultimate location of the investor rather than the location of their holding company or nominee account, where such information is available. For example, an Irish investor investing through a Maltese holding company will have returns on Irish debt, equity and real estate controlled for. A count of the number of investors in each ultimate location can be found in table 1 in the Appendix.

The expectation is that all alternative investment opportunities share a negative relationship with net subscriptions for an investor. The only exception is the return on Irish property for Irish investors, which should be positive. For this reason, an interaction term between Irish nationality and QoQ real estate returns is included.

Z_{jt} symbolises fund covariates, namely dividend yield and QoQ growth in capital appreciation.

The impact of the 2016 Finance Act is captured in the $Tax_{ij} * Post_t$ variable, where Tax_{ij} is a dummy variable taking a value of one if the investor's tax status changed, and $Post_t$ is a dummy variable taking a value of one in the post treatment period. In contrast to the investor covariates, the Tax_{ij} variable is determined by the proximate location of the investor. To re-use the previous example, an Irish investor investing through a Maltese holding company will see their tax status change.

θ_{ij} captures fund-investor fixed effects. v_t captures quarter fixed effects. $Char_{ij}$ captures investor characteristics (single investor status, size), and is interacted with the post dummy to control for investor heterogeneity.

Finally, care needs to be taken with the clustering of the error term u_{ijt}. Investors in the same fund will be subject to the same shocks, but investors also invest across multiple funds and their observations will not be independent either. Picking only one type of cluster would misspecify the data generating process for the error term, so two-way clustered standard errors are used, with errors clustered on investor and fund.

3.4 Announcement Effects

One challenge to credible identification is announcement effects. If the tax change had an impact on investors' behaviour after it was announced but before it was implemented, then the impact of the tax change will not be properly identified using the implementation date as the start of the treatment period.

The government admitted it was reviewing the taxation of real estate investment funds in September 2016, and published the proposed changes in October 2016. The changes were originally supposed to come into force on the 1st of January 2017 (Vale & McMahon, 2017), but at end January 2017 were ultimately postponed to the 30th June 2017 (Revenue, 2017). It is improbable that investors could have induced their funds to liquidate their property portfolios within the announcement period – industry contacts suggest it takes a year for a property to be sold. However, affected investors may have redeemed their shares or induced funds to provide dividends before the tax came into effect.

This possibility can be investigated using event study regressions. Regressing quarter fixed effects, shareholder fixed effects, and quarter-tax status interaction fixed effects on the dependent variable, we can derive the mean difference between net subscriptions or dividends in each quarter for tax affected investors and unaffected investors. If there is no announcement effect then there should be no significant differences between the two groups in Q4 2016, Q1 2017 or Q2 2017. The regression equation for this specification is found below:

8. $$Y_{ijt} = \sum_{t=2}^{16}\left(\delta_t Tax_{ij} * v_t + \gamma_t v_t\right) + \beta Tax_{ij} + \theta_{ij} + u_{ijt}$$

As the presence of an announcement effect undermines the potential credibility of identification, three alternative measures of net subscriptions and one measure of dividends are used. They are: net subscriptions as a percentage of opening position (chart 4), net subscription as a percentage of closing position (chart 5), net subscriptions in euros (chart 6) and dividends as a percentage of opening position (chart 7). The point estimates for the interaction between quarter and tax status, the δ_t, for each dependent variable are presented above.

Of the four measures included, three suggest that there was an announcement effect. These three suggest that the announcement effect was concentrated in Q4 2016, the initial announcement period. There is a clear drop in net subscriptions in € millions, and a less pronounced but still notable drop in net subscriptions as a percentage of closing position in Q4 2016. The measure in € millions is significant at the 5% level, while the measure in percentage is not. The net subscriptions in € millions estimate is also significant in Q2 2017.The difference between dividend yield between the group affected by the tax change and the group unaffected by the tax change remains close to zero for most of the series, but shoots up to 35 percentage points in Q4 2016. The parameter estimate is significant at the 1% level. This high estimate for Q4 2016 can be explained by certain shareholders response to the tax's announcement, which is elaborated on in future sections

Given the evidence presented here, and more that will be presented in Section 6.3, I designate treatment as beginning in Q4 2016 as opposed to Q3 2017.

Chart 4: Event Study Regression – Dependent variable: Net Subscriptions as % Opening Position

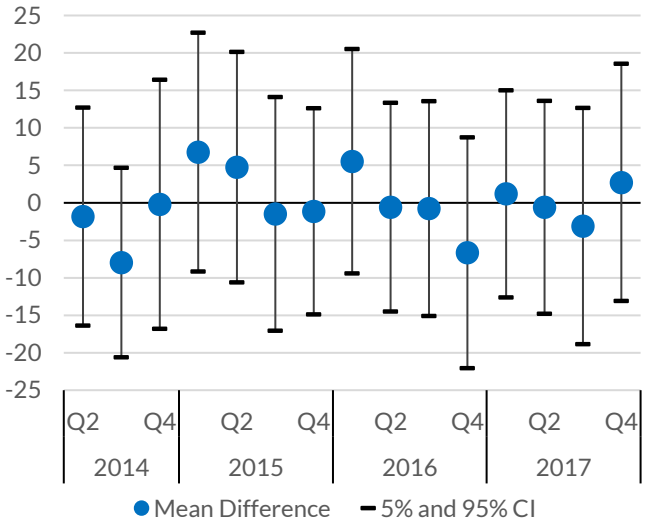


Chart 5: Event Study Regression – Dependent variable: Net Subscriptions as % Closing Position

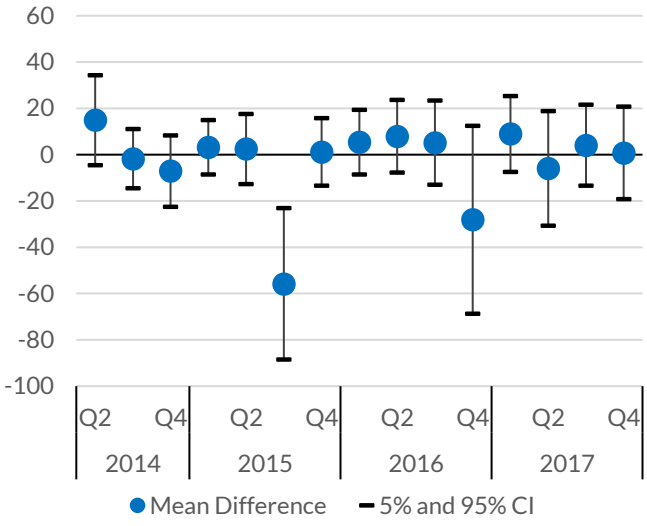


Chart 6: Event Study Regression - Dependent variable: Net Subscriptions in € Millions

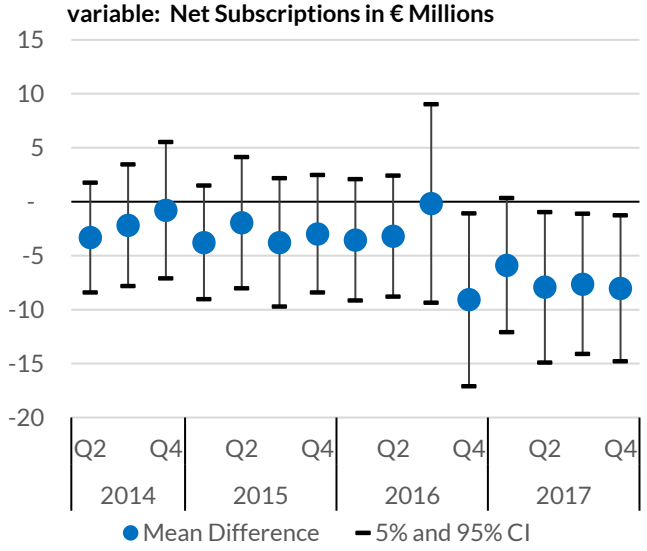
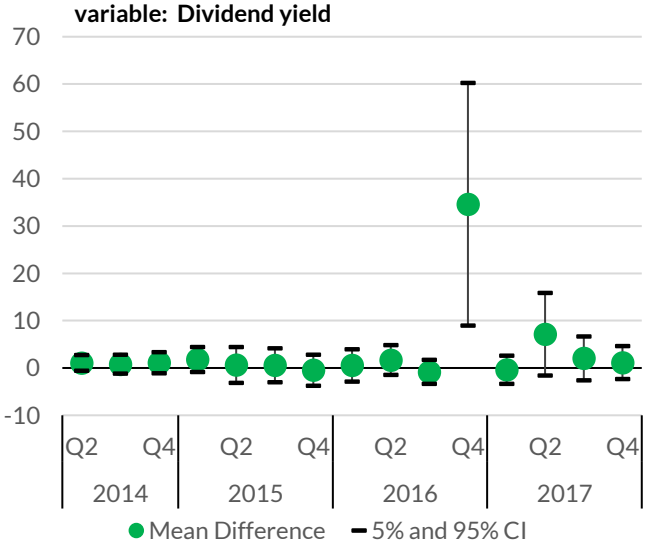


Chart 7: Event Study Regression - Dependent variable: Dividend yield



3.5 Comparing the Treatment and Control Group

The event study regression estimates (section 3.4) demonstrate that differences in mean investment between the treatment and control group are generally not significant and do not trend in any particular direction in the pre-treatment period. This suggests that differences between the treatment and control group following Q4 2016 are not a continuation of pre-existing trends.

The two groups show clear differences in the observable covariates that are used as control variables (Table 1). For domestic variables and cross sample variables this is likely due to the predominance of Ireland in the control group. Looking at the fund covariates, differences certainly exist, but they are not as proportionally large nor as statistically significant as for the investor covariates.

The combined evidence suggests that caution needs to be taken when analysing differences between the two groups. While they do not show differing trends in net subscriptions prior to the tax change,

the two groups differ substantially across observables. Thus for credible identification, relevant time varying confounding factors must be accounted for in the research design.

Table 1: Means of Key Variables

Variable	Treatment Group	Control Group	T- Statistic
Fund Covariates			
Dividend Yield	1.13 (0.14)	0.98 (0.01)	4.26***
QoQ Share Price Growth	9.16 (1.31)	7.17 (0.48)	-1.6
Investor Covariates			
QoQ RGDP	0.45 (0.05)	1.18 (0.02)	11.36***
QoQ Equity Returns (Domestic)	1.62 (0.09)	3.28 (0.06)	10.19***
QoQ Bond Returns (Domestic)	1.53 (0.05)	1.83 (0.02)	5.96***
QoQ Real Estate Returns (Domestic)	1.48 (0.3)	2.67 (0.05)	24.69***
QoQ FX rate change	-0.47 (0.08)	-0.03 (0.01)	12.15***
QoQ Equity Returns (Cross Sample)	2.14 (0.11)	2.98 (0.04)	7.16***
QoQ Bond Returns (Cross Sample)	1.21 (0.07)	1.85 (0.02)	10.04***
QoQ Real Estate Returns (Cross Sample)	4.35 (0.13)	2.14 (0.03)	-24.17***
QoQ NEER	0.61 (0.07)	-0.08 (0.03)	-8.16***

4. Data

4.1 Shareholder Register Dataset

I create an investor-level panel dataset using shareholder register records requested from the reporting population. These records contained information on the location, closing positions, opening positions, subscriptions and redemptions of IREF investors over the period Q1 2014 – Q4 2017. The dataset consists of 2,029 investor-fund pairings corresponding to 1,899 unique investors (see table 2).

The full sample is not used in the analysis due to the use of a difference-in-difference design. As a result, investors need to be present for at least one period prior to the taxes announcement (i.e. the pre-treatment period). As a result, the sample drops to 1,836 investor fund pairings.

The dependent variable in the analysis is net subscriptions (subscriptions-redemptions). Redemptions and subscriptions include secondary market purchases and sales of IREF shares. Net subscriptions vary with investor size, and thus are normalised with the opening stock position for each investor's shareholding.[10] [11]

This choice leads to the creation of extreme values where investors dramatically increase their investment in a fund relative to their opening position. Thus, the net subscriptions as a percentage of

[10] Opening position is preferred over closing position, as full redemptions will produce NA values if closing is used.
[11] To confirm data validity, the sample data is compared against the aggregate series which it is a component of.

opening position, and other series experiencing similar extreme values[12], are winsorised at the (0.1, 99.9) percentiles to remove the risk that outliers drive relationships in model estimates.

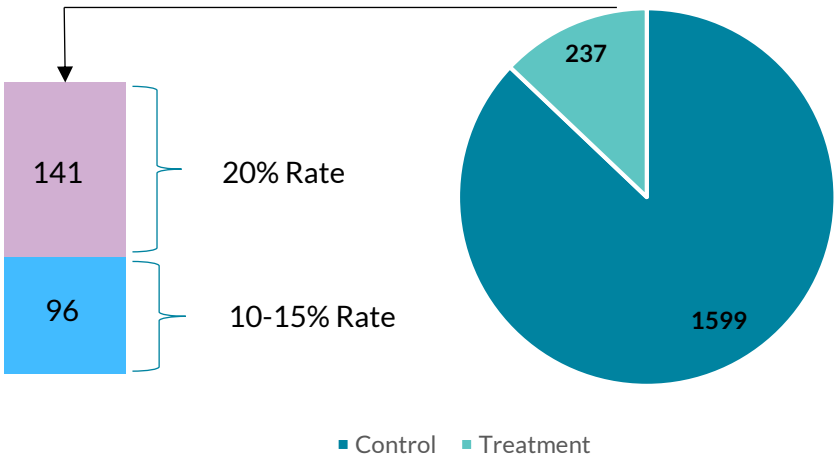
Table 2: Tabulation of Investor-Fund Pairings

No. Funds Invested In	No. Unique Investors	No. Investor Fund Pairings
1	1,830	1,830
2	47	94
3	15	45
4	2	8
5	1	5
7	1	7
8	1	8
9	1	9
23	1	23
Total:	1,899	2,029

The impact of the tax change on investors, the treatment variable, is constructed from the investor level dataset. The dataset contains the country and name of the investor, so it is possible to discern whether the investor is an exempt or non-exempt foreign investor.

The group that saw their tax rate change (the treatment group) accounts for a small portion of the total - only 237 investors-fund combinations out of 1,836 were affected by the tax change (chart 3). Of this 237, 141 pay the 20% rate, while 95 pay a reduced 15% rate and 1 pays a 10% rate.

Chart 3: Investors by Tax Category and Treatment Status – In Units



Source: Central Bank of Ireland, author's calculations.

The group who did not see their tax status change (the control group) is almost completely Irish, with only 107[13] non-Irish investors-fund combinations being exempted from the tax change. The

[12] These include net subscriptions as a percentage of closing position, share price growth and asset sales.
[13] The 107 is constituted of 43 investors exempted due to falling into investor categories specified in the legislation, while 64 are exempted due to reliefs available for investors holding less than 10% of fund equity.

composition of the control group does create concerns about the validity of comparing the treatment group to the control group.

4.2 Other Data Sources

The model used in this paper (see section 3.3) posits that when investing or divesting in an IREF an investor will be considering changes in their wealth constraint (as proxied by income growth), changes in the return on IREF equity, and the returns on alternative investment opportunities available to them.

Income growth is captured with quarterly growth in real gross domestic product (GDP). Given Ireland's outsized GDP growth in 2015 (caused primarily by the activities of multinational enterprises (OECD, 2016)), the Central Statistics Office's modified total domestic demand (in real terms) is used as an alternative. While it differs from GDP, most significantly by excluding net exports, it is available quarterly (unlike GNI*), available in real terms and should capture income growth for Irish investors. Data for this variable is taken from Eurostat, the International Monetary Fund's International Financial Statistics Dataset and the Central Statistics Office.

Changes in the return on IREF equity are determined by the EUR-XXX foreign exchange rate an investor faces, share price growth and dividend yield. All share classes are denominated in euro, so the model only requires quarter on quarter (QoQ) changes in FX rates for each investor country relative to the euro. Data for the variable are taken from the ECB's official exchange rate dataset. Share price growth and dividend yield for each fund are calculated using the investment fund dataset.

The model divides alternative investment opportunities into domestic, cross sample (i.e. between two countries in the sample), and out of sample (i.e. from a country in the sample to one outside the sample). Domestic and cross-sample alternative opportunities are explicitly specified in the model with QoQ returns on bonds, equity and real estate.

QoQ total returns for equity are calculated using the total return index for each investor national benchmark stock exchange. Coverage for these indices is extensive, and easy to source for all non-offshore financial centre locations. Data for this variable are taken from Bloomberg.

QoQ total returns for bonds are calculated using the total return index for each investor national sovereign bonds. Sovereign bonds indices were chosen as they had the best country coverage relative to aggregate bond indices or corporate bond indices. Where total return indices were not available price indices were used. Data for this variable are taken from Bloomberg and S&P.

QoQ returns on property are measured using the Bank for International Settlement's residential property price dataset. Unfortunately, no quarterly series for commercial property prices was available for all countries in the sample.[14]

Domestic returns are calculated from the index in an investor's country of origin. To account for cross sample returns, I use a weighted average of FX adjusted returns for bonds, equity and real estate in

[14] The International Property Dataset is the benchmark index for measuring returns on commercial property, but unfortunately it excludes a number of key countries including Luxembourg, and only has biannual or annual data for other European countries. Using it improves the strength results, but does so by excluding observations rather than accounting for unobserved variation.

other countries in the sample. Each country's weight is determined by their market size relative to the total. Data for market capitalisation for equity markets is taken from Datastream, data for debt securities issued by the residents of each country is taken from the BIS, and data for real estate market size is taken from MSCI's annual market size report.

Finally, data is drawn from two sources to construct an effective exchange rate for those countries outside the sample. Firstly, the weights are taken from the BIS's effective exchange rate dataset for the period 2014-2016. All countries in the sample are excluded and the weights are rebased to sum to 100. Secondly, the exchange rates are taken from the ECB's Statistical Data Warehouse and Bloomberg.

5. Results

The results of the models are presented below (Table 2). Model (1) is the baseline model, and includes only the DiD estimator, and shareholder and time fixed effects. Model (2) introduces the fund covariates, share price growth and dividend yield.

Model (3) introduces the investor variables. These include domestic and cross sample weighted returns on bonds, equities and real estate. They also include QoQ changes in FX rates, QoQ changes in the out of sample effective exchange rate and QoQ growth in real GDP.

Table 3: Main Regression Specification

Dependent Variable: Net subscriptions as percentage of opening position

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Treatment Variable					
Tax	-2.18 (1.97)	-3.37 (2.02)*	-3.05 (2.17)	-0.72 (2.88)	-2.82 (2.09)
Fund Controls	No	Yes	Yes	Yes	Yes
Investor Controls	No	No	Yes	Yes	Yes
Investor Fixed Effects	Yes	Yes	Yes	Yes	Yes
Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes
Period - Investor Size Interaction	No	No	No	Yes	No
Period - Single Investor Interaction	No	No	No	No	Yes
N	16,400	16,128	15,831	15,831	15,831

Notes: Standard errors are in parentheses and significance level displayed as * p<0.1; **p<0.05; ***p<0.0

Models (4)-(5) introduce two different types of post treatment period - investor characteristic interactions to control for differing opportunities across investor categories over time. Model (4) interacts investor size at different cut offs (€1mn, €2.5mn, €5mn, €10mn) with the post treatment period dummy to control for opportunities available to larger investors. No cut off showed results different to the others, so for parsimony only the models using the €1mn cut off are presented. Model

(5) includes an interactions post treatment period dummy and single investor status, to account for potential differences that may exist between single investors and other investors.

The results suggest that the tax change had a negative, but insignificant impact on the investment of the treatment group. The intention-to-treat (ITT) estimates of the tax change only achieve statistical significance in model 2, and then only at the 10% level. These results could be supportive of the ambiguous effect of such a tax change suggested by theory. Alternatively, this may reflect many investors inability to redeem shares within the treatment period. While many of these funds are nominally open ended, their conditions for redemption usually allow the fund to delay redemptions or fulfil redemption requests at a time of their choosing. While these results suggest a statistically insignificant effect, their sign does correspond to that seen in the literature.

The estimate in model (4) suggests that the estimates in others models are mainly driven by differences in how smaller and larger investors responded to the tax change. This is not surprising, given that the majority of investors in the control group hold positions that have never reached more than €1mn (1,481 of 1,599).

Similarly, the point estimate in model (5) declines relative to model (3), although not as dramatically as compared in model (4). This suggests that taxed single investors may respond differently to other investors.

Dividend yield shares a positive and significant relationship with the dependent variable throughout all modes. This would suggest that investors tend to reinvest dividends that they receive and that investors are more likely to invest more into funds that are paying higher dividends. Share price growth shares a generally negative and consistently insignificant relationship with the dependent variable.

The investor covariates (not shown) appear to have poor explanatory power for net subscriptions by investors. Of the nine variables included, only cross sample bond variable shares a statistically significant relationship with net subscriptions.

6. Further Analysis

6.1 Analysis with Difference-in-Difference-in-Difference Estimator

The estimates of models (4)-(5) in section 5 suggest that differences between large investors, and to a lesser degree single investors, and all other investors account for most of the negative impact of the tax on treated investors. Heterogeneity in the impact of the tax change is therefore a possibility.

There are good reasons to believe that single investors may respond differently to other investors. Firstly, they will face no coordination issues with other investors in planning responses to the tax change. Secondly, they will have significant influence over the fund – in certain cases the investment advisor or manager and the fund's shareholder will have the same ultimate controlling party.

To assess the sub-group (i.e. single investor) impact, models (1)-(4) used in section 5 are re-estimated with a difference-in-difference-in-difference estimator (DDD). This isolates the impact of the tax change on single investors, relative to the impact of the tax change between the rest of the treatment group and the control group (Table 3). In addition, model 5 runs the same specification as model 1, but

with dividend yield as the dependent variable. This is done to determine whether single investors drive the announcement effect shown in section 3.4 for dividends. The model thus changes to:

9. $Y_{ijt} = \delta_1 Post_t + \delta_2 Tax_{ij} + \delta_3 Single_{ij} + \delta_4 Tax_{ij} * Single_{ij} + \delta_5 Tax_{ij} * Post_t + \delta_6 Single_{ij} * Post_t + \delta_7 Single_{ij} * Tax_{ij} * Post_t + \beta X_{it} + \gamma Z_{jt} + \theta_{ij} + \pi Char_{ij} * Post_t + u_{ijt}$

The estimates for the DDD variable support for the tax change having a differential impact on single investors, relative to other investors who saw their tax status change (table 3). The DDD variable (*Tax X Single*) is significant in all specifications with net subscriptions as the dependent variable, twice at the 5% level. Model (4) suggests that amongst investors with shareholdings greater than €1mn, single investors who saw their tax status change reduced their investments by 18.5 percentage points relative to other investors who saw their tax status change. This would suggest a tax elasticity of demand of -0.93, which is smaller than that found in Desai and Dharmapala (2011). However, assuming that single investors are generally wealthier than other investors, this differential response is in line with the results from Zoutman (2014).

The estimates for the *Tax* variable now measure the difference in the dependent variable between non-single investors who saw their tax status change following Q4 2016 and the control group. The estimates for models (1)-(4) are similar to table 2 in sign and significance, and still suggest that the average non-single investor who saw their tax status change did not change their behaviour in response.

Model (5) suggests that treated non-single investors received increased dividends in the post treatment period. Single investors who saw their tax status change did receive larger dividends, although the difference between them and non-single investors is not significant.

Table 4: Analysis with DDD estimator

Dependent Variable	Net subscriptions as percentage of opening position				Dividend Yield
Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Treatment Variable					
Tax	-2.23 (1.84)	-2.79 (1.98)	-2.4 (2.07)	-0.79 (2.57)	4.14 (1.94)**
Tax X Single	-12.99 (7.83)*	-16.01 (8.48)*	-16.55 (8.07)**	-18.45 (8.44)**	13.83 (9.17)
Fund Controls	No	Yes	Yes	Yes	No
Investor Controls	No	No	Yes	Yes	No
Investor Fixed Effects	Yes	Yes	Yes	Yes	Yes
Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes
Quarter-Investor Size Fixed Effects	No	No	No	Yes	No
N	16,400	16,128	15,831	15,831	17,727

Notes: Standard errors are in parentheses and significance level displayed as * p<0.1; **p<0.05; ***p<0.01

To understand how the impact of the tax change was distributed across time the event study regression method used in section 3.4 (equation 8) can be employed. It will now use a triple interaction between quarter, tax status and single investor status.

10. $y_{ijt} = \sum_{t=2}^{16}(\delta_{1t}Tax_{ij} * Quarter_t * Single_{ij} + \delta_{2t}Quarter_t * Single_{ij} + \delta_{3t}Quarter_t * Tax_{ij} + \delta_{4t}Quarter_t) + \delta_5 Tax_{ij} + \delta_6 Single_{ij} + \delta_7 Tax_{ij} * Single_{ij} + \beta X_{it} + \gamma Z_{jt} + \theta_{ij} + u_{ijt}$

The DDD estimates represent the mean difference in the dividends/redemptions in each quarter between single investors who experienced a change in their tax rate and other treated investors. The DD estimates represent the mean difference in the dividends/redemptions in each quarter between non-single investors who experienced a change in their tax rate and investors in the control group. The estimates for model (3) and model (5) for each quarter are displayed below in Charts 8 and 9 respectively.

It is clear that responses of treated single investors in Q4 2016 are driving the DDD estimates in table 3. Furthermore, DD estimate for the model (5) is also driven by a sharp increase in dividends received by treated non-single investors in Q4 2016. Model (3) estimates that single investors' net subscriptions were 96 percentage points lower on average in Q4 2016, relative to other treated investor, with this difference significant at the 5% level.

The estimate for dividend yield also shows a marked increase in Q4 2016 in chart 9. Non-single investors who saw their tax status change received 10 percentage points more in dividends than investors in the control group. While insignificant, the DDD estimate for model (5) in Q4 2016 is also immense, registering at 61 percentage points. The implication of an investor redeeming

Chart 8: Model (3) Event Study Regression Estimates

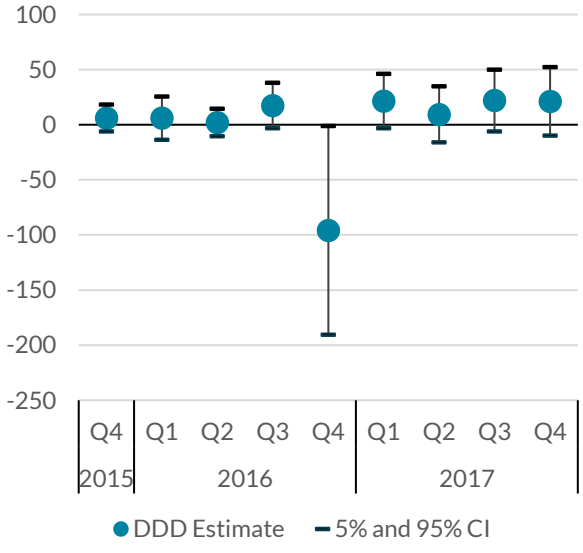
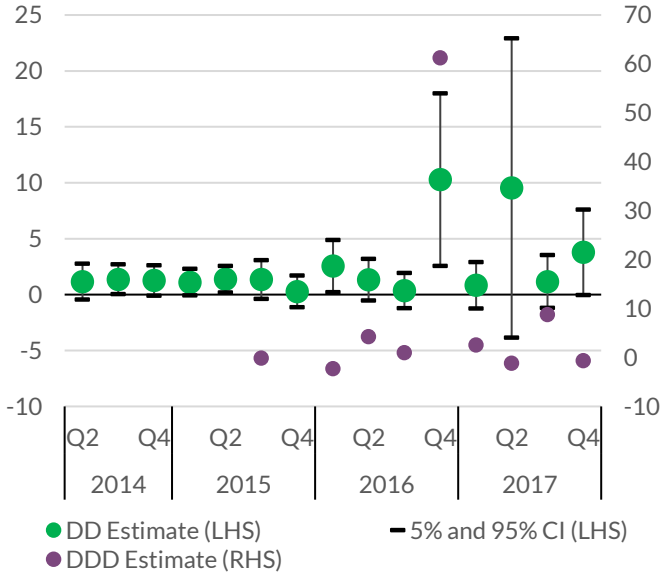


Chart 9: Model (5) Event Study Regression Estimates



96% of their funds opening equity or receiving a dividend equivalent to 61% of their funds opening equity would be a wind down of the fund, but removing those investors who finish Q4 2016 with a zero closing position the estimate only reduces slightly. Equally, controlling for asset sales only marginally dampens the point estimates (not shown, available on request).

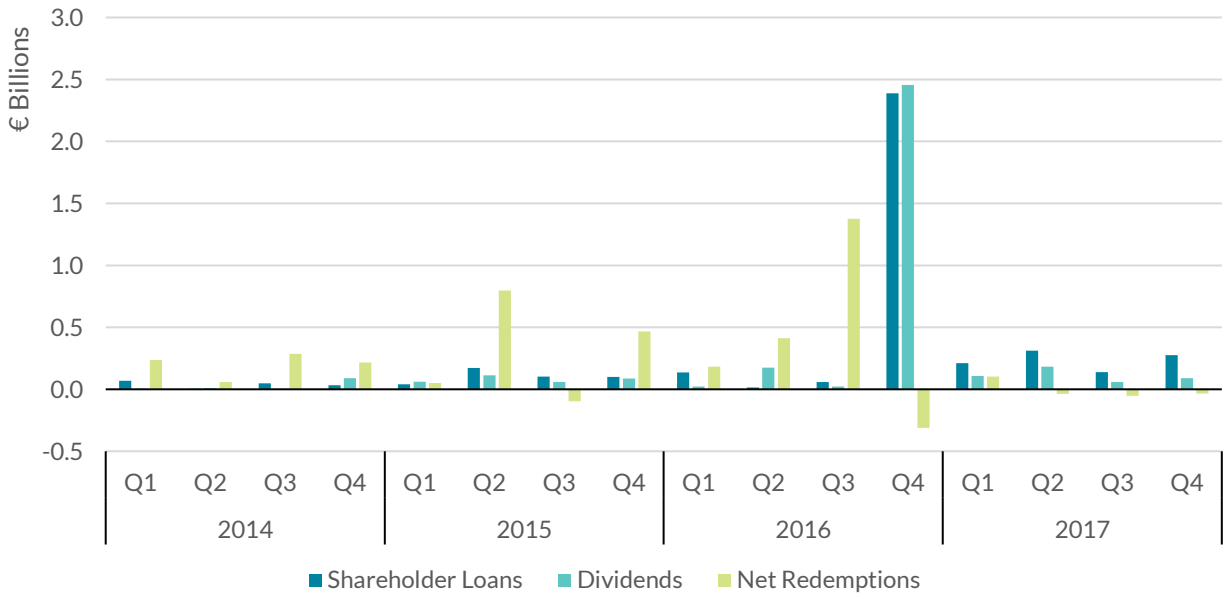
This leaves a question as to whether the effect is due to measurement error in the data, or whether the extreme estimates for single investors who saw their tax status change in Q4 2016 are in fact accurate. To answer this question, I draw on a further source of qualitative and quantitative data: audited financial statements.

6.2 Incorporating Information from Audited Financial Statements

Each IREF is required to submit their audited financial statement (AFS) to the Central Bank of Ireland annually. These documents provide varying levels of information, but usually include information on major financial events during the year. This information is frequently dated, so that it is possible to build quarterly series from the AFS.

The 2016 AFS for single investor funds provide an explanation for the extreme parameter estimates found in the event study regressions of section 6.1: a substantial minority of single investor IREFs funded large dividends (and redemptions) through shareholder loans. Often, the investor would provide the loan and receive the dividend (or redemption) on the same day. This behaviour was observed much more frequently with shareholder dividends, hence the focus on them from this point forward.

Chart 10: Shareholder Lending, Dividends and Net Redemptions for Treated Single Investor Funds – in € Billions



Source: Audited financial statements, Central Bank of Ireland

Using the AFS, I create a quarterly series of shareholder loans. Q4 2016 saw approximately €2.4bn in new shareholder lending to single investor funds, €2.5bn in shareholder dividends and €-0.3bn in net redemptions (See chart 10). It is very clear from Chart 10 that this was an exceptional quarter relative to any other.

6.3 Empirical Analysis of Single Investor Fund Dividend Behaviour in Q4 2016

While chart 10 is highly suggestive, it does not constitute econometric evidence that single investor funds responded to the tax change by loan funding dividends in Q4 2016. To test this hypothesis, and confirm earlier results, event study regressions are estimated using fund level data.

Fund level data is used as the responsibility for declaring dividends typically lies with the fund rather than the investor. Moving the data to the fund level changes the tax variable, which becomes a weighted mean[15] of its investors' tax statuses, and is thus a continuous, time varying variable taking values between 0 and 1. Thus, the model becomes:

11. $y_{jt} = \sum_{t=2}^{16}(\delta_{1t}Tax_{jt} * v_t * Single_j + \delta_{2t}v_t * Single_j + \delta_{3t}v_t * Tax_{jt} + \delta_{4t}v_t) + \delta_5 Tax_{jt} + \delta_6 Tax_{jt} * Single_j + \delta_7 Single_j + \theta_j + u_{jt}$

Where the dependent variable is the dividend yield[16] for fund j in quarter t.

Re-estimating the event study regression for dividends, we can see that fund level data matches the pattern seen in the investor level data: a sharp increase in dividends distributed by single investor funds who saw their tax status change in Q4 2016, relative to other funds where investors saw their tax status change (chart 11). The estimate is smaller than that estimated in section 6.1 (see Chart 9),

Chart 11: Estimates from Event Study Regression of Sole Investor-Tax Interaction on Fund Dividends

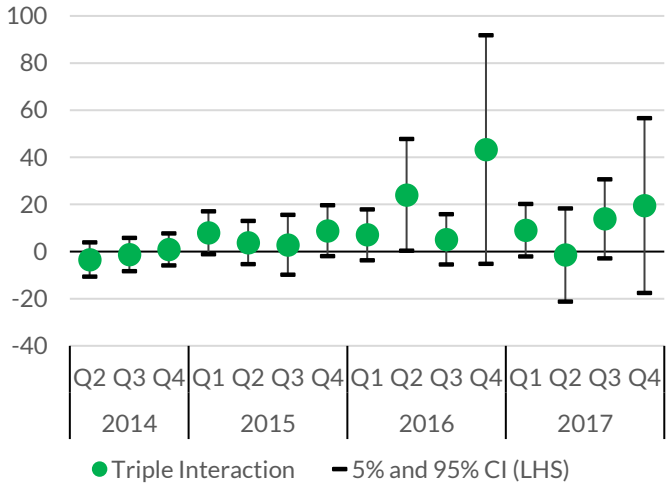
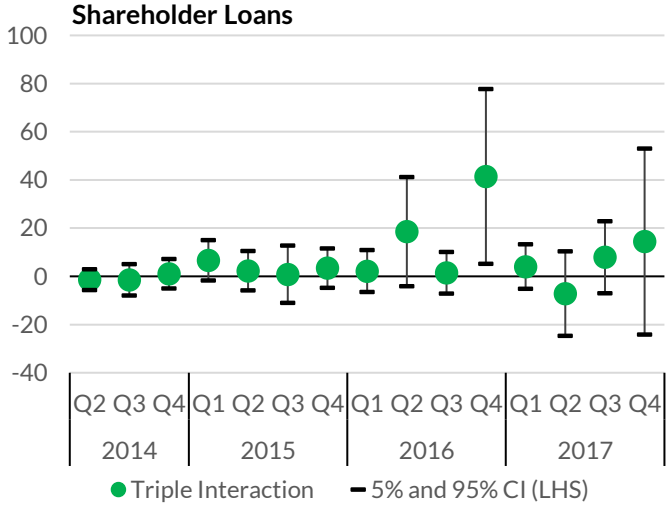


Chart 12: Estimates from Event Study Regression of Sole Investor-Tax Interaction on Fund Dividends - Controlling for Shareholder Loans



registering at 43 percentage points relative to 61 percentage points, but is significant at the 10% level.

Financial statements suggest that single investors who saw their tax status change used shareholder loans to fund dividends in Q4 2016. If this is true, it would be expected that the term on the quadruple interaction between Q4 2016, single investor fund status, the tax variable and shareholder loans would be positive, significant and close to 1. To test this, the below is added to the right hand side of equation 11.

12. $\gamma_1 Q4\_16_t + \gamma_2 Tax_{jt} + \gamma_3 single_j + \gamma_4 loan_{jt} + \gamma_5 Q4\_16_t * Tax_{jt} + \gamma_6 Q4\_16_t * single_j + \gamma_7 Q4\_16_t * loan_{jt} + \gamma_8 Tax_{jt} * single_j + \gamma_9 Tax_{jt} * loan_{jt} + \gamma_{10} single_j * loan_{jt} + \gamma_{11} Q4\_16_t * Tax_{jt} * single_j + \gamma_{12} Q4\_16_t * Tax_{jt} * loan_{jt} + \gamma_{13} Tax_{jt} * single_j * loan_{jt} + \gamma_{14} Q4\_16_t * Tax_{jt} * single_j * loan_{jt}$

Where γ_{14}, the term for the quadruple interaction, will be the parameter of interest.

[15] Weights are determined by the total % of a fund's shares which an investor holds.
[16] Defined as (dividends/opening NAV)*100

The estimates for γ_{14} is approximately 0.93, which implies that 1% increase in shareholder loans in Q4 2016 supplied by tax affected single investors is associated with a 0.93% increase in fund dividends (see Table 2 in the appendix for results). The estimate is significant at the 1% level, and emphatically supports the hypothesis that single investors used shareholder loans to provide dividends in Q4 2016.

The inclusion of the variables on the right hand side of equation 10 in the triple interaction model leads to the triple interaction estimate for Q4 2016 to reduce slightly in size and become significant at the 5% level (see chart 12).

It is difficult to formulate a reason why a number of funds would engage in this activity simultaneously that is not related to the tax change announced during the quarter. However, coincidence is not sufficient to demonstrate that this behaviour was the result of the tax change. Therefore, it must be shown that by engaging in this activity funds reduced their tax liability. An explanation on how this may work is provided in the next section.

6.4 Tax Implications of Swapping Equity for Debt

The provision of shareholder loans for dividends and redemptions allowed investors to reduce their tax liability in two ways. Firstly, it allowed investors to extract their unrealised gains on their investments up to Q4 2016 without liquidating those investments. For example, a fund purchases a property worth €20mn with €20mn worth of equity subscriptions, and incurs no other liabilities. In Q4 2016, the property is worth €38mn, and thus so is the fund's equity. If the fund were to sell the property after January 1st 2017, it would pay 20% on the €18mn in unrealised gains.

Instead, the investor provides a €18mn shareholder loan in Q4 2016 to fund a dividend payment of €18mn. The investor has now replaced its €18mn of unrealised gains with €18mn worth of debt. The repayment of loan principal is untaxed, so by swapping their equity for debt they have created a future stream of tax-free payments that will allow them to extract their unrealised gains up to Q4 2016 without paying the 20% withholding tax.

It should be made clear that the investor is no worse off as a result of this action. They have already been paid back the amount they provided as a loan through a dividend or redemption.

Secondly, if an investor is charging interest on the loan the interest can be used to nullify profits in their statement of income. The IREF tax is only applicable to profits as recognised in the statement of income. Thus if a large enough interest expense is present in the statement of income, it should extract any profit coming from rental income/valuation gains from property, and avoid the need for such profit to be distributed as taxable dividends. If there are no profits, then there is nothing to be taxed.

The remaining question is whether the interest paid by the fund to its shareholder will be subject to Irish withholding tax. If the shareholder resides in the EU, or in a country with which Ireland has a double taxation treaty, and does not have a permanent establishment located in Ireland that is engaging in the trade, then according to section 246 of the Taxes and Consolidation Act 1997 the investor will still pay the tax rate specified in the treaty. It should be noted that this rate is

unconditionally zero for 31 of the 73 countries which Ireland has double taxation treaties with, including Luxembourg, the UK and US – three of the most common single investor locations.[17] [18]

This method of avoidance is not just concentrated to Q4 2016, but also can be used if an IREF funds its purchases with shareholder loans at its launch. This is supported by the data on a fund's ratio of shareholder loans to equity in their first quarter of operation before and after Q4 2016. The median ratio for treated single investor funds who saw their tax status change rose from 0 to 2 between the pre-treatment period and the post-treatment period.[19] Further evidence is found in the amount of revenue that has been collected up to July 2018 from the IREF tax - €9mn (McCarthy L. , 2019).

Overall, this suggests that the original structure of the IREF tax law provides large financial institutions the opportunity to vastly reduce their tax liability, both in the announcement period of the tax and following its introduction. Anti-avoidance measures introduced in the 2019 Finance Act are likely to reduce the use of shareholder loans.

Conclusion

This paper aims to investigate the sensitivity of investors in Irish real estate funds to changes in taxation using the 2016 Finance Act as a case study. The tax change imposed a 20% rate on most foreign investors, while Irish investors and a subset of foreign investors saw no change in their tax rate. The paper applied a variety of panel difference-in-difference and triple difference models to a novel dataset to estimate the effect of the tax change on investor behaviour and sub-groups of investors.

The results provide two insights, both unexpected. First, the average investor who saw their tax status change did not respond by reducing their holdings. This contrasts with existing research, which largely finds that investors change their behaviour when their taxation changes. Second, the tax change led a subset of single investors to swap their equity for shareholder loans using loan funded dividends and redemptions. The latter is undesirable for policymakers as their intention was to prevent tax avoidance on profits from Irish property, and highlights the potential for unintended consequences when designing and analysing policy, especially tax policy.

It is also undesirable from a financial stability perspective. Increased leverage can make funds more prone to liquidate their investments in the event that their value reduces. If a fund is unable to recoup enough from the sale of its assets to pay its creditors and counterparties it may spread stress through the financial system. From a prudential perspective, the increase in leverage encouraged by the 2016 Finance Act makes it more challenging to accurately gauge a fund's leverage, as shareholders may be willing to write down shareholder loans as if they were in fact equity.

17 As noted, this exemption is conditional on a fund not having a permanent establishment located in Ireland. While investment funds may have addresses, no substantial business usually occurs at the addresses of these funds, which is key for determining whether the fund itself is a permanent establishment. Amendments to the 2015 Finance Act suggest that funds themselves are not permanent establishments, as the act exempted funds from having permanent establishment status on account of having an investment manager located in Ireland (KPMG Ireland, 2014).

18 The guidance material from Revenue (2018) on the IREF tax does refer to how it interacts with interest withholding tax. The guidance material does not say much more than interest withholding tax should be charged in accordance with section 246 of the Taxes and Consolidation Act 1997, so it suggests that the above analysis is accurate.

19 Single investor funds who did not see their tax status change and non-single investor funds saw an increase in the median shareholder loan to equity ratio from 0 to 0.11 between the pre and post-treatment period.

The introduction of new anti-avoidance measures in the 2019 Finance Act should lessen the attractiveness of shareholder loans, and reduce the ability of investors to avoid the IREF tax. However, further analysis and monitoring will be required to ensure that it is effective in doing so.

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Appendix: 1A

To ensure data validity, I compare the aggregated sample data against the aggregate data for real estate investment funds published by the European Central Bank (ECB). While they share a large common component, the two datasets are not identical because this paper's dataset excludes a) funds whose assets derive <25% of their value from Irish land, and b) IREFs which began operations on or after Q4 2016. Scatterplots of the ECB and this paper's dataset for both stocks (opening positions) and flows (net transactions) are found below (charts 1 and 2).

The stocks show near perfect co-movement over the series, with a correlation coefficient of 0.93. The flows show a very small correlation coefficient of 0.02 for the full series, which would it make it appear as though there should be some cause for concern in relation to the validity of the flows data. However, limiting the comparison to pre Q1 2017, and thus removing source b) of difference in the samples, the coefficient rises to 0.37. This is not as emphatic a co-movement as the stocks data, but it should be kept in mind that over this period the sample averages around half of the ECB aggregate.

Chart 1: Scatterplot of published vs sample data - stocks

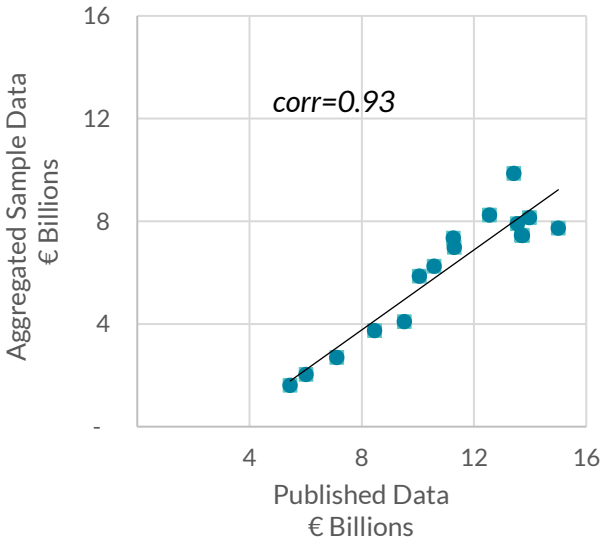

Chart 2: scatterlpot of published vs sample data - transactions

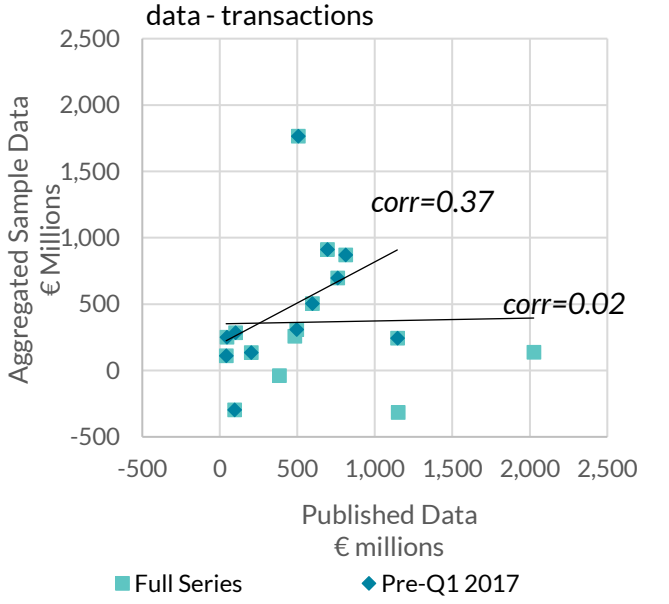

Table 1: Count of investors by ultimate location

Country	**No. Investors**	**Country**	**No. Investors**
Luxembourg	15	Vietnam	1
United Kingdom	128	Philippines	1
Ireland	1503	Netherlands	5
Switzerland	27	Belgium	3
France	8	Panama	5
Guernsey	1	Italy	1
British Virgin Islands	5	Norway	2
Jersey	4	Spain	1
Isle of Man	2	West Indies	1
United States of America	72	Austria	1
Germany	4	Malta	1
Denmark	1	Australia	1
Singapore	37	South Africa	1
Hong Kong	2	Canada	1
United Arab Emirates	1	Bahamas	1

Table 2: Event Study Regressions – Triple interactions

Dependent Variable:	Dividend Yield	
Variable	Model 1	Model 2
Pre		
*Tax*Single*Q2 2014*	-3.43 (3.68)	-1.36 (-0.62)
*Tax*Single*Q3 2014*	-1.28 (3.58)	-1.46 (-0.44)
*Tax*Single*Q4 2014*	0.9 (3.45)	1.06 (0.34)
*Tax*Single*Q1 2015*	7.9 (4.59)*	6.63 (1.57)
*Tax*Single*Q2 2015*	3.78 (4.62)	2.32 (0.56)
*Tax*Single*Q3 2014*	2.83 (6.43)	0.83 (0.14)
*Tax*Single*Q4 2015*	8.84 (5.46)	3.39 (0.82)
*Tax*Single*Q1 2016*	7.11 (5.47)	2.16 (0.49)
*Tax*Single*Q2 2016*	24.01 (11.97)**	18.55 (1.62)
*Tax*Single*Q3 2016*	5.16 (5.36)	1.45 (0.33)
Post		
*Tax*Single*Q4 2016*	43.26 (24.5)*	41.41 (18.31)**
*Tax*Single*Q1 2017*	8.99 (5.63)	4.05 (0.87)
*Tax*Single*Q2 2017*	-1.42 (9.98)	-7.23 (-0.82)
*Tax*Single*Q3 2017*	13.9 (8.47)	7.94 (1.05)
*Tax*Single*Q4 2017*	19.53 (18.72)	14.42 (0.74)
*Loans*Tax*Single*Q4 2016*		0.92 (0.32)***
Fund Fixed Effects	Yes	Yes
Shareholder Loans (including interactions)	No	Yes
N	1,327	1,327

Notes: Standard errors are in parentheses and significance level displayed as * p<0.1; **p<0.05; ***p<0.0.

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