Irving Fisher Committee on
Central Bank Statistics

BANK FOR INTERNATIONAL SETTLEMENTS

Ninth IFC Conference on "Are post-crisis statistical initiatives completed?"

Basel, 30-31 August 2018

Real estate fund investment in post-crisis Ireland[1]

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[1] This paper was prepared for the meeting. The views expressed are those of the authors and do not necessarily reflect the views of the BIS, the IFC or the central banks and other institutions represented at the meeting.

Real Estate Fund Investment in Post-Crisis Ireland

Barra McCarthy

Abstract

In the wake of the financial crisis and set against a recovering but fragile banking system, Ireland's economy has seen new players enter many different markets. In few areas has this been more evident than in the expanding role of Irish resident real estate funds (IREFs) in the Irish property market. Their rapid growth has led to IREFs property holding increase from €1bn in 2012 to €14.5bn at end-2016. Despite this, the role of IREFs in Ireland's post-crisis economic story is still largely unexplored. This paper aims to shine some light on the sector in two ways. Firstly, it uses a novel dataset to determine where and what type of property IREFs have invested. Secondly, using granular investor level data it asks what are the key policy and economic variables driving investment into Irish real estate funds over 2014-2017. The paper has three key findings: 1). IREF property holdings are overwhelmingly concentrated commercial real estate located in Dublin. 2). Variables measuring the return on IREF equity are predictive of investor net inflows, while alternative investment opportunities for investors are not. 3). Tax changes for foreign IREF investors over 2014-2017 have no significant impact on investment.

Keywords: Real Estate Funds, International Investment, Investor Taxation

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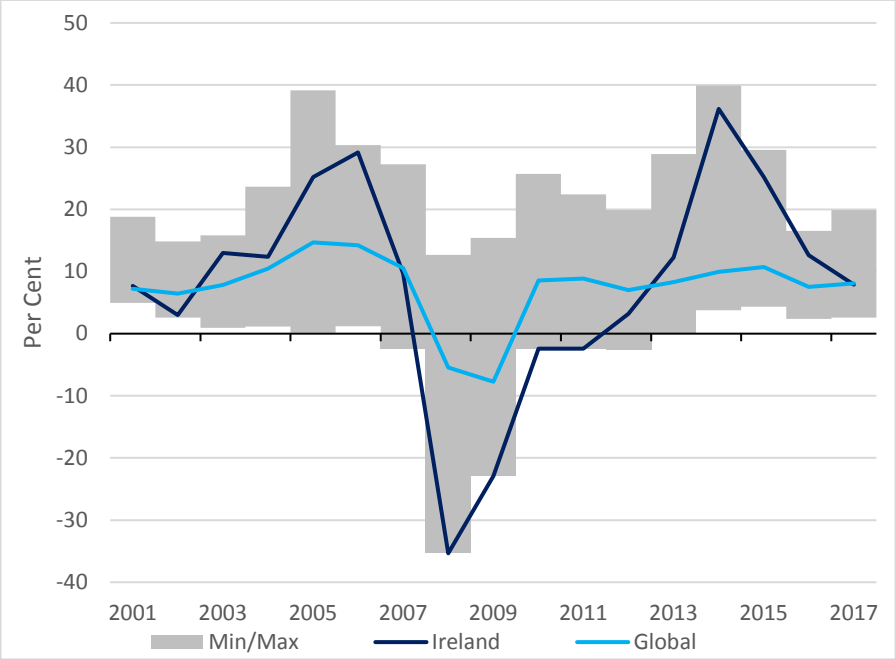
Introduction

One of the most striking changes to Ireland's property market following the financial crisis has been the growing importance of Irish real estate funds (IREFs). IREFs' total Irish property assets under management have grown from €1bn in 2012 to €14.5bn at end-2016.

This has been driven by two factors: valuation gains on Irish property and a large supply of property assets for sale. As can be seen in Chart 1, returns on Irish property have been high following the crisis, with total returns in the range of 30-40 per cent over 2014. This follows a period where property prices fell substantially with annual declines well in excess of 20 per cent in 2008 and 2009. Therefore, this growth has in part reflected the appreciation in the value of property already held by IREFs. However, IREFs have also been prolific purchasers of Irish property over the past 6 years. In some cases, existing IREFs expanded their property holdings, but most growth came from new investors entering the market using fund structures as their investment vehicle of choice.

Chart 1: Total Returns on Commercial Real Estate Across International Property Markets



Source: MSCI Real Estate/IPD.
Note: Grey bars signify the relevant maximum and minimum annual total returns observation excluding Ireland (in local currency) across 32 international markets. For more details on country coverage see: https://www.msci.com/real-estate.

In addition, large portfolios of property were being sold throughout the period. The Irish government set up the National Asset Management Agency to purchase non-performing property loans from the Irish banks. In 2010 NAMA purchased loans with a book value of €71.2bn for €30.2bn in 2010 (NAMA, 2010), and proceeded to sell the loans or the collateral (property) on which those loans were secured over the

following years. In addition, debtors who did not see their loans taken by NAMA but still defaulted commonly had the collateral on which their loans was secured sold ((RTE, 2012; Hancock, 2015). Recently, some IREFs have begun purchasing residential and commercial new builds (Fagan, 2016a; Fagan, 2016b), which has further contributed to the growth of their holdings of Irish property assets.

Despite their popularity, and maybe in part because of the pace of change, the role of IREFs in Ireland's post-crisis economic story is still largely unknown. Previous discussion of them has been limited to McCarthy (2017) and market commentary by real estate agents. This paper aims to shed light on IREFs by answering two questions. Firstly, how is IREF investment distributed geographically and across market segments? Secondly, what are the key policy, financial and economic variables that drive investment into IREFs?

To answer the first question the paper uses a novel property-by-property dataset created from regulatory data to understand how IREF investment is distributed across Ireland and in what sectors it is concentrated. To answer the second question, the paper uses a granular investor level dataset and tries to determine which economic, financial and policy variables drove investment into Irish real estate funds over the period 2014-2017.

This paper is not focusing on all funds that are classified as real estate funds in the Central Bank of Ireland (CBI) Investment Funds dataset, but rather the subset that have invested in Irish property directly or indirectly through partnerships and limited companies.[1] Thus, this paper does not include funds that only hold property located outside of Ireland, and funds that invest only in the debt or equity of real estate companies or funds. Real estate investment trusts are also not included.

Literature

Descriptive analysis on the activities of real estate funds in the Irish market has been limited. One source of information has been the market commentary produced by real estate agents, which reports on 'private equity investors', 'property companies' and 'institutional investors', who would commonly invest through an IREF. This commentary provides estimates of how active such investors are in the Irish property market, as well as providing some information on where such investors are focusing their investment and what types of property they are investing in (Savills World Research, 2018; Colliers International, 2016; DTZ Sherry FitzGerald, 2016).

Descriptive work using the CBI's Investment Fund return data is undertaken in McCarthy (2017). It provides a high-level overview of the sector, and shows that IREFs only invest in property in the UK and Ireland, and that on a first counterparty basis Irish investors held around 35 per cent of total IREF equity at Q1 2017. The current

[1] Real Estate Funds in the Investment Fund data include funds that primarily invest in the equity or debt of real estate companies.

paper will build on that work and market commentary, by providing a detailed geographic and property type breakdown of IREF investment over 2012-2016.

The literature on factors affecting investment into real estate funds, and other fund types, is more extensive. Research on investment flows into real estate funds and REITs tend to focus on establishing the relationship between returns and net subscriptions. Downs et al. (2016) examine German open real estate funds using a VAR 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 paper will differ to these two examples in its use of individual investor level data, rather than data aggregated at the fund level.

Other studies focus on returns to alternative investments and how they impact fund flows. Grose (2011) analyses the determinants of inflows and outflows into mutual bond funds in Greece, and finds that returns on the Athens Stock Exchange share a negative relationship with investment into bond funds.

The period is also characterised by a change in the withholding tax levied on foreign investors in IREFs, and thus the paper ties in with literature on investment taxation. The most salient 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.

Finally, this paper broadly relates to the literature studying the determinants of direct cross border real estate investment. Baum et al. (2013) attempt to estimate institutional and regulatory cross border determinants of cross border real estate investment, but find that regulatory and institutional variables have no impact on cross border flows. Muack and McKay Price (2017) attempt to determine the economic and property specific characteristics that make publicly traded retail investment firms to invest abroad. Both of these studies focus on features of the investment location that attract investment, whereas this paper will focus on determining how domestic factors influence investors decisions to invest abroad.

Data

Property-by-Property Dataset

IREFs supply data on aggregate property holdings broken down by country in the quarterly Investment Fund return collected by the Central Bank of Ireland. To understand how this investment was distributed across Ireland additional sources of data collected by the CBI were utilised. Location information for the properties held by IREFs is available in their annual audited financial statements. In the small number of cases where this information was unavailable in a funds audited financial

statement, the author request this data from fund administrators, ensuring that the dataset would be complete. The data was subsequently cross-checked with industry publications and the commercial property section of Irish newspapers. A quarterly dataset on purchases and holdings of Irish real estate between 2012-2016 was created.

There are a minimum of 2,400 unique properties in the dataset. The exact figure is higher due to properties in the same multifamily development being aggregated into one item in audited financial statements.

Investor Level Dataset

Similarly, the data the Investment Fund return provides is insufficient for rigorously analysing the determinants of investment into IREFs. This is due to the aggregation of fund equity holder positions by country and sector. If investors are investing across multiple funds, the observations will not be independent. Failure to take this account would undermine the validity of any hypothesis test conducted.

Shareholder registers were requested and received for all but a handful of IREFs in operation over the period 2014-2017. These registers provide individual level data for the subscriptions, redemptions, opening and closing position of each investor in each quarter, as well as the country in which each investor resides.

The dataset that has been constructed is a multidimensional panel dataset, with 128 funds and 1,895 unique investors. Multiple relationships exist between funds and investors in the data, with funds having multiple investors and investors investing across multiple funds.

One potential issue exists with the investor dataset. The investor country data is reported on a first counterparty basis, rather than an ultimate counterparty basis. This can be problematic, as the analysis aims to understand how domestic investment opportunities affect investors' decisions to invest in IREFs. To give an example, economic and financial variables for the British Virgin Islands are unlikely to explain the investment behaviour of investments that are held there. Unless the ultimate counterparty location can be determined, investors located in offshore financial locations are dropped from the analysis.[2]

However, this issue may also affect investors located in non-offshore financial centre locations if their investment is held on their behalf by a third party, for example in a nominee account with a broker. The robustness checks will attempt to determine whether this is an issue.

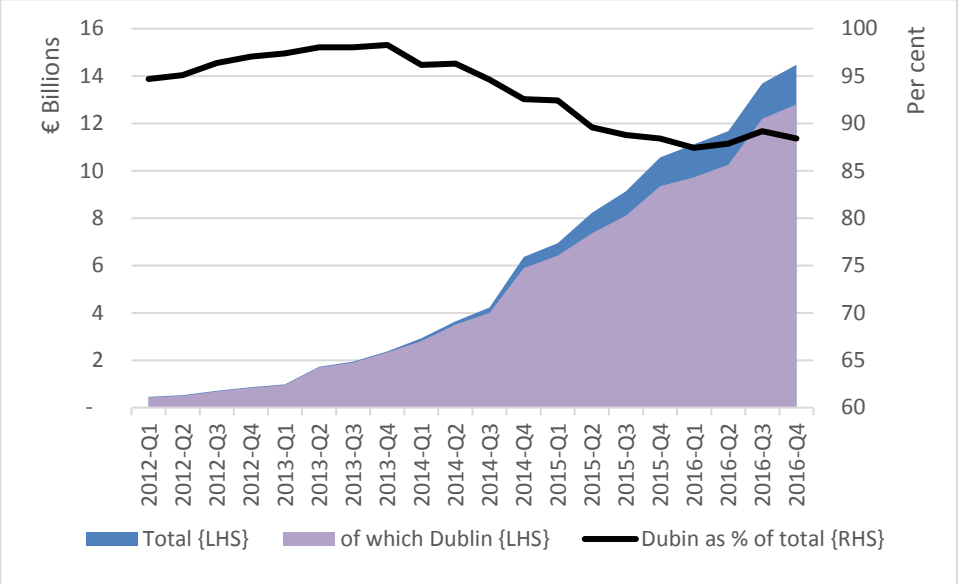
[2] Countries excluded include the Bahamas, the West Indies, Guernsey, Jersey, the British Virgin Islands, Panama, the Isle of Man and Malta.

Distribution of IREF Investment

Considering the geographical spread of investment across Ireland, the first thing that becomes obvious is that it is highly concentrated in Dublin, Ireland's capital, and is weakly dispersed throughout the rest of Ireland. As of 2016 Q4, some 88 per cent (€12.8bn) of investment property by value held was located in Dublin. By comparison, Ireland's second largest county by population, Cork, only accounts for 3 per cent of the total.[3]

The concentration of investment in Dublin is a consistent feature of the data, although there does seem to be a trend of decreasing concentration since 2014 (see Chart 2). Dublin's share of total assets was highest in 2013 Q4, when it accounted for approximately 98 per cent of total property assets by value before declining to a low of 87 per cent in 2016 Q1.

Chart 2: Total Property holdings of IREFs – Dublin and the Rest of Ireland



Source: Central Bank of Ireland

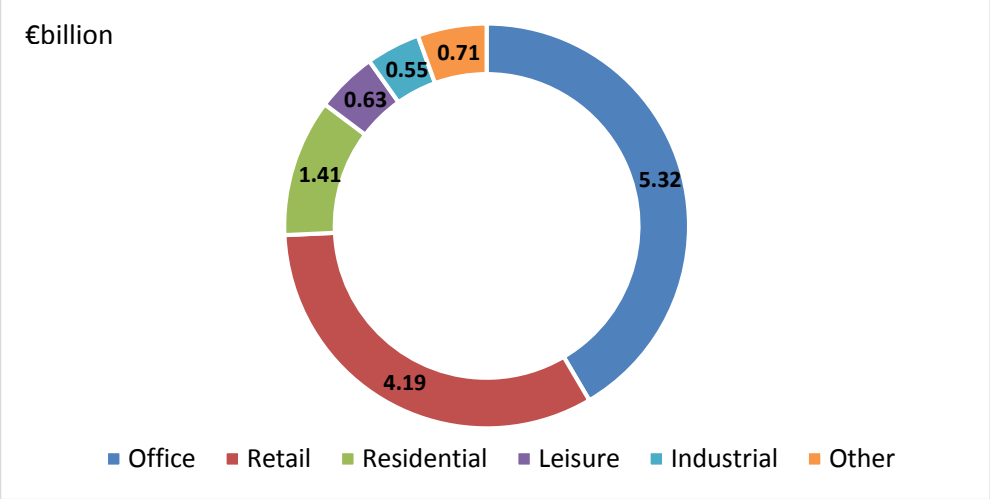
Given the clear split in investment between Dublin and the rest of Ireland, it seems apt to consider how investment varies across property categories within each region. Considering stocks of property at end 2016, the majority of Dublin located property held by IREFs is commercial. Using a generous definition of residential accommodation[4], IREFs hold €1.4bn of residential property out of the total Dublin located stock of €12.8bn. Retail and Office property make up the largest

3 As of 2016, Dublin county had a population of approximately 1.3 million while Cork county had a population of roughly 0.5 million.

[4]Student accommodation, mixed use residential-commercial accommodation and pure residential accommodation.

components of this stock, accounting for €4.2bn and €5.3bn respectively (see Chart 3). Leisure and industrial property make up the largest remaining components.

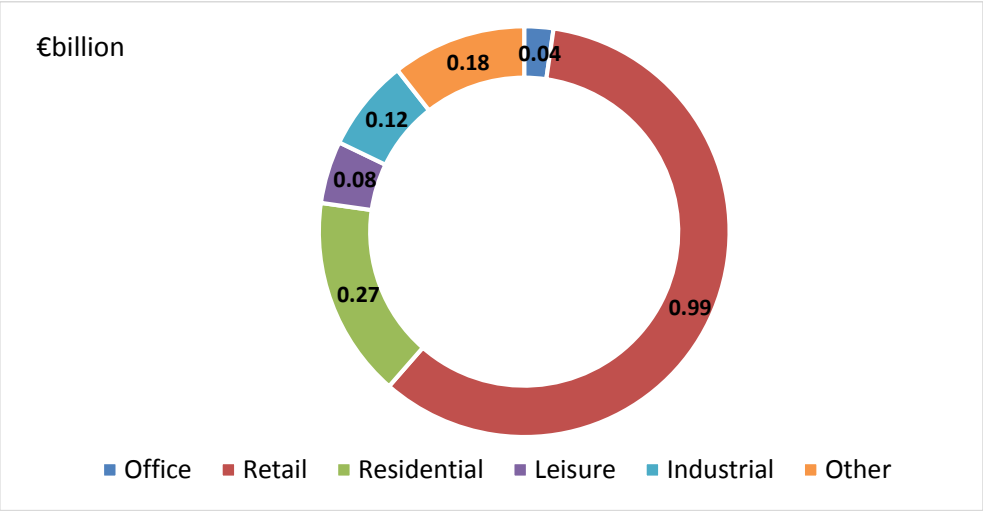
Chart 3: Holdings of Dublin property by category in €bn – Q4 2016



Source: Central Bank of Ireland

The composition of property holdings differs significantly in the rest of Ireland. Firstly, there is a sharp decrease in the amount of office property held - only around €38mn worth of office property is held by IREFs outside of Dublin (see Chart 4). Secondly, retail property accounts for a much greater share of the total. The stock of retail property is worth about €1bn relative to a total stock of €1.7bn in property held outside Dublin, whereas in Dublin it accounts for about €4.2bn of a total of €12.5bn. This is mainly explained by retail focused funds buying many shopping centres and retail outlets outside of Dublin. Finally, residential property makes up a somewhat larger proportion of the total stock outside of Dublin. It comes in at 17 per cent outside of Dublin, relative to 11 per cent in Dublin.

Chart 4: Holdings of non-Dublin property by category in €bn – Q4 2016



Source: Central Bank of Ireland

The property-by-property dataset provides two policy relevant insights. Firstly, to whatever extent IREF investment is a policy issue, it is a regional one – investment is highly concentrated in Dublin. Secondly, the vast majority of these funds are focused on commercial real estate. Therefore, they should be viewed as marginal players in the residential real estate market for the time being.

Modelling Framework

Modelling Investment into IREFs

To answer the second question set out in the introduction, we need a framework in which to analyse investors' demand for IREF shares. Ultimately, what is being analysed is investment choice. Therefore, the analysis is set within a portfolio choice framework such as Desai and Dharmapala (2011). Demand, as measured by net subscriptions, for IREF shares is determined by the return on fund equity, the returns of alternative investments and changes in each investor's wealth constraint (i.e. income, as proxied by real GDP growth).

A number of factors determine the return on IREF equity. At the fund level, it is determined by the capital appreciation and dividend yield of the shares held and changes in the FX rate.

What remains is to model alternative investment opportunities for investors. Let us state that the set of all countries in which an investor can invest is W, and that there are n countries in the sample where n is a subset of W (i.e. $n \subset W$), with W=[1,..,k]. Simplifying by assuming there is only one investor from each country and that income does not influence their decision, for a set of investors from countries 1,2,3,4 $\in n$ investing in the equity of fund j, their investment decisions can be modelled as follows:

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

Where Y_{1jt} is an investor from country *1*'s net subscriptions in fund j for period t, X_{21} represent the returns of investor from country *1* investing in country *2* and $\beta_{W1,2,3,4}$ are k by 1 vectors of parameter estimates for the impact of alternative investment opportunities in foreign countries.

To start, let us consider that each investor faces a choice to invest domestically or internationally. This distinction is important because It is generally acknowledged that a 'home bias' exists which leads to investors having a greater preference for investing

domestically. Whether its cause is informational (Suh, 2005), due to excessive optimism about domestic markets (Strong & Xu, 2003) or due to cultural factors (Anderson, Fedenia, Hirschey, & Skiba, 2011) it is well established, and should be taken into account when analysing investment choice.

To do so it is assumed 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 relationship between investment in IREF shares and returns on alternative investment opportunities, formally this can shown with:

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

Due to this feature of investor behaviour, it makes sense to isolate domestic investment from international investment for each investor, as has been done in the previous set of four equations.

What remains is to model international investment for each investor. Let us assume that two investors investing in the same foreign country should find the return on fx adjusted foreign investment equally attractive. For example, Spanish and UK investors should find the return on German equities equally attractive, after adjusting for FX rates. The author acknowledges that factors such as trust, language and proximity all play important roles in determining foreign investment. However, these factors are generally stable or fixed over the medium term, and thus should be captured by investor fixed effects. Formally, this can be stated as:

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

The set of all countries outside the n in the sample, those between n+1 and k in the equations, are common and equally attractive (given previous assumptions) investment opportunities to all investors. Thus, they can be picked up using a period fixed effect for each quarter.

What remains is investment between the set of countries present in the sample, the 1 to n countries. For each investor, this represents cross sample investment. To capture the impact of alternative cross sample investment opportunities a weighted average return for each investor country for bond, equity and real estate returns is constructed. Weights for each country are calculated as the market size for a given company as a percentage of the total market size of the countries in the sample.

To minimise the risk of dynamic misspecification quarter-on-quarter percentage returns are used for all alternative investment opportunities, real GDP growth, and growth in the value of a fund's equity.

One further factor that needs to be taken into account is the changing policy environment for investors over this period. The 2016 Finance Act levied a new withholding tax on foreign investors in IREFs. From 1st January 2017, investors not

resident in Ireland and not part of an exempted group[5] were subject to a 20 per cent withholding tax on capital gains and dividend income. As this tax change affected investors differentially, it needs to be controlled for.

Empirical Model

Formally, our model can be expressed by the following equation:

$$Y_{ijt} = X_{it} + Z_{jt} + T_{it} + F_{it} + u_{ijt}$$

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, including alternative investment opportunities and the proxy for income growth, quarter-on-quarter (QoQ) real GDP growth (*gdp*). For, Ireland real GDP growth has been replaced with growth in real modified domestic demand due to distortions in Irish GDP due to multinational corporations.

It would be expected 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 share a positive relationship with net subscriptions. To account for this an interaction term between a dummy for Irish nationality of investors and the return on property is included.

QoQ total returns for domestic and cross sample equity (*eqi, eqw*) are calculated using the total return index for each investor nationality's benchmark stock exchange. Coverage for these indices is extensive, and easy to source for all non-offshore financial centre locations.

QoQ total returns for domestic and cross sample bonds (*bnd, bdw*) are calculated using the total return index for each investor nationality's sovereign bonds. Sovereign bonds indices were chosen as they had the best country coverage relative to aggregate bond indices or corporate bond indices. Total return indices were not available in all cases, so on occasion price indices had to be used.

QoQ returns for domestic and cross sample property (*rre, rrw*) are calculated using indices of residential retail prices for each country. Unfortunately, quarterly commercial real estate indices do not have the same coverage. Interaction terms with a dummy for whether an investor is Irish are also recorded (*rre_ie*).

Z_{jt} symbolises fund covariates, namely dividend yield (*div*) and QoQ growth in the value of the fund's equity (*cap*). The dividend yield measures the value of dividends distributed in a quarter as a percentage of the total NAV.

[5] Investors who were pension funds, investment funds and life assurance companies located in the EEA were exempt from the tax change. UK charities were also deemed to be exempt from the tax change. This exemption was only valid if the investor was not using the fund as a personal investment vehicle.

The impact of the 2016 Finance Act is captured in the T_{it} variable (*tax*), which is structured as a difference-in-difference estimator.

F_{it} captures varieties of fixed effects and interaction fixed effects. The fixed effects used in various models include quarter fixed effects, investor-fund fixed effects, investor class-quarter interaction fixed effects and sole investor-quarter interaction fixed effects.

For the investor class-quarter fixed effects investor are divided into two groups to try and distinguish between retail investors and institutional investors. This is done by choosing a cut off point for the maximum shareholding an investor has over the period, and is tested at the €1mn, €2.5mn, €5mn and €10mn level. For parsimony, only results of the €1mn threshold are shown, but they do not differ from that of the others.

The data are characterised by many funds with only one investor. These investors may have different investment opportunities to other investors, and thus an interaction between being the sole investor in a fund and quarter fixed effects (i.e. sole investor – quarter fixed effects) are also included.

Finally, care needs to be taken with 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.

Data for fund covariates comes from the Investment Fund return and data for investor covariates comes from Bloomberg, Eurostat, IMF and BIS.

Empirical Analysis

The results of 5 models are detailed below (Table 1). Model 1 only includes fund covariates and quarter and investor-fund fixed effects. Model 2 adds investor covariates. Model 3 includes the tax variable; as it is structured as a difference-in-difference variable, all investors who were not present in the quarter preceding its announcement are dropped. Models 4 and 5 include different types of investor characteristic-quarter interaction fixed effects, to capture the possibility that types of investors may have different investment opportunities unique to them that vary over time. Model 4 includes investor size-quarter interaction fixed effects and model 5 includes sole investor-quarter interaction fixed effects.

The modelling framework considers investment in IREFs to be a function of their return, the return of alternative investment opportunities and income of investors. The results provide limited support for this view.

Table 1: Main Regression Specifications

Dependent Variable: Net subscriptions as percentage of opening position

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Fund Covariates					
Div	0.13 (0.04)***	0.13 (0.04)***	0.14 (0.03)***	0.15 (0.03)***	0.15 (0.03)***
Cap	0.00 (0.01)	0.00 (0.01)	0.01 (0.01)	0.01 (0.01)	0.00 (0.01)
Investor Covariates					
gdp		0.28 (0.3)	0.27 (0.33)	0.21 (0.32)	0.22 (0.31)
eqi		-0.26 (0.19)	-0.26 (0.19)	-0.28 (0.18)	-0.21 (0.2)
bnd		0.34 (0.53)	0.36 (0.54)	0.35 (0.55)	0.35 (0.54)
rre		0.82 (0.65)	0.87 (0.67)	1.21 (0.64)*	0.67 (0.68)
rre_ie		0.15 (0.5)	0.14 (0.52)	0.03 (0.51)	0.35 (0.39)
rrw		-1.84 (1.95)	-2.01 (2.04)	-1.42 (2.1)	-2.24 (2.14)
bdw		0.55 (1.34)	0.63 (1.42)	0.44 (1.46)	0.51 (1.4)
eqw		0.5 (0.42)	0.54 (0.43)	0.37 (0.45)	0.45 (0.37)
fx		1.43 (0.82)*	1.48 (0.83)*	1.21 (0.84)	1.75 (0.81)**
Policy Covariates					
tax			-0.2 (1.69)	2.03 (2.71)	-1.57 (1.99)
Fixed Effects					
Sole Investor-Quarter Interaction	No	No	No	No	Yes
Investor Class-Quarter Interaction	No	No	No	No	Yes
Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes
Investor-Fund Fixed Effects	Yes	Yes	Yes	Yes	Yes
N	16,479	16,083	15,211	15,211	15,211

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

Variables affecting the return of the fund show expected and mostly significant relationships with the investment. The dividend yield (*div*) on IREF shares is consistently significant at the 1 per cent level. A 1 per cent increase in the dividend yield is associated with a 0.13-0.15 percentage point increase in net subscriptions. This can be interpreted in two ways: funds that pay dividends see more investment, and that investors have a moderate propensity to reinvest dividends into the fund they receive them from.

The return on a fund's equity is also determined by the value of its equity, which depends on the fx rate (*fx)* and the price growth of the equity (*cap*). Both variables share an expected positive relationship with investment, such that growth in the value of a fund's equity is associated with increased investment. However, neither variable attains the same level of significance as the dividend yield variable. The fx rate variable achieves significance in 4 of 5 models, but only once at the 5 per cent

level. While the growth in the value of a fund's equity has the expected sign, it does not attain statistical significance in any model.

The variables capturing alternative investment opportunities are statistically indistinguishable from zero in all but one case, and frequently have the wrong sign. Of the 7 variables measuring alternative investment opportunities, only 3 show the expected sign; the interaction term for property prices and an investor being Irish (*rre_ie*), the domestic equity return variable (*eqi*) and the weighted cross sample real estate return variable (*rrw*).

The other 4 variables are all unexpectedly positive, but are nearly all statistically significant. The exception is the domestic residential real estate variable (*rre*) in model 4, which attains statistical significance at the 10 per cent level.

Investor income growth (*gdp*) shares a positive relationship with investment across all models, but never attains statistical significance.

Looking across the three specifications including tax (*tax*), there seems to be no clear evidence that the 2016 Finance Act had an impact on net subscriptions of affected investors. While the tax change has the expected sign in two of three cases, it never approaches statistical significance in any model. However, the increase in the estimate from model 3 to 4 suggests that larger investors are driving the negative estimate observed in model 3. In future work, the author will explore potential heterogeneity of the taxes impact amongst different categories of investors.

Robustness Test

The counterintuitive signs and general lack of significance for our alternative investment covariates may lead us to be concerned that some form of endogeneity is biasing the estimates. One possibility is measurement error arising from the country of the first counterparty and the ultimate counterparty of investors being different[6]. Such measurement error could explain the results for alternative investment opportunities and it is quite possible that some measurement error of this variety is present in the dataset - 1324 of the 1895 unique investors are recorded as nominee accounts.

To determine whether this is affecting the estimates investors who have invested through nominee accounts are dropped and the five models are estimated with a reduced sample. Other investor types do not suffer from this problem, so if the same relationships exist within this smaller sample then it can be concluded that measurement error arising from first counterparty reporting is not a significant concern.

[6] For example if a shareholding held in a nominee account with an Irish broker belongs to a US investor, then regressing alternative Irish investment opportunities for this investor will introduce measurement error into the model.

Dropping approximately 2/3rds of the units in the sample does not have a considerable effect on the results (Table 2). While point estimates change, the signs of most estimates do not. Only the tax variable (*tax*) and the interaction term between domestic real estate QoQ returns and whether an investor is Irish see sign changes. Both variables remain insignificant, but now also have signs contradictory to what would be expected.

Table 2: Robustness Test

Dependent Variable: Net subscriptions as percentage of opening position

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Fund Covariates					
div	0.13 (0.04)***	0.13 (0.04)***	0.14 (0.03)***	0.15 (0.03)***	0.15 (0.03)***
cap	0.00 (0.01)	0.00 (0.01)	0.01 (0.00)	0.01 (1033.31)	0.01 (1033.31)
Investor Covariates					
gdp		0.13 (0.36)	0.07 (0.38)	0.09 (0.37)	0.04 (0.36)
eqi		-0.18 (0.23)	-0.2 (0.24)	-0.2 (0.23)	-0.16 (0.26)
bnd		0.46 (0.7)	0.5 (0.71)	0.58 (0.74)	0.43 (0.71)
rre		0.84 (0.73)	0.94 (0.75)	1.05 (0.79)	0.79 (0.75)
rre_ie		-0.08 (0.58)	-0.08 (0.58)	-0.13 (0.63)	0.13 (0.46)
rrw		-1.22 (2.42)	-1.81 (2.38)	-1.63 (2.62)	-2.08 (2.65)
bdw		0.44 (1.52)	0.9 (1.55)	0.88 (1.65)	0.75 (1.64)
eqw		0.35 (0.5)	0.42 (0.5)	0.35 (0.53)	0.42 (0.46)
fx		0.9 (1.07)	0.97 (1.07)	0.9 (1.12)	1.28 (1.05)
Policy Covariates					
tax			2.89 (3.46)	3.5 (3.83)	1.13 (3.72)
Sole investor-quarter fixed effects	No	No	No	No	Yes
Investor class-quarter interaction effects	No	No	No	Yes	No
Quarter fixed effects	Yes	Yes	Yes	Yes	Yes
Investor-fund fixed effects	Yes	Yes	Yes	Yes	Yes
N	5,921	5,639	5,338	5,338	5,338

Given the change in the estimates, it must be asked whether this is evidence of measurement error being removed from the sample. Thankfully, clear predictions can be made for the effect that removing this bias would have on the tax variable. Dropping nominee accounts should remove an upwards bias in the parameter estimates. Affected investors should reduce investment relative to unaffected investors, so misclassifying them as unaffected should reduce the expected negative difference between the two groups. Likewise, it would be expected that unaffected investors would not change their behaviour, ceteris paribus, following the tax

change. By including them in the group of affected investors, the mean impact of the tax change is diluted and the difference between the two groups becomes less negative.

Dropping nominee accounts leads parameter estimates for the tax variable across all models to increase. This is contrary to what should happen if an upward bias is removed. Given this, and the fact that the signs of most variables remain unchanged, it can be concluded that measurement error due to differences in first and ultimate counterparty is not a significant issue.

Conclusion

This paper has sought to provide a better understanding of the investment activity of Irish real estate funds and the factors that have driven investor inflows. Using a new property-by-property dataset the paper has found that investment by these funds is overwhelmingly focused in commercial real estate located in Dublin. The geographic and sectoral concentration of these funds investment is a consideration for future policy discussions

The paper then analysed what factors drove investment by domestic and foreign investors into IREFs. The regressions results suggest that factors affecting a funds return are relevant for determining investment are relevant (i.e. dividend yield, foreign exchange rate), but that alternative investment opportunities perform poorly in predicting investment. In addition, it appears that a 20 per cent tax on foreign investors levied at the beginning of 2017 seems to have had no influence on their investment behaviour on average, relative to those investors who were not taxed. However, the results do suggest that the tax may have had a heterogeneous effect on investors according to their size, and the author intends to explore this in future work.

Robustness checks assessing whether the limited explanatory power of alternative investment opportunities arose from measurement error in investor location were run. The results suggest that such measurement error this is not the case.

It is possible that the absence of statistically significant relationships between the dependent variable and the alternative investment opportunity variables is due to the panel data structure used. Firstly, most investors will neither purchase nor sell/redeem shares during a given quarter. This means that the dependent variables is characterised by a lack of variation, while the dependent variables show much greater variance. In addition, it's possible that investment opportunities at a global level, or Irish economic conditions may be the main factors driving investors decisions. It is not possible to analyse the impact of either set of factors with the current Investment Fund series as to do so would require a time series approach, and the series is too short. Thus, analysis on understanding what other factors might drive investment into IREFs is left to future work.

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Ninth IFC Conference on "Are post-crisis statistical initiatives completed?"

Basel, 30-31 August 2018

Real estate fund investment in post-crisis Ireland[1]

Barra McCarthy,
Central Bank of Ireland

[1] This presentation was prepared for the meeting. The views expressed are those of the authors and do not necessarily reflect the views of the BIS, the IFC or the central banks and other institutions represented at the meeting.

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Real Estate Fund Investment in Post-Crisis Ireland

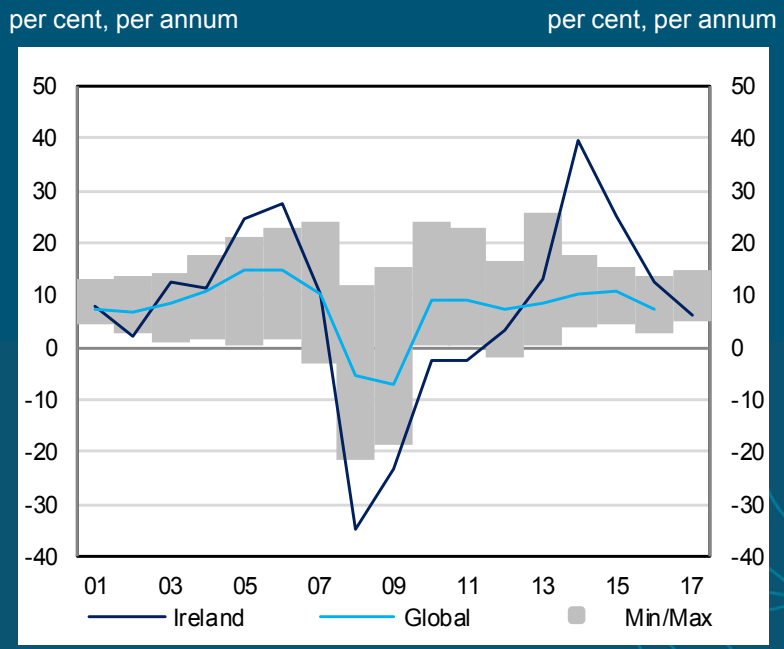
Barra McCarthy, Central Bank of Ireland

Disclaimer: All material presented reflect the author's views, and do not represent the views of the Central Bank of Ireland

Introduction

- Ireland's property market has had an exceptional experience over the past 17 years.
- Irish domiciled real estate funds (IREFs) have seen their Irish property assets increase from €1bn to €14.5bn between end-2012 and end-2016.
- Now own 53% of total CRE stock as of end-2016.
- Despite this, little is known about them. This paper seeks to answer two questions on them:
  - Where and in what are they investing?
  - What drives investment into them?

Total returns across international markets



Source: Source: MSCI/IPD.
Note: Grey bars signify the relevant maximum and minimum annual total returns observation (in local currency) across a number of international markets,

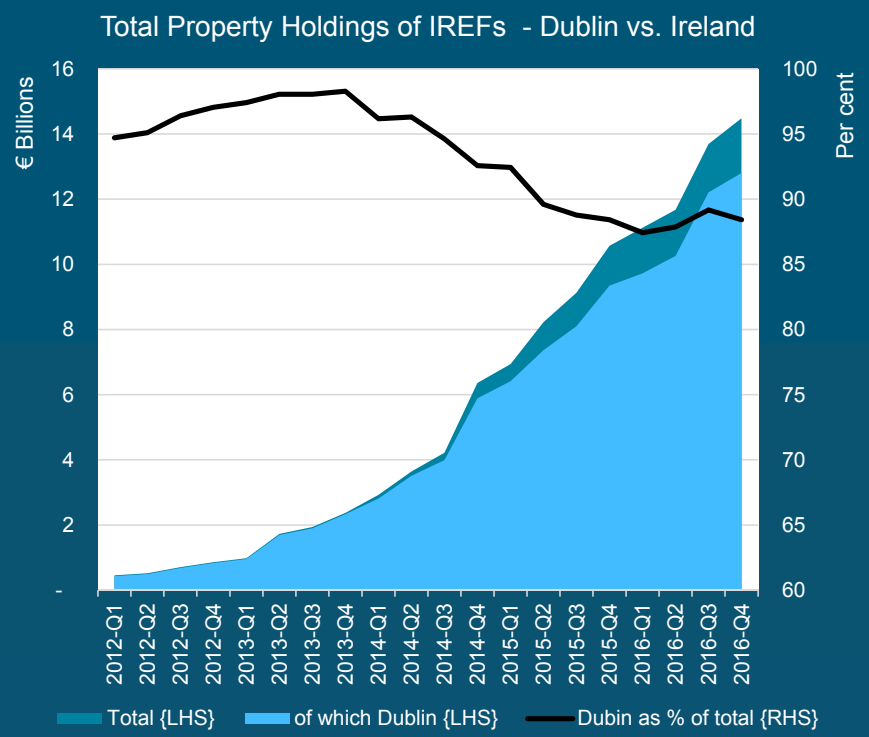
Literature and Data

- Previous literature includes:
  - Descriptive work: McCarthy (2017) and real estate agent market commentary.
  - Real estate fund investment flows and Fund Return: Ling and Naranjo (2004), Yung (2006) and Downs et al. (2016).
  - Mutual fund investment flows and alternative investment opportunities: Grose (2011) and Sebastien and Weistroffer (2007).
  - Cross border real estate investment: Baum et al. (2013).

Data

- Questions being asked require data beyond standard statistical return. To answer them, I construct:
  - A property-by-property dataset from audited financial statements.
  - An individual shareholder dataset from each fund's shareholder register.

The where of IREF Investment



Source: Audited financial statements, author's calculations

- Investment is overwhelmingly focused in Ireland's capital, Dublin.
- This is a consistent feature of the data.
- Decreasing concentration since 2014.

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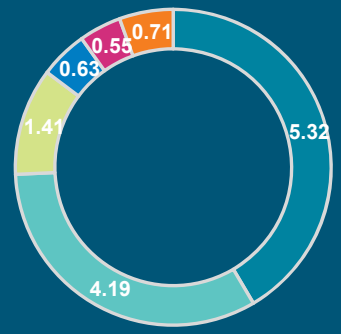
The what of IREF Investment

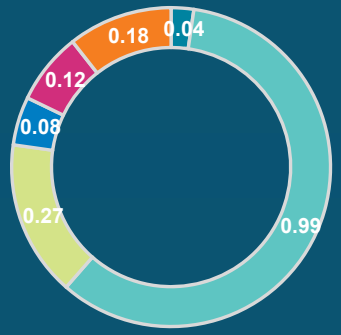
Dublin property holdings by property type- at Q4 2016

€ billion



Ireland ex-Dublin property holdings by property type – at Q4 2016

€billion



- Looking at Dublin vs. Rest of Ireland:
- Both consist of mostly commercial property…
- …but the composition of commercial property holdings differs.
- Residential property makes up small amount of total for each area.

Modelling Investment into IREFs

- In essence the analysis is one of portfolio choice.
- Therefore, changes in an investors wealth constraint, the expected return on IREF equity and the expected return on alternative investment opportunities are the relevant explanatory variables.
- Alternative investment opportunities can be modelled as domestic, cross-sample and out of sample.
- Larger investors may have different investment opportunities available to them.
- Taxes change for foreign investors at beginning 2017.

Model

- Analysis is conducted with a panel fixed effects model.

$$Y_{ijt} = B_0 + B_1 Z_{jt} + B_2 X_{it} + B_3 T_{it} + B_4 F_{it} + u_{ijt}$$

Where:

- Z_{jt} is a matrix of fund covariates
- X_{it} is a matrix of investor covariates
- T_{it} is a difference in difference estimator
- F_{ijt} is a matrix of fixed effects.
- u_{ijt} is the error term, two way clustered ony fund and investor.

Results

Variable	Model (1)	Model (2)	Model (3)	Model (4)
Investor Covariates				
GDP	0.3 (0.31)	0.18 (0.29)	0.27 (0.33)	0.16 (0.31)
Equity - Domestic	-0.24 (0.21)	-0.25 (0.18)	-0.22 (0.23)	-0.25 (0.21)
Bond - Domestic	0.14 (0.67)	0.2 (0.65)	0.11 (0.7)	0.21 (0.67)
Real Estate - Domestic	0.94 (1.06)	0.84 (0.96)	1.02 (1.13)	0.96 (1.07)
Real Estate (Ireland)– Domestic	0 .00 (0.96)	0.18 (0.82)	-0.08 (1)	0.09 (0.88)
FX	0.49 (0.4)	0.34 (0.36)	0.45 (0.42)	0.36 (0.4)
Equity – Cross Sample	0.15 (0.37)	0.13 (0.37)	0.2 (0.43)	0.15 (0.42)
Bond – Cross Sample	-0.24 (0.57)	-0.79 (0.72)	-0.29 (0.59)	-0.62 (0.63)
Real Estate – Cross Sample	-3.87 (5.34)	-5.28 (5.5)	-3.89 (5.67)	-6.27 (5.94)
Fund Covariates				
Dividend Yield	0.13 (0.04)***	0.13 (0.04)***	0.14 (0.03)***	0.15 (0.03)***
Capital Appreciation	0.00 (0.01)	0.00 (0.01)	0.01 (0.01)	0.01 (0.01)
Policy Covariate				
Tax			-1.23 (2.58)	1.14 (3.31)
Investor-Fund Fixed Effects	Yes	Yes	Yes	Yes
Quarter Fixed Effects	Yes	Yes	Yes	Yes
Investor Size-Quarter Interaction Fixed Effects	No	Yes	No	Yes
N	16,108	16,108	15,230	15,230

Key Results:

- Investor covariates show no statistically significant relationships.
- Fund covariates have expected relationship, but only dividend yield attains statistical significance.
- Tax change appears to have had an impact indistinguishable from zero.

Conclusion

- To conclude, I'll give an answer to the two questions raised at the start:

Where and what are IREFs investing in?

- IREFs are predominately invested in commercial real estate located in Dublin.

What drives investment into IREFs?

- Fund dividends the only variable to share a statistically significant relationship with investment.
- Tax change in 2016 Finance Act seems to have had no impact on affected investors.
- Domestic and cross-sample alternative investment opportunities do not appear relevant for investors.