The Determinants of Institutional Capital Allocation to Real Estate

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Abstract
Pension funds all over the world have experienced increasing allocations to alternative assets, the most important being real estate. The question is, however, what the drivers of that real estate allocation are. We exploit the global pension fund database of CEM to shed light on this issue. We find that pension funds' strategic allocation (net of performance effects) to real estate is the result of the historic performance of the asset class compared to other asset classes, and that pension funds adjust their actual allocation percentage quickly to the strategic allocation: we find allocation reductions in years after high returns, and increases in years after low returns. Market risk attitudes – measured by the credit risk spread and the term spread – do not play a role in the overall real estate allocations. Last, we observe that while pension funds' allocation to real estate has grown over time, this is not the case after we adjust for capital appreciation: In terms of physical real estate assets, pension funds' portfolios are generally shrinking, with the US leading the way.

Keywords: Real estate, pension funds, dynamic allocation, capital flows

JEL codes: G20, G11, G23

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1 Introduction

In a recent paper, Carlo et al. (2021) show that the allocation to real estate by pension funds across the world has been increasing, as part of a wider development of alternative asset portfolios by these institutional investors. This process is ongoing. For example, CalPERS, the largest pension fund in the U.S., recently announced the intention to increase the allocation to real assets (82% of which is real estate) from 13% to 15% in the 2023 fiscal year. But while the numbers clearly point towards a greater real estate allocation over time, the allocation dispersion among pension funds is substantial: many pension funds still do not invest in the asset class at all, while for example the Dutch Pension Fund for Construction Workers allocates 19% of the portfolio to real estate. Little is known about the cross-sectional variation in allocations to real estate and what explains the dynamics in that allocation over time. The main contribution of this paper is to provide a deeper understanding of the causes of institutional investors' allocation to real estate, both over time, and across investors.

Allocation decisions and fund flows have been investigated before, but not directly for pension funds, and most of the papers on the topic study both the question how capital flows influence subsequent returns, and how past returns affect fund flows. This has been done for public equity (Froot et al, 2001), private equity (Gompers and Lerner, 2000; Kaplan and Shoar, 2005), mutual funds (Karceski, 2002), and public and private real estate (Ling and Naranjo, 2003; Fisher et al., 2009).

Froot et al. (2001) study international capital flows into public equities. They document that flows are dependent on historic returns, i.e. they find evidence of return chasing behavior by international investors. And specifically for emerging equity markets, they also find that the inflows are predictive of future returns. For private equity, Gompers and Lerner (2000) and Kaplan and Schoar (2005) show that capital flows into private equity funds are positively and significantly related to past performance. Furthermore, inflows to venture capital funds have had a substantial impact on the pricing of private equity investments and that those changes in valuation reflect shifts in the demand for those securities or changes in future prospects.

For real estate, Ling and Naranjo (2003) studied REIT capital flows and returns, and find return-chasing behavior, but only in the short run: when looking at returns lagged by one quarter, they find a positive relationship between returns and subsequent allocation, but this seems to reverse for longer time periods, of two quarters and up. They also find that causality can go both ways, as the flows of funds into REITs also have a significantly positive effect on these REITs' returns.

Fisher et al. (2009) look at this for private real estate, both in the short and in the long run. They find that capital flows into private real estate influence subsequent returns at the aggregate level for the U.S., and that this effect is strongest for the apartment and office sector, and in a small number of core business statistical areas. On the contrary, they do not find that private real estate returns are predictive for future capital flow into or out of private real estate, neither at the national, nor at the regional level. In other words, they do not find evidence for return-chasing behavior for private real estate, which seems to contrast the earlier findings for REITs (Ling and Naranjo, 2003).

In short, the existing literature finds mixed evidence of return chasing explaining fund flows into various asset classes and for different types of investment vehicles. It also seems that fund flows affect subsequent performance. However, these papers do not investigate the source of these fund flows. Pension funds stand at the top of the investment feeding chain, and their decisions ultimately determine allocation to different asset classes and investment styles. However, not much is known about the allocation decisions by pension funds. In fact, to our knowledge there are no papers that study the forces driving asset allocation choices by pension funds. The main contribution of our paper is to fill that lacuna, with a focus on the allocation to real estate.

We employ the CEM database, a Toronto-based firm that keeps track of the investment choices and portfolios of over 1,100 pension funds worldwide. This database is the richest of its kind, not just providing invaluable insights in the way pension funds invest in different asset classes, and what this implies for costs and performance, but also providing information on the nature (i.e., public, corporate) and maturity of the fund, and the performance benchmarks used, and their strategic asset allocation to asset classes. This database has been used before to study pension funds' decision-making, for example by Andonov et al. (2015, 2017, 2022).

We find that institutional capital flows to real estate, above and beyond the returns generated by existing investments, are very small, and even negative in many years, which means investors are taking money off the table. As such, our key result is that pension funds tend to stick to their strategic allocations to real estate, where an increase in real estate returns in a given year tends to be followed by a lowering of the actual allocation, and vice versa. This holds for both private real estate as well as for public real estate. Bond yields also explain some of the variation in the dynamics of allocation to real estate, with lower yields in one year increasing the capital flows to real estate in the year after.

In the remainder of this paper, we will first present the database and provide sample statistics of our global pension fund dataset. We will then present the statistical methods we employ, which will be followed by a section presenting and commenting on the results. We end the paper with conclusions and a discussion of practical implications.

2 Data and Variable Construction

For the empirical analysis, we use annual data from 1998 to 2018. The capital flows and return variables, in addition to other pension fund data, are constructed and retrieved from the CEM database. Additionally, we retrieve macroeconomic variables from FactSet as explanatory factors for the capital flows to real estate. We will use the remainder of this section to discuss sources and to provide sample statistics.

2.1 Sources

2.1.1 CEM Database

For this study we employ data provided by CEM Benchmarking, a Toronto-based firm. CEM stands for cost effective benchmarking and the firm provides, amongst other things, investment benchmarking services for pension funds. CEM collects pension fund investment data through a voluntary online data reporting process. The main reason why pension funds report their investment data is to be able to compare their cost structure, risk exposure and performance against their local and global peers. This is especially useful when pension funds want to manage/reduce costs or when setting performance targets.[2]

[2]However, as reporting is voluntary, not all funds report every year to CEM. Some funds even stop reporting completely. Bauer et al. (2010) and Andonov et al. (2012) address possible self-reporting biases, reporting that funds

To our knowledge, the CEM database is the broadest global database on pension fund investments, including plan level data (e.g. fund size and percentage of retired members), strategic asset allocation targets, investment approaches, investment costs, benchmark choices and performance data. For an extensive overview of other studies using the database, see Carlo, Eichholtz, and Kok (2021). The database covers 1,131 unique pension funds across five regions over a time period of 28 years, from 1991 to 2018. The majority of the reporting funds are from the North American region, with a total of 871 unique funds. However, the coverage of European funds increased significantly over the past two decades, with funds from the Netherlands and U.K. representing 87% of the total European sample. As the amount of pension funds from the European region was very low at the start of the sample, we only include European funds reporting from the year 2000 onwards. The total assets held by all pension funds reporting to CEM increased from USD612 billion in 1991 to USD10.1 trillion in 2018. This represents a significant portion of total global pension fund assets, which were recently estimated to be valued at USD40 trillion globally.[3]

Over the entire sample period, the average size of the pension funds was USD33.7 billion, with average real estate holdings of USD1.5 billion. Noteworthy is that the European pension funds reporting to CEM in 2018 and investing in real estate are significantly larger than their North American counterparts, with an average size of USD46.3 billion in 2018 and USD1.53 billion in real estate holdings, against an average size of USD25.7 billion and average real estate holdings of USD1.3 billion for the funds from the North American region. A clear outlier are the pension funds from the "Rest of the World" region, with an average size of USD129 billion in 2018. However, this is driven by a small amount of very large funds in the Middle East, China and South Korea.

In this study, we focus on pension fund allocations to real estate at the *intensive* margin, that is, we are interested in the cross-sectional variation in real estate allocations between pension funds, as well time-series variation in real estate allocation within a given pension fund. As such, we discard all pension funds that do not invest in real estate. (Note that Andonov at al., 2014, study the allocation to real estate and the extensive margin.) Overall, we have 907 pension plans in our sample that invest in real estate, with a total of 6,537 fund/year observations. This implies that the average pension plan that invests in real estate stays in the panel for approximately 7.6 years.

do not enter or exit the database based on their performance. However, they do find that smaller pension funds are more likely to exit the database.

[3]This comparison is based on the Towers Watson Global Pension Assets Study 2018 (https://www.willistowerswatson.com/en-CA/insights/2019/02/global-pension-assets-study-2019).

For these pension funds we collected the following data: holding net asset value for all asset classes and their respective returns net of fees, strategic asset allocation targets, the percentage of retired members, fund size and plan type (i.e. public and corporate). Within the real estate allocation, we can further distinguish between public (i.e. REIT) investments and private equity real estate investments.

[Insert Table 1 Here]

2.1.2 FactSet

From FactSet we download several macroeconomic variables that we use as explanatory factors for the capital flows to real estate. The macroeconomic variables are: the 1-year government yield, the 10-year government yield, and the 10-year corporate yield. We also include the term structure by taking the difference between 10 year and 1 year government yield (Government Yield Curve). Finally, we create a credit spread (Credit Spread) variable, which is constructed as the difference between the 10 year corporate yield and the 10 year government bond yield. Table 2 displays the sample statistics of our sample. It can be observed that there is plenty of heterogeneity in the cross section (i.e. between the countries) and over time that we can explore in our analysis.

[Insert Table 2 Here]

2.2 Capital Flows to Real Estate

Figure 1 displays how the total allocation to real estate has developed over the years for the pension funds reporting to the CEM database. It can be observed that the allocation increased from USD28 billion in 1991 to approximately USD820 billion in 2018 (i.e. by a factor of 28). This translates to an increase in the allocation to real estate from 6.2% to 8.7%, relative to all other asset classes. This increase has been mostly monotonic, with the exception of a small decrease during the global financial crisis in 2008 and 2009. However, it is crucial to note that the overall increase in allocation over time is not only due to *additional capital flows* being committed to the asset class, but is also a result of the *net return* earned on the existing investments of pension plans. As our goal is to model the dynamics of global institutional capital flows into and out of real estate and its returns, it is crucial to distinguish between these two sources of change in allocation, so as to properly measure the real estate related capital flows.

[Insert Figure 1 Here]

We therefore decompose the aggregate change in total allocation between (1) the return component and (2) the capital flow component. First, we measure the annual total change in allocation as the change in holding net asset value of the real estate mandates. Next, we subtract the net return earned over the year from the total change in allocation. The remaining value is the change in allocation due to capital flows alone. Equation 1 shows the mathematical expression we use to get our capital flow variable:

$$CapitalFlow_{i,t} = NAV_{i,t} - NAV_{i,t-1} - [NR_{i,t} * NAV_{i,t-1}], \tag{1}$$

where NAV stands for net asset value and NR stands for net return.

[Insert Figure 2 Here]

Panel A of Figure 2 displays the annual capital flows to all real estate. It can be seen that in the years prior to the global financial crisis (hereafter referred to as GFC), the increase in allocation to real estate has been primarily due to the positive returns earned on the existing investments. In total, the cumulative absolute real estate return earned by the pension funds in our sample until the year 2007 has been approximately USD356 billion, while on the other hand approximately USD67 billion has been taken off the table from real estate mandates over the same time period. In other words, it could be said that the asset class has been a victim of its own success. Namely, the positive returns provide pension plans with the opportunity to take capital flows out of the asset class, while still retaining their target allocation weight to real estate. One reason could be that pension funds take out the capital flows in order to pay out their pension liabilities. Another reason could be that pension funds take money out of the asset class, in order to stick strictly to their strategic asset allocation target. We explore these possibilities later in the paper.

On the other hand, the opposite development can be observed during and right after the GFC. As returns turned negative in 2008 and 2009, the capital flows to real estate were USD35 billion and USD850 million respectively. Noteworthy is that as the asset class recovered from the crisis and started experiencing positive returns, the net capital flows into the asset class remained positive until the year 2014. A possible reason for this is that pension funds tried to increase the allocation back to pre-GFC period, to compensate for the losses made during the GFC, to catch back up with liabilities (Andonov et al., 2017), or, of course, to time the market.

Panel C of Figure 2 displays the cumulative sum of the capital flows from the year 1992 to 2018 for each region in the database. Interestingly, Panel C shows significant heterogeneity across the regions. Most noteworthy is the position of U.S. pension funds versus funds from the other regions. Over the entire sample pension funds from the U.S. have cumulatively taken out more capital over the entire sample, than they have contributed to real estate (i.e. USD72.6 billion). Funds in the other three regions have been net cumulative contributors to the asset class. By 2018, the net cumulative capital flows for Canada, Europe and Rest of the World had been USD39 billion, USD9 billion and USD19 billion respectively. Overall, we observe that the total capital flows to real estate fluctuated strongly throughout the sample period, with substantial heterogeneity across the regions.

2.3 The Interaction between Flows and Returns

Given that a main aim of the paper is to model the dynamics of capital flows relative to returns, we first take a look at the data. Panel A of figure 3 displays the global annual capital flows to real estate measured in billions of U.S. dollars and the holding-net-asset-value-weighted net returns earned over the same period. Panel B shows capital flow for private real estate, and panel C for public real estate. In all three panels, we observe a clear negative correlation between returns to the asset class and capital flows. This is especially apparent in the years before the global financial crisis. From 1991 to the year 2005, the weighted net return of all real estate has been positive for every year, while the capital flow has been negative every year.

For both private and public real estate, money was taken off the table before the GFC due to the positive returns earned during that time period, but during the global financial crisis, when real estate mandates produced negative returns, the capital flows were positive. This is mostly because of the capital flow to private real estate, which has been positive for all years from 1992 to 2014, even though the returns have already turned positive in 2010. As previously stated, a possible reason for this is that pension funds aim to increase the allocation back to their strategic targets, and add capital to compensate for the losses made.

[Insert Figure 3 Here]

3 Empirical Strategy

In the previous section, we provided some nonparametric insights into the dynamics of real estate capital flows relative to net returns. However, there are likely more factors that influence the capital flows to real estate over time and across pension funds. Furthermore, from panel B and C of exhibit 4 it appears as if the dynamics between capital flows and returns to real estate seem to differ between private and public markets in the years after the GFC. With the constructed capital flows variable from equation (1), we run the following pooled OLS panel regression:

$$\begin{aligned} CapitalFlow_{i,t} = {} & \beta_0 + \beta_1 RE_{i,t-1} + \beta_2 FI_{i,t-1} + \beta_3 S_{i,t-1} + \beta_4 OtherAlter_{i,t-1} \\ & + \beta_5 BM\_OutPerformance_{i,t-1} + \beta_6 Diff_all + \beta_7 \%RetirementMembers_{i,t} \\ & + \beta_8 Gov10Y_{i,t} + \beta_9 YieldCurve_{i,t} + \beta_{10} CreditSpread_{i,t} \\ & + \beta_{11} Public_i + \beta_{12} SizeQuintiles_{i,t} + YD_t + Region_i + \mu_{i,t} \end{aligned} \tag{2}$$

Historic performance variables

We first look at the return to real estate and the other main asset classes as explanatory variables. $RE_{i,t-1}$, $FI_{i,t-1}$, $S_{i,t-1}$, and $OtherAlter_{i,t-1}$ are the NAV-weighted lagged net returns for pension fund i's real estate, fixed income, public equities and "other alternatives" asset classes.$FI_{i,t-1}$ is added to control for possible search-for-yield behavior, which would be reflected in a negative coefficient (add references). $S_{i,t-1}$, and $OtherAlter_{i,t-1}$) are added to control for any other dynamics between the returns of these respective asset classes and the capital flows to real estate. Under $OtherAlter_{i,t-1}$, we group private equity, hedge funds and the remaining real asset classes: infrastructure and natural resources mandates. $RE_{i,t-1}$ is added to test for possible return chasing behavior by pension funds (in the spirit of Ling and Naranjo, 2003). Furthermore, interaction variables are added between the historic performance and a pre-GFC and GFC-period. The pre-GFC dummy equals 1 for years prior to 2008, while the GFC dummy is equal to 1 for the years 2008 and 2009.

Strategic asset allocation target

A possible reason for the relationship between the capital flow and returns to real estate, is that pension funds strictly follow their ex-ante determined strategic asset allocation target. Thus, capital flows in and out of real estate could partially reflect that mechanism behind how pension funds adjust their actual allocation towards the target allocation. This is measured by including the control variable "Diff_all", which is constructed as the difference between the target allocation and the actual relative allocation. In other words, when the variable is positive it implies that pension funds are under-allocated to real estate with respect to the target weight, and vice versa.

Liquidity concerns

We include the lagged percentage of retired members in the pension plan in an attempt to control for the liquidity concerns of pension plans. A high ratio of retired to total members could indicate the need for investment categories with a higher cash return, which could make real estate investment more attractive. So we would expect a positive regression coefficient for this variable.

Macroeconomic indicators

Finally, three macroeconomic indicators are added as further explanatory variables. First, the 10-year government yield *(Gov10Y)* in order to proxy for general investment sentiment and the extent that investors are "searching for yield." We also include the term structure by taking the difference between 10 year and 1 year government yield *(Yield Curve)*. This proxies the investor time preference, which could affect the choice for long-term and private assets versus more liquid assets. A higher time spread implies less investor appetite for long-term cash flows, which would reduce the attractiveness of real estate. So, we expect a negative regression coefficient. Finally, we include risk preferences in the market by adding a credit spread *(CreditSpread)* variable, which is constructed as the difference between the 10 year corporate yield and the 10 year government bond yield.

Last, *CapitalFlow* refers to the constructed capital flows variable, Region captures the region fixed effects, YD are the year dummies, and μ are idiosyncratic errors. We run this model specification for both private and public real estate and double cluster the standard errors at the fund and year level to control for potentially correlated performance shocks within pension funds and across years.

4 Results

4.1 Capital flow to private real estate

Results for equation (2), focusing on private real estate, are displayed in Table 3 Column (1) shows the results from the specification, where the main explanatory variable is the one-period lagged returns on private real estate mandates. Column (1) shows a negative relationship between lagged return and capital flows to real estate, which is statistically significant at the 1% level. A 1-percentage point increase in the net return to private real estate mandates leads to a positive capital flow out of the asset class of USD561 million during the next period. Interestingly, we observe that the interaction coefficient with the GFC dummy is positive and statistically significant at the 10% level. That implies that during the GFC, the relationship changed from negative to positive, for a total effect of USD256.6 million (-560.2+ 816.8). It seems that during times of real crisis, investors cut their losses.

In the second specification, displayed in column 2, the lagged returns to other major asset classes are added to the model, yielding two interesting observations. First, the coefficients for the lagged returns to fixed income are negative and statistically significant. This could indicate a possible search for yield. If returns on low risk assets, like bonds, diminish too much, pension funds may look for yield by stepping up on the risk ladder, possibly leading to a higher allocation to real estate. See Korevaar (2022) for a discussion and analysis of this phenomenon. On the other hand, the coefficient for the lagged return of the public equity portfolio is positive and statistically significant at the 5% level. That may be because the high return increases the allocation to public equities, forcing pension funds to increase the capital flow to real estate in order to maintain their strategic asset allocation target.

In column 3, we additionally control for the potential outperformance of the benchmark of the pension fund in the previous period, however we find no statistically significant effect for the variable.

Finally, in column 4, we add the "Diff˙All" variable alongside the macroeconomic indicators. For "Diff˙All" we find that the coefficient is negative and statistically significant, implying that the strategic asset allocation target to real estate seems to be important for the actual allocation. For the macroeconomic indicators we find that while the relationship is in the expected direction, the coefficients are not statistically significant. First, we observe that the coefficient of the 10-year government yield is negative, as we would expect. Again, this could be a reflection of a search for yield by pension funds. We observe that the coefficient for the yield curve is also negative, which is to be expected because a steepening yield curve implies lower investor demand for long term cash-flow, likely including real estate. Finally, for the credit spread the coefficient is positive but statistically insignificant.

Overall, the results reported in Table 3 from all four specifications indicate a negative relationship between the lagged returns and capital flows to private real estate. From the fourth specification we observe that a one percentage increase in lagged net returns results in a total of USD587.3 million to be taken off the table for the combined sample of pension funds. This negative relationship is highlighted even more when looking at the coefficients of the interaction of lagged returns with the pre-crisis and crisis dummies. Interestingly, the coefficients for the lagged return on the fixed income portfolio are negative and statistically significant for three out of the four specifications. The coefficient sign of the interest rate variable points in the same direction. This suggests that pension funds engage in some form of search for yield, or, given that real estate allows for significant use of leverage, pension fund allocation to real estate becomes more attractive as interest rates decrease – a one percent decrease in the return on the fixed income portfolio results in a positive capital flow to real estate USD99.93 million on average in the sample. The results for the macroeconomic indicators are all in the right direction, but for the combined pension funds are not statistically significant.

4.2 Capital flow to public real estate

For private real estate, it is relatively difficult to change the allocation quickly, given its illiquidity. That is why we also consider public real estate holdings of pension funds. The regression results for the model for capital flows to listed property are shown in Table 4, which has the same structure as before. In column (1), we observe that in contrast to the results for private real estate, the coefficient on the lagged returns to real estate mandates are positive, albeit statistically insignificant. We see that the relationship between capital flows and the lagged returns on the REIT portfolio is positive but never statistically significant in any of our model specifications. This is surprising, since it is much easier to adjust the public real estate portfolio than for private real estate.

In column (2), we observe that the coefficient for the returns on the fixed income portfolio is positive and statistically insignificant while the coefficient for public equities is negative and statistically insignificant. Neither the general public market sentiment, nor the performance of fixed income portfolios seem to affect capital allocation to REITs.

In the most complete specification, displayed in column (4), we find that all variables are still statistically insignificant, with the exception of *"Diff_All"*. In other words, as the "underallocation" to public real estate increases by 1 percentage point, the capital flows to publicly listed property increases by USD1.3 billion. This result is statistically significant at the 5 percent level. Overall, the results from Table 4 indicate that the capital flows to REITs are primarily dependent on the under- or over-allocation of the public real estate portfolio relative to its target and not on the historic performance of the public real estate portfolio nor any of the other asset classes.

4.3 The adjustment mechanism of the target allocation

In the previous section we found some evidence that the strategic asset allocation target to real estate seems to be important for the actual allocation, as the capital flow towards real estate has a significant relationship to being over- or under- allocated with respect to the target weight. In this section, we aim to find the determinants of strategic asset allocation targets for both the private and public real estate portfolio. Figure 4 displays both the weighted as the unweighted strategic and actual allocations towards real estate.

From both Panels A and B, it is clear that the actual allocation seems to oscillate around the target allocation over time. For example, during the global financial crises, the actual allocation was above the target allocation, and decreased until it was equal and then even under the target weight. In the meantime, the average target weight of the entire sample kept increasing. This raises an interesting question: why does the actual allocation decrease to meet the target allocation, while the target allocation itself seems to monotonically increase over time? To complete our analysis on the dynamics between capital flows and returns, it is thus also important to understand what determines the strategic asset allocation target.

To that end we run the following pooled OLS panel regression for the strategic asset allocation target weight, both for private real estate and for listed real estate:

$$\begin{aligned} TargetAllocation_{i,t} = {} & \beta_0 + \beta_1 RE_{i,t-1} + \beta_2 FI_{i,t-1} + \beta_3 S_{i,t-1} + \beta_4 OtherAlter_{i,t-1} \\ & + \beta_5 BM\_OutPerformance_{i,t-1} + \beta_6 \%RetirementMembers_{i,t} \\ & + \beta_7 Gov10Y_{i,t} + \beta_8 YieldCurve_{i,t} + \beta_9 CreditSpread_{i,t} \\ & + \beta_{10} Public_i + \beta_{11} SizeQuintiles_{i,t} + YD_t + Region_i + \mu_{i,t} \end{aligned} \tag{3}$$

4.3.1 Target allocation to private real estate

Table 5 shows the results for private real estate. The first observation from column (1) is that the target weight does not seem dependent on the historic return of private real estate, as the coefficient for the lagged return is close to zero and statistically insignificant. Interestingly, we observe that public pension funds have a higher target weight than their corporate counterparts. Furthermore, we see that the top 20% biggest pension funds are likely to have a target weight that is approximately 1.72% higher than that of the bottom 20% smallest pension funds. Finally, it can be observed that Canadian pension funds have on average a higher target weight in comparison to their counterparts in the U.S..

In column (2), we additionally control for the lagged return of the fixed income, public equities and other alternatives portfolios. As for the capital flows to private real estate, we find the coefficient for the lagged fixed income portfolios to be negative, albeit statistically insignificant. A one percent increase in the fixed income portfolio, would lead to a subsequent decrease in the target weight to private real estate of 1.7%, and vice versa. This hints toward a “search for yield” argument. From column (3), it seems that outperformance of the benchmark in the past year does not lead to an adjustment of the target weight.

The results of the most extensive model specification are displayed in column (4). Our first observation is that the coefficient for the percentage of retired members in the plans has a negative relationship with the target weight, albeit statistically insignificant. The direction of the relationship is reasonable, as more mature pension plans would need more liquidity, thus decreasing their strategic allocation weight to illiquid assets such as private real estate. Finally, we see that the coefficients of the 10-year government yield and the credit spread are positive and highly statistically significant. The results of the 10-year government yield is somewhat surprising, given that returns to real estate generally decrease in high-interest rate environments. For credit spreads, the results are in line with expectations: in a "risk on" environment, pension funds may allocate more capital to alternative investments.

4.3.2 Target allocation to public real estate

Table 6 shows the results for the target weight of public real estate mandates. In column (1) we observe that the coefficient of the lagged return of publicly listed real estate is close to zero and statistically insignificant. As for private real estate, we observe that public pension funds have on average a higher target weight compared to corporate pension funds. Noteworthy here is that larger pension funds have lower target weights to public real estate. Furthermore, we see that the top 20% biggest pension funds have on average a target weight that is approximately 2.7% lower than that of the bottom 20% smallest pension funds. Finally, it can be seen that European pension funds have on average a higher target weight in comparison to their US counterparts.

From Column (2), (3) and (4) we observe that overall, the lagged returns on other asset classes seem to have no relationship with the target weight of REITs, with the exception of the historic performance of other alternative asset classes. A one percent increase in the return on the portfolio of other alternatives leads to a subsequent increase in the target weight of 1.7% on average. Finally, the only macroeconomic variable that seems statistically significant is the yield curve. We observe that the coefficient for the yield curve is also negative, which is to be expected because a steepening yield curve implies lower investor demand for long term cash-flow, likely including public real estate.

5 Conclusion

Institutional investors generally, and pension funds specifically, tend to reside at the top of the investment pyramid. To a large extent, pension fund allocation decisions determine capital scarcity or abundance for different asset categories, including private and public real estate. Yet little is known about the question of how these allocation decisions are made. This paper aims to shed light on the dynamics of capital flows into real estate, globally.

We consider the universe of pension funds reporting to CEM, which represents approximately one quarter of total global pension fund capital. Over the last 25 years, these pension funds gradually increased their allocation to real estate, both in absolute and in relative terms. The average allocation to the asset class was 8.7% in 2018, the last year of our sample period, as compared to 5.6% in 1998. However, the dispersion across pension funds is large, with some not investing in the asset class at all, and other pension funds structurally allocating over 20% to real estate. We employ a panel setting to investigate both the dynamics over time and this dispersion across funds.

We first assess whether past returns on real estate and other asset classes affect pension fund capital flows into and out of real estate. A key question in the literature regarding the capital allocation to different asset classes is whether investors exhibit so-called return chasing: i.e. the extent to which capital flows into an asset category are influenced by the past returns on that category. We do not find evidence of that for the allocation to real estate by pension funds. On the contrary, pension funds reduce their holdings after experiencing good returns on their real estate holdings, and increase the allocation after bad returns, presumably to stay in tune with their strategic asset allocation.

We also find that pension funds increase their real estate holdings after periods in which their fixed income has generated weak returns. This could be a sign of a search for yield, where pension funds take a step up the risk ladder after experiencing poor returns on their lowest-risk assets. This is aligned with risk-taking behavior observed across U.S. pension plans due to low funding ratios and high return expectations (Andonov et al., 2017). Liquidity considerations do not seem to play an important role in the decision to invest in real estate: pension funds with a high ratio of retired to active members face a relatively high cash outflow in pension payments, and this could result in a need for relatively high-yielding assets, like real estate, but we find no evidence of that for private or for public real estate.

Overall, our findings suggest that, while the aggregated amount of capital allocated to real estate has grown quite substantially over the past decades – from USD28 billion in 1998 to USD820 billion in 2018, most pension funds have not invested additional, or "fresh" capital into real estate. Rather, it is the returns to existing investments that have provided for the growth, with pension funds mostly reinvesting the proceeds, and even taking some of the returns off the table. In the industry, there is often talk about a wall, or flood, of capital into the real estate sector. Our results rather suggest a continuous ebb tide. For pension funds, that is not necessarily a bad thing: the returns generated by existing investments, including substantial cash returns from rental payments, allow them to both keep the strategic asset allocation at the required level, while also funding pension obligations – akin a " gift that keeps on giving."

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7 Tables and Figures

Table 1: The CEM Database

	U.S.	Canada	Europe	Rest of World	Overall
Panel A: CEM Coverage					
#Funds in data	611	260	227	33	1,131
#Funds in RE	482	183	212	30	907
#Observations	3704	1651	1023	159	6,537
Avg. Size USD bn	27.4	22.3	46.3	129.4	33.7
Avg. RE Holdings USD bn	1.2	1.5	1.6	2.8	1.5
Panel B: Relative allocation to real estate					
Min	0.0%	0.0%	0.0%	0.0%	0.0%
Average	4.6%	5.5%	6.4%	5.3%	5.2%
Max	32.9%	23.9%	26.8%	28.4%	32.9%
Panel C: Fund level data					
% Public	49.2%	54.6%	25.0%	12.1%	37.2%
% Corporate	50.8%	45.4%	75.0%	87.9%	62.8%
% Retired Members	41.7%	40.9%	30.7%	19.7%	38.3%

Note: This table provides descriptive statistics of the pension fund data that we use in the CEM database. Panel A shows the coverage of the CEM database. *Avg. Size USD bn* and *Avg. RE Holdings USD* bn are both only for the year 2018. Panel B shows the minimum, maximum and average relative allocation to real estate with respect to other asset classes. Panel C displays the percentage of funds that are public and corporate, together with the percentage of retired members in all pension funds for each region and for the sample as a whole.

Table 2: FactSet Data

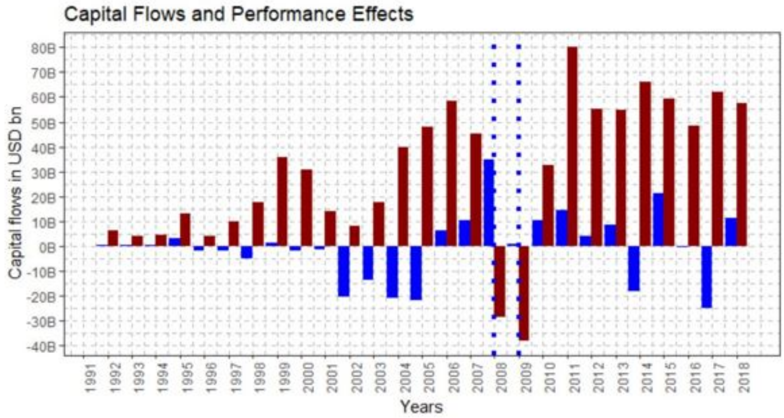
	U.S.	Canada	U.K.
Panel A: Pre-Global Financial Crisis			
10Y Government Yield	4.2%	4.0%	4.5%
1Y Government Yield	3.0%	3.4%	4.6%
Government Yield Curve	1.2%	0.0%	-0.2%
10Y Corporate Yield	6.3%	5.8%	5.6%
Credit Spread	2.0%	1.3%	1.1%
Panel B: Global Financial Crisis			
10Y Government Yield	2.9%	3.1%	3.7%
1Y Government Yield	0.4%	0.8%	0.5%
Government Yield Curve	2.6%	2.4%	3.2%
10Y Corporate Yield	6.9%	6.6%	7.2%
Credit Spread	4.0%	3.5%	3.5%
Panel C: Post-Global Financial Crisis			
10Y Government Yield	2.2%	1.9%	1.7%
1Y Government Yield	0.7%	1.0%	0.4%
Government Yield Curve	1.5%	0.8%	1.3%
10Y Corporate Yield	4.5%	4.1%	3.7%
Credit Spread	2.3%	2.2%	2.0%

Figure 1

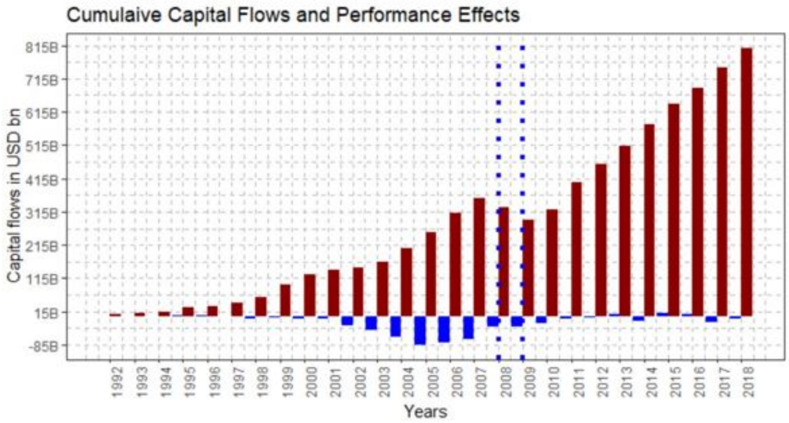
800B
700B
600B
500B
400B
300B
200B
100B
0B
Total holding nav in USD bn
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
Years
Private Real Estate
Public Real Estate

Figure 2

Panel A



Panel B



Panel C

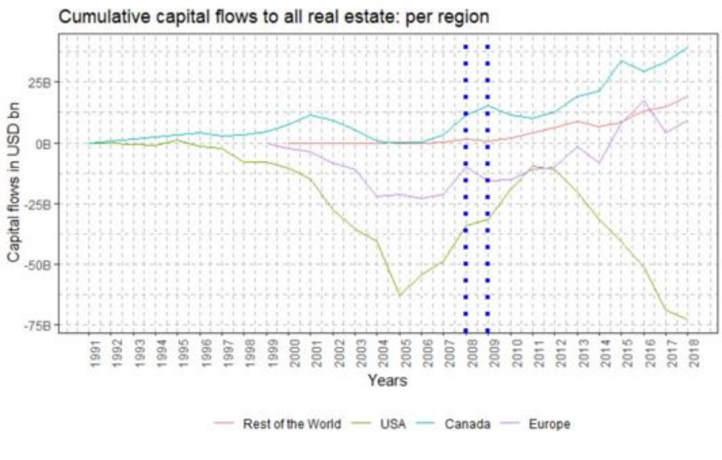
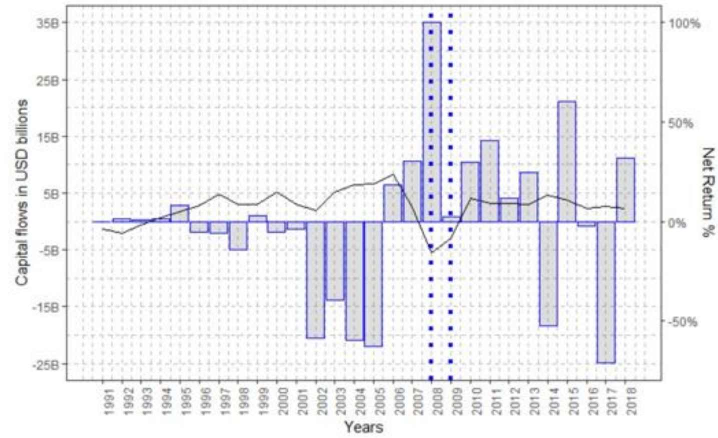
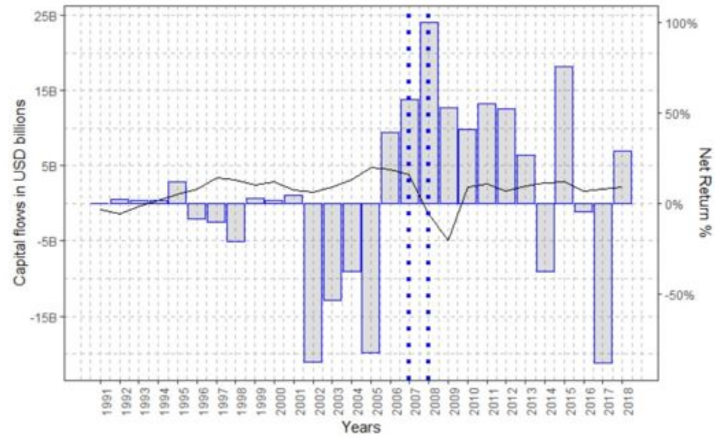


Figure 3

Panel A



Panel B



Panel C

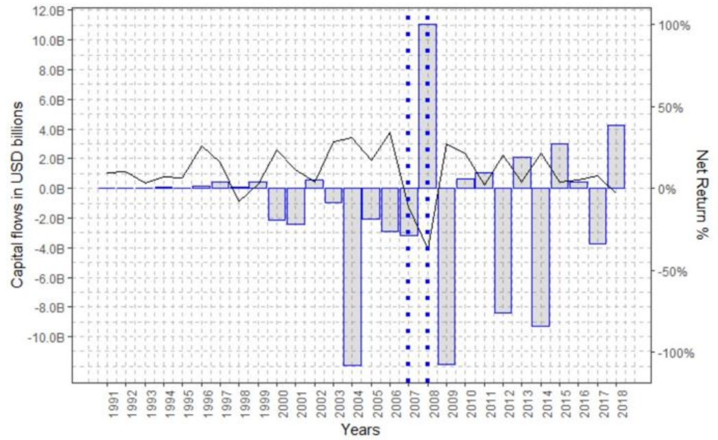


Table 3: Capital flow to private real estate – (one-year lag)

	1	2	3	4
RE_t-1	-561.2**	-623.5**	-641.6*	-587.3**
	(208.3)	(239.4)	(258.0)	(190.0)
lagRet_Rre x D_PreGFC	494.5	570.5	587.6	115.7
	(299.8)	(383.1)	(388.1)	(1,102.2)
lagRet_Rre x D_GFC	814.8*	908.6*	921.5*	888.2*
	(361.8)	(369.3)	(375.8)	(421.8)
FI_t-1		-379.5*	-377.5*	-73.77
		(171.8)	(170.3)	(172.3)
S_t-1		326.5*	331.1.	187.5
		(200.6)	(199.6)	(173.6)
Alter_t-1		6.988	5.463	20.98
		(72.79)	(73.06)	(111.1)
BM_OutPerformance			-0.1636	8.382
			(22.73)	(31.00)
Diff_All				1,744.7*
				(816.6)
% Retirement Members				-161.8*
				(79.82)
Gov10Y				-51.19
				(46.24)
Yield Curve				-41.52
				(34.85)
Credit Spread				12.24
				(71.04)
Public	47.89**	49.23*	51.96*	25.45
	(17.81)	(23.34)	(22.72)	(21.17)
Size_quintile 2	5.649	6.719	6.478	7.583
	(10.43)	(14.26)	(13.94)	(13.46)
Size_quintile 3	14.62	13.43	12.59	2.012
	(12.29)	(15.33)	(15.14)	(16.16)
Size_quintile 4	16.83	14.78	16.12	-2.632
	(17.10)	(19.21)	(18.10)	(18.55)
Size_quintile 5	36.74	0.4476	1.959	-120.0
	(67.33)	(60.89)	(58.23)	(76.77)
YD	Yes	Yes	Yes	Yes
#Obs	4,040	3,077	3,072	1,835
R^2	0.029	0.046	0.0467	0.054

Note: Standard errors are shown in brackets and the significance levels are reported with ".", *, **, ***, which match with 0.10, 0.05, 0.01 and 0.001 respectively. The R^2 row shows the R-square.

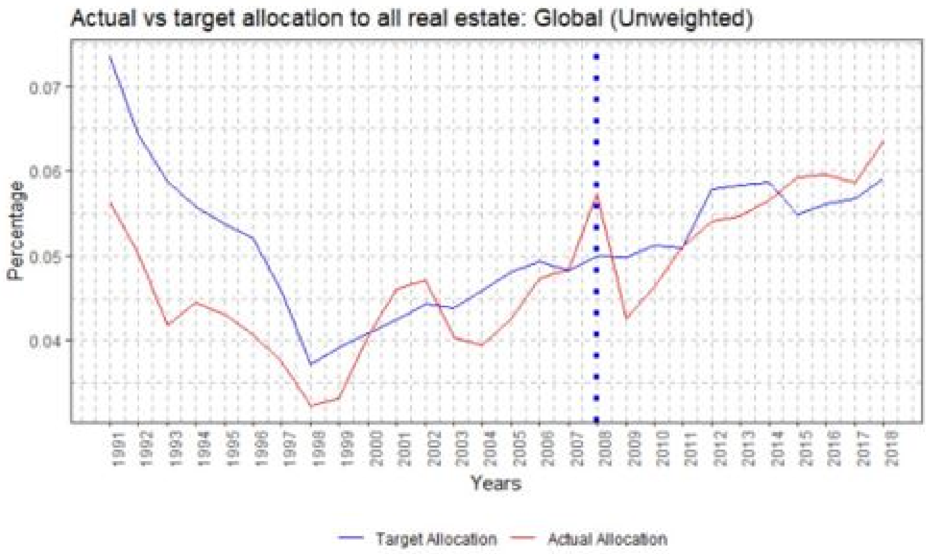
Table 4: Capital flow to public real estate – (one-year lag)

	1	2	3	4
RE_t-1	1.644	11.47	42.95	110.7
	(44.66)	(49.97)	(60.03)	(71.65)
lagRet_Rreit x D_PreGFC	-82.27	-64.72	-81.30	63.43
	(148.2)	(189.1)	(192.5)	(396.8)
lagRet_Rreit x D_GFC	-29.49	-51.90	-68.81	-228.2.
	(60.78)	(83.16)	(84.89)	(126.0)
FI_t-1		59.42	69.92	174.0
		(81.24)	(82.27)	(119.5)
S_t-1		-179.9.	-201.6.	-114.3
		(106.1)	(109.8)	(165.0)
OtherAlter_t-1		-33.43	-40.03	69.09
		(70.60)	(72.17)	(65.65)
BM_OutPerformance			-12.56	-11.51
			(14.49)	(17.10)
Diff_All			1,131.0*	1,301.8*
			(453.8)	(572.3)
% Retirement Members				115.0
				(97.74)
Gov10Y				20.02
				(41.77)
Yield Curve				-1.367
				(25.64)
Credit Spread				36.97
				(81.71)
Public	19.55	20.64	22.50	19.14
	(13.31)	(14.29)	(14.81)	(13.09)
Size_quintile 2	5.624	9.886	13.17.	15.81
	(7.592)	(8.712)	(7.957)	(13.09)
Size_quintile 3	-2.120	1.980	5.854	8.553
	(6.264)	(7.905)	(8.057)	(11.49)
Size_quintile 4	-18.63	-12.10	-8.846	-8.340
	(11.45)	(11.44)	(10.59)	(11.86)
Size_quintile 5	-65.41*	-72.31**	-69.79**	-74.50*
	(25.84)	(26.13)	(25.21)	(25.83)
YD	Yes	Yes	Yes	Yes
#Obs	1,017	850	846	638
R^2	0.052	0.065	0.073	0.085

Note: Standard errors are shown in brackets and the significance levels are reported with ".", *, **, ***, which match with 0.10, 0.05, 0.01 and 0.001 respectively. The R^2 row shows the R-square.

Figure 4

Panel A



Panel B

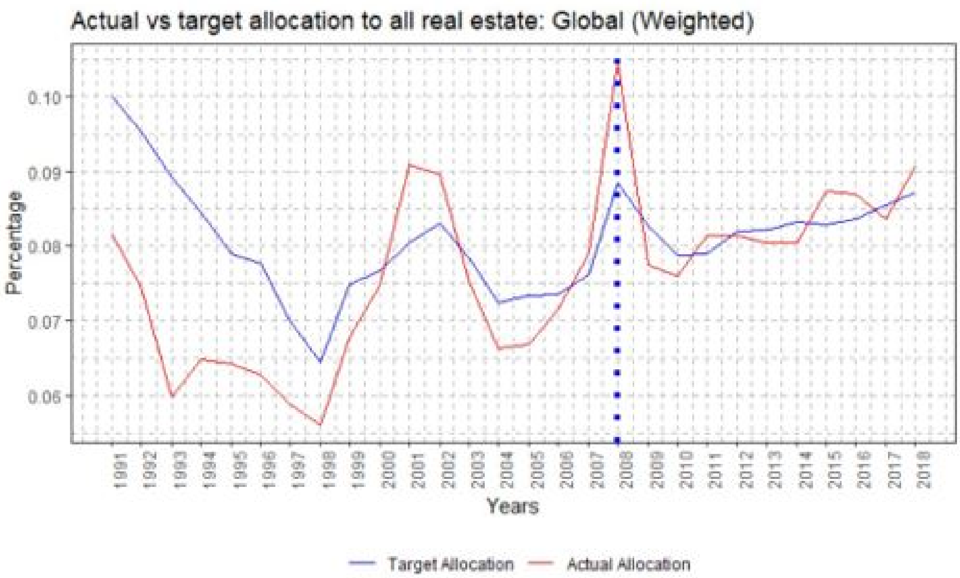


Table 5: Target weight of private real estate – (one-year lag)

	1	2	3	4
RE_t-1	0.0138	0.0150	0.0115	0.0244
	(0.0114))	(0.0126)	(0.0157)	(0.0184)
FI_t-1		-0.0170	-0.0175	-0.0295
		(0.0223)	(0.0222)	(0.0240)
S_t-1		-0.0036	-0.0039	-0.0181
		(0.0117)	(0.0123)	(0.0227)
OtherAlter_t-1		0.0055	0.0054	-0.0011
		(0.0066)	(0.0066)	(0.0080)
BM_OutPerformance			0.0014	-0.0021
			(0.0021)	(0.0026)
% Retirement Members				-0.0063
				(0.0159)
Gov10Y				0.0315***
				(0.0054)
Yield Curve				0.0023
				(0.0041)
Credit Spread				0.0402***
				(0.0054)
Public	0.0146***	0.0137***	0.0137***	0.0161***
	(0.0033)	(0.0039)	(0.0039)	(0.0048)
Size_quintile 2	-0.0013	0.0030	0.0030	0.0032
	(0.0039)	(0.0053)	(0.0052)	(0.0060)
Size_quintile 3	-0.0028	-3.1e-5	-0.0002	0.0039
	(0.0043)	(0.0052)	(0.0051)	(0.0062)
Size_quintile 4	-0.0006	0.0051	0.0050	0.0106.
	(0.0044)	(0.0055)	(0.0053)	(0.0061)
Size_quintile 5	0.0172**	0.0216**	0.0213**	0.0282***
	(0.0056)	(0.0068)	(0.0067)	(0.0079)
YD	Yes	Yes	Yes	Yes
#Obs	4,112	3,128	3,119	1,869
R^2	0.147	0.166	0.166	0.204

Note: Standard errors are shown in brackets and the significance levels are reported with ".", *, **, ***, which match with 0.10, 0.05, 0.01 and 0.001 respectively. The R^2 row shows the R-square.

Table 6: Target weight of public real estate – (one-year lag)

	1	2	3	4
RE_t-1	0.0028	-0.0006	0.0019	-0.0054
	(0.0075)	(0.0079)	(0.0083)	(0.0118)
FI_t-1		0.0061	0.0077	-0.0163
		(0.0105)	(0.0106)	(0.0144)
S_t-1		-0.0017	-0.0033	0.0026
		(0.0164)	(0.0161)	(0.0157)
OtherAlter_t-1		0.0086	0.0088	0.0170.
		(0.0065)	(0.0064)	(0.0084)
BM_OutPerformance			-0.0014	-0.0019
			(0.0017)	(0.0016)
% Retirement Members				0.0035
				(0.0102)
Gov10Y				0.0005
				(0.0154)
Yield Curve				-0.0152*
				(0.0057)
Credit Spread				-0.0147
				(0.0151)
Public	0.0053.	0.0041	0.0040	0.0021
	(0.0027)	(0.0029)	(0.0029)	(0.0034)
Size_quintile 2	-0.0092	-0.0155*	-0.0161*	-0.0179*
	(0.0060)	(0.0072)	(0.0075)	(0.0080)
Size_quintile 3	-0.0182***	-0.0207**	-0.0213**	-0.0230**
	(0.0052)	(0.0064)	(0.0065)	(0.0068)
Size_quintile 4	-0.0236***	-0.0279***	-0.0284***	-0.0255**
	(0.0053)	(0.0068)	(0.0069)	(0.0069)
Size_quintile 5	-0.0277***	-0.0302***	-0.0307***	-0.0305***
	(0.0053)	(0.0064)	(0.0065)	(0.0071)
YD	Yes	Yes	Yes	Yes
#Obs	1,048	874	873	660
R^2	0.249	0.275	0.279	0.329

Note: Standard errors are shown in brackets and the significance levels are reported with ".", *, **, ***, which match with 0.10, 0.05, 0.01 and 0.001 respectively. The R^2 row shows the R-square.