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ORIGINAL ARTICLE

The effect of sector specialisation on unlisted real estate fund performance amid economic downturns

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Abstract
This study focuses on the relationship between fund performance, sector specialisation and the state of the economy in the unlisted European real estate fund sector. We construct a sector concentration index to measure the impact of sector specialisation on unlisted fund performance, measured by total returns, in Europe. Using the INREV database, our sample draws from 634 private real estate funds investing in European countries over the period 2000 to the end of 2021. After controlling for key factors influencing fund performance, we find a positive and statistically significant relationship, at the 10% level, between sector specialisation and fund performance. Specifically, fund managers who concentrate their resources on a smaller number of sectors tend to achieve stronger performance, and this result is not driven by any particular sector. An implication of this study is that the results could be conditional to the method selected to measure sector specialisation. A consistent finding across specifications is that a recession has a significant adverse impact on fund performance. The positive relationship between fund performance and total returns is weakened during recessions; however, this finding is not statistically significant. These tentative findings are particularly relevant for sector-specific funds, which lack the mandate to diversify into other sectors. To protect performance during recessions, such funds may need to consider alternative de-risking strategies, including increasing geographical diversification, optimising tenant mix, and deleveraging.

Keywords Private real estate funds · Financial performance · Sector specialisation · Economic downturns

Introduction

This study examines the impact of sector specialisation on the performance of unlisted real estate funds under varying economic conditions. Previous research suggests that unlisted real estate funds with a focus on a single sector or a limited number of sectors tend to outperform their more diversified counterparts (INREV 2018a; Fisher and Hartzell 2016). However, evidence from asset pricing literature indicates that this relationship may not hold during economic downturns, when diversification becomes more crucial for investors (Kacperczyk et al. 2007; Hu et al. 2013). Overall, the findings on the role of sector specialisation remain inconclusive. Moreover, most studies in this area do not explicitly account for the state of the economy in their analyses, despite evidence showing that the marginal utility of investor wealth is highest during recessions (Glode 2011). In the real estate sector, vintage year analysis does consider the economic and property market conditions, as funds launched just before a downturn typically underperform over their lifetime.

This study focuses on the relationship between sector specialisation, fund performance, and economic conditions in the context of unlisted European real estate funds. According to the European Association for Investors in Non-Listed Real Estate Vehicles (INREV), the sector's capitalisation was nearly €400 billion in Europe by the end of 2021. Institutional investors, such as pension funds, sovereign wealth funds, and insurance companies,

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are exposed to this sector through indirect (non-listed) investments. This analysis seeks to provide further insights into the effect of specialisation and its dependence on economic conditions by addressing the following research questions: (i) how does the level of sector specialisation in the holdings of unlisted European real estate funds affect their financial performance? and (ii) how does this relationship change during economic downturns?.

We address these research questions by estimating unbalanced panel regressions with total returns as the dependent variable, using a sample of 634 unlisted European real estate funds from 2000 to 2021. The fund data are sourced from INREV. Sector specialisation is examined using two different approaches: a sector-specialist dummy variable and the sector concentration index (SCI), which is adapted from the industry concentration index developed by Kacperczyk et al. (2005) for the real estate industry.

The findings generally support the two main hypotheses of this study. A positive relationship between sector specialisation and performance is observed, though this relationship appears to diminish or even reverse during recessionary periods. The results suggest that in stable economic conditions, fund managers who concentrate on a smaller number of sectors can leverage informational advantages to achieve stronger performance. However, the benefits of this strategy may not persist during economic downturns.

Related studies

General fund characteristics in empirical work

Past research evaluates how fund characteristics systematically affect the performance of unlisted funds. Fuerst and Matysiak (2013) show that fund size, investment style, gearing level and distribution yield are all important determinants of fund performance. Fuerst et al. (2014) extended the sample period to the global financial crisis and found that the effect of leverage is asymmetric, with the magnitude of the leverage effect being larger during periods of negative market returns, a finding that was in line with previous research by Alcock et al. (2013).

Delfim and Hoesli (2016) analysed a range of risk factors for unlisted real estate funds through panel regression models with random effects. The risk factors considered are both macroeconomic and fund-specific. The results show that fund size, gearing level, investment style, vehicle structure and vintage year all have a significant effect on returns. Regarding style, open-ended and core funds are shown to outperform closed-ended and value-added funds amid economic downturns. These findings suggest that any study analysing the effect of specialisation of fund holdings on performance should control for these other characteristics. Furthermore, the findings on the leverage and fund style effects also suggest that the state of the economy has a significant effect on fund performance, which indicates that an investigation into how the effect of other fund characteristics, such as the level of specialisation, is dependent on the state of the economy could lead to valuable insights.

Specialisation in real estate funds

Research work on the effect of specialisation of holdings on the performance of real estate funds is limited. Such research is therefore facilitated by readily available data for listed real estate funds in the United States where a number of studies focus on the relationship between specialisation and performance for real estate investment trusts (REITs) domiciled in the U.S. Chen and Peiser (1999) analyse the effect of property type diversification, finding that REITs that diversify across different property sectors underperform on both an absolute and risk-adjusted basis. These findings are broadly in line with results from the finance literature on the effects of specialisation for equity mutual funds, such as Kacperczyk et al. (2005, 2007). However, Ro and Ziobrowski (2009) analyse the effect of both sector-based and geographic specialisation in U.S. REITs, using various factor models. Their findings suggest that specialised REITs do not outperform diversified REITs on a risk-adjusted basis. As a result, it can be concluded that research on the effects of specialisation in listed real estate companies has produced mixed results thus far reached mixed conclusions.

There are only a small number of studies that have an explicit focus on fund specialisation in private real estate. Fisher and Hartzell (2016) use dummy variables to capture the effect of U.S. property funds allocating more than 75% of their capital to any single region, property type or development. The results show that specialisation rarely has a significant effect on the performance of unlisted real estate funds, except for in the case of office specialisation, where there is a significant negative effect. It should be noted that the dataset in this study consists only of value-added and opportunistic funds and the effect of leverage is not accounted for.

Farrelly and Stevenson (2016) also analyse the effect of specialisation in U.S. unlisted real estate funds by using the Herfindahl index to measure property type and regional concentration of holdings. This index-based methodology is commonly used in industrial organisation to measure the concentration of companies in an industry and is related to the industry concentration index developed by Kacperzyck et al. (2007), to quantify the industry concentration of holdings in equity mutual funds. The results from Farrelly and Stevenson (2016) suggest that property type

specialisation has no effect, while geographic specialisation has a significantly positive effect on fund performance. INREV (2018a) is the only major study on the effect of specialisation in European funds. Using a simple dummy variable methodology, the analysis demonstrates that specialisation by property type, region, or both consistently results in the outperformance of more diversified funds.

The study includes its various specialisation dummy variables in random effects panel regressions with total fund returns as dependent variable. However, after controlling for fund characteristics that have been identified as important in other studies, the positive relationship between specialisation and performance becomes insignificant. It can be concluded that prior research on the impact of specialisation in unlisted real estate funds remains largely inconclusive.

Real estate funds and the state of the economy

There is ample evidence on the intuitive positive relationship between fund performance and the state of the economy (e.g. Fuerst and Matysiak 2013; Arnold et al. 2019). The performance of real estate funds is inextricably linked to the well-being of the occupiers that determines rent growth, level of vacancy in the building and rent void and time of vacant space on the market. In essence, the demand for commercial real estate is derived from the demand for goods and services produced in the premises. It is therefore expected that the performance of commercial real estate investment funds is likely to move in the same direction as the general economy. But economic conditions affect the capital side of the underlying building assets through investor sentiment, liquidity (transactions), yield impact among several more channels. In addition, the relationship between certain fund characteristics and fund performance may also be dependent on the state of the economy. For example, research has provided evidence of the asymmetric relationship between leverage and performance that is conditional to the state of the economy (e.g. Giacomini et al. 2014).

The way in which the state of the economy affects the relationship between specialisation and fund performance has yet to receive the research attention it merits, especially in the specific context of real estate funds. Hu et al. (2013) provide evidence suggesting that the benefits of diversification in equity funds increase when market returns are lower implying that specialisation is not as beneficial amid economic downturns when market returns worsen. Similarly, Kacperczyk et al. (2016) show that managers should pay more attention to stock-specific shocks during expansion periods and macroeconomic shocks ahead of downturns. This is because the latter are more volatile during recessions, and it is therefore more valuable for fund managers to gain macroeconomic informational advantages. These findings suggest that the benefits of specialisation and obtaining asset-specific informational advantages are not as prevalent amid economic downturns. However, this need not be the case in the context of real estate funds.

Hypothesis development

The current literature on assessing the impact of real estate fund characteristics and fund specialisation on fund performance during economic downturns provides the basis to form the hypotheses for this study. The explicit focus on sector specialisation and fund performance is a topic of much importance to institutional investors. General intuitive reasoning would suggest that specialisation in specific sectors utilises experience and idiosyncratic knowledge and can prove beneficial. In the real estate context this relationship requires further empirical evidence as the results are inconclusive. However, several studies see an advantage over balanced funds and provide support to the claim that there are performance benefits when fund managers focus their skills and obtain informational advantages in a smaller number of real estate sectors (e.g. office, distribution warehouses, shopping centres, residential, hotels). This finding is reinforced by evidence on the performance of funds investing in other asset classes. Consequently, the following initial hypothesis is formulated for this study:

Hypothesis 1 Unlisted real estate funds with a higher level of sector specialisation will exhibit stronger unconditional performance than funds that are more diversified across sectors.

This hypothesis essentially claims that sector specialised funds will outperform more diversified funds when the state of the economy is not taken into consideration. However, the current literature on investment performance indirectly suggests that the benefits of specialisation and specific informational advantages disappear during recessions. Macroeconomic shocks may not have the same impact across sectors pointing to the resilience of a balanced approach. For example, the pandemic took its toll on retail and leisure assets but boosted the attractiveness of distribution warehouses.

Therefore, the following second hypothesis has been formulated for this study:

Hypothesis 2 Unlisted real estate funds with a higher level of sector specialisation will fail to outperform funds that are more diversified across sectors amid economic downturns.

Testing these hypotheses provides further insight into the advantages and disadvantages of real estate fund managers

focusing their efforts on specific sectors or pursuing a more balanced approach. Further, the results of the second hypothesis test should guide fund managers how to structure and manage their fund when periods of market turmoil are imminent. Empirical evidence on the two research questions is obtained from a panel analysis that applies to a large sample of funds in Europe. The definitions of the variables, data sources and methodology are presented in the next section.

Variable definition and data sample

Variable definition

Unlisted real estate fund performance (dependent variable)

The dependent variable in this study is the financial performance of unlisted real estate funds, which is measured as the quarterly total returns net of fees. These quarterly total returns are the sum of the quarterly distributed income returns and the quarterly capital growth. In most fund holdings concentration studies from financial literature, the dependent variable used is some measure of abnormal or risk-adjusted returns. This is often calculated by adjusting raw total fund returns by the rolling exposure of the fund to various risk factors, such as those included in the Fama and French five-factor model, as explained by Del Guercio et al. (2018). This type of methodology is not as prevalent in the real estate context, although some variations have been used in certain studies. For example, Bond and Mitchell (2010) use various methods to estimate risk-adjusted returns for real estate funds, including adjusting the returns for their exposure to various MSCI property indices. However, such adjustment methods are challenging in specialisation studies because the investible universe— and, consequently, the appropriate definition of the market—varies depending on whether funds specialise in certain sectors or countries. To address these challenges, this study opts to use raw total returns. This measure is still very important to investors and in line with methodology of INREV (2018b).

For the sample of unlisted real estate fund performance, anonymised data on the historical performance and characteristics of unlisted European real estate funds are collected, including data on their quarterly allocations to each of the main real estate sectors. As this study focuses on European real estate funds, any funds investing outside of Europe are removed from the original dataset.

Unlisted real estate fund sector specialisation (independent variable)

One of the two main independent variables in this study is the degree of sector specialisation of the unlisted real estate funds in the sample. This variable is measured in two distinctly different ways. Firstly, a binary variable is constructed to denote whether the fund in question invests in a single property sector or multiple sectors. This initial stage of the analysis will be conducted over a longer sample period, as the data required are available over a longer time window than the more specific sector allocation data.

The second method to measure the degree of sector specialisation of the funds is to construct a quarterly SCI. The formula for calculating the SCI is as follows:

$$\mathrm{SCI}_t = \sum_{j=1}^{6} \left(w_{j,t} - \overline{w}_{j,t}\right)^2 \tag{1}$$

In this index, w_j is the weight of the real estate funds holdings in sector j and $\overline{w}_j$ is the weight of sector j in the total European property market at time t. In this study, j is one of the six sectors for which MSCI publishes capital value data. This index is essentially a variation of the industry concentration index from Kacperczyk et al. (2005, 2007), applied to the real estate context. The index measures the extent to which the sector composition of the portfolio of the fund deviates from the sector composition of the market, with a high score suggesting a strong deviation and a high degree of sector specialisation.

To construct the variable that measures the sector specialisation of funds, data on the sector composition of the European real estate markets are required. The data are sourced from quarterly capital value data from MSCI's European Property Index, and the proportion of each sector's share in the total capital value of the European market is then calculated the proportion that each sector holds in the total capital value of the European market. The categorisation of real estate sectors that MSCI uses when collecting capital value data consists of retail, offices, industrial, residential, hotels and other (alternatives). As a result, INREV data on fund allocations to specific alternative sectors (e.g. healthcare, student accommodation) are all grouped under one general alternative category. These adjustments ensure a strong level of compatibility between the INREV and MSCI data, which is required to construct the variable that measures sector specialisation for each fund in the sample.

The state of the economy (independent variable)

The second main independent variable in this study is a proxy for the state of the economy. To investigate the effect that the state of the economy has on the relationship between

Table 1 Geographical analysis of recessionary periods

Market	Number of recessionary periods (in quarters)
Finland	14
Spain	14
Italy	13
Germany	12
Portugal	12
Europe	10
Austria	8
Denmark	8
France	7
Ireland	6
Nordic	6
Sweden	6
United Kingdom	6
Netherlands	5
Norway	3
Switzerland	3
Czech Republic	1
Poland	1

sector specialisation and fund performance, historic GDP data of all European markets (economies) invested in by the funds in the filtered INREV dataset are required. We obtain such quarterly GDP data from the Organisation for Economic Co-Operation and Development (OECD). These data are subsequently used to construct a recession dummy variable for each European market and subsequently added to the regression models as a simple proxy for the state of the economy.

For funds investing in a single country, the recession dummy variable indicates whether that market is experiencing a technical recession in each quarter of the sample period. A technical recession is defined as two consecutive quarters of negative GDP growth. For funds investing across Europe, an aggregate European GDP measure is used to construct the dummy variable. In this case, the threshold for the aggregate European recession dummy is set to two consecutive quarters of less than 0.5% growth, as true technical recessions are rare in aggregated measures such as European GDP.

Table 1 displays the number of technical recessions for each country where funds are invested and also shows the number of recessions in Europe based on the specified definition. Finland and Spain experienced fourteen episodes of recession over the sample period from Q1 2000 to Q4 2021; however, these episodes were not consecutive.

The duration of the recession (number of consecutive quarters denoting recession) varies between one and four quarters (in the majority of cases) with the mode to be 2–3 quarters. Spain and Italy have exhibited longer periods of maximum recessions.

Further analysis of the economic recession calculations is presented in Appendices 1 and 2. Appendix 1 reveals that 50% of the funds have experienced between one and six recession quarters, while an additional 45% have been affected by recessions spanning seven to eleven quarters. Appendix 2 details that most funds faced recessions during three distinct periods: from Q2 2008 to Q2 2009 (5 quarters), from Q2 2011 to Q3 2013 (10 quarters), and from Q4 2019 to Q2 2020 (3 quarters). The recession dummy variables we construct are included in the analysis to examine the impact of macroeconomic conditions on fund performance and to explore how these conditions influence the relationship between performance and specialisation.

Unlisted real estate fund characteristics (control variables)

Various fund characteristics are also included in the regression models, to control for the effect that these variables may have on returns. These characteristics are fund style, vehicle structure, age, size, and gearing level. Style is measured through a dummy variable that shows whether the fund in question is core or value-add, as determined by INREV methodology. Structure is measured by a dummy variable that shows whether the fund is open or closed-ended. Age is defined as the number of years between when the fund closed its first round of capital raising and the relevant point in the sample period. Size is defined as the gross asset value of the fund at the relevant point in the sample period. Finally, gearing is defined as the fund-level loan-to-value ratio (LTV) at the relevant point in the sample period. As stated, previous research illustrates the importance of controlling for these variables (e.g. Farrelly and Matysiak (2013) and Delfim and Hoesli (2016) among other related real estate studies).

It should be noted that fund sizes are recorded by INREV as gross asset value figures in different currencies and we have carried out the necessary conversions—expressing value variables in euros (e.g. fund size)—to ensure comparability among observations.

Data sample characteristics and summary statistics

The composition of the sample of funds regarding style, structure, market allocations and sector allocations is presented in Table 2.

The table shows the composition of the complete sample of unlisted European real estate funds used for this study. The classifications refer to style, structure, target market and target sector. The table shows the number and proportion

Table 2 Fund characteristics in the sample

	Number of funds	Weight
Total	634	100%
Style-based classification		
Core funds	456	71.9
Value-add funds	178	28.1
Structure-based classification		
Open-ended funds	340	53.6
Closed-end funds	294	46.4
Market-based classification		
Single-country funds	340	53.6
Multi-country funds	294	46.4
Sector-based classification		
Single-sector funds	329	51.9
Multi-sector funds	305	48.1

of funds in the sample of 634 funds by the given fund characteristic.

The sample is relatively balanced in terms of structure, market allocations and sector allocations. On the other hand, the sample is heavily skewed when it comes to style, with approximately 72% of the sample being core funds. More information about fund characteristics in the sample are contained in Appendices 3 and 4. Appendix 3 shows that Europe is the most popular target region for about 31% of the funds in the sample (pan-European funds). United Kingdom and Germany are the most popular target countries for about 17% and 15% of funds. Appendix 4 summarises the funds allocations by sector with the traditional sectors (office, retail, residentials and industrial and logistics) dominating allocations, especially among single-sector funds. There is also a significant amount of alternative sector specialist funds (approximately 15% in the sample). Table 3 presents summary statistics.

The data sample contains a number of extreme values. An inspection of the timing of the most extreme outliers shows that they occupy very early or late on in the fund life. The timing is not unexpected as major investment decisions or capital flows will have a more significant impact on returns when the GAV is small. The extreme values in the sample appear to occur in periods when funds are not stabilised. In the estimates we do not remove these extreme values as we acknowledge that outlier data can still inform the data generating process. In Table 3, we report minimum and maximum values along with the standard deviation of winsorised data at the 99th percentile for a more representative picture of the range of returns in the sample. Reporting of 100% gearing relates to every early or late periods of fund life. However, 100% leverage may reflect a fund whose equity portion has been wiped out, either temporarily or permanently.

Table 4 Total returns by fund specialisation and periods of recession

	No of obs	Mean (%)	Median (%)
Full sample	22264	1.37	1.03
Non-specialised funds	10654	1.16	0.99
Specialised funds	11610	1.57	1.07
Normal economic times	19921	1.52	1.12
Recessionary periods	2343	0.09	0.00

Table 4 contrasts total returns by specialisation and between normal economic periods and periods of recession as defined in this study. A larger men return is reported for specialised funds although the median value does not differ much. The larger spread in the mean return is observed at periods of normal and recessionary economic conditions.

Methodology

The main analysis conducted in this study will consist of two regressions, each using one of the two methods to estimate the level of sector specialisation in funds, as described in the variable definitions above. The first regression will include the dummy variable that indicates whether the fund invests in a single sector or multiple sectors. The regression specification used for this first stage of the analysis is as follows:

Table 3 Preliminary statistics for fund characteristics

	Mean	Median	Minimum	Maximum	St dev
Quarterly total return (%)	1.37	1.03	−21.7	18.3	4.9
Fund age (years)	8.4	7.0	0.0	54	8.1
Fund size (GAV in millions of euros)	592.9	321.7	0.03	19,579	911.9
Fund gearing level (%)	30.3	34.4	0.0	100.0	22.7
Fund sector concentration index (%)	0.30	0.20	0.00	1.24	0.27
Sample size - total number of funds: 634					
Number of obs: 22,264;					
Fund sector concentration index sample: 2,151					

For total returns the min, max and st dev values are shown for the sample winsorised at the 99th percentile

$$
\begin{aligned}
R_{i,t} = {} & a_i + \beta_{\text{SPEC}}\text{SPEC}_{i,t} + \beta_{\text{ECON}}\text{ECON}_{i,t} \\
& + \beta_{\text{SPEC*ECON}}\left(\text{SPEC}_{i,t} * \text{ECON}_t\right) \\
& + \beta_{\text{STYLE}}\text{STYLE}_{i,t} + \beta_{\text{STRUC}}\text{STRUC}_{i,t} \\
& + \beta_{\text{AGE}}\text{AGE}_{i,t} + \beta_{\text{SIZE}}\text{SIZE}_{i,t} \\
& + \beta_{\text{GEAR}}\text{GEAR}_{i,t} + e_{i,t}
\end{aligned} \tag{2}
$$

In this regression equation: $R_{i,t}$ refers to the total returns of fund i in quarter t; $\text{SPEC}_{i,t}$ is a dummy variable taking the value one if fund i was invested only in a single sector in quarter t; $\text{ECON}_{i,t}$ is a dummy variable taking the value one if the relevant economy for fund i was experiencing a recession in quarter t and zero otherwise; $\text{STYLE}_{i,t}$ is a dummy variable that takes the value one if fund i was defined as a value-add fund in quarter t and zero otherwise; $\text{STRUC}_{i,t}$ is a dummy variable that takes the value one if fund i had a closed-ended structure in quarter t and zero otherwise; $\text{AGE}_{i,t}$ is the number of years since fund i was first launched in quarter t, $\text{SIZE}_{i,t}$ is the natural log of the gross asset value of fund i in quarter t; $\text{GEAR}_{i,t}$ is the fund-level loan-to-value ratio of fund i in quarter t.

It should be noted that the size variable is log-transformed due to it being significantly positively skewed, and for more comparable coefficient interpretation. The coefficient $\beta_{\text{SPEC*ECON}}$ on the interaction term indicates how the state of the economy affects the relationship between sector specialisation and fund returns.

Due of the longer availability of the single/multi-sector indicator data, this regression will be run over the sample period from Q1 2000 to Q4 2021, as data available prior to this date are not available to us. Over this period, the sample consists of 634 unlisted European real estate funds.

The second panel regression includes the SCI and its interaction with the recession dummy as a variable to enable a more detailed analysis of the relationships between these key variables. The regression specification used for this first stage of the analysis is as follows:

$$
\begin{aligned}
R_{i,t} = {} & a_i + \beta_{\text{SCI}}\text{SCI}_{i,t} + \beta_{\text{ECON}}\text{ECON}_{i,t} + \beta_{\text{SCI*ECON}}\left(\text{SCI}_{i,t} * \text{ECON}_t\right) \\
& + \beta_{\text{STYLE}}\text{STYLE}_{i,t} + \beta_{\text{STRUC}}\text{STRUC}_{i,t} + \beta_{\text{AGE}}\text{AGE}_{i,t} \\
& + \beta_{\text{SIZE}}\text{SIZE}_{i,t} + \beta_{\text{GEAR}}\text{GEAR}_{i,t} + e_{i,t}
\end{aligned} \tag{3}
$$

In this equation, $\text{SCI}_{i,t}$ is the sector concentration index. The definition of all remaining variables is identical to the first regression equation. Detailed sector allocations data from INREV are very limited before Q1 2010. As a result, the sample period for this regression is from Q1 2010 to Q4 2021. To avoid complex market definition issues, this stage of the analysis focuses on funds pursuing pan-European investments across different sectors. It can be argued that this restriction is justified as a comparison of the level of sector specialisation can only be made between funds that have a similar mandate and therefore the same investable universe. Furthermore, this restriction allows the SCI to be calculated using the overall European market sector composition as the benchmark and results in a sample size for this regression of 94 funds. It should also be noted that both main regressions are run without the state of the economy variable and the interaction term in order to test the first preliminary hypothesis of this study, which looks at the unconditional relationship between specialisation and performance. Both main specifications are run as panel regression with fixed-effects where the intercepts vary cross sectionally. Furthermore, all necessary diagnostics tests are carried out, which primarily involves testing for serial correlation, heteroskedasticity, and whether the fixed effects approach is redundant. This is done to ensure that the regression results are unbiased and valuable conclusions can be drawn from the study.

Findings

Results with property sector dummies

In the first stage in the panel regressions we examine the relationship between fund performance and sector concentration by incorporating a dummy variable that denotes whether the fund in question invests in a single sector or multiple property sectors. The main results from this stage of the analysis are provided in Table 5.

The results in column 1 of Table 5 show that a number of fund characteristics included as control variables in the models do not have a significant effect on total returns. The relationship between fund structure and performance is insignificant, suggesting that a manager simply choosing to structure their fund as closed-end or open-ended does not improve performance. It is often the case that open-ended funds have a core style while closed-end funds have a riskier investment style and hence achieve higher returns. This argument rationalises the positive sign on the coefficient; however, the coefficient is not significant. It could be the case that the effect of structure is largely captured by the fund style variable. Correlation analysis between the style and structure variables shows a moderate correlation (around 0.4) suggesting small bias from multicollinearity. The effects of fund age and size on performance are both found to be positive; however, they are insignificant too.

The insignificance of the age variable suggests that the additional experience gained by funds over time does not significantly enhance their performance. Fund performance appears to be influenced by a variety of factors, regardless of the fund's age. It is important to note that fund age should not be confused with the experience of the fund manager.

This finding may be influenced by the composition of our sample, which includes both closed-ended and

Table 5 Panel results for total returns and sector concentration

Dependent variable	Quarterly total returns	Quarterly total returns
	(1)	(2)
SPEC (dummy)	0.51*	0.85*
	(0.23)	(0.45)
STYLE (dummy)	2.35*	2.35
	(1.15)	(1.70)
STRUC (dummy)	0.40	0.40
	(1.56)	(1.65)
AGE	0.02	0.02
	(0.16)	(0.16)
LNSIZE	0.79	0.79
	(0.91)	(0.91)
GEARING	4.47**	4.84**
	(1.89)	(2.18)
ECON (dummy)		−9.46**
		(0.14)
SPEC × ECON		−4.00
		(4.85)
Observations	22,264	22,264
Adjusted *R*-squared (%)	8.1	9.3
Fixed effects	Yes	Yes
Sample period	Q1 2000–Q4 2021	Q1 2000–Q4 2021

This table shows the main results of the unbalanced panel regressions with the specification described by Eq. (2). The results in column 1 seek to test hypothesis 1, while the results in column 2 seek to test hypothesis 2 of the study. SPEC takes the value of 1 if the fund specialises in a specific sector. STYLE takes the value 1 if the fund pursues a value-added strategy, STRUC takes the value 1 if the fund has a closed-ended structure, AGE refers to the number of years since the fund's first closing, LNSIZE is the natural logarithm of the GAV of the fund, GEARING is the fund-level LTV (expressed in %), and ECON takes the value 1 if the relevant point in the sample period was a recession period in the market in which the relevant fund primarily invests. The numbers listed are the regression coefficients, with the number of asterisks showing the level of statistical significance of the coefficient. The numbers in brackets below the coefficients are the standard errors associated with those coefficients. The regressions are run with cross-sectional fixed effects to capture both observable and unobservable cross-sectional (fund) influences on returns that do not vary over time. Hausman tests reject the null hypothesis at the 1% significance level that the random effects model is more efficient. Regressions are estimated with clustered standard errors as panel heteroskedasticity LR tests

***1% significance, **5% significance, *10% significance

open-ended funds. Closed-ended funds typically execute their investment strategy and complete acquisitions within the first three years, with the remainder of the fund's life focused on implementing a development or refurbishment business plan. As a result, there is limited opportunity for these funds to 'learn from experience' during their lifecycle, and any learning may instead benefit subsequent funds in the series. In contrast, open-ended funds generally have a longer lifespan and an evolving strategy, making them more likely to benefit from experience within the same fund.

Similarly, the findings for fund size do not indicate significant performance improvements from the additional resources that become available as a fund's capital base grows. On the other hand, the fund style variable (value-add or core) does appear to influence performance, with a significance level of 10%. Value-add funds exhibit a quarterly return premium of 2.35% over core funds. While this is a notable result, the premium is likely due to value-add funds taking on more risk.

In the same vein, the significant positive relationship between gearing and returns is also likely a consequence of funds taking on greater risk. This supports the theoretical argument that leveraging can enhance returns during favourable market conditions but also amplifies losses during downturns.

The most important result in column 1 of Table 3, given the objectives of this study, is the coefficient on the sector specialisation dummy, which seeks to test hypothesis 1. A positive relationship between sector specialisation and fund performance is documented, which is in line with the relationship stipulated in the hypotheses. This relationship is statistically significant, although only at the 10% level. Nonetheless, it represents evidence of a positive unconditional relationship between sector specialisation and fund performance which in line with findings of the study by INREV (2018a, b). The finding suggests that quarterly returns will improve by 0.51% (average value in sample used) when a fund chooses to specialise in a specific sector.

The results in column 2 of Table 5 provide evidence supporting the second hypothesis, which posits that the positive unconditional relationship between specialisation and performance diminishes during economic downturns. This can be attributed to the heightened importance of diversification and macroeconomic informational advantages during such periods. The control variable results in column 2 are generally consistent with those in column 1, except for the fund style variable, which now becomes insignificant.

The relationship between sector specialisation and performance remains significant at the 10% level, with a slight increase in magnitude. The results also reveal a negative and statistically significant association between the recession dummy (ECON) and fund performance at the 5% level. Specifically, quarterly returns decrease by 9.5% per quarter when the economy in which the fund operates enters a recession—a substantial decline. For context, the underlying market could experience drops of over 20%, depending on the sector, in particularly bad years. This magnitude may also reflect leverage effects from extreme negative outlier total return values.

Importantly, the coefficient on the interaction term between the sector specialisation dummy and the recession

dummy is negative, although not statistically significant. This finding suggests that the positive relationship of 0.85% per quarter between sector specialisation and performance turns negative, resulting in a 3.15% decline (computed as the coefficient on the SPEC variable of 0.85% minus the interaction term coefficient of −4.0%) when the economy enters a recession. This suggests that the boost to returns from specialisation is more than offset by recessionary conditions. However, this interpretation is tentative due to the non-significant interaction term. Nonetheless, the results broadly align with the hypothesis that the unconditional positive relationship between specialisation and performance is eliminated when the economy enters a recession.

It could be the case that the positive unconditional relationship between sector specialisation and performance found in the first stage of the analysis is simply the result of the strong performance of certain specific sectors, rather than the general benefits of specialisation. To test this theory, we run an auxiliary regression exclusively on the sector specialist funds, with dummy variables indicating in what specific sector the funds are specialising. The results from this analysis are shown in Appendix 5. In this analysis, the six broad MSCI sector categories are used, since the inclusion of a broader range of more specific sector dummies results in singular matrix issues in the estimations. The results show that there is not a single specific sector where specialising leads to superior fund performance, as all the sector dummies are found to be insignificant. This suggests that the positive unconditional relationship between specialisation and performance identified in the previous regressions is not driven by a single specific sector, indicating that it can be considered robust.

The overall significance of the models is confirmed with an F-test, but both models have explanatory power of less than 10%. This denotes the fact that fund returns are influenced by many variables, including factors specific to the properties in the portfolios of the funds.

Sector concentration index regressions

It could be argued that the dummy variable methodology used in the first stage of the analysis to examine the effects of sector specialisation is relatively inflexible. In practice, the degree of specialisation in the holdings of multi-sector real estate funds can vary significantly, which is what the SCI (sector specialisation indicator) variable seeks to capture. The regression models incorporating this variable build on the first stage of the analysis, by examining whether the hypothesised relationships hold when this more detailed proxy of sector specialisation is used on the multi-sector fund subsample. One noteworthy difference from the sample used in the first part of the empirical analysis is that the smaller subsample of Pan-European multi-sector funds is more heavily tilted towards an open-ended structure, which reflects the fact that open-ended funds tend to be more diversified. The findings of the panel regressions using the SCI are provided in Table 6.

Table 6 Panel results for total returns and SCI measurement of specialisation

Dependent variable	Quarterly total returns	Quarterly total returns
	(1)	(2)
SCI (%)	0.47 (0.36)	0.62* (0.37)
STYLE (dummy)	−0.60** (0.27)	−0.55** (0.27)
LNSIZE	0.36*** (0.09)	0.38*** (0.09)
GEARING	0.96* (0.53)	0.82 (0.47)
ECON (dummy)		−0.94** (0.42)
SCI×ECON		−0.31 (0.25)
Observations	2,151	2,151
No of funds	94	94
Adjusted *R*-squared (%)	9.4	11.5
Fixed effects	Yes	Yes
Sample period	Q1 2010–Q4 2021	Q1 2010–Q4 2021

This table shows the main results of the unbalanced panel regressions with the specification described by Eq. (3). The results in column 1 seek to test hypothesis 1, while the results in column 2 seek to test hypothesis 2 of the study. SCI is the sector concentration index value of the fund at the relevant point in the sample period, as calculated by Eq. (1). STYLE takes the value 1 if the fund pursues a value-added strategy, STRUC takes the value 1 if the fund has a closed-ended structure, Age refers to the number of years since the fund's first closing, LNSIZE is the natural logarithm of the GAV of the fund, GEARING is the fund level LTV (expressed in %), and ECON takes the value 1 if the relevant point in the sample period was a recession period in the aggregate European economy. The numbers listed are the regression coefficients, with the number of asterisks showing the level of statistical significance of the coefficients. The numbers in brackets below the coefficients are the standard errors associated with those coefficients. The Hausman tests indicate that the use of cross-sectional fixed effects is warranted, while the apparent presence of heteroskedasticity in the residuals suggests that clustered standard errors should be used. Regressions are estimated with clustered standard errors as panel heteroskedasticity LR tests

***1% significance, **5% significance, *10% significance

In this set of panel regressions, we exclude the fund structure and fund age variables as they have a weak relationship with the dependent variable, to obtain a more parsimonious model. Of the control variables that remain in the specification, there are several notable differences with the previous stage of the analysis. Firstly, the relationship between fund style and performance has now changed from significantly positive to significantly negative. As this

second stage of the analysis focuses exclusively on Pan-European multi-sector funds, this result appears to suggest that the performance benefits of taking on more risk through a value-add approach does not appear to hold for this highly diversified subsample of funds.

The relationship between fund size and returns remains positive, and it has now become highly significant. This finding is in line with the idea that larger funds have more resources to analyse markets, select the best assets and enhance their returns on the upside. An additional interpretation to consider is that larger funds are more stable/diversified and thus better able to withstand downturns. These large open-ended funds are also less likely than smaller funds to suffer liquidity problems/become forced sellers of their best assets due to redemptions during a downturn. They may also have more buying power to secure the best properties. An additional million euros to secure the highest bid will represent a smaller proportion of a larger fund's overall size compared to a smaller fund.

The well-established positive effect of gearing receives some further support by the models in Table 6. The gearing variable is now only significant at the 10% level in the regression in column 1 and insignificant in column 2. The coefficients on the SCI variable in Table 6 seek to provide additional evidence in favour of hypothesis 1. While the positive sign on the coefficients is in line with the hypothesis and the results obtained in the previous stage of the analysis, the coefficient on SCI in column 1 is statistically insignificant. This finding would suggest that there is no significant positive unconditional relationship between sector specialisation and fund performance, which contrasts the results at stage 1 of the analysis.

However, when the state of the economy is incorporated into the model in column 2 of Table 6, the relationship between sector specialisation and performance does become marginally significant at the 10% level. In this case, the results suggest that a 1% increase in the SCI of a fund leads to a 0.62% increase in quarterly total returns. The increase in the SCI by 1% means that the sector composition of the portfolio of the fund has deviated 1% further from the market and is therefore more specialised. The resulting increase in total returns of 0.62% quarterly can be viewed as too large—it may partially be a sample issue. Column 2 of Table 6 also shows that the effect of the recession dummy is once again negative and significant, although the economic significance of the coefficient has now decreased considerably. In line with the previous analysis, the coefficient on the interaction term is negative, although statistically insignificant. Overall, the results across all regressions show a consistent positive unconditional relationship between sector specialisation and fund returns, although the statistical significance is modest, especially when incorporating the Sector Specialisation Index methodology. Moreover, the consistently negative coefficient on the interaction term suggests that this positive relationship is weakened during recessions, although this particular finding is not statistically significant. Overall, there is evidence in support of the two main hypotheses in this study (see bubble chart in Appendix 5).

Conclusion

This study examines the impact of sector specialisation on the performance of unlisted pan-European real estate funds and how this relationship changes during recessionary periods. While the effect of sector specialisation has received limited attention in the current real estate literature, existing studies have often produced inconclusive or contradictory results. By incorporating the state of the economy into the analysis, this study aims to provide insights into how the performance of real estate funds with varying characteristics is affected during adverse economic conditions, aiming to contribute to relevant empirical work on the subject with European fund data analysis.

The analysis focuses on testing two main hypotheses. The first hypothesis posits that the unconditional relationship between sector specialisation and fund performance is positive. In a stable economic environment, fund managers may achieve better informational advantages by concentrating their resources on a smaller number of sectors, leading to superior asset selection, management, and ultimately, fund performance. However, the second hypothesis argues that this positive relationship diminishes during economic downturns.

To test these hypotheses, a panel regression analysis was conducted using a sample of 634 unlisted European real estate funds. Data on fund characteristics, sector allocations, and performance were provided by INREV, while GDP growth data were used to construct recession dummy variables for various European markets. Additionally, a SCI was developed for each fund to further investigate the effect of specialisation on performance. The construction of this index required sector composition data for the overall European market, obtained through capital value data from MSCI. These datasets were employed in a series of unbalanced panel regressions to explore the relationships between the key variables analysed in this study.

The results indicate that several fund characteristics significantly influence performance, justifying their inclusion in the regression models to control for these effects. In the larger sample of real estate funds analysed in the first stage, a value-add investment style shows a significant positive impact on performance. However, in the second stage, where the focus is on pan-European multi-sector funds, the value-add style is found to have a significantly negative effect on performance. This suggests

that while a value-add style may enhance returns for most funds, it may not be as beneficial for funds with a very broad investment mandate.

Additionally, the analysis reveals a significant positive relationship between leverage and fund performance, aligning with previous research findings. However, it is important to note that the effects of investment style and leverage on performance should ideally be assessed from a risk-adjusted perspective. In contrast to some earlier studies, fund age, size, and structure do not exhibit a strong relationship with returns in this analysis.

The relationship between sector specialisation and fund performance is consistently found to be positive, whether using the dummy variable or the SCI methodology, though the statistical significance of these findings is at the 10% level. This suggests that fund managers may benefit from concentrating their resources to gain informational advantages in a smaller number of sectors. This insight could be particularly valuable for managers of smaller funds, who may face resource limitations, making a focused strategy even more advantageous.

However, the results also broadly support the hypothesis that this positive relationship is diminished or potentially even reversed during recessions, although this finding is not statistically significant. The direction of the interaction terms consistently indicates that managers should avoid specialisation when anticipating a recession, opting instead to increase the diversification of their funds. In practice, sector-specific funds may not have the mandate to diversify into other sectors, even if they foresee an economic downturn. Therefore, they might consider other forms of diversification, such as by geography, tenant base, or lease terms, or mitigate risk by deleveraging or disposing of weaker assets.

Overall, this study offers valuable insights into how sector specialisation and recessions can impact the performance of unlisted funds, but it also highlights the need for further research. Notably, the presence of extreme outlier values in the sample suggests that future work should address these outliers, whether by removing them, winsorising the data, or employing other methods. While extreme values can contain important information in the study of fund performance, addressing them can lead to more efficient estimates.

This study uses absolute total returns as the target variable, but future research could consider alternative measures, such as risk-adjusted returns. Factors like specialisation, a value-add style, and higher leverage are associated with higher returns, but they are also likely to increase risk. A more detailed framework, including specific categories for alternative sectors beyond the five broad MSCI categories used here, would be beneficial, especially given the recent growth in alternative sectors as more data become available. Additionally, it would be worthwhile to explore how different types of recessions—such as banking or financial crises, pandemics, high inflation, or others—affect various funds.

Appendix 1

Frequency of recession periods by fund

Recession dummy	Freq.	Fund	Per cent	Cum.
1	122	122	5.21	5.21
2	200	100	8.54	13.74
3	225	75	9.6	23.35
4	160	40	6.83	30.17
5	195	39	8.32	38.5
6	282	47	12.04	50.53
7	168	24	7.17	57.7
8	128	16	5.46	63.17
9	288	32	12.29	75.46
10	400	40	17.07	92.53
11	55	5	2.35	94.88
12	36	3	1.54	96.41
13	39	3	1.66	98.08
14	28	2	1.2	99.27
17	17	1	0.73	100
Total	2,343	549	100	

This table reports that out of 22,364 observations, there are 2,343 recession periods which have been analysed for the funds. Out of 634 funds, 549 funds have experienced at least one recession period. The table displays the frequency of the recession dummy for each fund during the sample period, which also gives an idea of the duration of the recession per fund. For instance, the first and last rows show that 122 funds have experienced 1 recession period, and 1 fund has experienced 17 recession periods.

Appendix 2

Dates of recessions and durations

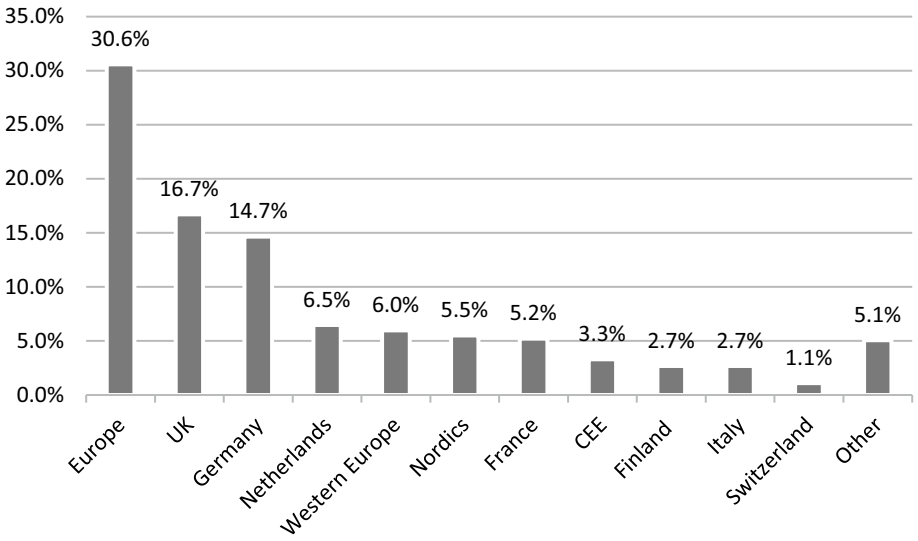
Date	Recession dummy = 0 (no recession)	Recession Dummy = 1 (denotes recession)	Total
31-Mar-00	18	0	18
30-Jun-00	18	0	18
30-Sep-00	18	0	18
31-Dec-00	26	2	28
31-Mar-01	30	0	30
30-Jun-01	29	1	30
30-Sep-01	29	3	32

Date	Recession dummy = 0 (no recession)	Recession Dummy = 1 (denotes recession)	Total
31-Dec-01	44	4	48
31-Mar-02	35	3	38
30-Jun-02	39	0	39
30-Sep-02	41	0	41
31-Dec-02	64	1	65
31-Mar-03	44	3	47
30-Jun-03	45	2	47
30-Sep-03	48	2	50
31-Dec-03	76	0	76
31-Mar-04	54	0	54
30-Jun-04	59	0	59
30-Sep-04	63	0	63
31-Dec-04	91	8	99
31-Mar-05	71	0	71
30-Jun-05	75	0	75
30-Sep-05	80	0	80
31-Dec-05	139	0	139
31-Mar-06	96	0	96
30-Jun-06	106	0	106
30-Sep-06	115	0	115
31-Dec-06	180	1	181
31-Mar-07	137	0	137
30-Jun-07	145	0	145
30-Sep-07	152	1	153
31-Dec-07	223	0	223
31-Mar-08	174	0	174
30-Jun-08	166	13	179
30-Sep-08	35	148	183
31-Dec-08	29	243	272
31-Mar-09	16	208	224
30-Jun-09	149	78	227
30-Sep-09	228	1	229
31-Dec-09	306	1	307
31-Mar-10	306	1	307
30-Jun-10	315	0	315
30-Sep-10	310	2	312
31-Dec-10	326	0	326
31-Mar-11	328	4	332
30-Jun-11	234	105	339
30-Sep-11	232	106	338
31-Dec-11	225	129	354
31-Mar-12	192	157	349
30-Jun-12	329	26	355
30-Sep-12	322	28	350
31-Dec-12	180	192	372
31-Mar-13	258	112	370
30-Jun-13	375	1	376
30-Sep-13	264	115	379
31-Dec-13	387	0	387
31-Mar-14	374	9	383
30-Jun-14	384	0	384
30-Sep-14	383	0	383
31-Dec-14	387	0	387
31-Mar-15	377	8	385
30-Jun-15	385	0	385
30-Sep-15	384	0	384
31-Dec-15	386	0	386
31-Mar-16	380	0	380
30-Jun-16	397	0	397
30-Sep-16	395	1	396
31-Dec-16	405	0	405
31-Mar-17	395	0	395
30-Jun-17	397	0	397
30-Sep-17	396	0	396
31-Dec-17	400	0	400
31-Mar-18	391	0	391
30-Jun-18	398	0	398
30-Sep-18	390	9	399
31-Dec-18	393	8	401
31-Mar-19	392	0	392
30-Jun-19	386	0	386
30-Sep-19	381	0	381
31-Dec-19	364	25	389
31-Mar-20	61	327	388
30-Jun-20	142	249	391
30-Sep-20	386	0	386
31-Dec-20	390	0	390
31-Mar-21	385	6	391
30-Jun-21	392	0	392
30-Sep-21	392	0	392
31-Dec-21	377	0	377
Total	19,921	2,343	22,264

The table shows how many total return observations are stated in periods of recession as defined in this study. For example, in the last quarter of 2008, we have 183 total return observations, out of which 148 observations are reported in recessionary conditions.

Appendix 3

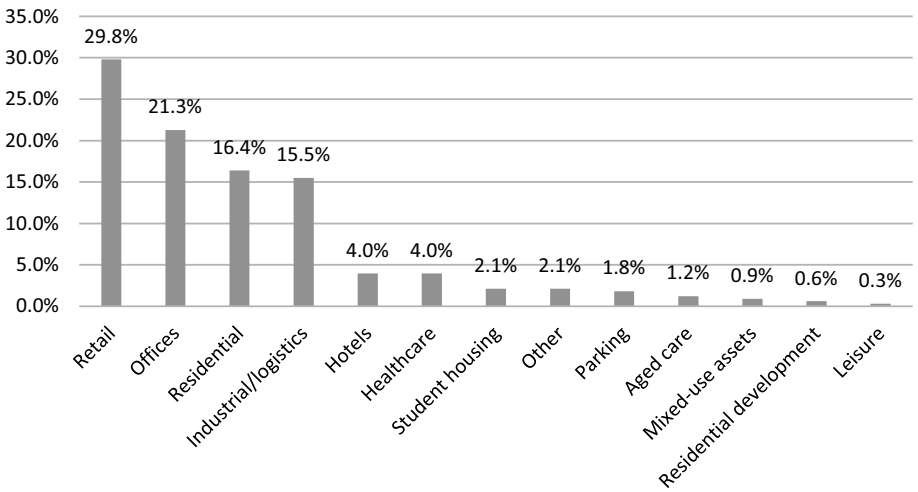
Geographical fund allocation



This figure presents the geographical allocation of funds in the sample. Funds with pan-European mandates represent just over 30% the funds in the sample. The geographical focus of 17% of the funds in the sample is the UK and those targeting Germany is just under 15%. The category Other comprises all countries with less than 1 per cent target rate in the sample. This category consists of Southern Europe, Portugal, Poland, Sweden, Austria, Norway, Czech Republic, Denmark, Spain and Ireland.

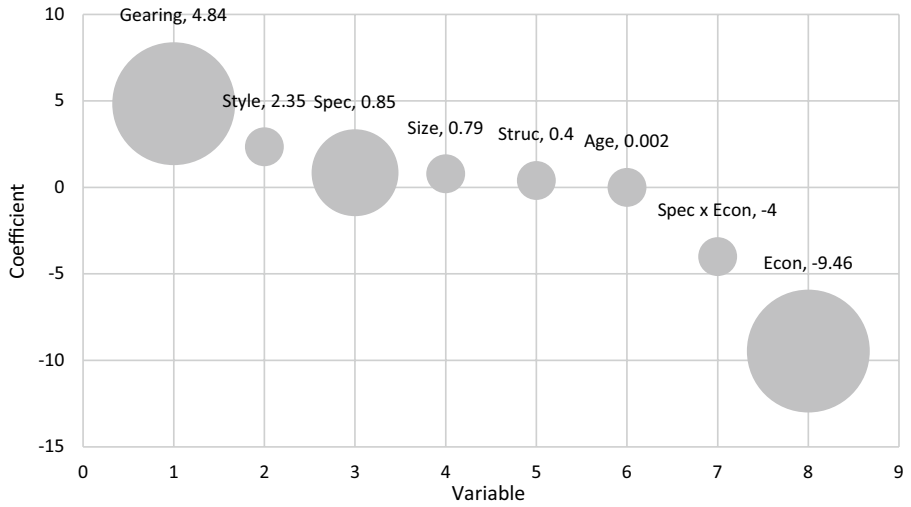
Appendix 4

Sector composition of specialist funds in sample



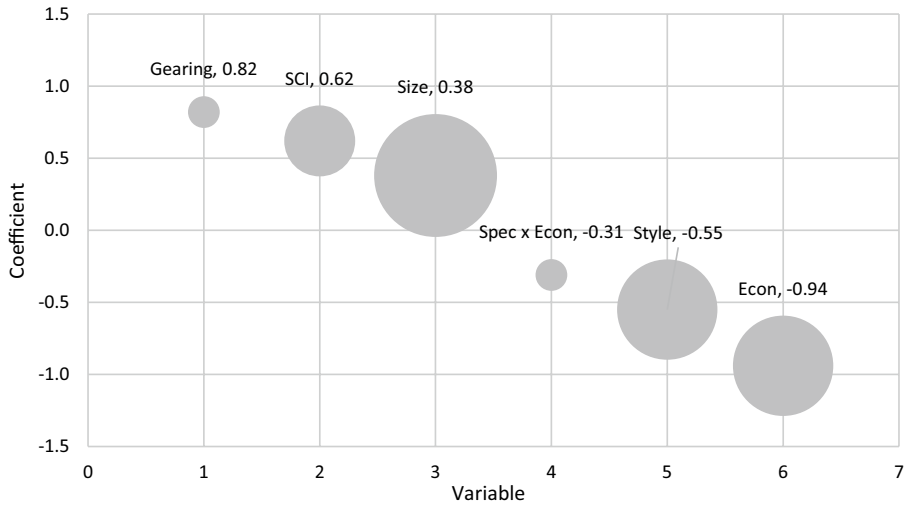
Appendix 5

Panel results for quarterly total returns



Bubble size relates to statistical significance of coefficient: Smallest = no significance, mid = 10%, largest = 5%

Panel results for quarterly total returns SCI



Bubble size relates to statistical significance of coefficient: Smallest = no significance, mid = 10%, larger = 5%, largest = 1%

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