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**IDENTIFYING A SET OF GENERAL EQUITY STYLE AND FACTOR GUIDELINES FOR EUROPEAN LISTED REAL ESTATE**

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# BACKGROUND

- This paper forms part of an ongoing series that we are undertaking specifically looking at how different listed real estate (“LRE”) strategies can be used by practitioners across different market cycles.
- Our previous work has included blending (combining direct property and LRE) (2015), the use of Smart Beta allocations (2015), incorporating Trend Following and Momentum strategies to reduce Maximum Drawdown (2015) , and incorporating LRE within a 4 Quadrant allocation model (2021).
- At the Bayes RE Centre we currently produce a quarterly Monitor of LRE factor performance using a proprietary European LRE database of > 300 stocks.

■ Our main focus is on automated allocations and trading strategies that can be employed by generalist/ Multi asset funds as well as direct/real estate fund investors.

■ As a result we are interested in applying commonly used equity market techniques such as Factor Analysis, automated trading Signals, Cluster analysis and Portfolio Baskets.



Real Estate Monitor | Q4 2022 & Annual Summary 2022

This Quarter at a glance			
Sentiment	Factor Analysis	Valuation	Market Structure
Analyst recommendation	↓ Small vs Large	↓ Discount to NAV	↑ Systemic risk
Sector Relative	↓ Value vs Growth	↑ Dividend Yield	↓ Demand M&A
Sector Absolute	↑ High vs low LTV	↓	

**Factor analysis**

Q4 2022 finally saw a small reversal of fortunes for the European sector as the market took the view that the undoubtedly poor economic outlook was more than factored into listed real estate share prices. In addition, the sharp expansion of bond yields abated, inflationary pressures saw some signs of relief, and there was evidence of stronger than expected retail sales and GDP in December. For Q4 2022, the EPRA Index showed a positive 4.6% total return although this was below the 13% return from European equities. This was above our equal weighted return from our 304-stock universe of -0.1% as the largest stocks absorbed most of the renewed positive sentiment and fund inflows. For the year, however, the EPRA Index was down 37% compared to 11% for the equity market and 20% for our universe.



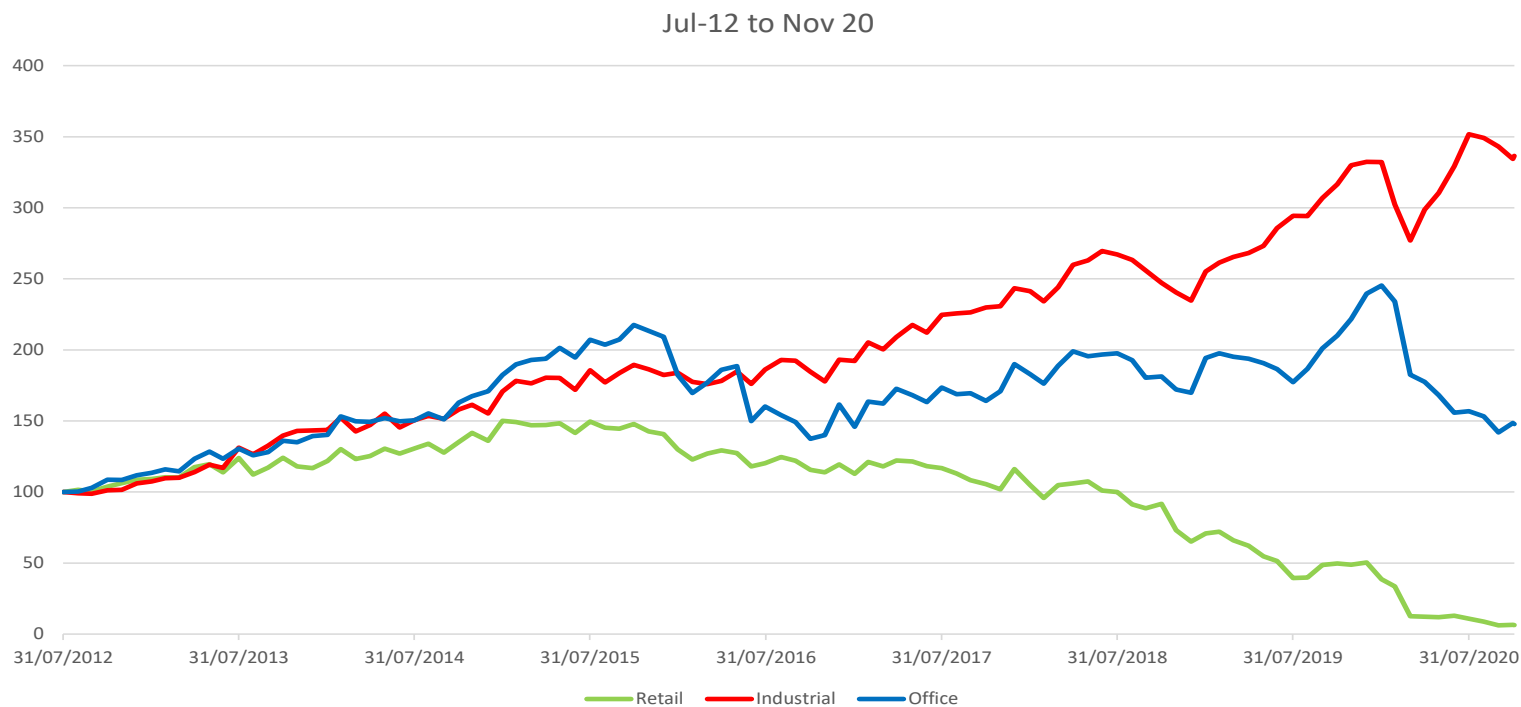
# BACKGROUND

- Historically generalist equity/multi-asset allocators have employed a buy and hold strategy for a sector proxy via Index trackers, larger, particularly diversified stocks, ETFs or an actively managed real estate securities Fund ("RESF").
- Typically this allocation was sharply increased at positive inflection points in the sector such as interest rates starting to trend down e.g. 2010 onwards, and then sharply reduced at negative inflection points e.g. Summer 2022 .
- As a result these strategies provided geared exposure to the underlying assets. Outperformance when the assets were appreciating was significant , but unfortunately so was underperformance on the way down.
- We are therefore focussed on strategies which can capture the outperformance for generalists but minimise the extent that it is given away when the sector as a whole underperforms.
- By contrast actively managed Sector specialist Funds will seek to generate outperformance against the benchmark by stock/sub-sector weightings e.g. underweight retail and overweight logistics and residential post 2015 ( see slide on next page)



# BACKGROUND

- One problem in particular that has arisen is the extent to which the performance of the different asset types has diverged post the advent of e-commerce and WFH.
- As can be seen below prior to 2015 the main LRE asset types performed broadly in line but since then their performance has decoupled
- We are interested in discovering whether this divergence is purely sector related or masks other underlying security specific factors/attributes. We therefore start our study in Dec 2015



# PURPOSE OF THIS STUDY

- Identify a set of general equity style and factor guidelines for European LRE that can be used by non-specialist investors across different periods of the cycle.
- These style and factor guidelines are asset ambivalent
- Performance characteristics are relative to both an equity benchmark and a property benchmark
- Aim to identify performance over both the full period and different stages of the cycle
- Determine if there are strategies a multi-asset/generalist fund manager can use to maintain a constant exposure to the LRE.



# DATA

European Listed Real Estate - EPRA Index<sup>7</sup>

European Equities – ETF based on MSCI Europe Index

UK Equities – All Share Index

European Bonds – Bloomberg European Govt Bond Index

UK Bonds – Bloomberg UK Bond Index

The Fama-French factors were sourced from the Kenneth French website: [https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data\\_library.html](https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html)

European LRE – Bayes RE centre database of >300 companies

All returns are Euro% based, Total Return ,



# CAVEATS

- No transaction costs are taken into account
- Fixed not (yet) dynamic allocations
- Liquidity threshold may be too low for some investors
- Sample of 10 may be too small to be representative for each factor
- Factors other than those selected may be more important
- All of these issues will start to be addressed in the next iteration of this paper





# BACKGROUND –METHODOLOGY

- Determine periods of the cycle :
  - Full period Dec 2015 June 2023
  - Pandemic Period Feb 2020 – Jan 2022
  - Interest rate inflection period Feb 2022- June 2023
- Determine minimum liquidity threshold (> €500m market capitalisation)
- We then apply two approaches , a Practitioner Approach and an academic Fama-French Factor Modelling Approach
- Determine 10 highest scoring LRE stocks in each of the following 6 categories :
  - **Gearing:** Low Leverage (under 20% LTV)
  - **Size:** Largest stocks ( by market cap)
  - **Valuation#1 Quality Premium to NAV** : Highest premium to NAV
  - **Valuation #2 Quality Income** : Lowest dividend yield
  - **Sentiment** : Highest sell side analyst rating
  - **Volatility** : Lowest annual volatility



# BACKGROUND – METHODOLOGY

- Calculate total returns, average monthly returns, volatility and Max Drawdown for each of three periods for benchmarks
- Then apply Trend Following (Faber 2007) to minimise maximum drawdown
- For the academic approach OLS factor modelling is employed over the full sample period with the single factor (Sharpe 1964) and Fama-French (2015) five factor models used to assess the risk-return profile of the various European REIT smart beta strategies
- For the five-factor model, general European equities performance and the European Fama-French factors were used



# RESULTS - PRACTITIONER APPROACH FULL PERIOD

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FULL PERIOD RESULTS Dec 2015 to June 2023				
	Total Return	Mean Return	Max drawdown	Volatility
European equities	62%	0.62%	-43%	13.78%
UK Equities	56%	0.57%	-40%	12.32%
European Bonds	-8%	-0.08%	-21%	4.49%
UK Bonds	-10%	-0.08%	-33%	8.17%
European LRE Index	-20%	-0.09%	-42%	18.14%

All Factor strategies outperformed LRE Index and Bonds and 2/6 outperformed equities

Volatility (ex Large Stocks) was lower than LRE Index

BUT...Maximum Drawdown was higher suggesting they need to be subject to an automated trading strategy such as 10m MA Momentum to reduce this risk

FULL PERIOD RESULTS Dec 2015 to June 2023				
	Total Return	Mean Return	Max drawdown	Volatility
Low Leverage	31%	0.37%	-44%	12.12%
Largest stocks	9%	0.36%	-63%	20.66%
Quality Prem /NAV	126%	0.96%	-65%	9.90%
Quality Income	55%	0.57%	-62%	12.65%
Low Volatility	47%	0.45%	-46%	6.40%
Analyst rating	75%	1%	-54%	12.22%



# RESULTS - PANDEMIC

PANDEMIC PERIOD RE Feb 2020 to Jan2022				
	Total Return	Mean Return	Max drawdown	Volatility
European equities	16%	0.75%	-37%	19.00%
UK Equities	9%	0.49%	-30%	18.23%
European Bonds	-5%	-0.18%	-6%	4.76%
UK Bonds	-6%	-0.22%	-12%	6.39%
European LRE Index	-2%	0.14%	-31%	23.58%

Again. all Factor strategies outperformed LRE Index and Bonds and this time 3/6 outperformed equities

Volatility (ex Large Stocks) was lower than LRE Index

PANDEMIC PERIOD RE Feb 2020 to Jan2022				
	Total Return	Mean Return	Max drawdown	Volatility
Low Leverage	27.05%	1.11%	-40.73%	19.73%
Largest stocks	21.70%	1.05%	-45.73%	26.88%
Quality Prem /NAV	28.44%	1.07%	-35.37%	13.64%
Quality Income	12.73%	0.60%	-34.92%	17.63%
Low Volatility	13.00%	0.52%	-22.33%	6.45%
Analyst rating	8.67%	0.50%	-34.44%	20.16%

Apart from Low Volatility Maximum Drawdown was still an issue



# RESULTS - INTEREST RATE INFLECTION

INTEREST RATE PERIOD Feb 2022 to June 2023				
	Total Return	Mean Return	Max drawdown	Volatility
European equities	8%	0.60%	-18%	16.47%
UK Equities	4%	0.29%	-14%	12.32%
European Bonds	-14%	-0.90%	-16%	9.38%
UK Bonds	-24%	-1.62%	-24%	11.85%
European LRE Index	-38%	-2.58%	-38%	31.12%

INTEREST RATE PERIOD Feb 2022 to June 2023				
	Total Return	Mean Return	Max drawdown	Volatility
Low Leverage	-15%	-0.95%	-19%	15.26%
Largest stocks	-53%	-3.84%	-56%	44.29%
Quality Prem /NAV	-14%	-0.89%	-15%	10.08%
Quality Income	-26%	-1.75%	-28%	19.15%
Low Volatility	-16%	-1.06%	-18%	7.07%
Analyst rating	-12%	-1%	<b>-18%</b>	10.99%

Considerably more challenging period,

ALL factor strategies underperformed Equities and Bonds , but (ex Large stocks) performed better than the LRE Index.

Volatility (ex Large Stocks) was lower than LRE Index

Interestingly Maximum Drawdown (ex Large stocks ) was closer to general equities



# ADDING 10m MA TREND FOLLOWING STRATEGY

- Comparison with Original Results

FULL PERIOD RESULTS	Dec 2015 to June 2023			
	Total Return	Mean Return	Max draw	Volatility
Raw Low Leverage	30.86%	0.37%	-44%	12.12%
10m MA Low Leverage	37.42%	0.44%	-8%	6.32%
Raw Largest stocks	8.93%	0.36%	-63%	20.66%
10m MA Largest stocks	72.78%	0.78%	-16%	4.90%
Raw Quality Prem /NAV	126.06%	0.96%	-65%	9.90%
10m MA Quality NAV	163.48%	1.21%	-12%	5.38%
Raw Quality Income	55.01%	0.57%	-62%	12.65%
10m MA Quality Income	76.15%	0.72%	-8%	2.84%
Raw Low Volatility	46.78%	0.45%	-46%	6.40%
10m MA Low Volatility	101.15%	0.91%	-17%	4.64%
Raw Analyst rating	75.38%	0.70%	-54%	12.22%
10m MA Analyst rating	109.02%	0.94%	-19%	5.74%

In all cases the return is improved significantly and the maximum drawdown reduced to an acceptable level



# ACADEMIC APPROACH :SINGLE FACTOR MODEL RESULTS

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FULL PERIOD RESULTS		Dec 2015 to June 2023			
<b>Relative to General European Equities</b>					
	Annualised Alpha	Beta	RSq	Correlation	Tracking Error
Low Leverage	-0.8%	0.71	59%	0.77	9%
Largest stocks	-4.2%	1.14	44%	0.66	18%
Quality Prem /NAV	8.1%	0.46	39%	0.63	11%
Quality Income	2.0%	0.67	44%	0.66	12%
Low Volatility	4.3%	0.17	10%	0.31	14%
Analyst rating	3.1%	0.72	58%	0.76	9%
<b>Relative to European Real Estate Equities</b>					
	Annualised Alpha	Beta	RSq	Correlation	Tracking Error
Low Leverage	5.1%	0.58	75%	0.86	10%
Largest stocks	5.5%	1.16	84%	0.91	10%
Quality Prem /NAV	12.0%	0.41	56%	0.75	13%
Quality Income	7.6%	0.65	76%	0.87	10%
Low Volatility	5.7%	0.16	15%	0.39	18%
Analyst rating	9.0%	0.54	61%	0.78	12%

- EPRA index showed the following vs general European equities:
  - -1% p.a. alpha
  - 1.08 beta
  - 63% RSq
  - 0.79 correlation
  - 10% annualised tracking error
- Clear these smart-beta strategies offer a diversifying and potentially outperforming listed real estate sector exposure vs benchmark for broader equities and multi-asset investors
- High tracking errors of 9-10%+ can be diversified away
- Low volatility strategy provides the highest level of diversification



# FAMA-FRENCH FIVE-FACTOR MODEL RESULTS – GENERAL EQUITIES

	Low Leverage		Largest stocks <sup>16</sup>		Quality Prem /NAV		Quality Income		Low Volatility		Analyst rating		EPRA	
Alpha	-0.001		-0.005		0.007	***	0.001		0.004	*	0.002		<b>-0.008</b>	**
Excess Market Returns	0.583	***	0.891	***	0.419	***	0.497	***	0.190	***	0.607	***	<b>0.911</b>	***
Size Factor	0.728	***	0.495		0.610	***	0.454	**	0.170		0.681	***	<b>0.613</b>	***
Value Factor	0.294	*	0.694	*	-0.073		0.454	**	-0.152		0.292		<b>0.449</b>	*
Investment Pattern Factor	-0.389		-1.559	**	-0.164		-1.004	***	0.138		-0.107		<b>-0.841</b>	**
Profitability Factor	0.356		0.556		0.069		0.319		-0.242		0.330		<b>0.504</b>	
*** <=1% p-value, ** <=5% p-value, * <=10% p-value														

- Smart-beta strategies offer an array of factor exposures for general equities and multi-asset investors to consider
- Alpha or excess returns remained positive for two of the strategies and market beta has generally reduced
- Consistent with prior studies these portfolios load positively on the size factor showing a small-cap effect at work
- Some positive value effects, most notably for the Quality Income strategy
- The profitability factor is insignificant in all instances, but the investment pattern factor shows some suggesting that certain strategies' performance is aligned to high re-investment firms





# CONCLUSIONS AND NEXT STEPS

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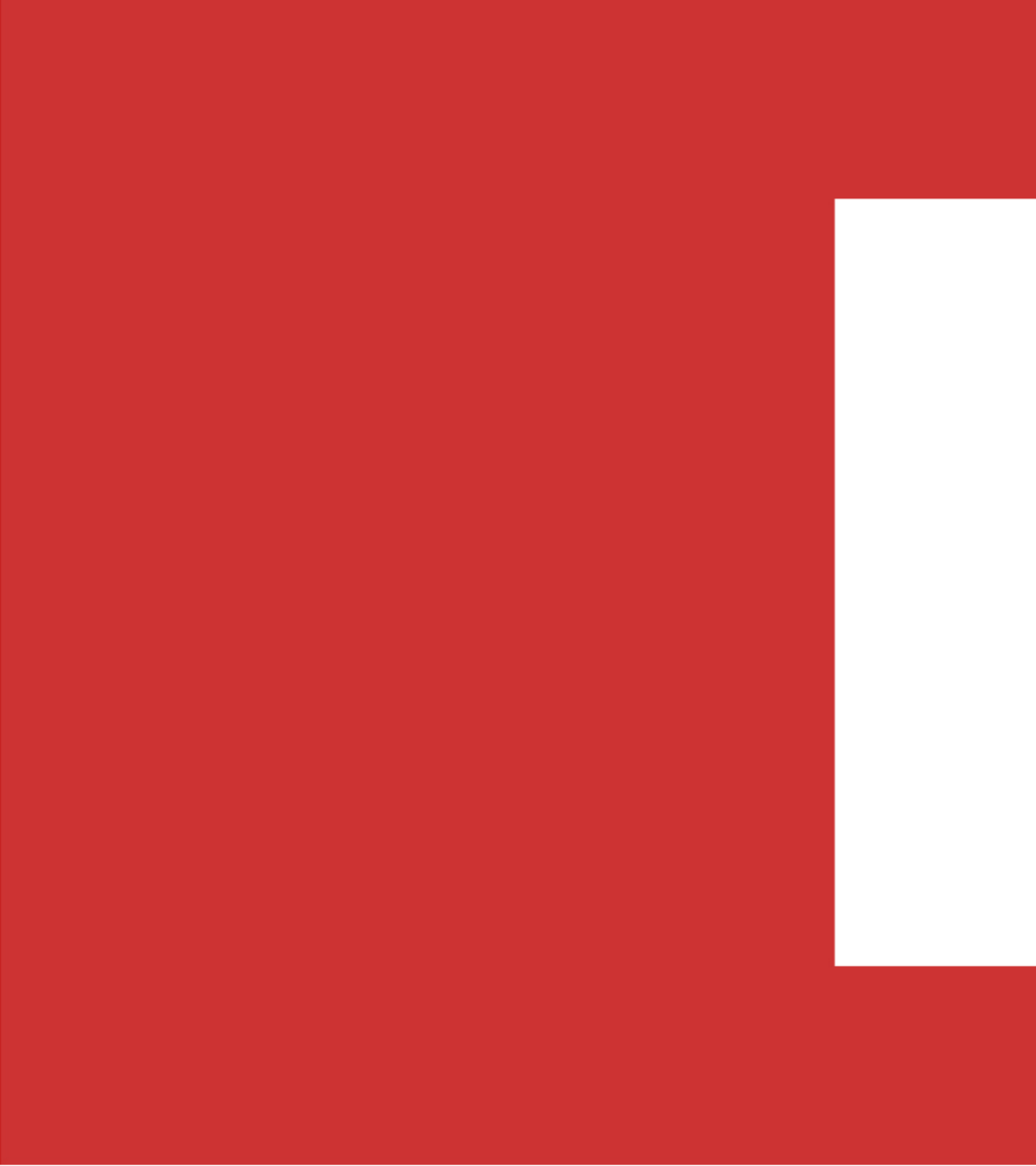
- Promising initial results but we note the relatively small size of the European market universe
- However, this highlights that mechanical smart beta strategies can produce performance akin to that of actively managed strategies.
- General equities and multi-asset investors can easily incorporate these especially as tracking-error risk can be diversified away through exposure other equities sectors
- Possible next steps:
  - Expand into the Global REIT universe
  - Automated dynamic rebalancing and potentially long-short strategies all incorporating the impact of transaction costs
  - Explore a richer set of factors including real estate specific and macroeconomic variables
  - Sector and country breakdowns
  - Assess multiple real assets combined e.g. listed infrastructure, agriculture and commodities,



# References

- Faber, M., 2007. A quantitative approach to tactical asset allocation. *The Journal of Wealth Management*, Spring.
- Fama, E.F. and French, K.R., 2015. A five-factor asset pricing model. *Journal of financial economics*, 116(1), pp.1-22.
- Farrelly, K. and Moss, A., 2021. Re-examining the Real Estate Quadrants. *The Journal of Portfolio Management*, 47(10), pp.62-74.
- Moss, A., Clare, A., Thomas, S. and Seaton, J., 2015. Trend following and momentum strategies for global REITs. *Journal of Real Estate Portfolio Management*, 21(1), pp.21-31.
- Moss, A. and Farrelly, K., 2015. The performance of a blended real estate portfolio for UK DC investors. *Journal of Property Investment & Finance*, 33(2), pp.156-168.
- Moss, A. and Farrelly, K., 2015. *Alternative Index (Smart Beta) strategies for REIT Mutual Funds* (No. eres2015\_60). European Real Estate Society (ERES).
- Sharpe, W.F., 1964. Capital asset prices: A simplified model of portfolio analysis. *Management Science*, 9(2), pp.425-442.





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