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Recent trends in the real estate market and its analysis–2023 edition

Narodowy Bank Polski and
SGH Warsaw School of Economics Conference
29th-30th November 2023

"New approaches towards classifying European unlisted commercial real estate funds (UCREF)"

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Agenda

- Introduction
- Background to unlisted (private) real estate funds
- Research considerations
- Methodology
- Data and data-related matters
    - ex ante data
    - the ‘J-curve’ effect
    - addressing valuation and ‘smoothing’ issues
- Results
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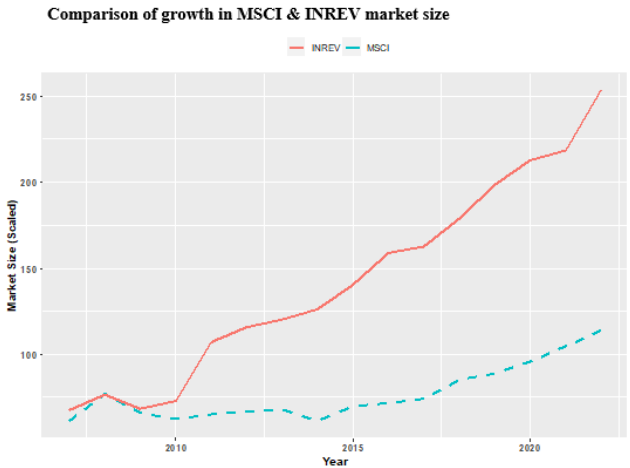
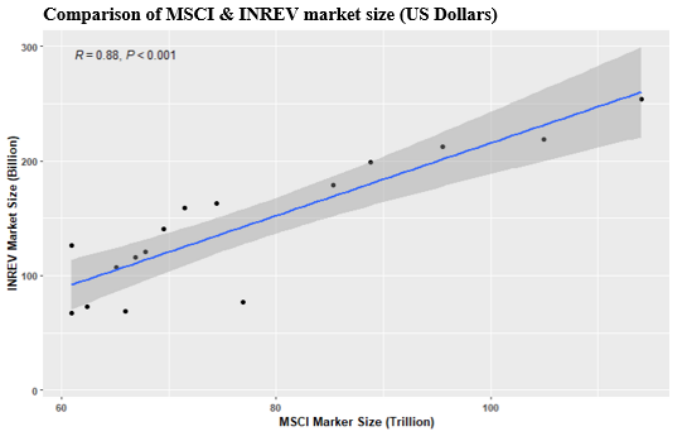
- Contribution
- Limitations and further research

Background to unlisted commercial real estate funds (UCREF)

The rapid growth in unlisted commercial real estate funds, UCREF, has established this sector as a major investment vehicle. A comparison is shown between the growth in investments in UCREF and the direct commercial property markets from 2006 to 2021.



Source: Own composition based on MSCI Real Estate Market Size reports (2022)



Source: Own composition based on MSCI Real Estate Market Size reports (2022)

Background to unlisted commercial real estate funds (UCREF)

- A UCREF is a type of investment fund that is not publicly traded on a stock exchange and is managed by a general partner (GP). This structure is commonly found in private equity, venture capital, and certain types of real estate funds.
- Key features include:
    - Private nature
    - General Partner (GP)
    - Limited Partners (LP)
    - Investment strategy
    - Illiquid investments
    - Profit sharing
    - A partnership agreement
- These types of funds provide investors with exposure to diversified real estate portfolios.

Background to unlisted commercial real estate funds (UCREF)

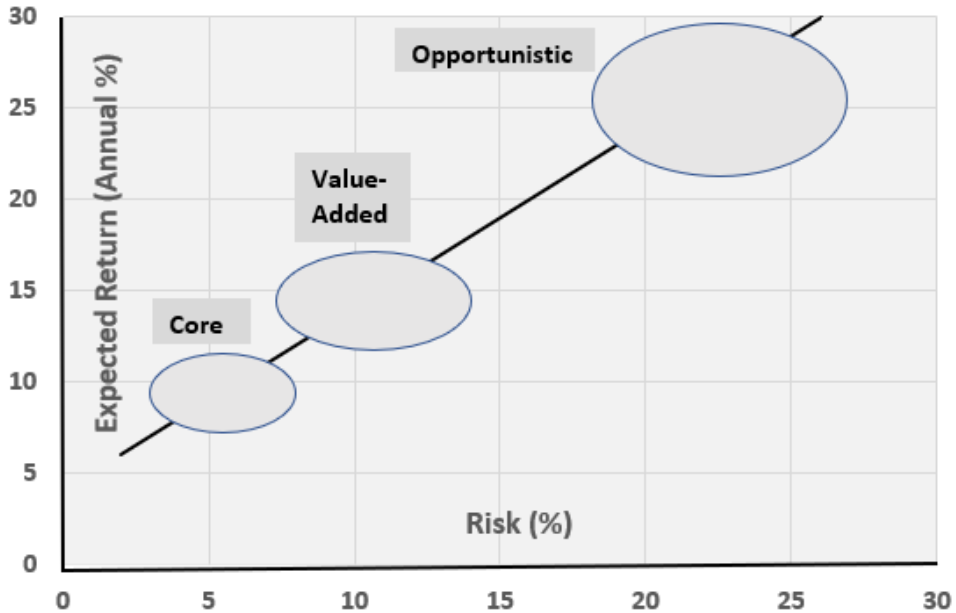
- The General Partner (GP) refers to the individual responsible for managing the UCREF and making investment decisions. The GP typically takes a more active role in the fund's operations and decision-making compared to Limited Partners (LPs), who are passive investors.
- The specific terms and conditions, including the responsibilities and compensation of GPs, are typically outlined in the fund's partnership agreement.
- Investors in the fund are often referred to as limited partners (LPs). Limited partners contribute capital to the fund but generally have a more passive role. Limited partners invest capital in the fund and generally have a more passive role and limited influence on the day-to-day operations. They may include institutional investors, high-net-worth individuals or other entities.
- The relationship between the general partner and the limited partners is governed by a partnership agreement. This legal document outlines the terms, conditions, rights, and responsibilities of each partner in the fund.

Background to unlisted commercial real estate funds (UCREF)
Types of funds

- Core funds: These funds invest in high quality, stabilized real estate assets with predictable income streams. Core funds typically have a low–risk profile and are focused on generating steady income for investors.
- Value–Added funds: These funds invest in real estate assets that require some form of active management or repositioning to enhance their value. Value–Added funds typically have a higher–risk profile than Core funds but offer the potential for higher returns.
- Opportunistic funds: These funds invest in real estate assets with significant potential for appreciation in value but also have higher risk. Opportunistic funds may target distressed properties or development projects, typically having a longer investment horizon than other types of funds. The performance of these very risky funds can be extremely erratic and is not addressed in the research.

Background to unlisted commercial real estate funds

The current UCREF investment styles classification system



Research considerations

- To develop a new cluster-based classification system for UCREF which reflects their ex ante risk profiles.

- There are currently no rigorously tested classification systems for UCREF.

- The classification of investment funds in other markets is common, particularly for mutual funds. Financial services firms categorize mutual funds by assessing their performance using a blend of qualitative and quantitative criteria *primarily relying on historical ex post data*. Academic studies also use ex post data, which is a limitation of the studies.

- Upon reviewing the literature on mutual funds, it was found that classification criteria did not provide any suitable practical information fir classifying UCREF.

    - This provides a research opportunity to fill the classification gap for UCREF.

Research considerations (cont.)

1) Theoretical considerations:
   - to address UCREF valuation issues and corresponding risk measures
   - to address risk and return relationship for UCREF

2) Methodological considerations:
   - to design suitable data analysis procedures for analysing UCREF
   - to develop a rigorous and quantitatively based classification system for UCREF

3) Empirical considerations:
   - to develop a classification system which uses known, *ex ante*, fund features at the start of a fund's life
   - to test the robustness of the classification system
   - to compare the existing system of classification against a newly established system

Research considerations (cont.)
Why reliable classification of funds 1?

- Investing involves taking some level of risk in exchange for potential reward. Taking too much risk can lead to large variations in investment performance that may be outside the fund's comfort zone. Taking too little risk can result in returns which are too low for the fund to achieve its financial goals.

- The implications of being invested in the wrong risk class include:
  - incorrect volatility exposure
  - 'unanticipated' financial loss and decline in fund values
  - achievement of long-term financial goals
  - for pension funds, potential mis-match between assets and liabilities
  - impact on financial security
  - diversification implications if fund is part of a portfolio
  - opportunity cost/missed opportunities
  - General Partner's loss of reputation

Research considerations (cont.)
Why reliable classification of funds 2?

- More broadly:
  - to enable potential investors to align their risk preferences with anticipated investment returns for funds
  - to assist fund mangers to construct portfolios with target risk-expected return profiles
  - to enable comparison of performance against appropriate benchmarks and other asset categories
  - to enable modelling/forecasting of homogeneous risk-return categories
  - to attribute performance to underlying factors
  - to measure a fund manger's value-added (alpha) performance
    - ➢ distinguish between overall market (beta) performance and real estate selection ability

Methodology

A distinction between using ex ante and ex post data was made. Consequently, a two-stage approach was implemented.

- Stage 1 uses ex ante data:
  - selection of ex ante data features
  - determine the number of clusters using two *fundamentally different* cluster techniques, namely K-prototypes and latent class analysis (LCA)
- Stage 2 uses ex post data:
  - calculation of risk and risk-adjusted investment performance measures
  - calculation of risk-adjusted investment performance of the determined clusters
  - ranking the clusters and testing for statistical difference in cluster risks
  - validating the clusters 1: estimating multinomial and ordered logistic models
  - validating the clusters 2: estimating and testing econometric models

Methodology (cont.)
Cluster determination: Stage 1 analysis

- Comparatively few clustering methods are available for cluster analysis based on mixed data features
  - two conceptually different clustering algorithms, one being distance based the other model–based were used namely, K-prototypes and latent class analysis, LCA
  - no reliance on a single clustering technique; comparison of the results will be insightful and facilitate complementary insights
  - K-prototypes distance-based metrics and LCA model-based i.e. parametric probability data distributions
  - essentially, LCA inference can be thought of as, *what are the most similar patterns based on probability?* and cluster analysis as, *what is the closest object using a distance measure?*
  - the estimated the clusters were ranked according to their risk and assigned category 'labels' for further analysis

Methodology (cont.)
Risk measurement considerations: Stage 2 analysis

- Risk metrics play a crucial role in the research, and the following measures were employed.
  - average standard deviation of returns (SD Mean Returns)
  - average of fund standard deviations (Mean of Fund SDs)
  - average Gearing (Mean Gearing)
  - average of Maximum Drawdowns (Mean of Max Drawdowns)
  - average Sortino Ratio (Sortino Ratio), average Sharpe Ratio (Sharpe Ratio)
  - average Sharpe Ratio modified VaR (Sharpe Ratio Mod VaR)
  - average Sharpe Ratio modified Cornish–Fisher (Sharpe Ratio Mod Corn–Fish)

Methodology (cont.)

Cluster interpretation from a financial perspective: Stage 2 analysis

- Estimated clusters are a purely data driven exercise based on unsupervised algorithms. Consequently, it is important to interpret them. Are they meaningful groupings? Which underlying factors have driven the cluster formation?
- Supervised learning multinomial logit and ordered logistic models were employed, the established cluster labels being the dependent variable.
- The analysis looked to identify the relationship between the clusters and ex post measures of various risk variables.
- Statistical testing and classification accuracy employed to identify a suitable model.

Methodology (cont.)
Significance of clusters: Stage 2 analysis

- Clusters ranked according to underlying risk.
- Clusters represent a bundle of risks, is this reflected in ex post investment returns?
- Econometric models used to estimate the relationship between investment returns and clusters.
- Average annualised cross-sectional cluster returns regressed on clusters as indicator variables and several risk measures.
- Variety of tests undertaken.

Data and data-related matters

1) Data:
   - unique private funds data obtained exclusively from European Association for Investors in Unlisted Real Estate Vehicles (INREV)
   - fund characteristics such as commencement/closing dates, legal structure, intended investment strategies, asset values , cash flows and other information provided
   - 21 years of quarterly data covering the period 2000:Q2 – 2021:Q2
   - 618 funds, of which, after validation, 576 were used
   - 419 'Core' funds and 157 'Value-Added' funds

2) Data considerations:
   - the original unstructured raw data required correction of errors and formatting in preparation for the analyses
   - dealing with outlier data points → winsorizing data at 99%: out of 21,417 obs. 214 winsorized
   - criteria for selecting funds → 'J-curve' effect: funds with *at least* 2 years/8 quarters data selected
   - selection of ex ante data for Stage 1 cluster determination → 6 variables identified as influential
   - addressing valuations and 'smoothing' issues → smoothed values observed in 30% of the funds

Data and data-related matters (cont.)

Ex ante data for Stage 1 analysis

Final selection of ex ante fund features based on calculation of *misclassification* rates.

Selected ex ante fund features for cluster determination

Feature	Interpretation
Target IRR From	Lower target rate of return for the fund
Target IRR To	Upper target rate of return for the fund
Multi or Single Sector Investment	Intention of the fund to invest in multi–sectors or a single sector
Target Redevelopment Exposure	Maximum percentage of the fund's investments to be invested in development exposure
Provision to extend Termination Date	Facility exists to extend the date of termination of the fund
Structure of fund	Open-ended or Closed-ended fund

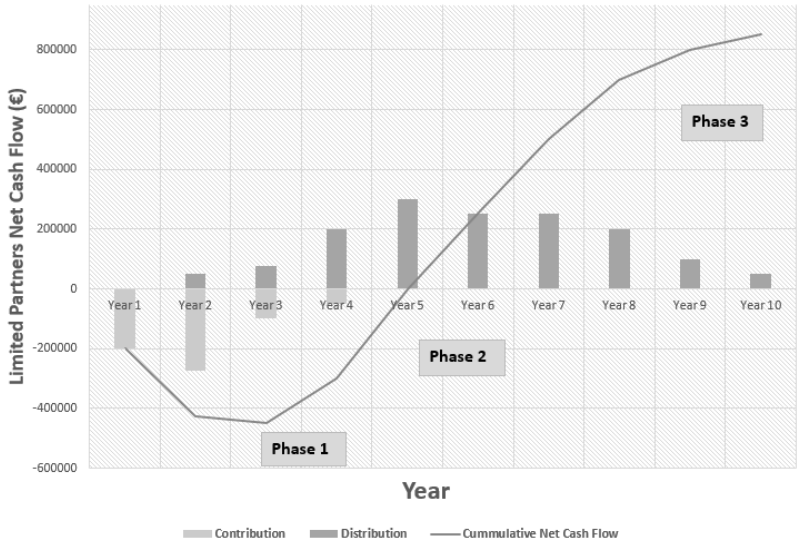
Source: Own compilation based on data obtained from INREV.

Potential ex ante fund features for Stage 1 cluster determination

Feature	Description	Type of Feature
Target IRR From	Quartile Annual target return (%)	Numerical
Target IRR To	Quartile Annual target return (%)	Numerical
Multi or Single Sector Investment	Intended real estate investment in multi or single sectors?	Categorical
Target Distribution Yield	Annual distribution/Net Asset Value (%)	Numerical
Target Redevelopment Exposure	Maximum percentage of fund exposed to redevelopment	Nominal
Provision to extend Termination Date	The fund's business plan has the option to extend the specified date of termination	Categorical
Target Gearing	Gearing: the ratio of borrowing (debt) to fund asset value (%)	Numerical
Structure of fund	Open–ended or Closed–ended fund	Categorical

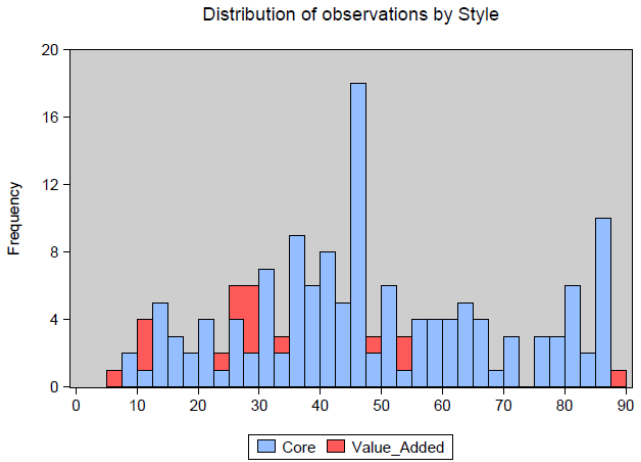
Source: Own compilation based on data obtained from INREV.

Data and data-related matters (cont.)
J-curve 1



Three J-curve phases:
Phase 1: The general partner (GP) 'calls' capital from the limited partners (LPs) to finance the purchase of properties.
Phase 2: The fund begins to realise profits from the investments and make distributions.
Phase 3: The fund sells off the remaining investments and the investment returns level off in these later years of a fund's life.

Data and data-related matters (cont.)
J-curve 2



Distribution of observations

Value	Count	Percent	Cumulative Count	Cumulative Percent
[0, 10)	3	1.71	3	1.71
[10, 20)	16	9.14	19	10.86
[20, 30)	19	10.86	38	21.71
[30, 40)	29	16.57	67	38.29
[40, 50)	41	23.43	108	61.71
[50, 60)	19	10.86	127	72.57
[60, 70)	19	10.86	146	83.43
[70, 80)	10	5.71	156	89.14
[80, 90)	19	10.86	175	100.00
Total	175	100.00	175	100.00

- The distribution of the figures indicates that most funds are relatively mature in their investment cycle and will likely have absorbed the early J–curve costs. Such funds are likely to be operating in Phases 2 or 3 on the J–curve.
- It is not suggested that the J-curve figure is representative of every fund's cash flow profile, as different cash flows and property valuations will exhibit different J–curve profiles and different phases.

Data and data-related matters (cont.)
Unsmoothing valuations

Issues with using raw INREV valuation-based data, so-called 'smoothing'. Consequently, need to 'unsmooth' the data. Several unsmoothing approaches can be employed.

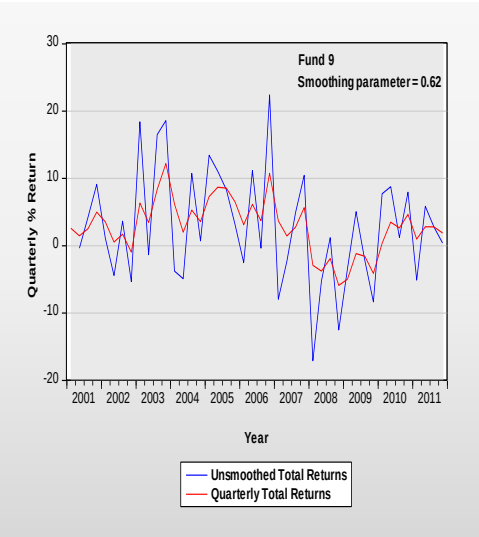
An AR(1) process was employed to estimate the smoothing parameter α for each fund, and subsequently applied to remove impact of smoothing from the investment returns. The underlying AR(1) process can be represented as:

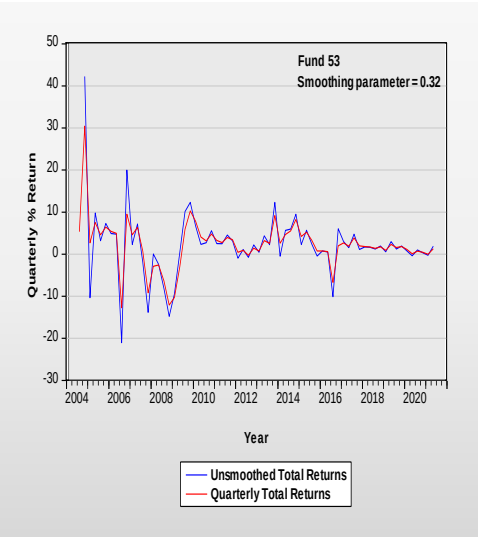
$$V_t = (1 - \alpha)P_t + \alpha V_{t-1}$$

α = a constant lying in the range $0 \leq \alpha \leq 1$
V_t = valuation at time t
P_t = implied market price at time t, which is backed-out

The statistical significance of α was tested, for which 30% of funds were found to have smoothed values.

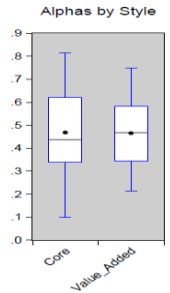
Data and data-related matters (cont.)
Unsmoothed valuation returns





Distribution of smoothed funds

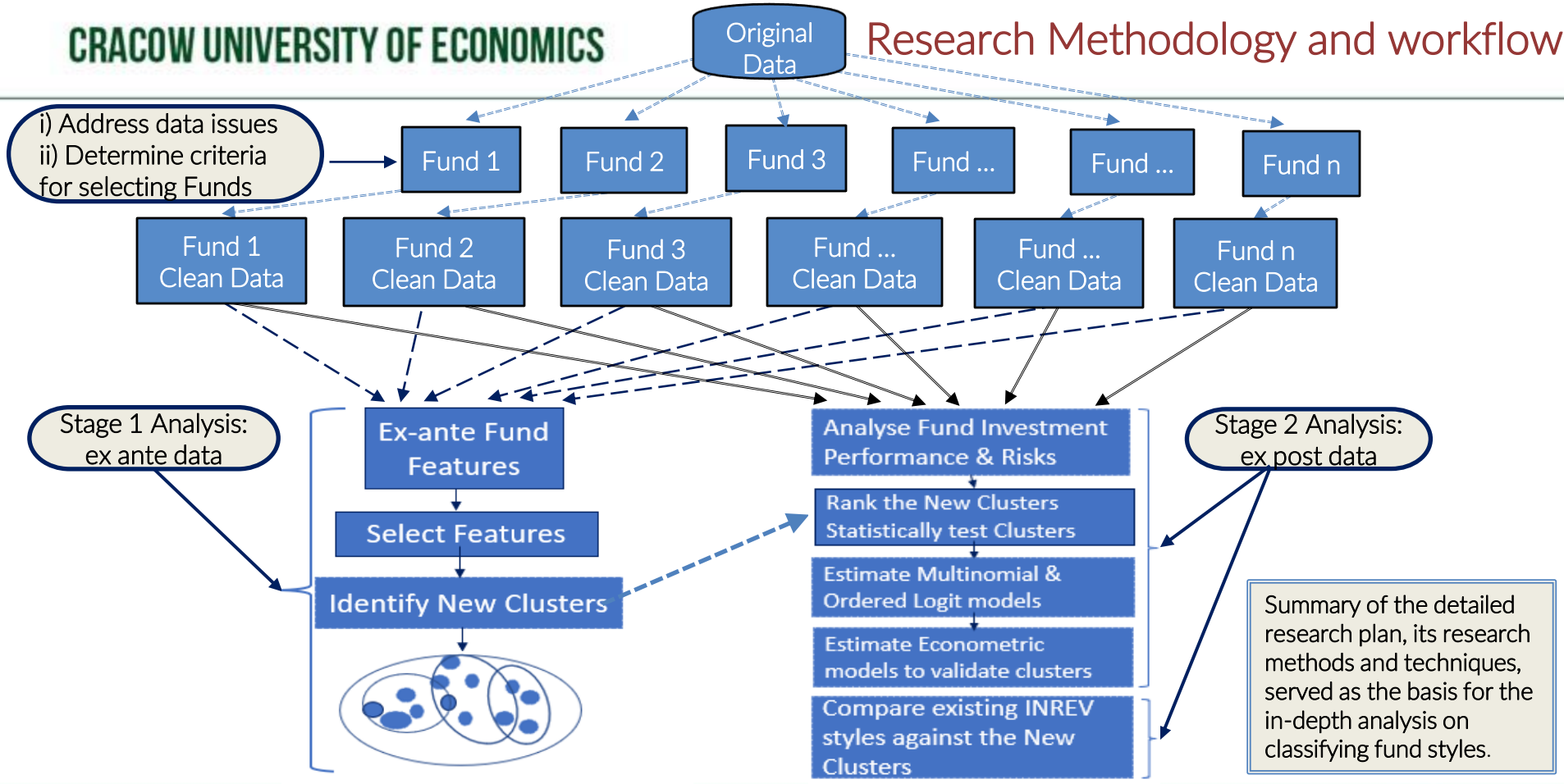
Value	Count	Percent	Cumulative Count	Cumulative Percent
Core	137	78.29	137	78.29
Value_Added	38	21.71	175	100.00
Total	175	100.00	175	100.00



Distribution of Alphas

Value	Count	Percent	Cumulative Count	Cumulative Percent
[0, 0.2)	6	3.43	6	3.43
[0.2, 0.4)	66	37.71	72	41.14
[0.4, 0.6)	53	30.29	125	71.43
[0.6, 0.8)	49	28.00	174	99.43
[0.8, 1)	1	0.57	175	100.00
Total	175	100.00	175	100.00

Research Methodology and workflow



Summary of the detailed research plan, its research methods and techniques, served as the basis for the in-depth analysis on classifying fund styles.

Research results

UCREF investment styles

- By addressing the empirical analysis from a statistical, financial and econometric perspective, the research showed the existence of three risk groups, clusters.
- Assessing the clusters from an ex post perspective, it is evident that the clusters display increasing risk profiles and so have distinct risk rankings. This was demonstrated by all 3 different risk measures.
- The estimated logistic and econometric models validated the three clusters by providing insights into the risk factors that characterise the three risk clusters.
- The research results demonstrate that risk and return factors play crucial roles and provided financial and econometric support for the existence of three clusters.
- The lowest risk Cluster 1 had a smaller risk profile than the current Core risk category, as illustrated in the upcoming slide *'Comparison of old and new research determined styles.'*

Research results (cont.)

Summary Tables for latent class analysis clusters

Three meaningful clusters identified. LCA was the preferred model based on various criteria.

LCA cluster mean returns and summary risk statistics

		CLUSTER AVERAGES 2000–2021			
Cluster	Mean Returns (%)	Mean Return SD (%)	Mean of Fund SDs (%)	Mean Gearing (%)	Average of Max Drawdowns (%)
1	4.50	4.29	6.55	17.38	19.90
2	3.89	6.49	11.90	32.73	38.50
3	1.16	17.64	19.60	41.65	52.30

Source: Own calculations based on LCA model output.

Individual fund features and the subsequent ex post risk measures are consistent with the established cluster classes.

i) Tests of equality of mean returns between Clusters 1 and 2 are not rejected. However, significant differences between Clusters 1/2 and Cluster 3 .

ii) Test results indicate that all risk variables are not equal across clusters.

LCA cluster summary risk-adjusted performance statistics

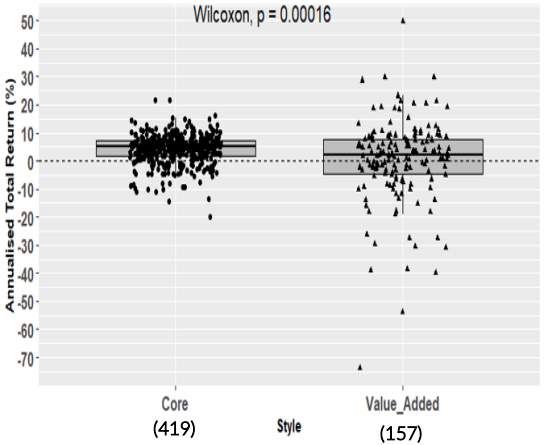
	CLUSTER AVERAGES 2000–2021			
Cluster	Sortino Ratio (%)	Sharpe Ratio (%)	Sharpe Ratio Mod VaR (%)	Sharpe Ratio Mod Corn–Fish (%)
1	0.016	0.163	0.516	0.744
2	–0.016	0.060	0.066	0.133
3	–0.036	–0.195	0.009	0.046

Source: Own calculations based on LVA model output.

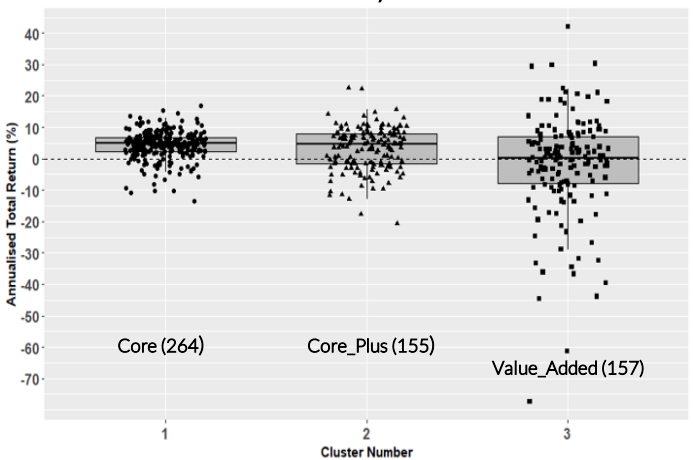
Research results (cont.)

Comparison of old and new research determined styles

Old styles



New styles



Some 37% of Old styles Core funds were misclassified.

Research results (cont.)
Multinomial and ordered logit models

- The results from the logit models show that fund structure, fund gearing and two risk variables, maximum drawdown and standard deviation, were statistically significant at the 5% level.
- The classification accuracy (based on LCA generated labels) was around 70% for both the multinomial and ordered logit models.
- Ex post, the logit models have indirectly confirmed that UCREF features contributed towards the formation of appropriate risk clusters.
- The models have validated the role of finance–related variables driving cluster membership.

Research results (cont.)
Econometric models

- The three clusters were found to be statistically significant at the 5% level.
- The statistical evidence is such that higher risk as measured by either maximum drawdown or volatility of returns does not result in higher ex post returns.
- The results are highly suggestive that maximum drawdown has a differential impact on clusters ranging from the lowest impact on clusters 1 and 2 and highest impact on cluster 3. This again confirms cluster 3 is the riskiest of the three clusters.

Research implications

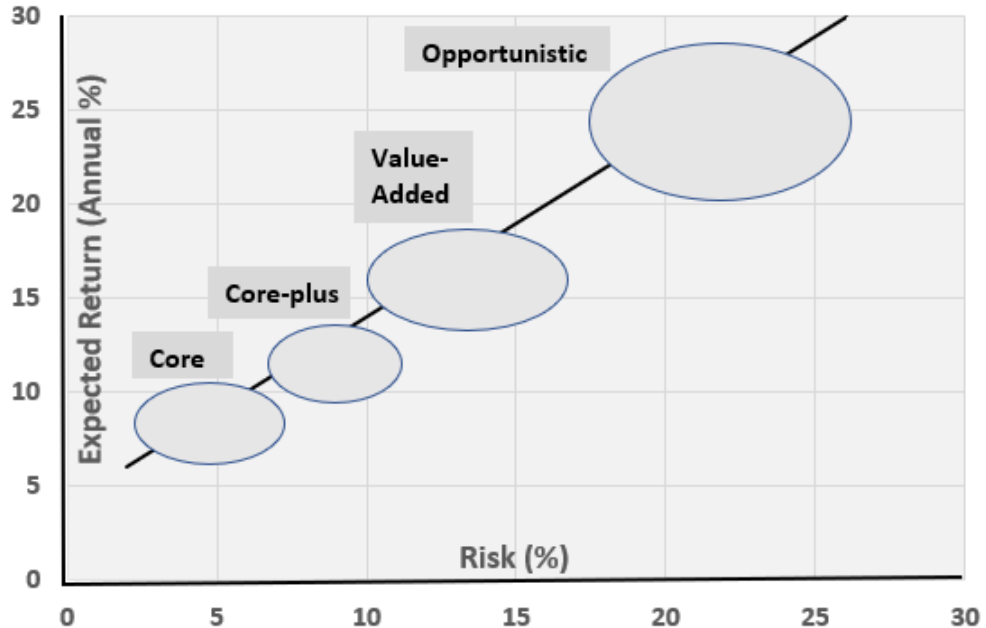
- Based on the obtained INREV data, the research findings show that the existing classification system does capture the appropriate number of investment styles.
- The existing INREV classification consolidates the initial two clusters into a unified Core group, effectively avoiding the categorization of a lower-risk classification.
- Investors may be investing in the wrong risk class resulting in potential consequences.
- Issues surrounding valuation-based commercial real estate, smoothing, need to be addressed before undertaking an analysis of UCREF data.

Research implications (cont.)

- Ex post, the highest risk cluster did not, as anticipated by theory, provide the highest average return. Although several funds in Cluster 3 did produce the highest risk-adjusted returns, as a group, this was not the case.
- Funds can and should be classified on the basis of ex ante data.
- The two-stage methodology can be applied to funds in other investment markets which currently use ex post data to classify funds.
- Previous studies using the Core and Value-Added styles may need to be reconsidered.

Research implications (cont.)

New styles classification system



Research contribution

- A new methodological contribution by adopting an original two-stage approach using ex ante and ex post data specially provided for the research.
- Using a two-stage approach, Stage 1 ex ante data determined clusters which were then validated using ex post data in Stage 2.
- Encouragement for researchers investigating UCREF, or indeed other asset classes such as mutual funds, to use a two-stage approach.
- Using a unique data set, ex ante data identified the clusters, allowing the style classification of UCREF to be determined.
- Two conceptually distinct clustering approaches were employed in determining the clusters.

Research contribution (cont.)

- Risk measures were calculated to rank the clusters. The validity of the clusters was confirmed from financial and econometric perspectives.
- The latent class analysis, LCA, approach enables a simple and cost-effective way to classify *new* funds with no historic, ex post, data. Furthermore, this also provides a practical way to assess the existing classification of private commercial real estate funds.
- This was the first study to *quantitively* classify European unlisted commercial real estate funds, UCREF.

Research limitations and further research

- No system using cluster classification can be fully accurate. Individual UCREF will have their own unique characteristics.
- At least 8 fund quarterly observations, 2 years data, were required and a specific AR model was used to unsmooth the UCREF investment returns.
- To avoid valuation and unsmoothing issues, data using only actual transactions prices, and not valuations, would be required.

Research limitations and further research (cont.)

- Several interesting areas for future research include:
  - As the dataset expands over time, the robustness of the number of clusters could be revisited.
  - Given more extensive data, alternative risk measures could be used to examine cluster risk.
  - Revisit the study and apply a pure time-series clustering approach and investigate the risk profiles of funds in different market environments.
  - An investigation of so-called ‘style drift’, which is the tendency of a fund’s risk class to change/vary over time, and so deviates from its specified investment objectives.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