

## WORLD CLASS REAL ESTATE RESEARCH



# **Cambridge Real Estate Research Centre**

Annual Report 2022



"The primary aim of the Centre is to build and maintain a stream of applied real estate research that is innovative, interdisciplinary and industry-relevant."

#### INTRODUCTION

The Cambridge Real Estate Research Centre (CRERC) co-ordinates and acts as a focus within the Department of Land Economy and across the University of Cambridge for applied research about real estate. It aims to ensure that real estate research in the University is "world class" and to raise the profile and impact of real estate research by members of the University in the wider academic, policy and business communities. The Centre works with other academic organisations, professional bodies and industry to ensure research is of the highest quality, is relevant and has maximum impact.

The Centre is extremely grateful for the financial and broader support of its partners and other supporters including the Cambridge Land Economy Advisory Board (CLEAB) that have helped fund and enable its activities. This report aims to give an overview of all the activities of the Centre in the year of 2022.

The Centre continues to act as a hub for the various data sources available on real estate for staff and students, and is actively engaged in discussion for new or improved data sources — if interested please email us via mstrealestate@landecon.cam.ac.uk

### Our Research

## Research projects for industry bodies and the public sector

A full list of publications and working papers is contained in Appendices 1 and 2. The strength and quality of the research produced is consistent with our goal of being rated as "world class" in real estate research and it was wonderful news to hear that the Department was top ranked in the UK in the recent research excellence framework, reflecting the work across the Departments of Land Economy and Architecture on issues in the built environment.

Research has been produced and undertaken under a broad range of areas related to challenges in finance, investment and the built environment.

Our work has examined topics ranging from key issues in real estate performance and the impact of size in real estate companies through to behavioural loss aversion studies and from projects looking at capital flows and to projects exploring the impact of migration and projects looking at issues around urbanisation and housing. Publications in 2022 include:

"The aim of the Centre is to produce applied real estate research that is **innovative**, **interdisciplinary** and **industry-relevant**."

### Local Beta: Has Local Real Estate Market Risk Been Priced in REIT Returns Bing Zhu and Colin Lizieri

This paper studies the pricing of the risk associated with the location of the assets. The local real estate market risk is measured by 'local beta', which combines the systematic risk of local property markets and the property allocation strategy of real estate firms. The empirical results confirm a higher equity return for a firm with higher exposure to the most volatile property markets, particularly for REITs which are more geographically concentrated. For REITs with highly diversified assets, local real estate risks are not reflected in REIT returns. For those REITs with most concentrated assets, a one standard deviation increase in the local beta will lead to a 4.7% increase in the annual return. Investors can use REITs' local real estate risk as an information tool to construct a long-short investment portfolio of real estate firms and can achieve a significant non-market performance of 4.9% per annum.

https://link.springer.com/article/10.1007/s11146-022-09890-4



## **Urban land valuation with bundled good and land residual assumptions**John M Clapp and Thies Lindenthal

This paper develops a new approach to estimate the value of urban land. We extend AMM theory by adding the assumption of partial irreversibility. Bundled goods assumptions imply that land value with a structure can evolve differently than as-if vacant value, even in the first decades of structure life. We develop a hybrid model that nests bundled goods with land residual methods and we develop a new test of predictive accuracy. Granular house price indices produced by machine learning are used to estimate hybrid economic structure and land values.

https://www.sciencedirect.com/science/article/pii/S1051137722000444#fig0002

## Behavioural land use policy studies: Past, present, and future Helen Bao and Guy Robinson

In this introduction to the themed issue, "Behavioural Land Use Policy Studies", we firstly provide a brief review of the current state of behavioural studies in land use policy, followed by a discussion of behavioural biases that are most relevant to land use policymaking. Next, we summarise the seven papers included in this themed issue. The behavioural topics explored by these papers include endowment effect, prospect theory, nudge, trust, social norms, time preference, and loss aversion. Our review of the literature examines the role played by Land Use Policy in applications of behavioural insights in environmental studies in general and land use policy studies in particular. The papers included in this themed issue push this research frontier by using large survey datasets from the field, and by investigating some under-researched behavioural tools (e.g., nudge). We conclude by suggesting research gaps to be filled by future behavioural land use policy studies.

https://www.sciencedirect.com/science/article/pii/S0264837722000400

## On the Strategic Timing of Sales by Real Estate Developers: To Wait or To Presell? Ling Li, Helen Bao and Kwong Wing Chau

In timing property listings, real estate developers can exercise the "option to wait" or "option to presell" to mitigate price uncertainty risk. In this study, we study the effectiveness of both strategies under a unified framework. We test our hypotheses using residential development data from Hong Kong between 1995 and 2015. Empirical evidence shows that when the presale option is unavailable, developers tend to adopt the waiting strategy when facing price uncertainty risk. Conversely, when a presale option is available, developers will accelerate sales when price volatility is high. Moreover, the effectiveness of the presale option depends substantially on government restrictions. Our approach facilitates the identification of the net effect of either tool and provides an opportunity to unify conflicting findings in the literature.

https://link.springer.com/article/10.1007/s11146-022-09894-0



# RESEARCH PROJECTS – OTHER COLLABORATIONS AND INTERNATIONAL RESEARCH PROJECTS

Micro-foundation of China's Rural Land Institutional Changes: Construction and Tests of Dynamic Models (2022 – 2025)
Helen Bao

Funding body: National Natural Science Foundation of China Principal Investigator: Prof. Lei Feng, Renmin University of China

Co-Investigator: Helen Bao

Budget: RMB 480,000 (Approximately £55,600)

This study constructs a dynamic institutional change model from the perspective of micro-motivation and endogenous changes. It examines the path characteristics, determining conditions and influencing factors of China's rural land institutional change by using a combination of theoretical modelling, measurement testing, questionnaire survey, simulation and case analysis methods. 1) Based on endogenous institutional change theory, behavioral economics, learning theory, and game theory, we construct individual utility function that include endogenous preferences in order to investigate the micro-mechanism of dynamic modelling and consolidate the micro-foundation of institutional change theory. 2) We build a mathematical model of dynamic change based on the individual's utility function and integrate short-term change and long-term evolution into a unified analysis framework, moving beyond the dichotomy of imposed-induced/ rational construction-spontaneous evolution. This framework is expected to explain both individual institutional changes and the continuous process of multiple institutional changes, both the success and the failure of reform. 3) To conduct a large number of extensive empirical tests and systematically summarize and analyze the experience and lessons of the rural land institutional reforms since the founding of the China, we plan to combine traditional questionnaire survey-quantitative methods with behavioral economics field experiments, computer simulations, and dynamic tracking survey methods. These works help to explore the commonalities and laws and provide theoretical guidance and empirical support for deepening the implementation of a number of central reforms and promoting the integration of urban and rural development.

## Land Use Policies for Smart City Development in Hong Kong (2021 – 2023) Helen Bao

Funding body: Interdisciplinary Research Fund in Smart Cities (IRF-SC), Hong Kong

Principal Investigator: Prof Geoffrey Qiping Shen, Smart Cities Research Institute, The Hong Kong

Polytechnic University. Co-Investigator: Helen Bao

Budget: HKD 500,000 (Approximately £50,000)

This project provides an innovative participatory platform based on spatial analysis technologies to support land use policy-making on smart city development in Hong Kong (Kowloon East development as the study area). Local environmental impacts and infrastructure capacity are two major concerns of land use policies for urban land development. This platform can simulate local environmental impacts through 3D spatial analysis technologies based on different scenarios with different restrictions. Moreover, 3D visualization and scenario analysis in this platform could help the non-professional public understand the developing land and its future development, which is beneficial to the public engagement. Stakeholders/decision makers could readily understand and participate in public consultation for better land use policy-making with the assistance of this platform. Therefore, the proposed platform can be used as a policy-making support tool for the government to assess whether the current land use policies are compatible with smart/ sustainable city development or not, and to let more stakeholders/the public truly engage in the public consultation process.

### **OUR PEOPLE**

The Centre is led by Prof Colin Lizieri (Centre Director) and Nick Mansley (Executive Director) who both have over 30-years of real estate research experience. The Centre also has a number of key Departmental staff with the expertise and proven capability of delivering the highest calibre of applied research and a breadth of research interests.





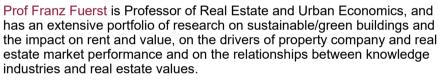
Prof Colin Lizieri is Grosvenor Professor of Real Estate Finance and was Head of the Department (Jan 2016-Dec 2019). Over 30-years he has advised international bodies, governments, professional bodies and private organisations on real estate investment, and has published widely on real estate finance, investment risk management and office market dynamics.

Nick Mansley draws on extensive experience in investment management including as head of the global multi-manager business at Aviva Investors responsible for c.\$20 billion of investments across all asset classes as well as a long track record of applied economics and real estate research.





Prof Helen Bao is a Professor in Land Economy at the Department of Land Economy, and a Fellow in Newnham College. Helen is a real estate economist with a research focus on behavioural finance and real estate/housing markets, urbanization in China and has strong links with Chinese state and private organisations, research institutes and real estate investors.

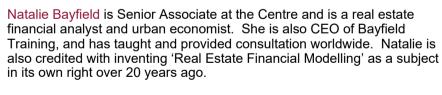








Dr Zilong Wang is Senior Research Associate and his specialism is Finance and Risk. He also teaches quantitative methods on the MSt programme. Prior to his PhD, Zilong worked in investment banking as a financial analyst.





Dr Ozge Oner is an Associate Professor in Spatial Economics and Real Estate. Her research is rooted in Urban and Regional Economics, and deals with issues related to migration, labour mobility, micro geography of segregation and ethnic enclaves, retail and service geography, urban amenities, as well as geography of entrepreneurship.

Dr Christina Li is an Assistant Professor in Real Estate Finance. Her primary research interests include real estate and urban economics, behavioural economics, and public policies.



Dr Carolin Schmidt is a Senior Teaching Associate in Real Estate Finance and Economics, Fellow of the Cambridge University Land Society and Junior Research Associate at ZEW Mannheim. Her research interests include housing economics, household finance, and economic and urban history.



Dr Gerogios Xyngis is a Senior Teaching Associate in Finance. His research interests lie in the intersection of statistical signal processing, empirical asset pricing and macro-finance.

### **PHD Successes**

In line with our aim to foster researchers, there are a number of PhD students currently associated with the Centre:

Yana Akhytrs'Ka: How can energy data analytics platforms affect small firms? A study of a reduction in energy use in the service sector and its spillover effects

Thuqan AlHindawi: Can BD/ML techniques enhance RE markets' transparency by providing a more efficient/robust way to examine the risk/return profile of real estate as an asset class?

Floris Blok: Alpine land and climate change: A Ricardian Analysis

Maximilian Exler: Real Estate Investment Trusts in Bear Markets: To What Extent Drivers of Returns and Volatility Change in Times of High Uncertainty

Marco Felici: Empirical questions in Housing Markets and Policy

Xinyan Huang: ESG Disclosure and Access to Finance: Insights from Analysis of REITs

Kahshin Leow: Spatial dependencies and their effects on real estate funds

Haotong Li: Overconfidence and real estate investment

Qiumeng Li: The impact of the pandemic on the urban spatial structure and people's travel behavior

Yangfanqi Liu: Nudging people towards better housing decisions: The long-term effect of focalism interventions on households' travel patterns and social capital

Katharine Minkow: How does technological infrastructure impact on rents, sales prices, and occupancy rates of office buildings in the UK?

Yiwen Qiu: Firm Locations, Industrial Structures, Regional Development Paths from a Dynamic Perspective: A case study in China

Saad Siddiqui (part-time): International asset pricing, housing and consumption

He Tang: Political Uncertainty in The Real Estate Industry

Jiabin Wei: Dynamic Prediction of the Real Estate Price Spatial Distribution in the Autonomous Vehicle Era with Hedonic Regression and Reinforcement Learning-aided Microsimulation

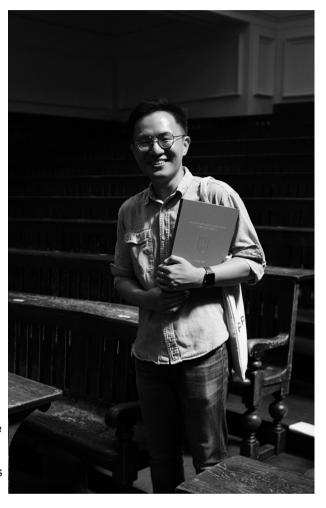


### **PHD SPOTLIGHT**

One of the job market candidates from the CRERC team, Mr. Xinwei Wan (Wayne), joined the Department of Banking and Finance in Monash University as a tenure track lecturer (assistant professor) in September 2022. Monash University is a world leading research universities based in Melbourne, Australia, and its finance department is ranked the 34<sup>th</sup> in QS World University Ranking by Subjects in 2022.

Wayne was a PhD candidate joining the Department of Land Economy in 2019 as an awardee of the Cambridge Trust and St Edmund's Duke of Edinburgh Scholarship. His supervisor, Dr. Thies Lindenthal, and his research areas including urban economics, behavioural economics, and real estate finance. Wayne was especially interested in exploring the application of machining learning and unstructured data (e.g., texts and images) in real estate research. He defended his PhD thesis titled "Bounded Rationality in Real Estate Investment Decisions" in May 2022.

As a PhD student, Wayne had outstanding research records with publications in the top real estate journals, such as *Real Estate Economics*, *Journal of Regional Science*, *Journal of Real Estate Finance and Economics*, etc. Some of his working papers are also under revision in the leading mainstream finance journals, such as *Management Science* and *Review of Finance*. His key publications and working papers include:



- Quan Gan, Maggie Hu, Wayne X. Wan, Contract Rescission in the Real Estate Presale Market, Real Estate Economics (2022). DOI: 10.1111/1540-6229.12363.
- Yi Fan, Ho Pin Teo, Wayne X. Wan, Public Transport, Noise Complaints, and Housing: Evidence from Sentiment Analysis in Singapore, *Journal of Regional Science* (2021). DOI: 10.1111/jors.12524.
- Ling Li, Wayne X. Wan, The Effect of Expected Losses on the Hong Kong Property Market, *The Journal of Real Estate Finance and Economics* (2021). DOI: 10.1007/s11146-021-09851-3.
- Wayne X. Wan, Thies Lindenthal, Towards Accountability in Machine Learning Applications: A Systemtesting Approach, conditional acceptance by Real Estate Economics, July 2022.
- Maggie Hu, Desmond Tsang, Wayne X. Wan, Corporate Relocation and Housing Market Spillover, minor revision at *Management Science*, July 2022.
- Sumit Agarwal, Kwong Wing Chau, Maggie Hu, Wayne X. Wan, Tobin Tax Policy, Housing Speculation, and Property Market Dynamics", revise & resubmit at *Management Science*, June 2022.
- Yi Fan, Maggie Hu, Wayne X. Wan, Zhenping Wang, A Tale of Two Cities: Mainland Chinese Buyers in Hong Kong Housing Market, revise & resubmit at *Review of Finance*, February 2022.



## **CONFERENCES AND OUTREACH**

### **CAMBRIDGE REAL ESTATE RESEARCH CLUB**

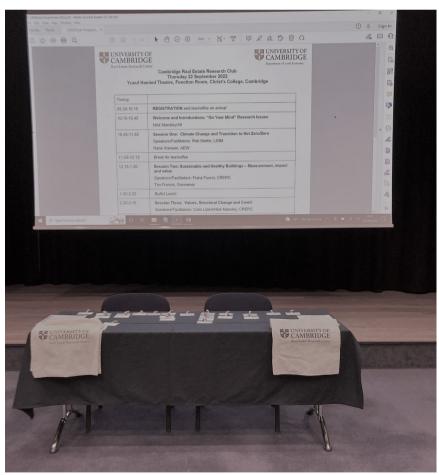
Finally in the year of 2022 our team were able to attend numerous conferences and after a 2 year hiatus we hosted the Cambridge Real Estate Research Club.

Our covered the following topics:

- Climate Change and Transition to Net Zero/Zero
- Sustainable and Healthy Buildings Measurement, impact and value
- Values, Structural Change and Covid
- Machine Learning, Data etc.

Thank you to those who presented:

- Rob Martin *Director, Strategy & ESG* from Legal & General
- Hans Vrensen Head of Research & Strategy, Europe from AEW
- Tim Francis Head of Research from Grosvenor Britain & Ireland





#### **INDUSTRY AND PUBLIC BODIES**

A number of members of the Centre continue to play leading roles in supporting industry and other bodies:

Nick Mansley is currently Chair of the Lord Chancellor's Strategic Investment Board (Ministry of Justice), an adviser to the Official Solicitor and Public Trustee as well as undertaking a number of advisory/investment committee roles in the private sector.

Nick was appointed to the investment committee of a fund investing in planting forests – the True North Carbon Sequestration Fund and as the independent investment committee member of a fund investing in private market rented housing for local authority pension funds.

Carolin Schmidt is currently part of the scientific board of ReCapNet and Board of the American Real Estate and Urban Economics Association (AREUEA).

Thies has been elected to the Board of the American Real Estate and Urban Economics Association (AREUEA).

Colin Lizieri is a member of the Society of Property Researchers Fellows Committee

The Centre also recognises the continued support of its sponsors and research grant providers.



## MASTERS IN REAL ESTATE (MST) AND MPHIL

The Centre has led the development and delivery of part-time Masters course since 2016. This year we saw our 2019-2021 cohort finally graduate in March. We were able to host them for one final residential where they had the opportunity to explore the city of Manchester, meeting with likes of Urban Splash and Muse. We wish all of the best to 2019 cohort, we hope to see you in Cambridge in the future.

In July our 2020 cohort had their final residential before their dissertation hand-in in September. Our 2020 cohort had the opportunity to explore Amsterdam seeing Circl and the Municipality. The cohort had their final submission in September. We're looking forward to see another cohort who were badly affected by the Covid pandemic overcoming those difficulties successfully

We also welcomed our new 2022-24 cohort in early September. It was great to start this cohort face-to-face, as they explored Cambridge and had numerous site visits in London. They have successfully submitted their first two assignments are we look forward to seeing them back in March 2023 for their second residential.

Our 2022 MPhil in Real Estate students started in September where we are now fully back to face-to-face lectures and with the University of Cambridge activities back to their pre-Covid levels. It was great to see the students back in person during Michaelmas term.

The ultimate goal is to educate the up and coming leaders in the industry, to equip them with the very latest knowledge and skills to lead and innovate within their organisations, improving the performance, efficiency and sustainability of the Real Estate sector.





## **Looking Forward**

The Centre aims to continue build on its strengths and successes as outlined in this report and enhance its position as a leading centre of rigorous and relevant research into real estate markets.

We will seek further funding and partnerships to help address important challenges for the industry and policymakers.

We will bring together researchers and practitioners to explore emerging issues in the market, new sources of data and new analysis techniques. As a hub for international research, we will bring researchers (both academic and professional) to Cambridge as visitors and as associate members of the Centre and through conferences, seminars and meetings.

We will actively seek doctoral students interested in undertaking research in our priority areas. The critical constraint they face is funding and we will look to find ways of providing financial support. – we would welcome partners in this effort.



## RESEARCH THEMES AND PRIORITIES FOR THE FUTURE

### Real Estate as an Investment – Long Run and Cycles

Real estate plays a major role in global wealth and the economy. Our research explores how real estate has performed as an investment over the long and very long run as well as the drivers and indicators of cycles and shorter term performance. The aim is to inform discussion in the industry about the realistic net returns in the asset class and help inform policymakers, including those responsible for financial stability.

#### Real Estate Investment in a Multi-Asset Context

This work explores the drivers of risk and return in real estate and how they differ from other asset classes. It explores some of the trends impacting on the real estate market in different sectors, notably the influence of technology and changes in working and consumption patterns. It also examines a number of approaches to identifying both known risk factors and uncertainties in investment and how to integrate real estate into multi-asset class frameworks.

#### Structures and Vehicles for Investment into Real Estate:

It is increasingly recognised that the risk and return of real estate depends not only on the income and capital appreciation of the underlying assets, but also on the vehicle in which the properties are held: its institutional and capital structure and other characteristics of the investment vehicle. This research explores how different characteristics influence risk and performance and the overall efficiency of real estate markets.

#### Non-Traditional Real Estate Investments:

As real estate investment changes with greater lease flexibility and increased investment in residential and other non-traditional sectors this explores the risks and performance of these emerging investment subsectors and how these influence how real estate fits within wider investment portfolios.

Technology, Data and Machine Learning: Sensors, imaging and other new sources of data provide new sources of information for real estate analysis. This stream of work explores how new techniques and new sources of data can be used to identify characteristics and preferences that might influence attractiveness, demand and ultimately pricing.

Ownership, Globalisation and Yield Structures: Prompted by the growing dominance of non-domestic purchasers in London (and other world gateway cities), the focus of this research includes attempting to understand the implications of global capital flows on market performance and values. How are ownership patterns changing and what are the implications of different types of investor being significant in a particular city sub-market?

Sustainability, Resilience and Performance: The Centre researches sustainability and real estate markets at different scales — energy performance and environmental sustainability at building level and its link to value and return, complemented by a broader perspective on sustainability and urban resilience.

Locational Choice, Urban Development and Regeneration: This theme looks at a range of issues related to how individual properties and developments perform and the wider context for local economic performance including interaction with local economies, infrastructure and policy.

Behavioural Economics, Perceptions and Preferences: Decisions by private and institutional investors are influenced by beliefs, attitudes and perceptions, many of which result in suboptimal or irrational decisions which are difficult to reconcile with standard finance and economic theory. This research area seeks to quantify the extent to which the aforementioned factors play into the decision-making process of various agents in the housing, land and capital markets and to find ways to improve these decisions.

Housing Finance: This research looks at a range of issues in housing markets and housing finance including individual choices, factors that influence housing outcomes and how policy interacts with housing markets.



## **Appendix 1**

#### **PUBLISHED RESEARCH 2022**

Lai, Y., Papadopoulos, S., **Fuerst, F**., Pivo, G., Sagi, J. and Kontokosta, C.E. (2022). Building retrofit hurdle rates and risk aversion in energy efficiency investments. Applied Energy, 306, p.118048. <a href="https://doi.org/10.1016/j.apenergy.2021.118048">doi:10.1016/j.apenergy.2021.118048</a>.

Elhorst, P., Abreu, M., Amaral, P., Bhattacharjee, A., Bond-Smith, S., Chasco, C., Corrado, L., Ditzen, J., Felsenstein, D., **Fuerst, F.,** McCann, P., Monastiriotis, V., Quatraro, F., Temursho, U. and Yu, J. (2022). Raising the bar (19). Spatial Economic Analysis, 17(1), pp.1–6. doi:10.1080/17421772.2022.2018168

Bao, H.X.H. and Robinson, G.M. (2022). Behavioural land use policy studies: Past, present, and future. Land Use Policy, 115, p.106013. doi:10.1016/j.landusepol.2022.106013

**Bao**, H.X.H. and Lim, Y. (2022). Behavioural interventions for micro-mobility adoption: Low-hanging fruits or hard nuts to crack? Transportation Research Part F: Traffic Psychology and Behaviour, [online] 84, pp.423–441. doi:10.1016/j.trf.2021.12.011.

**Bao**, **H.X.H.** and Ng, J. (2022). Tradable parking permits as a transportation demand management strategy: A behavioural investigation. Cities, 120, p.103463. doi:10.1016/j.cities.2021.103463

**Bao**, **H.X.H.** and Song, Y. (2022). Improving Food Security through Entomophagy: Can Behavioural Interventions Influence Consumer Preference for Edible Insects? Sustainability, 14(7), p.3875. <a href="https://doi.org/10.3390/su14073875">doi:10.3390/su14073875</a>.

Crosby, N., Devaney, S., Lizieri, C. and Mansley, N. (2021). Modelling sustainable rents for estimation of long-term or fundamental values of commercial real estate. Journal of Property Research, pp.1–26. doi:10.1080/09599916.2021.1913441

**Li, L**. and Xia, F. (2022). Wandering in the gray: The pricing of housing restricted by land use regulation in Beijing, China. Land Use Policy, 115, p.106045. <a href="https://doi.org/10.1016/j.landusepol.2022.106045">doi:10.1016/j.landusepol.2022.106045</a>

Li, L., Bao, H.X.H. and Chau, K.W. (2022). On the Strategic Timing of Sales by Real Estate Developers: To Wait or To Presell? The Journal of Real Estate Finance and Economics. doi:10.1007/s11146-022-09894-0

Zhu, B. and Lizieri, C. (2022). Local Beta: Has Local Real Estate Market Risk Been Priced in REIT Returns? The Journal of Real Estate Finance and Economics. doi:10.1007/s11146-022-09890-4

Clapp, J.M. and Lindenthal, T. (2022). Urban Land Valuation with Bundled Good and Land Residual Assumptions. Journal of Housing Economics, p.101872. doi:10.1016/j.jhe.2022.101872

## Appendix 2

## RESEARCH WORKING PAPERS

The centre has been active in publishing a significant number of working papers which can be downloaded from our website: <a href="https://www.landecon.cam.ac.uk/cambridge-real-estate-research-centre/page/crerc-publications">https://www.landecon.cam.ac.uk/cambridge-real-estate-research-centre/page/crerc-publications</a>





"A leading international research centre at the forefront of driving the development of the real estate agenda in the UK and beyond"



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