



UNIVERSITY OF
CAMBRIDGE

WORLD CLASS REAL ESTATE RESEARCH



Cambridge Real Estate Research Centre

Annual Report

2020-2021



Department of Land Economy
University of Cambridge



“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 over the Covid-affected years of 2020/21 and highlight key initiatives and priorities for the future.

A copy of the Centre brochure is available on our website:

<https://www.crerc.landecon.cam.ac.uk/about-us>

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 mstrealstate@landecon.cam.ac.uk.

Our Research

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.

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

Research has been produced and undertaken across a broad range of areas around real estate finance, investment and development. These include studies looking at drivers of real estate performance, long-run returns and indicators of market risk and potential downturns, how decisions are made, the connectivity between global markets, the impact of migration, land price and housing issues.

Publications in 2020-21 include:

Do Specialist Funds Outperform? Evidence from European Non-listed Funds

Franz Fuerst, Nick Mansley and Zilong Wang

This paper explores the extent to which specialisation can lead to outperformance for European non-listed real estate funds. Based on an analysis of the performance of 592 funds over nearly two decades between 2001 and 2019, the research concludes that both country specialisation and a combination of a country and sector specialisation are indeed associated with superior performance, but that sector specialisation alone is not.

The full paper can be downloaded here: <https://doi.org/10.1016/j.ribaf.2021.101434>

This paper was awarded the 2021 Nick Tyrrell Research Prize, which acknowledges innovative and high quality, applied research in real estate investment. The prize is sponsored by The European Association for Investors in Non-listed Real Estate Vehicles (INREV), the Investment Property Forum (IPF) and the Society of Property Researchers (SPR).



IPF—Long-term Value Methodologies in Real Estate Lending

Colin Lizieri, Nick Mansley and Zilong Wang.

This major project for the Investment Property Forum in partnership with colleagues at the University of Reading, initially reviewed and tested earlier worked methodologies to estimate the long-term or sustainable value of real estate.

The research team then expanded the analysis of the main models and developed new approaches as well as exploring other indicators that might help identify if market values are above long-term sustainable values. The project's results were presented to the Bank of England and further discussions are ongoing about regular updates that could be used by the Bank and the wider industry. Published January 2020

The full paper can be downloaded here: <https://www.ipf.org.uk/resourceLibrary/ipf-long-term-value-methodologies-in-commercial-real-estate-lending--july-2020--full-report-.html>

Real Estate in a Mixed-Asset Portfolio: The Impact of Market Uncertainty and Uncertainty Aversion

Colin Lizieri, Nick Mansley and Zilong Wang

The classic mean-variance approach to determine the optimal allocation to listed real estate is often based on historical performance and correlations. This approach often yields extreme and unrealistic asset allocations and fluctuates significantly over time. Optimal allocations can be extremely volatile during a period of market uncertainty. By introducing the concept of 'uncertainty', this study adopts the uncertainty aversion approach to determine the optimal allocation to listed real estate. Optimal allocations to listed real estate are much more stable and realistic under the uncertainty aversion approach compared to the traditional mean-variance approach.

<https://prodapp.epra.com/media/2021->

[Real Estate in a Mixed Asset Portfolio the impact of market uncertainty and uncertainty aversion 1643109820578.pdf](https://prodapp.epra.com/media/2021-Real_Estate_in_a_Mixed_Asset_Portfolio_the_impact_of_market_uncertainty_and_uncertainty_aversion_1643109820578.pdf)

"The Total Return and Risk to Residential Real Estate", The Review Of Financial Studies

Piet Eichholtz, Matthijs Korevaar, Thies Lindenthal, Ronan Tallec

We estimate total returns to rental housing by studying over 170,000 hand-collected archival observations of prices and rents for individual houses in Paris (1809–1943) and Amsterdam (1900–1979). The annualized real total return, net of costs and taxes, is 4.0% for Paris and 4.8% for Amsterdam and entirely comes from rental yields. Our returns weakly correlate with the implied returns in Jordà et al. (2019) and are substantially lower. We decompose total return risk at the individual asset level and find that yield risk becomes an increasingly important component of property-level risk for longer investment horizons.

<https://doi.org/10.1093/rfs/hhab042>

Machine Learning, Architectural Styles and Property Values

Thies Lindenthal & Erik B. Johnson

This paper couples a traditional hedonic model with architectural style classifications from human experts and machine learning (ML) enabled classifiers to estimate sales price premia over architectural styles, both at the building and the neighbourhood-level. We find statistically and economically significant price differences for houses from distinct architectural styles across an array of specifications and modeling assumptions. Comparisons between classifications from ML models and human experts illustrate the conditions under which ML classifiers may perform at least as reliable as human experts in mass appraisal models. Hedonic estimates illustrate that the impact of architectural style on price is attenuated by properties with less well-defined styles and we find no evidence for differential price effects of Revival or Contemporary architecture for new construction.

<https://link.springer.com/article/10.1007/s11146-021-09845-1>



RESEARCH PROJECTS – OTHER COLLABORATIONS AND INTERNATIONAL RESEARCH PROJECTS

Nudging Towards a Better Financial Future: Applying Behavioural Insights in the Development of Financial Systems in Rural China (2017 – 2021)

Helen Bao

Funding body: ESRC & NSFC

Principal Investigator: Helen Bao & Prof. Jinmin Yan (Renmin University of China)

Co-Investigator: Prof. Colin Lizieri

Budget: £ 318,236 (ESRC) & CNY2,000,000 (NSFC, approximately £230,000)

The project provides insights on how to leverage behavioural insights to overcome persistent poverty in the developing world. The project investigates the applications of a proven behavioural approach, namely, Libertarian Paternalism, in the development of rural financial systems in China. This approach promotes choice architectures to nudge people into optimal decisions without interfering with the freedom of choice. Relying on field evidence, the project team develop two types of tools, namely, "push" tools that aim to achieve short-term policy compliance among rural households so that they can break out of the persistent poverty cycle and "pull" tools that can reduce fraud, error, and debt among rural households to prevent them from falling back into poverty. Finally, the project team also use the research activities and findings as vehicles to engage and educate rural residents, local governments, regulators, and financial institutions. Standard and good practice will be proposed to interested parties for the designs of good behavioural interventions; ethical guidelines will be provided to encourage good practice. The findings of and the engagement in this project will help policy makers to develop cost-effective behavioural change policies. Rural households will benefit by being nudged into sound financial decisions and healthy financial habits. Therefore, the research will be of interest to communities in China and internationally.

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.



Price diffusion across international private commercial real estate markets

Bing Zhu, Dorinth van Dijk and Colin Lizieri

Joint project with Bing Zhu (Technical University of Munich) and Dorinth van Dijk (National Bank of the Netherlands) on price shocks and contagion across international real estate markets.

<https://www.dnb.nl/en/publications/research-publications/working-paper-2021/732-price-diffusion-across-international-private-commercial-real-estate-markets/>

Enclave living in the post-pandemic city: How would the COVID-19 change the socio-spatial structure of Beijing, China

Christina Ling Li, Li Wan and Shenjing He

Grant: 2021-22 Lincoln Institute China Program International Fellowship

The COVID-19 pandemic has brought enormous changes on urban enclave living or living in enclosed urban settings in China. To fight against the pandemic, China is unique to impose stringent access controls on nearly all residential neighborhoods in the city. These pandemic prevention measures were implemented with exceptional effectiveness in residential enclaves featured with distinctive boundaries and existing security facilities. Nevertheless, the strengthened access control could have great influence on the exclusivity of these enclaves, with profound implications on social segregation in the long run. It might have reduced the interaction of enclave residents with those living outside and entailed exclusion of relatively vulnerable social groups that cannot afford urban enclaving living. Given the crucial time-window of opportunity opened up by the pandemic, this research will revisit major types of residential enclaves in China and their socio-spatial implications in times of uncertainty.

<https://www.lincolninst.edu/publications/working-papers/understanding-spatial-impact-covid-19>

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.



Prof Franz Fuerst is Professor of Real Estate and Urban Economics, and has an extensive portfolio of research on sustainable/green buildings and the impact on rent and value, on the drivers of property company and real estate market performance and on the relationships between knowledge industries and real estate values.



Dr Thies Lindenthal, is an Associate Professor Real Estate Finance. He works on very long-run real estate performance and on the impact of technology on the analysis and behaviour of property markets.



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.



Natalie Bayfield is Senior Associate at the Centre and is a real estate financial analyst and urban economist. She is also CEO of Bayfield Training, and has taught and provided consultation worldwide. Natalie is also credited with inventing 'Real Estate Financial Modelling' as a subject in its own right over 20 years ago.



Dr Ozge Oner is 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.

There has also been a change in the administration staff at the Centre as we said thank you and goodbye to Centre and MSt Coordinator **Barbora Sajfrtova** and **Lynda Haines**. We welcome **Megan Renouf** from the Student Business Office within the Department as new coordinator.

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 behaviour

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



CONFERENCES AND OUTREACH

The pandemic provided huge challenges to the team both for teaching and research. The part-time Masters programme was probably the first to face the challenge of switching to online as the pandemic swept through the world in March 2020. From a teaching perspective it was far from ideal as the energy and engagement of having students in person was hard to maintain. However, it did provide an opportunity to have international speakers for the class and sessions were arranged with speakers from Asia Pacific, Africa, the Middle East and the Americas. This aspect of online teaching is something we intend to continue going forward.

Fortunately, we developed an online real estate financial modelling course in conjunction with Bayfield Training and were able to make that available to MPhil students.

The pandemic largely stopped in-person academic conferences and similar events. We organised an online international symposium with the University of Florida, the University of Geneva and the National University of Singapore with speakers from around the world. Papers included:

- The impact of loss aversion in property markets
- Credit risk transfers and moral hazard
- Identifying beliefs and how expectations are formed
- Style drift and procyclical risk taking
- Decomposing the value and cash flow effects of environmental performance.
- How machine learning can be applied to real estate price data

Helen Bao:

- Globalization, Real Estate and Urban Development”, panel discussion. Cátedra Europa International Conference, The University of the North, 26 October 2021, Colombia.
- Designing and Structuring a Research Project”, School of Civil Engineering and School of Management Sciences and Engineering, Northeast Forestry University, 29 November 2021, Heilongjiang, China.
- Behavioural Sciences and Applications in Real Estate Finance”, School of Civil Engineering and School of Management Sciences and Engineering, Northeast Forestry University, 19 October 2020, Heilongjiang, China.
- Housing Provident Fund and Homeownership”, School of Public Administration, Zhejiang University, China, 24 May 2020, Hangzhou, China.

Carolyn Schmidt:

- Presented along with Thies “The Odd One Out: Asset Uniqueness and Price Precision” at ASSA-AREUEA 2020 January 2020, San Diego.
 - Schmidt (2021) was part of an edited volume on rental housing markets across the globe (USA, UK, France, Spain, Germany, Japan), organised by Jenny Schuetz (Brookings). They were invited to take part in a moderated panel in April 2021 to discuss how rental regulation influences housing affordability etc. The panel was live streamed and had an audience of roughly 1,000 people from industry, policy and academia.
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Thies Lindenthal organised a series of regular global seminars which focus on one specific topic each time. These have included:

- Micro-geographic property price and rent indices
- The opioid crisis and real estate prices
- “Indoor Air Quality and Student Performance”
- Risk perception of real estate investors.
- Public responses to Covid and their implications
- “How Does Property Location Influence Investment Risk and Return?”
- “The Impact of Environmental Interventions on Commercial Real Estate Operations”
- “Fewer players, fewer homes: concentration and the new dynamics of housing supply”
- Do Institutional Investors Trade on Mispricing? Evidence from Real Estate Markets
- “Tenant Rights, Evictions, and Rent Affordability”
- “Value Capture of Public Infrastructure Projects”
- “Housing Markets in a Pandemic: Evidence from Historical Outbreaks”

Colin Lizieri:

- Urban Land Institute UK conference: moderated panel on “Reinvigorating our Towns and Cities” online, June 2021
- Chaired a session on Real Estate Economics at the European Real Estate Society Conference. Also presented: Zhu, B., van Dijk, D. and Lizieri, C. (2021) Price diffusion across international private commercial real estate markets. June 2021

Christina Ling Li jointly organised with the University of Hong Kong the ‘HKU-Cambridge Joint Seminar Series’. Christina’s session was on Field and Natural Experiments: Planning, Property and Health.

Together with the University of Tokyo (*Center for Spatial Information Science*) we organized a series of online workshops with a focus on sustainable property markets including the economics of energy efficiency in buildings, climate change mitigation and adaptation as well as the broader role of real estate markets in a sustainable society.

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.

Carolyn Schmidt is currently part of the scientific board of ReCapNet.

Congratulations to **Thies Lindenthal** for winning a **J M Keynes Fellowship in Financial Economics**. It was great to see this recognition, definitely a first for the Department of Land Economy. Thies has also 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. The 2018 cohort faced the challenge of completing their dissertations as Covid made working life very stressful and complicated for them.

The 2019 cohort fortunately had the benefit of two weeks together in Cambridge before the pandemic made residential sessions unworkable.

The 2020 cohort were not so lucky and were unable to have any residential sessions in 2020 and 2021.

Given our students are spread across the world from Japan, China/HK and Singapore to the West coast of Canada and the US this led to the challenge of how to have online interactive sessions with the whole cohort. Thanks to some students getting up at 4 am and others staying up into the early hours of the morning we were able to do so.

As ever the students bring a huge range of professional experience and have worked across a broad range of markets. Experience includes property finance/lending, investment, construction and development management, engineering, law, accountancy etc. The MSt is delighted to be able to draw on leading industry experts to deliver lectures and we are looking forward to field trip visits to better understand buildings and developments now that these are viable again.

The MPhil faced similar challenges with the move to online teaching but fortunately the 2019-20 cohort had finished the taught modules of their course before the pandemic hit.

For the 2020 cohort there was more time to prepare online material and delivery. However, we all looked forward to when the students could enjoy the full Cambridge experience.

The online financial modelling certificate was developed in conjunction with Bayfield Training:
<https://www.bayfieldtraining.com/certificate/>

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 additionally 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 sub-sectors 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 2020/21

Fuerst, F. and Haddad, M.F.C. (2020). *Real estate data to analyse the relationship between property prices, sustainability levels and socio-economic indicators*. Data in Brief, 33, p.106359. [doi:10.1016/j.dib.2020.106359](https://doi.org/10.1016/j.dib.2020.106359)

Fuerst, F., Haddad, M.F.C. and Adan, H. (2019). *Is there an economic case for energy-efficient dwellings in the UK private rental market?* Journal of Cleaner Production, p.118642. [doi:10.1016/j.jclepro.2019.118642](https://doi.org/10.1016/j.jclepro.2019.118642).

Elhorst, P., Abreu, M., Amaral, P., Bhattacharjee, A., Chasco, C., Corrado, L., Doran, J., Felsenstein, D., **Fuerst, F.**, Le Gallo, J., McCann, P., Monastiriotis, V., Quatraro, F., Temursho, U. and Yu, J. (2020). *Raising the bar* (15). Spatial Economic Analysis, 15(2), pp.115–119. [doi:10.1080/17421772.2020.1756468](https://doi.org/10.1080/17421772.2020.1756468).

Fuerst, F., Kavarnou, D., Singh, R. and Adan, H. (2019). *Determinants of energy consumption and exposure to energy price risk: a UK study*. Zeitschrift für Immobilienökonomie. [online] [doi:10.1365/s41056-019-00027-y](https://doi.org/10.1365/s41056-019-00027-y).

Bao, H.X.H. and Li, H. (2020). *Housing Wealth and Residential Energy Consumption in the UK*. Energy Policy, Volume 143 [online] doi.org/10.1016/j.enpol.2020.111581.

Li, L., **Bao, H.X.H.** and Robinson, G.M. (2020). *The Return of State Control and Its Impact on Land Market Efficiency*. Land Use Policy, Volume 99 [online] doi.org/10.1016/j.landusepol.2020.104878

Deng, Z.; Zhao, Q.; **Bao, H.X.H.** *The Impact of Urbanization on Farmland Productivity: Implications for China's Requisition–Compensation Balance of Farmland Policy*. Land 2020, 9, 311. doi.org/10.3390/land9090311

Liu, J., Hao, J., Shi, Z. and **Bao, H.X.H.** (2020). *Building the COVID-19 Collaborative Emergency Network: a case study of COVID-19 outbreak in Hubei Province, China*. Natural Hazards, 104(3), pp.2687–2717. [doi:10.1007/s11069-020-04379-w](https://doi.org/10.1007/s11069-020-04379-w)

Bao, H.X.H. and Li, S.H. (2020). *Investor Overconfidence and Trading Activity in the Asia Pacific REIT Markets*. JRFM, [online] 13(10), pp.1–21. Available at: <https://ideas.repec.org/a/gam/jjrfmx/v13y2020i10p232-d421455.html>

Bao, H.X.H. and Shah, S. (2020). *The Impact of Home Sharing on Residential Real Estate Markets*. Journal of Risk and Financial Management, [online] 13(8), p.161. [doi:10.3390/jrfm13080161](https://doi.org/10.3390/jrfm13080161).

Bao, H.X.H., Brady, A. and Wang, Z. (2020). *Pricing Efficiency and Bounded Rationality: Evidence Based on the Responses Surrounding GICS Real Estate Category Creation*. International Real Estate Review, [online] 23(1), pp.37–63. Available at: <https://ideas.repec.org/a/ire/issued/v23n012020p37-63.html>

Allen, D., **Lizieri, C.** and Satchell, S. (2020). *A comparison of non-Gaussian VaR estimation and portfolio construction techniques*. Journal of Empirical Finance, 58, pp.356–368. [doi:10.1016/j.jempfin.2020.07.001](https://doi.org/10.1016/j.jempfin.2020.07.001).

Mansley, N., Tse, T.C.M. and **Wang, Z.** (2020). *Risk classification of Asian real estate funds and their performance*. Pacific-Basin Finance Journal, 63, p.101400. [doi:10.1016/j.pacfin.2020.101400](https://doi.org/10.1016/j.pacfin.2020.101400)

Abreu, M. and **Öner, Ö.** (2020). *Disentangling the Brexit vote: The role of economic, social and cultural contexts in explaining the UK's EU referendum vote*. Environment and Planning A: Economy and Space, 52 (7), p.0308518X2091075. [doi:10.1177/0308518x20910752](https://doi.org/10.1177/0308518x20910752)

Klaesson, J. and **Öner, Ö.** (2020). *Ethnic enclaves and segregation—self-employment and employment patterns among forced migrants*. *Small Business Economics*. doi:10.1007/s11187-019-00313-y.

Daunfeldt, S., Mihaescu, **O., Öner, Ö.** and Rudholm, N. (2020). *Retail and Place Attractiveness: The Effects of Big Box Entry on Property Values*. *Geographical Analysis*. doi:10.1111/gean.12247

Li, L., Bao, H.X.H. and Robinson, G.M. (2020). *The return of state control and its impact on land market efficiency in urban China*. *Land Use Policy*, 99, p.104878. doi:10.1016/j.landusepol.2020.104878

Sha, Y., **Wang, Z.**, Bu, Z. and **Mansley, N.** (2020). DOES DEFAULT RISK MATTER FOR INVESTORS IN REITS. *International Journal of Strategic Property Management*, 24(5), pp.1–14. doi:10.3846/ijspm.2020.13504

Fuerst, F. and Warren-Myers, G. (2021). *Pricing climate risk: Are flooding and sea level rise risk capitalised in Australian residential property?* *Climate Risk Management*, p.100361. doi:10.1016/j.crm.2021.100361

Fuerst, F., Mansley, N. and Wang, Z. (2021). *Do specialist funds outperform? Evidence from European non-listed real estate funds*. *Research in International Business and Finance*, 58, p.101434. doi:10.1016/j.ribaf.2021.101434

Candelon, B., **Fuerst, F.** and Hasse, J.-B. (2021). *Diversification potential in real estate portfolios*. *International Economics*, 166, pp.126–139. doi:10.1016/j.inteco.2021.04.001

Bao, H.X.H. and Saunders, R. (2021). *Reference dependence in the UK housing market*. *Housing Studies*, pp.1–29. doi:10.1080/02673037.2021.1935767

Bao, H.X.H., Meng, C.C. and Wu, J. (2021). *Reference dependence, loss aversion and residential property development decisions*. *Journal of Housing and the Built Environment*, 36(4), pp.1535–1562. doi:10.1007/s10901-020-09803-y

Zhao, Q., **Bao, H.X.H.** and Zhang, Z. (2021). *Off-farm employment and agricultural land use efficiency in China*. *Land Use Policy*, 101, p.105097. doi:10.1016/j.landusepol.2020.105097

Zhu, B. and **Lizieri, C.** (2020). *Connected Markets through Global Real Estate Investments*. *Real Estate Economics*. doi:10.1111/1540-6229.12319

Eichholtz, P., Korevaar, M., **Lindenthal, T.** and Tallec, R. (2021). *The Total Return and Risk to Residential Real Estate*. *The Review of Financial Studies*. doi:10.1093/rfs/hhab042

Clapp, J.M., Cohen, J.P. and **Lindenthal, T.** (2021). *Are Estimates of Rapid Growth in Urban Land Values an Artifact of the Land Residual Model?* *The Journal of Real Estate Finance and Economics*. doi:10.1007/s11146-021-09834-4

Lindenthal, T. and Johnson, E.B. (2021). *Machine Learning, Architectural Styles and Property Values*. *The Journal of Real Estate Finance and Economics*. doi:10.1007/s11146-021-09845-

Mansley, N., Wang, Z. (2021): *Long lease real estate—a revised for real estate in pension fund portfolios*. *Journal of property Investment & Finance* <https://www.emerald.com/insight/content/doi/10.1108/JPIF-05-2021-0050/full/html>

Klaesson, J., **Öner, Ö.** and Pennerstorfer, D. (2020). *Getting the first job: Size and quality of ethnic enclaves and refugee labor market entry*. Journal of Regional Science, 61(1), pp.112–139. [doi:10.1111/jors.12504](https://doi.org/10.1111/jors.12504)

Andersson, M., Larsson, J.P. and **Öner, Ö.** (2020). *Ethnic enclaves and self-employment among Middle Eastern immigrants in Sweden: ethnic capital or enclave size?* Regional Studies, pp.1–15. [doi:10.1080/00343404.2020.1839638](https://doi.org/10.1080/00343404.2020.1839638)

Li, L. and Wan, W.X. (2021). *The Effect of Expected Losses on the Hong Kong Property Market*. The Journal of Real Estate Finance and Economics. [doi:10.1007/s11146-021-09851-3](https://doi.org/10.1007/s11146-021-09851-3)

Li, L., Wan, W.X. and He, S. (2021). *The Heightened ‘Security Zone’ Function of Gated Communities during the COVID-19 Pandemic and the Changing Housing Market Dynamic: Evidence from Beijing, China*. Land, 10(9), p.983. [doi:10.3390/land10090983](https://doi.org/10.3390/land10090983)

Bartsch,F, Buhlmann,F, Kirschenmann,K, **Schmidt,C.** (2021). *Is There a Need for Reverse Mortgages in Germany? Empirical Evidence and Policy Implications*. Europe EconPol Available at: <https://www.brookings.edu/essay/germany-rental-housing-markets/>

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: <https://www.crecr.landecon.cam.ac.uk/working-papers>



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