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Real estate rental market: a 10-year bibliometric-based review

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ABSTRACT

The real estate rental market (RERM) is considered to have an important role in the entire real estate market. It refers to a property composed of land and its buildings, including the natural resources that can be rented or leased. Previous researches show that most developed countries have experienced the historical process of passively renting, actively buying, and actively renting. Moreover, academic interest in the impact of different sectors of the RERM has been reviewed increasingly over the past decade. However, previous studies provide limited insights into a comprehensive review of the RERM. Based on a 10-year database of 790 articles collected from the Web of Science, a comprehensive literature review is presented to discover the knowledge structure of RERM using CiteSpace software. First, this study recognizes the cluster of the articles, and discusses six major clusters in detail. Next, this study has identified four research trends that emerged during the past decade. To reveal the differences between the studies in the United States (US), China and the United Kingdom (UK), this study compares their publication scales and co-word networks. Finally, this study suggests six meaningful future research directions.

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Real estate rental market; bibliometric; knowledge structure; CiteSpace

1. Introduction

Most developed countries experienced the historical process of passively renting, actively buying, and actively renting. The decision to fulfil living or working needs is a significant economic choice made in a person's, household's, or company's life-cycle, that is, whether to buy a property, or to rent one. Therefore, the real estate market can be broadly divided into two parts: real estate buying market and real estate rental market (RERM).

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The macro economy is largely influenced by the RERM. Lopez-Salido (2011) presented that the usability of rental housing could diminish the risk of the housing price bubble. Furthermore, Rubaszek and Rubio (2020) indicated that a larger rental portion reduces fluctuations in business cycles. Cuerpo et al. (2014) and Czerniak and Rubaszek (2018) discovered that a mature real estate rental market diminishes the disturbances from both economic and demographic factors on the housing market.

Previous studies have comprehensively analyzed real estate market publications. Dixon et al. (1999) reviewed the measurement methods of rent depreciation applied in the UK commercial real estate market. Zietz (2003) analysed more than 100 studies on multi-family housing and divided them into five categories. Winson-Geideman and Evangelopoulos (2013) used a latent semantic analysis to evaluate the real estate research topics from 1973 to 2010. However, to the best of our knowledge, there is no research work yet that analyses publications in the field of RERM. Therefore, a comprehensive analysis of the literature on the RERM is necessary, as it could inspire policy makers, practitioners, and researchers.

In this context, this paper attempts to present a comprehensive map and structure of the RERM and recommend meaningful future research directions by presenting a systematic review. We use citation analysis and a visualization map by CiteSpace software with the Web of Science database to comprehensively analyse the publications from 2010 to 2020 with 790 articles in the RERM field. The analysed indicators are divided into two parts: (1) *Overview indicators*: the scale of published and cited studies, important journals, categories, authors, high-yield countries, and institutes. (2) *Structure indicators*: co-citation networks, co-word clusters, and keyword bursts. Furthermore, we compare the RERM studies from the US, China, and UK and provide the general research differences between developed and emerging countries. Our findings can be summarized as follows: (1) The number of publications and citations have been increasing year by year, which indicates that the RERM domain is gradually attracting greater attention. (2) For decades, one of the most popular ideas in RERM literature is the idea that asset allocation of buying or renting a house in the life cycle will lead to various influences. Another widespread idea is the point of discriminate problems in RERM, such as racial/ethnic discrimination, discrimination by school quality, and discrimination in evictions. (3) Interdisciplinary research covering green buildings or energy efficiency is becoming more prevalent. Moreover, the cutting-edge technologies in this field are sharing economy and health. (4) The comparison results reveal that researchers in the US focus on the micro level aspects, while those in China and UK pay more attention to the macro level dynamics. Finally, we provide some future research directions: (1) green and energy efficiency, (2) economic inequality, (3) ageing population, (4) interdisciplinary research and analysis methods innovation, (5) technological changes, and (6) regulation of the real estate rental market.

The rest of the paper is structured as follows. In [Section 2](#), we explain data collection, analysis steps and the process of using CiteSpace software. We report statistical information about the RERM in [Section 3](#). [Section 4](#) describes the RERM knowledge structure. [Section 5](#) presents the evolutionary trends in the RERM. In [Section 6](#), we

compare the differences in research topics between the US, China, and the UK. We summarize this research and recommend future research directions in [Section 7](#).

2. Methodology

2.1. Data collection

We consulted a panel of experts to define the search keywords. The following search string was applied to the Science Citation Index Expanded (SCI-EXPANDED) and the Social Sciences Citation Index (SSCI) of the Web of Science core database: $TS=(rent^* OR leas^* OR hir^*) AND TS=(hous^* OR build^* OR dwell^*) AND TS=(market^*)$, where the ‘TS’ operator allows to search in titles, abstracts, and keywords, as fulfilled on January 29, 2020. In order to make every possible effort to cover all the articles in the field of RERM, we have chosen the key terms based on their synonyms, and use ‘*’ to cover all the parts of speech. The records were then selected to contain only English peer-reviewed articles, classified into the following research areas: *management, business, economics, ethics, business finance, operations and management science*, and *urban economics*. This initial stage resulted in 1026 articles. The titles and abstracts were then read carefully and separately, and the articles unrelated to RERM were removed. As shown in [Table 1](#), at the end of this process, 790 original research articles that published from 2010 to 2020 were retained.

2.2. Analysis process and applied software

In order to fully analyse the RERM topic, we divided the analysis process into four steps:

- Analyse the descriptive statistics of literature records, which include the number of published and cited articles, important journals, research categories, authors, and high-productive countries and institutes;
- Identify the knowledge structure by analysing the important references and research articles in the RERM field through co-citation networks and clusters;
- Analyse the evolutionary trends, research frontiers in the RERM field by investigating co-word clusters and bursts of keywords;
- Compare the differences between studies in the US, China and the UK by analysing the publication scales and co-word networks.

To provide an accurate analysis of the RERM we used a comprehensive literature review that is supported by the bibliometric analysis with the fundamental technique of visualization of similarities (Chen, 2006). CiteSpace is a commonly used bibliometric software designed to analyse the citation networks (Chen et al., 2012; Niazi & Hussain, 2011). By grouping all the separate networks, we observe the evolution process based on some visualization maps and detailed information.

Co-citation analysis investigates the frequency of the two articles that are cited simultaneously assuming that the more number of times that publications are shown

Table 1. Results of search process.

Step	Description	Total articles
Step 1	Articles retrieved from WOS with selected keywords	2576
Step 2	Articles in English, peer-reviewed, research areas: management, business, economics, ethics, business finance, operations and management science, and urban economics	1026
Step 3	Articles remaining after we read the title and abstract independently, and deleted the irrelevant articles	790

in the same reference list, the more reliable the content of the cited articles. If two articles are cited by n articles ($n = 1, 2, \dots$) synchronously, the two articles have a co-citation relationship with the intensity of n . Generally, the co-citation articles investigate similar research questions. Therefore, the number of co-citations, as well as the co-citation intensity can be used to measure the relevance of the content of the articles (Raghuram et al., 2010).

3. Descriptive statistics analysis

Descriptive statistics reveal the number of publications and cited frequencies over the past decade, as well as the research trends of RERM.

3.1. Publications and citations

Figure 1 shows the growing interest in the RERM over the past decade. The number of publications increased significantly in 2019 with 126 articles, four times the number published ten years ago, or 34 articles, in 2010.

Figure 1 also shows the growth trend in RERM-research citations. The citations were close to 2470 in 2019 and only 10 in 2010. Among the short-listed articles, the most cited was Fuerst and McAllister (2011b). In this article, the authors used hedonic regression analysis to prove and discover that eco-certified buildings have both rental and sale price premium with three main drivers of price differences between certified and non-certified buildings—additional occupier benefits, lower holding costs for investors, and a lower risk premium.

3.2. Analysis of journals

In this section, we analyse the existing research areas by summarizing the distribution of journals. The results of network analysis of journals in the RERM domain are presented in Figure 2. We can observe some mainstream journals in the RERM field, namely *Journal of Urban Economics* and *Urban Studies*, which are mostly associated with RERM related to urban developing. On the other hand, *Real Estate Economics*, *Journal of Real Estate Finance* and *Journal of Housing Economics* express the ‘real estate’ viewpoint. We notice that there are five journals in the top ten Real Estate Journal List provided by the American Real Estate Society (ARES) (labelled as ‘*’). This journal list is created through the collaboration of editors of top real estate journals as well as other real estate scholars. The publications in this journal list— *Real Estate Economics*, *Regional Science and Urban Economics*, *Journal of Real Estate*

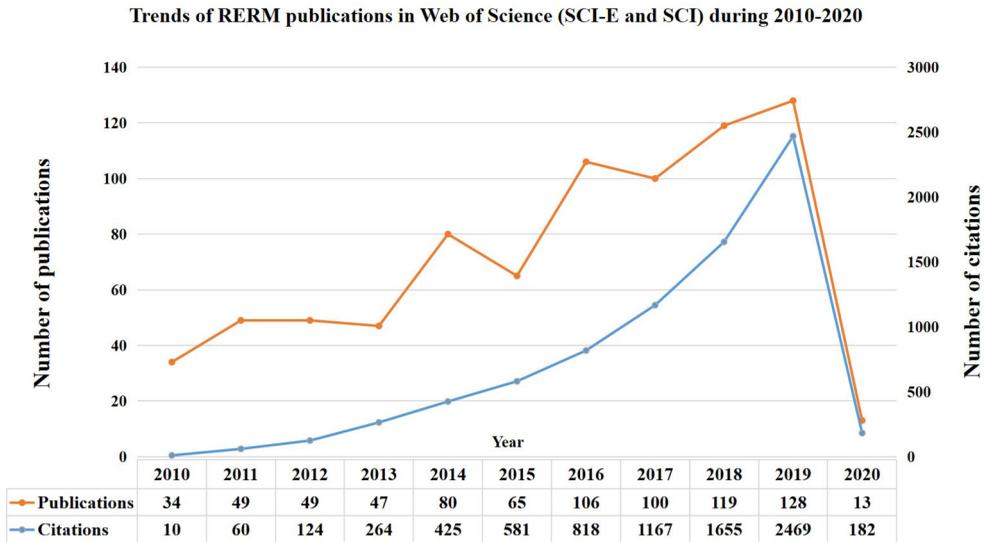


Figure 1. Publications and citations per year, 2010–2020.

Finance and Economics, *Journal of Urban Economics*, and *Journal of Housing Economics*—focus more on ‘market’, ‘price’, and ‘model’.

The article citations received by journals are presented in Table 2. *Real Estate Economics*, *Energy Policy*, and *Urban Studies* are the top three journals with maximum citations. Surprisingly, *Energy Policy* ranks second in terms of citations per publication, which implies that interdisciplinary research between energy and RERM (see, e.g., Kok & Jennen, 2012) is receiving considerable attention from researchers.

3.3. Analysis of categories

Each article in the Web of Science list is appointed to several subject categories. In this section, we show the prevalence of different RERM articles across various subject categories and the emergence of trends based on the term bursts.

Figure 3 shows the network of various subject categories based on frequency. Here, concentric circles exhibit publications separated by years and each circular ring is coloured separately—grey represents the earliest year, green represents middle year, and yellowish and reddish colours represent correspondingly modern publications. In addition, red colour presents the citation burst or sudden increasing of citations in the year. The most ordinary category is *Business & Economics*, which has the biggest circle, followed by *Economics*.

Although the visualization presents an array of categories, we also show some details of the top ten key categories based on frequency and citation bursts in various subject categories in Table 3 among 50 categories. ‘*Business & Economics*’ with a frequency of 464 leads the rest and is followed closely by *Economics* with 440. We notice ‘*Science & Technology*’ has the biggest burst associated with the year 2017, followed by ‘*Green & Sustainable Science & Technology*’, ‘*Mathematical Methods in Social Sciences*’ and ‘*Management*’. The four bursts may give us a signal that increasingly

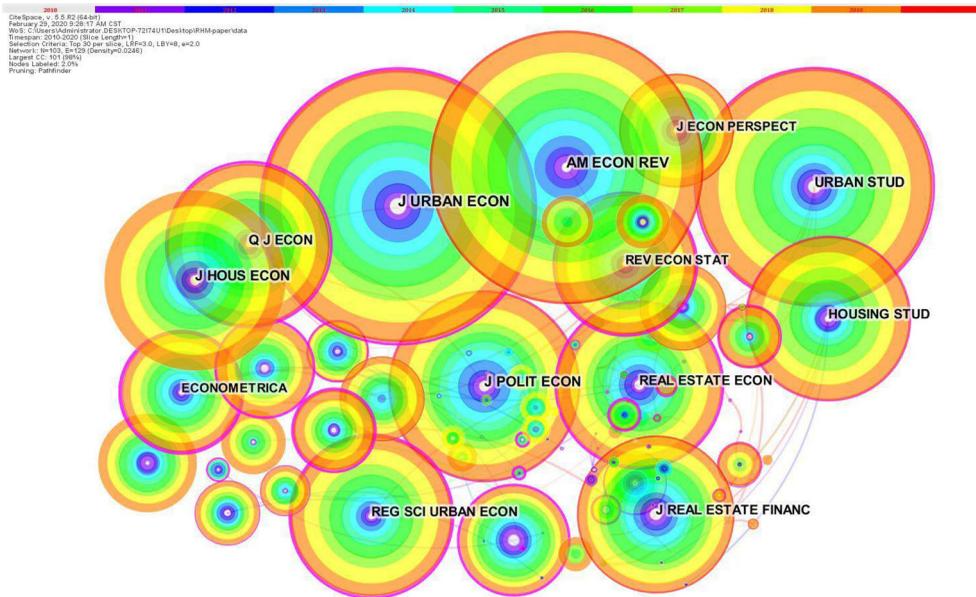


Figure 2. Key journals based on frequency.

Table 2. Top 10 journals in the dataset by number of citations per publication.

Rank	Journal	Publications	Citations	Citations per publication	Keywords
1	Real Estate Economics *	15	318	21	market; model; price
2	Energy Policy	14	233	17	energy efficiency; energy performance certificate; price
3	Urban Studies	18	228	13	market; policy; price
4	Regional Science and Urban Economics *	27	335	12	market; bubble; demand
5	Housing Studies	38	408	11	market; Australia; housing policy
6	Journal of Real Estate Finance and Economics *	30	300	10	model; housing; market
7	Journal of Urban Economics *	24	211	9	housing market; price; model
8	Journal of Housing Economics *	44	326	7	price; market; model
9	Housing Policy Debate	26	151	6	low-income housing; rental housing; affordability
10	Journal of Housing and the Built Environment	25	121	5	homeownership; city; affordability

The journals on 2020 ARES Real Estate Journal List are marked with an '*'.

more scholars are focusing on the field of technology, sustainable science, and social sciences (see, e.g. Eichholtz et al., 2013; Kubicki et al., 2019; Ning et al., 2018).

3.4. Analysis of author networks

In this section, we provide an analysis of author co-cited networks. Figure 4 presents the core authors as well as emerging authors in the RERM field, represented by red circles. The visualization pictures are concise but with some less details, so detailed

information of the top ten authors based on frequency can be found in [Table 4](#). We observe that the top cited author is Edward L. Glaeser, an economist focusing on the determinants of city growth and the role of cities as centres of idea transmission. Following him are economists Sherwin Rosen, who majored in labour economics, and Karl E. Case, a professor in microeconomics.

3.5. Analysis of originating countries

In this section, we observe the proliferation of research in the RERM domain in various countries based on centrality in [Figure 5](#). It can be observed that the concentric circles of different colours indicate articles published during different time slices (we chose one year as a single time slice). A large diameter implies that the country has a high centrality. The figure denotes that the key publications in the RERM domain originated in the US, followed by China, England, Netherlands, Germany, and Australia. Furthermore, we present statistical results for the top ten countries based on the number of publications in [Figure 6](#). The top two countries are the US and China, with 300 and 104 publications, respectively.

3.6. Analysis of institutes

In this section, we provide visualization for an array of institutes in the RERM domain and aggregation of strong keywords related to them on the right side of [Figure 7](#). It can be observed that the *Halle Institute for Economic Research (IWH)* led the rest in the last decade, followed by *University of Aberdeen*, *University of New South Wales*, *University of Pennsylvania*, and *the World Bank*, etc.

We further list the top ten (among all the 104) institutes according to frequency in [Table 5](#). *University of Amsterdam* ranks first with a frequency of 23 articles, followed by *MIT* and *University of Cambridge* both with a frequency of 11 articles. *Georgia State University* and *the World Bank* are next, both are from the US and have 10 articles each. As we can see in the rightmost column in [Table 5](#), the most common topic is ‘market’ (8 out of 10). Climate changes and inequalities are current mainstream researched topics as well. A large number of scholars and institutes are focusing on fields, such as ‘energy efficiency’ (*University of Cambridge, UK*; and *Maastricht University, Netherlands*); ‘social housing’ (*University of Cambridge, UK*); ‘ethnic discrimination & racial discrimination’ (*University of Technology Sydney, Australia*).

4. Knowledge structure analysis

A ‘structure’ is a group of inter-related constituents that can define what constitutes a system. Knowledge structures have information about concepts, elements, and their relationships related to specific knowledge. A vivid way to demonstrate a knowledge structure is to form a network by defining the network actors and ties (Su & Lee, 2010). Hence, we show the knowledge structure of RERM studies by creating a co-citation network.

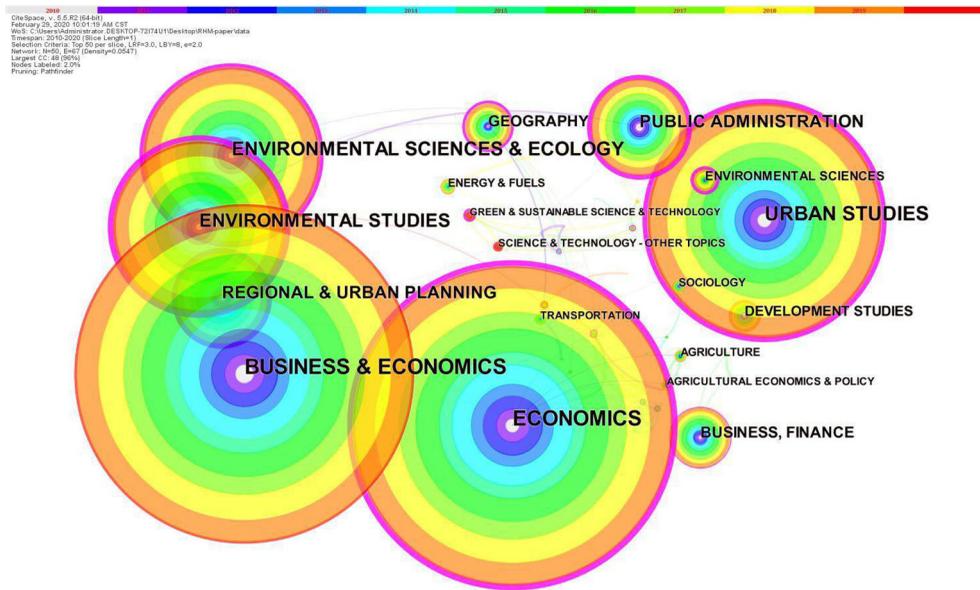


Figure 3. Key categories based on frequency.

Table 3. Top 10 categories based on frequency and keyword bursts.

Top 10 categories	Category	Year Ave.	Key bursts	Category	Year
464	Business & Economics	2010	4.58	Science & Technology	2017
440	Economics	2010	4.03	Green & Sustainable	2017
323	Urban Studies	2010	2.81	Science & Technology	2013
246	Environmental Sciences & Ecology	2010	2.53	Mathematical Methods in Social Sciences	2016
240	Environmental Studies	2010		Management	
135	Public Administration	2010			
130	Regional & Urban Planning	2010			
87	Business & Finance	2010			
69	Geography	2010			
49	Development Studies	2010			

Figure 8 presents the co-citation network, the clustering results and burst terms of articles in the RERM. The size of a node represents the citations rate, that is, how many citations are received from related references. The higher the cited frequency, the larger the nodes in the graph. The red rings in some concentric circles indicate the citation bursts in the year. Citation bursts offer valuable indicators to analyse the emerging development process of scholars' concern. We noticed in Figure 8 that the cluster #4 has many citation bursts, as indicated by the red rings. Therefore, we provide further analysis of cluster #4 in the subsequent part.

Table 6 presents 13 key clusters according to their size, that is, the number of articles in the cluster. The co-citation network can be divided into several clusters of co-cited references by CiteSpace. Each cluster involves citing articles and cited references and is labelled with noun phrases from the title of the cited articles (Chen

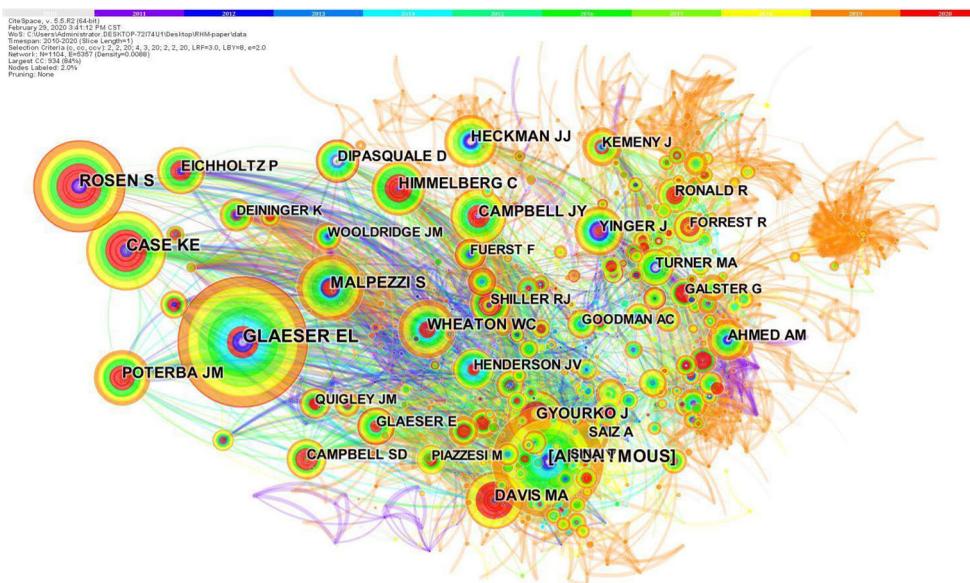


Figure 4. Visualization of co-author networks.

et al., 2010). Thus, references are tightly connected in the same cluster but loosely connected between different clusters. The silhouette score of a cluster measures the homogeneity of the papers in the cluster. A high silhouette score (close to 1) indicates that the topics studied in the papers are related, causing many within-cluster citations. All the clusters in Table 6 have high silhouette scores.

The average year for each cluster shows its recentness, such as cluster #1 (housing price) has an average year of 2010, and cluster #5 (financial geographies) has an average year of 2016, making it the most recent cluster.

We chose the top six clusters for further analysis. The following tables present the key information of some major clusters, that is, cluster #0, #1, #2, #3, #4, and #5 to reveal their respective focus.

4.1. Cluster # 0—housing wealth

Cluster #0 is the largest size with 130 articles. In this cluster, most scholars used the relationship between house price and rental price to analyse some important factors as shown in Table 7. Winters (2013) (the most citing article) and Sommer et al. (2013) (the 3rd most citing article) used the relationship between house price and rental price to analyse the impact from the perspective of economic fundamentals. The other three articles in the list of top five citing articles (Halket and Pignatti Morano di Custoz, 2015; Marekwica et al., 2013; Sinai & Souleles, 2013) analysed the topic of household asset allocation. Although some authors' papers were not listed among the top five citing articles, these authors also used the relationship between house price and rental price to analyse economic problems, such as housing price bubbles (Feng & Wu, 2015; Goswami et al., 2014; Nneji et al., 2013; Teng et al., 2013).

Table 4. Top 10 authors based on frequency.

Frequency	Burst	Author	Year
123	2.95	Glaeser EL	2010
90	4.03	Rosen S	2010
74	6.32	Case KE	2011
61	3.15	Malpezzi S	2010
56	6.54	Gyourko J	2010
55	7.42	Poterba JM	2012
55	5.13	Campbell JY	2009
55	4.48	Wheaton WC	2010
55	4.31	Davis MA	2012
53	8.07	Himmelberg C	2011

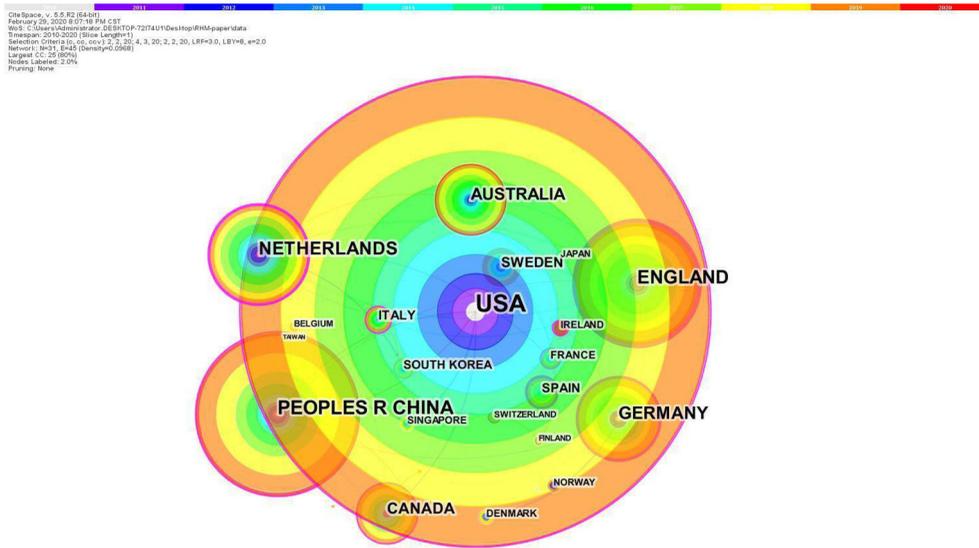


Figure 5. Centrality of countries.

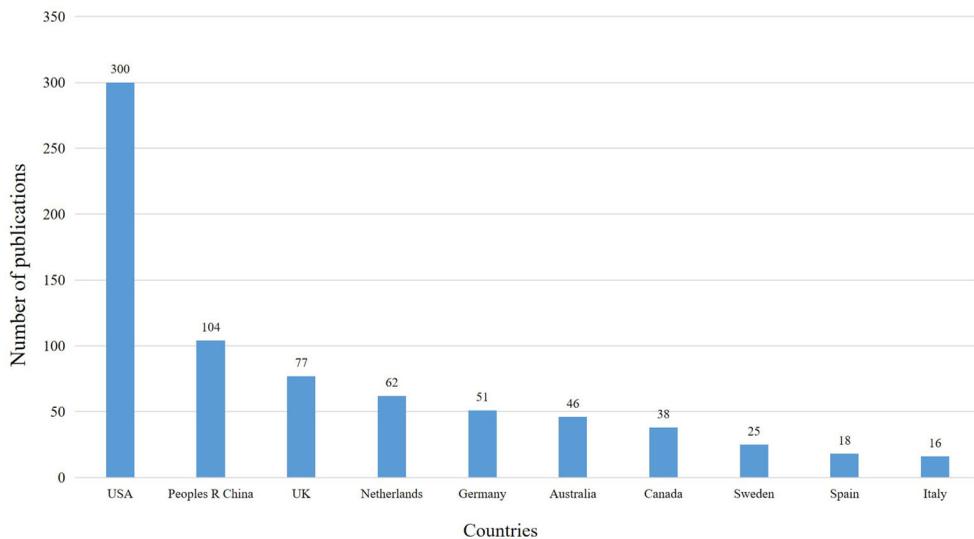


Figure 6. Top 10 countries based on the number of publications.

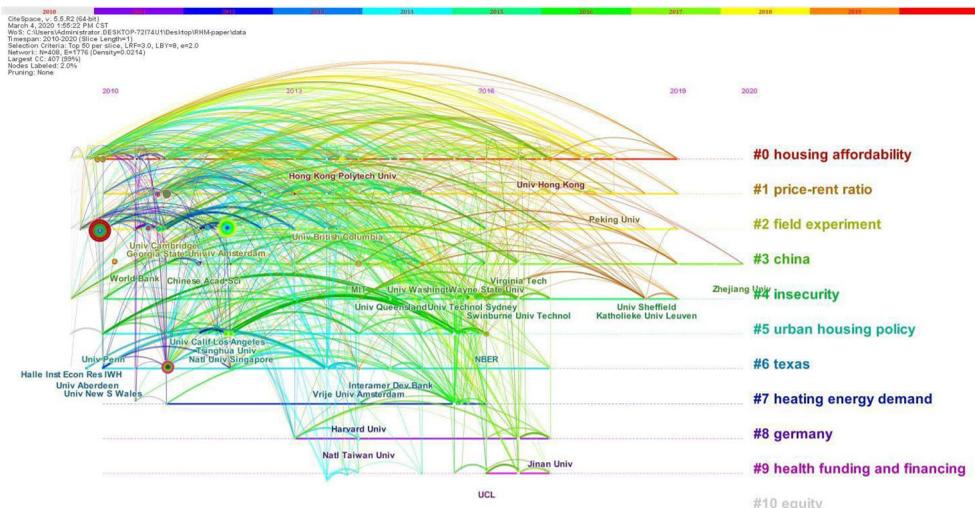


Figure 7. Institutes' network based on popular keywords.

Table 5. Top 10 institutes according to frequency.

Frequency	Institutes	Keywords
23	University of Amsterdam, Netherlands	housing policy; homeownership; gentrification
11	MIT, USA	rent; market; China
11	University of Cambridge, UK	market; social housing; energy efficiency
10	Georgia State University, USA	model; field experiment; mobility
10	World Bank, USA	market; property right; urbanization
9	National University of Singapore, Singapore	market; information asymmetry; social interaction
8	Maastricht University, Netherlands	energy efficiency; price; market
8	The Hong Kong Polytechnic University, China	price; market; consumption
8	Tsinghua University, China	market; spatial variation; economic return
7	University of Technology Sydney, Australia	ethnic discrimination; racial discrimination; market

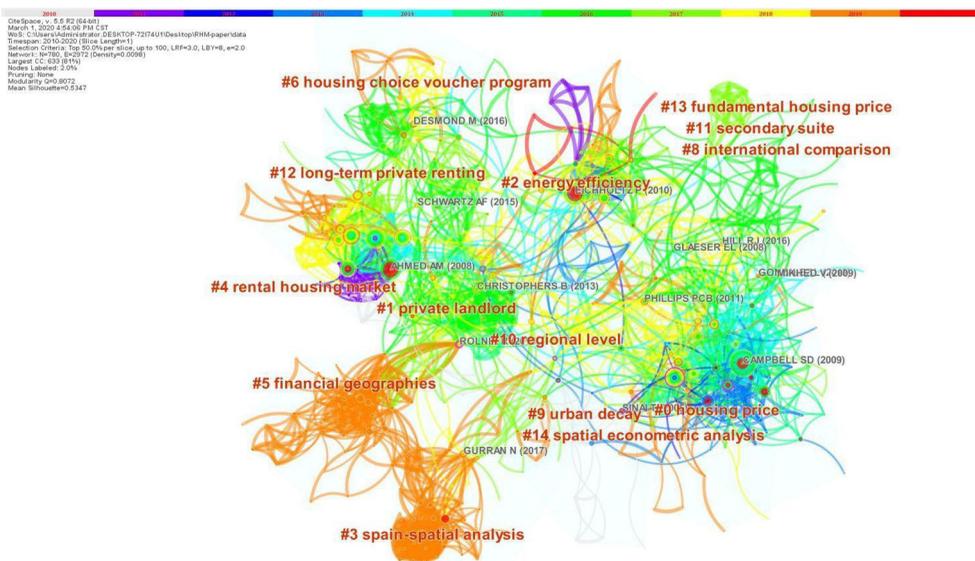


Figure 8. Co-citation network and co-citation clusters, 2010-2020.

Table 6. Key clusters based on co-cited references.

Cluster ID	Size	Silhouette	Label (TFIDF)	Label (LLR)	Label (MI)	Year Ave.
0	130	0.707	Price swings	Housing wealth	Heterogeneous moving cost	2010
1	93	0.783	Emerging adulthood	Private landlord	Property market	2011
2	61	0.861	Commercial office markets	Energy efficiency	Air quality	2011
3	52	0.903	Short-term rentals	Airbnb offer	Economic geography	2016
4	51	0.909	Social exclusion	Discrimination	Housing unit characteristics	2010
5	51	0.949	Financialization	Financial geographies	Asymmetric marketization	2016
6	49	0.844	Rent limits	Overcharging housing voucher holder	Public housing demolition	2012
8	38	0.878	Supply-side speculation	House rent	Historical evidence	2012
9	26	0.883	Transport infrastructure	Commuter rail accessibility	Identifying policy solution	2006
10	25	0.930	Housing price bubbles	School quality	Discount rate	2012
11	25	0.936	Accessory apartment	Municipal policy	Social housing	2012
12	13	0.961	Owner-occupiers	Influencing reported housing maintenance cost	Price-rent relationship	2013
13	12	0.944	To-rent ratios	Marginal price	Income risk	2011
14	7	0.985	Immigration	Migration flow	Spatial hedonic analysis	2012

The three algorithms for term ranking are *term frequency by inverted document frequency (TFIDF)*, *log-likelihood ratio test (LLR)*, and *mutual information(MI) test*. Clusters labels are chosen based on the log-likelihood ratio test (LLR) method, which tends to reflect a unique aspect of a cluster (Chen et al., 2010).

In cluster #0, 32% articles were published in 2013 and 29% in 2015. In 2013, a majority of scholars focused on choice problems, such as choice of house ownership (Marekwica et al., 2013; Sinai & Souleles, 2013) and the choice of house location (Plantinga et al., 2013).

Recently, many scholars shifted their attention to the macro level of the RERM. Fairchild et al. (2015) used a dynamic factor model with respect to the price-rent ratio and found that the national factors have become more important than local factors in driving housing market volatility since 1999. Gete and Zecchetto (2018) pointed out that higher mortgage spreads and housing rents will likely drive increases in wealth inequality. Sommer and Sullivan (2018) studied the impact of the mortgage interest tax deductions on equilibrium house prices, rents, homeownership, and welfare.

The most cited reference in this cluster is the study by Campbell et al. (2009). The authors disintegrated the trend and variance in rent-price ratios from 1975 to 2005 using the method of the dynamic Gordon growth model. The second most cited reference is an interdisciplinary research article. The authors processed satellite-generated data of terrain elevation and water presence to accurately estimate the amount of land available for development in the metropolitan areas of the US. Both the third and fifth most cited references are research articles on the relationship between house prices and rentals (Ambrose et al., 2013; Gallin, 2008). The fourth most cited reference was published by Kiyotaki et al. (2011), which analysed the relationship between house prices, total output, and household behaviour throughout one's life using a quantitative analysis approach.

Table 7. Citing articles and cited references of cluster #0 housing wealth.

Citing Articles Coverage %	Author (Year) Title	Cited References Cites	Author (Year)
11	Winters (2013) <i>Differences in quality of life estimates using rents and home values</i>	27	Campbell et al. (2009)
9	Marekwica et al. (2013) <i>Life cycle asset allocation in the presence of housing and tax-deferred investing</i>	21	Saiz (2010)
9	Sommer et al. (2013) <i>The equilibrium effect of fundamentals on house prices and rents</i>	12	Ambrose et al. (2013)
8	Sinai and Souleles (2013) <i>Can owning a home hedge the risk of moving?</i>	12	Kiyotaki et al. (2011)
7	Halket and Pignatti Morano di Custoza (2015) <i>Homeownership and the scarcity of rentals</i>	12	Gallin (2008)

Each cluster involves citing articles and cited references. Coverage %: the percentage of a citing article cites references in the clusters. Cites: the number of citing articles cite the reference.

4.2. Cluster # 1—private landlord

Cluster #1 is second largest with 93 articles among all the clusters. The most cited reference in this cluster is the study of Eichholtz et al. (2010), as listed in Table 8. The authors proposed the concept of rationing price equilibrium that can capture the specific characteristics of the housing market with rent control.

The top five citing articles are published after 2016. Lennartz et al. (2016) discovered a common trend that diminishing homeownership leads to larger rental sectors in many countries. Arundel and Ronald (2016) found that the degree of housing independence can be partly explained by the welfare system background, while the co-residence tendency seems to relate to the affordability of the rental market. Blessing (2016) reviewed the recent market-oriented reform of government subsidized rental housing supply in the US, Australia, and England. Lennartz (2016) discovered that the current perception of competition among most property owners is special in low-income rental housing, but it is obvious in the case of more expensive commercial housing rental. Hochstenbach (2017) found that under the condition of housing market-oriented reforms, the disappearance of social rent has accelerated.

4.3. Cluster #2—energy efficiency

Cluster #2 comprises interdisciplinary research articles on energy efficiency. The most cited references in this cluster is the study of Eichholtz et al. (2010), as listed in Table 9. The authors indicate the impact of green label on market rent and value of commercial space. The second most cited article was published by Fuerst and McAllister (2011b) with 20 citations. The authors used hedonic regression analysis to reveal that eco-certified buildings have both rental and sale price premiums.

The top five citing articles were published after 2015. Robinson et al. (2017) used lease-level analysis to indicate the influence of 15 green sustainable building features on office rents. Chegut et al. (2016) analysed the value effects of energy efficiency in the affordable housing market. Qiu et al. (2017) discovered that the rental premium with green building certification is likely greater than the expected savings of operating cost, based on the present value. Franke and Nadler (2019) indicated that owners are observably more familiar with the Energy Performance Certificates (EPCs) tool

Table 8. Citing articles and cited references of cluster #1 private landlord.

Citing Articles Coverage %	Author (Year) Title	Cited References Cites	Author (Year)
13	Lennartz et al. (2016) <i>Younger Adults and Homeownership in Europe Through the Global Financial Crisis</i>	10	Andersson and Svensson (2014)
10	Arundel and Ronald (2016) <i>Parental co-residence, shared living and emerging adulthood in Europe: semi-dependent housing across welfare regime and housing system contexts</i>	10	Christophers (2013)
10	Blessing (2016) <i>Repackaging the poor? Conceptualising neoliberal reforms of social rental housing</i>	9	Ronald (2009)
8	Lennartz (2016) <i>Rivalry between social and private landlords in local rental housing markets</i>	8	Kemp (2015)
6	Hochstenbach (2017) <i>State-led Gentrification and the Changing Geography of Market-oriented Housing Policies</i>	7	Huang (2012)

Each cluster involves citing articles and cited references. *Coverage %*: the percentage of a citing article cites references in the clusters. *Cites*: the number of citing articles cite the reference.

than tenants. Heffernan et al. (2020) proposed a conceptual framework to highlight the interplay of stakeholders and enabling forces, which has the potential to lead to a win-win-win scenario for landlords, tenants, and the environment, as well as build a more sustainable rental sector.

4.4. Cluster #3—Airbnb offer

With the emergence of the sharing economy in the RERM, Airbnb is attracting the attention of more number of scholars. We list the details of cluster #3 with the top 10 citing articles and cited references in Table 10 as it is currently a hot topic and the most contemporary cluster among the others.

The most cited references are those of Guttentag (2015), which found that Airbnb may have caused the disruptive innovations in the traditional accommodation sector, and Gurran and Phibbs (2017) briefly summarized the scholarly literature on Airbnb and analysed the implications for urban policy and planning.

The top ten citing articles, published after 2017, can be divided into five areas: (1) Impact on tourism and housing markets (Horn & Merante, 2017; Zou, 2020); (2) Focus areas of Airbnb (Adamiak et al., 2019; Domenech et al., 2019); (3) Investment opportunities of Airbnb (Cocola-Gant & Gago, 2019; Grisdale, 2019); (4) Regulatory policies (Crommelin et al., 2018; DiNatale et al., 2018; Yang and Mao, 2019); and (5) Users' experience of Airbnb (Guo et al., 2019).

4.5. Cluster #4—discrimination

Cluster #4 contains numerous nodes with red rings, that is, citation bursts (Figure 8). The most cited reference was published by Ahmed and Hammarstedt (2008). The authors used field experiments based on personal experiences and discovered that ethnic and gender discrimination exists in the Swedish rental housing market. The

Table 9. Citing articles and cited references of cluster #2 energy efficiency.

Citing Articles Coverage %	Author (Year) Title	Cited References Cites	Author (Year)
6	Robinson et al. (2017) <i>Which green office building features do tenants pay for? A study of observed rental effects</i>	27	Eichholtz et al. (2010)
5	Chegut et al. (2016) <i>Energy efficiency and economic value in affordable housing</i>	20	Fuerst and McAllister (2011b)
5	Qiu et al. (2017) <i>Factors influencing commercial buildings to obtain green certificates</i>	15	Brounen and Kok (2011)
5	Franke and Nadler (2019) <i>Energy efficiency in the German residential housing market: Its influence on tenants and owners</i>	11	Hyland et al. (2013)
5	Heffernan et al. (2020) <i>Towards an environmentally sustainable rental housing sector</i>	9	Wiley et al. (2010)

Each cluster involves citing articles and cited references. *Coverage %*: the percentage of a citing article cites references in the clusters. *Cites*: the number of citing articles cite the reference.

second most cited reference, published by Bosch et al. (2010), investigated the effect of disclosing information on discriminatory behaviour against immigrants in the Spanish rental market. The third most cited article was published by Ahmed et al. (2010). The authors investigated how increasing information about applicants affects discrimination in the rental housing market. Both Baldini and Federici (2011) (fourth highly cited reference) and Hanson et al. (2011) (fifth highly cited reference) discovered that discrimination exists in the rental housing market when tenants use different types of names to contact with landlords by sending emails.

The top five citing articles are listed in the order of their citation coverage in Table 11. Hanson et al. (2011) discovered that property owners practice subtle discrimination in the rental housing market using language. Some scholars found that discrimination is associated with new forms of family households (Lauster & Easterbrook, 2011) and neighborhood characters (Galster et al., 2018; MacDonald et al., 2018).

4.6. Cluster #5—financial geographies

Cluster #5 is another contemporary cluster. Therefore, we list the top 10 citing articles and cited references in Table 12. The most cited reference is published by Rolnik (2013), based on the withdrawal of states from the housing sector and the implementation of policies designed to create stronger and larger market-based housing finance models. The second most cited reference (Aalbers, 2016) asserted the centrality of housing to the contemporary capitalist political economy and placed housing at the centre of the financialization debate.

The top ten citing articles are published in 2019. The highest citation coverage of 25% is published by Aalbers (2019). The author indicated that financialization of real estate is not limited to the rise in household debt, or mortgage securitization and international investment in office markets, but also increasingly affects rental housing: private equity. Both Nethercote (2018) and Migozzi (2020) studied the financialization process of the rental housing market. Single-family rental housing is an

Table 10. Citing articles and cited references of cluster Cluster #3 airbnb offer.

Citing Articles Coverage %	Author (Year) Title	Cited References	
		Cites	Author (Year)
28	Adamiak et al. (2019) <i>Airbnb Offer in Spain-Spatial Analysis of the Pattern and Determinants of Its Distribution</i>	9	Guttentag (2015)
21	Domenech et al. (2019) <i>Disentangling The Geographical Logic Of Airbnb In Switzerland</i>	9	Gurran and Phibbs (2017)
20	Cocola-Gant and Gago (2019) <i>Airbnb, buy-to-let investment and tourism-driven displacement: A case study in Lisbon</i>	8	Ambrose et al. (2015)
17	Grisdale (2019) <i>Displacement by disruption: short-term rentals and the political economy of "belonging anywhere" in Toronto</i>	6	Lee D (2016)
7	Zou (2020) <i>Examining the Impact of Short-Term Rentals on Housing Prices in Washington, DC: Implications for Housing Policy and Equity</i>	5	Wachsmuth and Weisler (2018)
6	Yang and Mao (2019) <i>Welcome to My Home! An Empirical Analysis of Airbnb Supply in US Cities</i>	5	Paciorek (2013)
5	Horn and Merante (2017) <i>Is home sharing driving up rents? Evidence from Airbnb in Boston</i>	5	Zervas et al. (2017)
3	Guo et al. (2019) <i>Exploring the Salient Attributes of Short-Term Rental Experience: An Analysis of Online Reviews from Chinese Guests</i>	4	Cócola Gant (2016)
3	Crommelin et al. (2018) <i>Is Airbnb a Sharing Economy Superstar? Evidence from Five Global Cities</i>	4	Glaeser and Ward (2009)
3	DiNatale et al. (2018) <i>Short-term rentals in small cities in Oregon: Impacts and regulations</i>	4	Gutiérrez et al. (2017)

Each cluster involves citing articles and cited references. Coverage %: the percentage of a citing article cites references in the clusters. Cites: the number of citing articles cite the reference.

increasingly prevalent form of housing tenure in the suburban neighbourhoods of the US (Charles, 2019a, 2019b). Furthermore, at the macro level of the RERM, three studies describe three special views of rental housing development (Christophers, 2019; Clegg, 2019; Todes & Robinson, 2019).

5. Evolution trends of topic analysis

Co-word analysis determines the relationship between the topics in a given discipline by measuring the association strength of the representative words in related publications in this field (Ding et al., 2001). A coinage network, composed of the association of word-pairs, could be formed by counting the frequency of a group of keywords appearing in the same document. Furthermore, the affinity of the subject content could be reflected by the network-node-distance analysis or cluster analysis.

We present the timeline visualization graph of the co-word network based on keyword analysis (Figure 9) and list the top 37 keywords with the strongest citation bursts (Figure 10). We recall that the number of publications increased yearly and there are two years with significantly increasing number of publications, that is, 2014

Table 11. Citing articles and cited references of cluster #4 discrimination.

Citing Articles Coverage %	Author (Year) Title	Cited References Cites	Author (Year)
7	Ahmed et al. (2010) <i>Can Discrimination in the Housing Market Be Reduced by Increasing the Information about the Applicants?</i>	23	Ahmed and Hammarstedt (2008)
6	Hanson et al. (2011) <i>Subtle discrimination in the rental housing market: Evidence from e-mail correspondence with landlords</i>	21	Bosch et al. (2010)
6	MacDonald et al. (2018) <i>The geography of rental housing discrimination, segregation, and social exclusion: New evidence from Sydney</i>	20	Ahmed et al. (2010)
5	Lauster and Easterbrook (2011) <i>No Room for New Families? A Field Experiment Measuring Rental Discrimination against Same-Sex Couples and Single Parents</i>	20	Baldini and Federici (2011)
5	Galster et al. (2018) <i>What Explains the Differential Treatment of Renters Based on Ethnicity? New Evidence From Sydney</i>	19	Hanson et al. (2011)

Each cluster involves citing articles and cited references. *Coverage %*: the percentage of a citing article cites references in the clusters. *Cites*: the number of citing articles cite the reference.

and 2016 (Figure 1). Therefore, we analyse in detail the potential evolution trends that emerged during these two years.

5.1. Living and Working environment

From 2010 to 2012, the publications focused on the micro level aspects, as reflected by ‘amenity’ and ‘office building’. In this part, the authors studied the influence of the living environment and energy-efficient designs. The various environmental amenities have a significant impact on rental prices (Baranzini & Schaerer, 2011; Donovan & Butry, 2011; Püschel & Evangelinos, 2012). The energy efficiency ratings will affect the sale and rental prices of office buildings (Fuerst & McAllister, 2011b, 2011a; Wiley et al., 2010).

5.2. Market and Policy

This trend is associated with labels such as ‘labour market’, ‘house price’, ‘housing policy’, and ‘housing bubble’. A family’s employment decisions affect housing decisions and vice versa (Colom & Moles, 2013). Some scholars studied the relationship between house prices and rents (Ambrose et al., 2013; Kivedal, 2013). In 2014, a year that witnessed significant increases in the number of publications, many studies concentrated on housing policies and the housing price bubble. Che (2014) used a probit, tobit, and semi-parametric model to evaluate the relative impact of full-scale land reallocation (FLR) and partial-scale land reallocation (PLR) on household land rental behaviour in rural China. Autor et al. (2014) found that rent decontrol generated substantial, robust price appreciation at decontrolled units and nearby never-controlled units. Ambrose and Diop (2014) filled the gap of how the expansion in mortgage credit affected the rental market.

Table 12. Citing articles and cited references of cluster #5 financial geographies.

Citing Articles Coverage %	Author (Year) Title	Cited References	
		Cites	Author (Year)
25	Aalbers (2019) <i>Financial geography II: Financial geographies of housing and real estate</i>	8	Rolnik (2013)
19	Charles (2019a) <i>The financialization of single-family rental housing: An examination of real estate investment trusts? ownership of single-family houses in the Atlanta metropolitan area</i>	7	Aalbers (2016)
16	Nethercote (2018) <i>Build-to-Rent and the financialization of rental housing: future research directions</i>	7	Fields and Uffer,(2016)
14	Todes and Robinson (2019) <i>Re-directing developers: New models of rental housing development to re-shape the post-apartheid city?</i>	7	Beswick et al. (2016)
12	Migozzi (2020) <i>Selecting Spaces, Classifying People: The Financialization of Housing in the South African City</i>	6	August and Walks (2018)
9	Cocola-Gant and Gago (2019) <i>Airbnb, buy-to-let investment and tourism-driven displacement: A case study in Lisbon</i>	6	Wijburg et al. (2018)
7	Charles (2019b) <i>A Latent Profile Analysis of Suburban Single-Family Rental Housing (SFR) Neighborhoods</i>	5	Aalbers and Christophers (2014)
4	Clegg (2019) <i>Economic geography and the regulatory state: Asymmetric marketization of social housing in England</i>	4	Fields (2015)
4	Grisdale (2019) <i>Displacement by disruption: short-term rentals and the political economy of "belonging anywhere" in Toronto</i>	4	Wainwright and Manville (2017)
4	Christophers (2019) <i>A tale of two inequalities: Housing-wealth inequality and tenure inequality</i>	3	Immergluck and Law (2014)

Each cluster involves citing articles and cited references. Coverage %: the percentage of a citing article cites references in the clusters. Cites: the number of citing articles cite the reference.

5.3. Social wealth

In 2015, most publications concentrated on topics such as 'metropolitan area', 'low-income household' and 'rural China'. Wang et al. (2015) analysed how tenure security, especially issuance of land documents, affected people's behaviour in China's rural land rental markets. Desmond and Bell (2015) called for renewed focus on housing, law, and poverty, specifically focusing on the housing sector where most low-income families live.

A year later in 2016, another year with a significant increase in number of publications, most studies concentrated on 'housing affordability', 'home ownership' and 'income'. Some scholars discovered that the development of the housing rental market would help to reduce the inequality between income and house prices (Zhang et al., 2016). On the topic of home ownership, some scholars presented that buying or renting, as an investment decision by households, has long-term consequences on their financial well-being (Beaubrun-Diant & Maury, 2016; Crowley & Li, 2016; Tabner, 2016).



Figure 10. Top 37 keywords with the strongest citation bursts.

of economies that are advanced and/or emerging. Through a comparative analysis, we aim to recognize the important topics and research gaps in the two types of countries, which may be helpful for scholars focusing on the RERM domain to identify research opportunities.

6.1. Comparison of publication scales

We present the result of a comparison on the number of publications from 2010 to 2020 in Figure 11. All the countries show an increasing trend in publications, and the number of publications in the US consistently exceeds that in China and the UK.

6.2. Comparison of research topics

In this section, we use co-word analysis to compare the differences in the research topics between these three countries. Figures 12–14 present the important topics yearly in each country. Some similarities and differences can be observed in the research topics.

The scholars in these three countries focus on topics such as ‘housing market’ and ‘housing price’. In the US, researchers pay more attention to the micro level aspects of the RERM, such as ‘neighbourhood’, ‘amenity’, ‘homeownership’, and ‘income’. In contrast, Chinese researchers are involved with macro level analysis for policy-led development in the RERM, specifically ‘labour market’, ‘rural China’, ‘housing policy’, and megacities (‘Shanghai’, ‘Zhejiang’, ‘Hong Kong’). Similarly, researchers in the UK are also inclined towards the macro level of RERM, but pay more attention to economic and financial trends, such as ‘investment’, ‘demand’, and ‘pricing management’, etc.

We elaborate the research differences as follows. The studies in the US can be categorized into three parts:

1. *Housing choice*. The researchers in the US consider choice of housing tenure as a dynamic process. Boehm and Schlottmann (2011) used an extended continuous time probability model to analyse the impact on tenure choices of sample households across three time periods. Boehm and Schlottmann (2014) investigated the likelihood and timing of housing tenure choice. With the development of interdisciplinary studies, some scholars began to use interdisciplinary methods to analyse the RERM. Cronqvist et al. (2014) found that genetic factors influence the choice to own or rent. The cost of housing is one of the main factors that affects housing choice. McCabe (2018) discovered that homeowners with mortgage strain are more likely to prefer rental housing when they next move.
2. *Housing environment*. Spatial amenities are deemed to influence both housing prices and rental prices. Agha and Coates (2015) used a compensating differential framework to measure the social benefits of minor league baseball teams. Brasington (2017) and Beracha and Hardin (2018) both analysed from the perspective of residential property amenities and the impact of school quality on housing prices.
3. *Resident wealth*. The income advantages of tenants living in rent-subsidized accommodation will likely reduce the inequality and poverty (Frick et al., 2010).

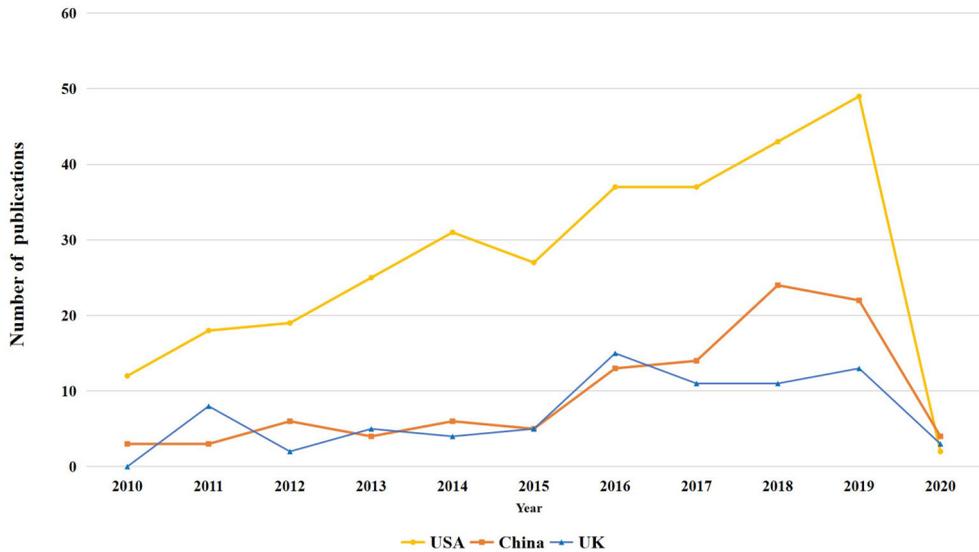


Figure 11. Comparison of publications from 2010 to 2020.

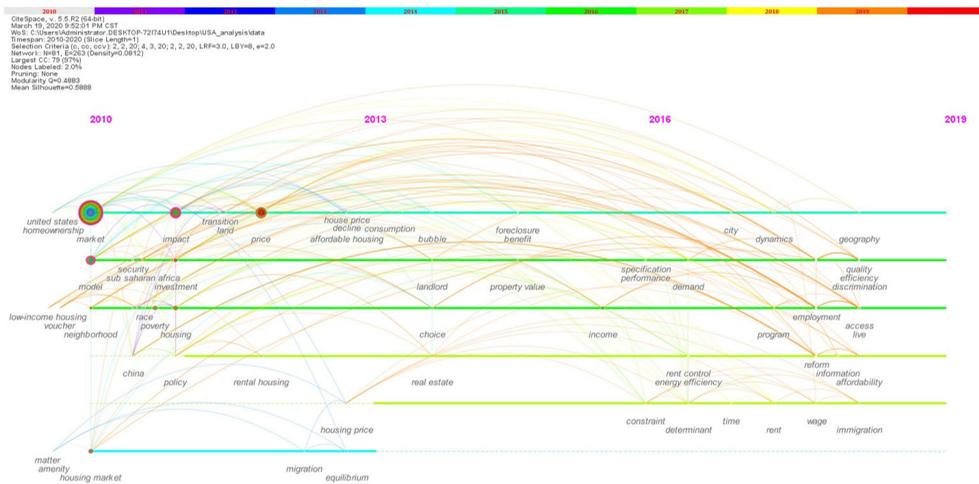


Figure 12. Timeline of co-word clusters in the US.

Furthermore, Goffette-Nagot and Sidibe (2016) discovered that if tenants live in the public housing sector with below-market rents they will likely save for a down payment more quickly than if they live in other sectors. Gete and Zecchetto (2018) found that higher mortgage spreads and housing rents would increase wealth inequality.

Over the past decade, scholars in the US paid more attention to the micro level aspects of the RERM, while Chinese scholars focused more on the macro level factors. The studies in China can be also categorized into three parts:

1. *Housing policy.* Deng et al. (2011) introduced China's emerging housing policy framework—three major affordable housing programs and a heavily regulated housing finance sector. The government promulgates policies to ease the imbalance of economic and social inequalities. The state provides houses as a short term state remedy to solve the problem of low-income population housing affordability, but more effective solutions are required in the long term (Chen et al., 2017). Housing prices could be hampered in the current period under the home-purchase limit policy, but the demographic changes with positive shifts would immediately lead to a rise in rent growth and eventually to an increase in housing prices in the subsequent periods (Chen et al., 2018).
2. *Relationship between housing prices and rents.* Liu et al. (2017) decomposed the log price-rent ratio into three components and used the price-rent ratio's variance to distinguish the relative impact of the three components on housing prices. Yu et al. (2018) discovered that haze significantly has a negative impact on both housing selling and rental prices. Han et al. (2018) built a dynamic rational expectations general equilibrium framework and found that the equilibrium house price and rent under reasonable parameterizations of the model are substantially lower than the data.
3. *Labour market.* Yu and Rickman (2013) analysed the link between the US state and local fiscal policies and non-metropolitan county growth in earnings and housing rents during the 1990s. Land rent is one of the important parts of the RERM in China. Che et al. (2015) discovered that the land rental market and farm labour market are complementary. Off-farm employment is among the main driving factors on households' decisions to rent out land (Yan & Huo, 2016). Milic and Zhou (2018) discovered that changes in labour markets, extended education periods, and economic instability negatively influence young adults' accessibility to housing.

Over the past ten years, scholars in the UK were also inclined towards the macro level of the RERM, although research topics in the UK differed from that in China. The UK studies can be divided into three parts:

1. *Investment market.* The studies in this field can be divided into two streams: (a) *Land rental market.* Ali et al. (2011) discovered that land rental has been legalized, but the right to transfer is still restricted, and the concept of continuous insecurity of land use right is still quite strong. Lovo (2016) suggested that future land reforms must address the informality of the land rental market and the gap between land users and landowners caused by existing practices. (b) *Private rental housing market.* Fields and Uffer (2016) compared how the wave of private equity real estate investment reshapes the rental market in New York and Berlin and found that financialization exacerbated the existing inequalities in housing affordability and stability. In recent years, compared to non-profit social housing, the investment made by large developers' housing associations in profitable and high grade rental housing is becoming increasingly important (Crook & Kemp, 2019; Morrison, 2016).

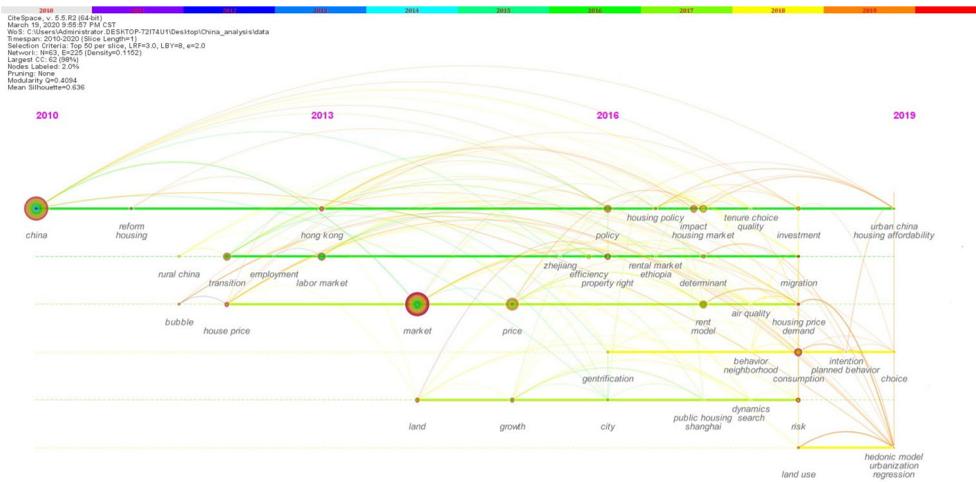


Figure 13. Timeline of co-word clusters in China.

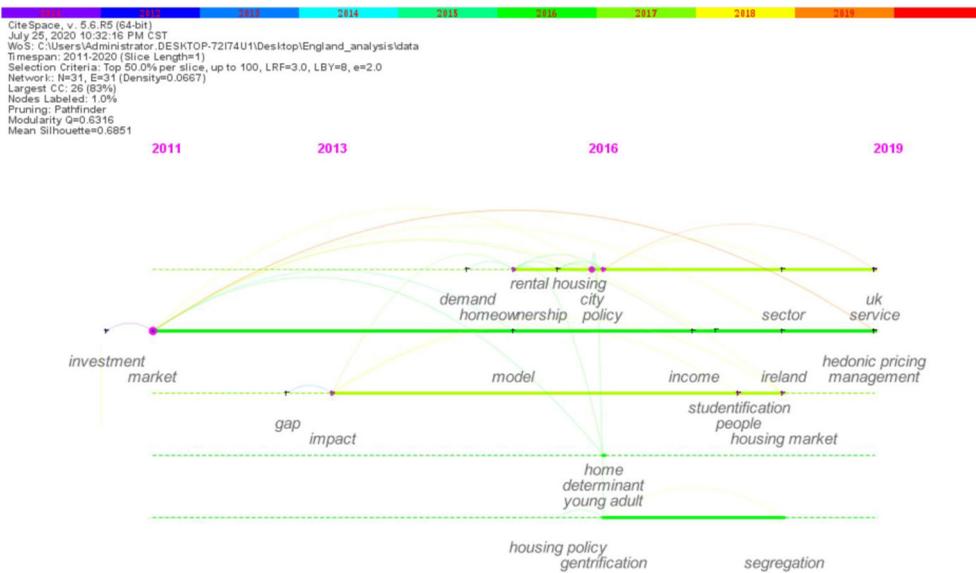


Figure 14. Timeline of co-word clusters in the UK.

2. *Demand.* Recently, the transition of younger people into homeownership has been on the decline, producing a larger demand for rental housing across many countries (Lennartz et al., 2016). Some evidence shows that rents were not a significant financial burden for low-income families. Thus, in order to satisfy the housing demand of low-income families, affordable rental housing needs to be developed (Acheampong, 2016; Carmona et al., 2017). With increased urbanization, more people are demanding high-quality sanitation and are willing to pay higher rental values for accessing improved sanitation facilities (Tidwell et al., 2019).

3. *The impact of energy efficiency on rents.* Energy efficiency has a positive effect on the rents of both the commercial office market and the residential market. Different scholars chose various methods to analyse this issue. The majority of scholars used hedonic models to discover that buildings with Energy Performance Certificates, eco-labelling or energy efficiency ratings would have a rental price premium (Fuerst et al., 2015; Fuerst & McAllister, 2011b, 2011a; Fuerst & Warren-Myers, 2018). Other methods were also chosen to study this topic, such as the Heckman selection technique (Hyland et al., 2013), the difference-in-differences estimation, the fixed-effects model approach (Reichardt et al., 2012), and the time-on-market model (Fuerst et al., 2020), etc.

7. Conclusions and future research directions

7.1. Conclusions

Due to the importance of the RERM in the economy, the real estate rental market has attracted greater attention from researchers. It is very crucial to comprehensively analyse the recent RERM studies, however, there is no RERM review yet. To fill this gap, we collected the related articles from the Web of Science list for a bibliometric and comprehensive literature review. Our work can be divided into four parts: (1) summarizing the number of publications and citations each year from 2010 to 2020, and recognize important journals, categories, authors, high-yield countries, and institutes; (2) identifying the knowledge structure by analysing the important references and research articles in the field of RERM through co-citation networks and clusters; (3) analysing the evolutionary trends, hot-spots, and latest frontiers in the field of RERM through co-word clusters and keyword burst analysis; and (4) comparing the RERM studies in the US, China, and UK.

Our findings can be summarized as follows:

1. The top three categories in terms of research attention are *Business, Economics,* and *Urban Studies*. Moreover, the majority of articles were published in the top journals, such as *Real Estate Economics, Energy Policy,* and *Urban Studies*. Furthermore, there are some interdisciplinary research achievements, indicated by the key bursts in subject categories—Science & Technology and Green & Sustainable Science.
2. The key publications in this field originated in the US, and most of the publications are from the US and China. However, interestingly, the most high-yield institute is University of Amsterdam, Netherlands. The high-yield authors are mainly from the US, such as Edward L. Glaeser, Sherwin Rosen, and Case Karl E.
3. The hot topics in the field of RERM are as follows: (a) *Housing wealth* The majority of scholars combined price and rent to analyse some significant issues—household asset allocation, housing bubbles and the impact from economic fundamentals. (b) *Energy efficiency* Most scholars focus on the influence of green label or eco-certified buildings and how to build a more sustainable rental sector. (c) *Airbnb offer* Scholars focus on the impact of tourism and housing markets,

concentration of Airbnb, investment opportunities, regulatory policies, and users' experience of Airbnb. (d) *Discrimination* There are different types of discrimination problems in various aspects, not surprisingly in the real estate rental market. (e) *Financial geographies* These studies can be divided into three parts: financial products, financialization process, and macro development of the real estate rental market.

4. We identified four evolutionary trends—(a) living and working environment, (b) market and policy, (c) social wealth, and (d) sharing economy and health. From 2010 to 2012, the topics of most articles belong to micro level aspects such as the amenity and energy efficiency ratings of office buildings. In 2013 and 2014, a year that witnessed a burgeoning increase in publications, the topics of most articles focused on the macro level, such as the labour market and housing policy and housing bubble. In 2015 and 2016, the other most important year with a significant increase in research publications, the articles covered topics such as social wealth, metropolitan areas, low-income households, rural China, housing affordability, home ownership, and income. In 2015 and 2016, the other most important year with a significant increase in research publications, the articles covered topics such as social wealth, metropolitan areas, low-income households, rural China, housing affordability, home ownership, and income. In recent years, the cutting edge of the RERM domain is the sharing economy and health. The prevalence of Airbnb will have various effects on tourism and communities. As the population ageing continues to intensify, researchers pay more attention to health issues in many sectors and not surprisingly in the RERM.
5. A comparison of the results of the research topics in the US, China, and the UK show that all the researchers in these countries are concerned about the 'housing market' and 'housing price'. The US researchers pay more attention to the micro level aspects of the RERM, such as housing choice, housing environment, and resident wealth. In contrast, researchers in China care more about the macro level aspects for the policy-led development of the RERM, such as housing policy, relationship between housing prices and rents, and labour market. In the UK, researchers are also inclined to focus on the macro level, but pay more attention to the economic and financial trends, such as the investment market, demand, and the impact of energy efficiency on rents.

7.2. Future research directions

Based on the above conclusions, we suggest several future research directions:

1. *Green and energy efficiency.* World leaders acknowledge that climate change is one of the biggest challenges we face in the 21st century. Currently, the main response to sustainability challenges is based on green growth policy recommendations (Obama, 2017). The real estate rental market also needs to make some environmental contributions. The vast majority of existing green-related RERM articles focus on the commercial estate (Devine & Kok, 2015; Fuerst & McAllister, 2011b; Holtermans & Kok, 2019; Kok & Jennen, 2012). However, a

few scholars study the connection between residence and energy efficiency. Existing evidence shows that rental homes often have lower levels of energy efficiency than owner-occupied homes, and policy makers are paying increasingly greater attention to this gap in energy efficiency (Burford et al., 2012). Hence, we suggest studying more sectors (e.g., rental homes) of the RERM for saving energy, so that a more sustainable environment can be achieved.

2. *Economic inequality.* Increasing social inequality has emerged as one of the threats to the current standards of living, peace, and democracy. This problem is always tackled in the policy planning process (D'Alessandro et al., 2020). The rental housing market will provide accommodation for people who cannot afford to buy one, and thus the public sector may reduce social inequality. However, the question arising is how to make this sustainable when many governments are facing a massive rise in debt levels? A feasible approach could be to develop financial products based on the stable cash flows collected from faithful tenants, so that the financial gains can be used to build more rental houses. Since it has been shown that healthy financial products such as RERM-REITs (real estate investment trust) can promote RERM to grow efficiently (August & Walks, 2018; Charles, 2019a), we suggest fostering greater financial innovation in RERM to deal with economic inequality.
3. *Ageing population.* The world's population is ageing due to declining fertility rates and rising life expectancy. Increasingly more scholars are focusing on ageing populations, especially from the perspectives of health, nursing care services, and housing. For example, Teariki (2017) revealed the association between housing and health. It could be interesting to study the impact of different household decisions (rent or buy) early in life on a household's wellbeing during old age. Besides, the policy maker may be seeking possible connections between pension, reverse mortgage, and rental income. Future research studies are expected to combine micro data from the survey of health, ageing, and retirement with macro data on the housing policy to analyse the residential mobility decisions of the elderly in emerging countries.
4. *Interdisciplinary research and analysis methods innovation.* Major research funding institutions are increasingly focusing on strengthening interdisciplinary cooperation, affecting the epistemology and ontology of contemporary research plans (Pedersen, 2016). Cronqvist et al. (2014) combined biological and genetic factors with household decisions to find that an individual's preference with respect to home ownership and home location are partly genetic. Empirical approaches are the dominating research methods in RERM studies. However, empirical approaches may not be suitable in some situations, especially when there is lack of available data, or the data is too big to be analysed using traditional methods. In future, there are several possible topics for better understanding the RERM in a hyper-connected world, such as: (a) analysing the impact of shared office space, such as 'WeWork', on the RERM; (b) studying the effect of different home-ownership decisions on marriage or fertility; (c) simulation methods could be used to study complicated problems, for instance, how to design the evacuation routes in a rental property.

5. *Technological changes.* With technological advancements it is easier to tackle some of the greatest challenges in various fields, not surprisingly in the RERM. Canas et al. (2015) developed a multi-criteria decision support system to calculate the residential rents. Ma et al. (2018) used the machine learning techniques to estimate the rental price of warehouses and found that the warehouses' location and land price have a pivotal impact on its rent. Benefield et al. (2019) estimated a simultaneous systems model by using virtual tours as a proxy to observe the agent effort. In future, several possible technological changes could be used to improve the development of the RERM: (a) incorporating the blockchain technology to perform a rental contract automatically with the help of a smart contract; (b) big-data analytics could be used to solve problems with massive amounts of data; (c) artificial intelligence methods such as face recognition could be used to solve security issues in the RERM; (d) reinforcement learning methods could be used to improve the investment policy for rent-related financial products.
6. *Regulation of the real estate rental market.* Mature RERMs are commonly regulated by necessary policies, such as a rent control policy (Diamond et al., 2019; Kattenberg & Hassink, 2017), rent supplement schemes (Blessing, 2016; Watson & Corrigan, 2019), and regulation of rental contracts (Huisman, 2016; Moon, 2018). In emerging countries, the RERM may be immature, imperfect, and also lack sufficient regulations and policies. Thus, scientifically planning, developing, and regulating such markets seems crucial. We suggest that it is worth making further research efforts to design a proper regulatory system for the RERM consistent with the country's culture, economy, population, and other resources, so that the government can efficiently and effectively regulate changes in rental prices, provide sufficient welfare housing services, protect users' interest on rental platforms (e.g., Airbnb) and respond to emergencies (e.g., COVID-19 crisis) that could become monopolies in the future digital economy.

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