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Housing market bubbles and urban resilience: Applying systems theory

Bilal Ayub⁎, Nader Naderpajouh, Frank Boukamp, Tony McGough

School of Property, Construction and Project Management, College of Design and Social Context, RMIT University, GPO Box 2476, Melbourne, Victoria 3001, Australia

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ABSTRACT

In this paper, we aim to connect the academic discourses of housing market and urban resilience. For this purpose, we discussed the housing market and its performance within the broader housing system, with a specific attention to the transient state of the housing market bubble. Through a systematic literature review, the housing system is framed based on the involved actors and their interactions. This systems theory based view is then used to provide a broader definition of the variations in the market performance within the urban resilience literature. In this sense, the theoretical underpinning of the literature of resilience within the systems and the observed variations in the housing market performance is discussed in view of shocks and stressors to the system, as well as equilibria and responses to disturbances. The aim is to provide a foundation for an alternative theoretical framework that focuses on interactions within the market and can be used to understand the impact of the housing market’s financial drivers on urban resilience.

1. Introduction

The trend in urban growth and the need for urban resilience is coupled with the challenges associated with the housing systems (van Doorn, Arnold, & Rapoport, 2019). We consider the housing system as a collective of actors and their interactions around development, delivery, and operation of the housing market within the broader urban system. This includes financial, institutional, human, and ecological systems (Aalbers, 2016). The housing system is often assessed based on the performance of the housing market (Gibb & Hoesli, 2003; Jones, 2002). As a result, while housing can be considered a major speculative investment within capital markets in the broader housing system, it has substantial implications for individuals and societies trying to fulfill their basic need for shelter (Brown & Hincks, 2008). The market's vulnerability to unpredictable disturbances and cyclic dynamics can have detrimental consequences for the society, such as social distress, homelessness (Baker & Lester, 2017; Piat et al., 2015), unaffordability, and even economic collapses (Martin, 2011a; Martin, 2011b). To a large extent, these interrelated issues are studied within two separate research streams of housing studies: (i) the urban stream focuses on the planning and social implications of accommodating humans and communities, meanwhile, (ii) the financial stream focuses on market-driven dynamics and incentives. Exploring the links between these streams can provide a different angle on the impact of housing market performance on urban resilience (Wang, 2018b).

The interrelated structure of the housing systems and dynamics of the housing markets are governed by planning, regulations, policy, psychology, and economics (Case & Shiller, 2003; Chen & Wen, 2017; Lind, 2009). Because of the unexpected variations, these dynamics can be better observed in transient states, such as housing market bubbles. Bubbles occur when housing prices deviate from their fundamental values and create an unstable regime (Kim & Renaud, 2009). Framing the housing system within such a state can provide insight into the interactions between financially driven factors in the housing market and the broader urban resilience. This study aims to span the boundaries of the urban and financial streams of research in housing through a systematic approach. We examined literature about the housing market concerning the transient case of bubbles. We then aimed to provide an exploratory framework towards answering key questions: (1) how is the performance of the housing market understood in view of urban resilience? (2) what are the common stressors and shocks in the housing market? (3) what are the broader implications for urban resilience? and (4) what are the strategies to improve urban resilience in the face of shocks and stressors that are rooted in the housing market?

2. Background

2.1. The housing system

Based on Klir’s (1985) view on systems, the housing system can be
defined as an interrelated system composed of its actors, such as developers, communities, and regulators; their interactions, such as transactions; and the context, such as norms, policies, and regulations (Aalbers, 2016). This system has been discussed in the literature covering more than just the buy-sell dynamics of the housing market. Other areas include social relations (like neighborhood dynamics), regulations, investment and finance policies, spatial and land dynamics (Ball, 1986), climate and environment (Lovell, 2004), collective demographics (Green & Lee, 2016), politics (Van Der Heijden, 2013), individual and communal preferences, and quality of life (Shaw, 2004).

The actors and their interactions collectively shape the performance of the system in the broader urban setting. Within the housing system, this paper will focus on the performance of the housing market, specifically the impact of financial performance metrics within the overall system. Also, this focus is to explore the broader implications of financial variations of the housing supply and demand for urban resilience.

2.2. Urban resilience in the housing system

Resilience, from an urban perspective, is defined by the potential of an urban system to survive, adapt, and thrive in view of a range of disturbances (Index, 2014; Spans & Waterhout, 2017). Rooted in material engineering, the resilience concept has evolved and been applied in various disciplines, including ecology (Holling, 1973), psychology (Werner, Bierman, & French, 1971), engineering (Hollnagel, Woods, & Leveson, 2007), and organizational studies (Barnett & Pratt, 2000). Resilience studies have focused mainly on managing the impact of shocks and stressors, and proactively adding systemic features to sustain the required performance and prevent collapse (Zhang & Li, 2018).

Much of the literature related to urban resilience is concerning human-made disasters (Coaffee, 2016), natural disasters (Campanella, 2006), and climate change (Leichenko, 2011), which indicates the emphasis on emergency and disaster planning. This trend is shifting from a focus on being able to sustain systemic functions during disturbances towards adapting and even thriving, as conditions change (Ribeiro & Gonçalves, 2019).

Including market dynamics in the analysis of urban resilience can help broaden the analysis of urbanization issues by shifting the focus of resilience from dominant actors towards broader communities (Squires & White, 2019). Taking an example of density in urban regions, Brody, Kim, and Gunn (2013) focused on population density and suggested that larger population densities in disaster-prone areas can degrade urban resilience. Similarly, Antonucci and Marella (2016) studied the Italian housing market and indicated that less dense cities have more resilient housing markets. From a social perspective, less dense communities generally have better psychological, relational, and environmental quality of life (Passio, Rollero, & De Piccoli, 2013). With yet again a different focus, Sharifi et al. (2017) highlighted the argument that advanced construction techniques and enforcement of regulations can improve urban resilience in higher density areas and thus boost economic benefits. From the political viewpoint, communities either resist or accept densification based on several factors, including their history and their local government system (Charmes & Keil, 2015). This shows that a multitude of factors can influence urban resilience via the housing market, where the housing market is not an independent variable, but rather it impacts and is impacted by other broader factors in the urban context. We aim to use the synthesis of the prior literature on the financial stream to provide a synthesis of the impact of variations in the housing market that can be used for broader understanding of their implications for urban resilience.

The performance of the housing market in a broader urban resilience framework can be framed through its structure, specifically its performance in equilibria and through, shocks, stressors and market responses (Folke, 2006; Levine & Nicholson, 2017; OECD, 2011; Sharifi, 2019). Equilibria, or the steady states, are the periods in which the system performs according to an established norm. In the context of human-made systems (mostly engineering), there is often a desired state of the system as a single equilibrium (Davidson, Nguyen, Bellin, & Briggs, 2019). In the context of social-ecological systems (SES), the system can have multiple equilibrium states or be in a dynamic non-equilibrium state (Gunderson, 2000; Holling, 1996), which is also commonly associated with urban resilience (Meerow, Newell, & Stults, 2016). As mentioned previously, the bubble state is often seen as a transient state moving towards instability from the equilibrium state. The rise in prices may potentially end in gradual deflation or a sudden collapse. Collapse is a temporal and spatial transformation in a system that often results in the failure of that system, such as a cessation in the economic process, reduced growth, loss of capital/wealth, or failure of multiple industries or institutions (Cumming & Peterson, 2017).

The housing system is also affected by stressors, shocks and resulting responses. Stressors pressure the system in a gradual manner and over an extended period (Helbing, 2013). Shocks are sudden events that impact the system’s performance and stability (Sagara, 2018). Shocks or stressors do not undermine the system in isolation; instead, collapse often results from a combined impact of stressors and shocks (Vaughan, 2018). The uncertainty on timing and severity of consequences is a significant concern for societies during a bubble (Kanoh & Murase, 1999). Responses are the actions to alter the trajectory of systemic performance in the wake of shocks and stressors, some of which are based on early warning indicators and constant monitoring of systemic performance (Mitchell & Harris, 2012). Examples include measures to increase the stability of the system by providing shock absorbers, such as social housing in the housing market. Other responses can be adjustments to a system to improve its adaptive capacity or even transforming a system to a different steady state (Béné, Wood, Newsham, & Davies, 2012). Responses are important to contain the impact of disturbances on actors in the broader urban context, i.e., spillovers, such as homelessness.

To connect the performance of the housing market with urban resilience, factors of market boom and bust can be understood in terms of shocks and stressors, as the market responds to disturbances (Mitchell & Harris, 2012). Observing various phases of the market performance can highlight the state(s) of equilibria, which can be used to understand feedback and feedforward loops and consequent implications for resilience (Biggs et al., 2015). A conceptual framework is presented in the next section to further illustrate the theoretical underpinning of the synthesis and how it leads to the objective of the paper.

3. Conceptual framework

The system’s structure is a major determinant of its collective performance, its vulnerability to shocks and stressors, and its resilience (Cumming, 2016; Cumming & Peterson, 2017; Helbing, 2013). Therefore, a conceptual framework informed by a synthesis of this information is developed to connect urban resilience to the housing market (Fig. 1). That is, the framework aims to connect the financial discourse in the housing market to social discourse in urban resilience. The system boundaries in Fig. 1 are demarcated by the housing system within the broader urban and rural systems that include political, social, and institutional dynamics. Within the housing system, we focused on the performance of the housing market because of its (sometime undesired) significant in defining the structure and dynamics of the housing system in real world. In the wake of disturbances, the performance of the system will change, but the implications of the change are beyond the housing market and also affects the urban (and rural) systems. Linking the metrics of housing market performance to urban resilience can provide a systematic framework to explore these broader implications.

Presenting the framework, based on the synthesis of the prior literature, in the discussion henceforth we discuss actors and their
interactions within the housing system, the concepts of shocks and stressors, their connection with housing market performance, and its potential impact on states of equilibrium and systemic structure. We will further examine the responses and countermeasures put in place to stabilize market performance and discuss the implications of performance variations and spillovers in an urban setting.

4. Methodology

We reviewed the literature of the housing market to extract common system behavior properties by focusing on market bubbles. This is performed by adopting Systematic Literature Review (SLR) steps (Aarseth, Ahola, Aaltonen, Økland, & Andersen, 2017; Kitchenham & Charters, 2007) to synthesize the literature of housing market bubbles. We limited the focus to published literature through the Web of Science (ISI) and did not consider any grey literature. The search string was defined based on the housing market bubbles with permutations of the words including “housing market bubble” or “residential property bubble” or “property market bubble” in manuscripts’ titles, abstracts or keywords. The string used was “((ts="housing* market* bubble* OR property* market* bubble* OR residential* property* bubble* OR real estate* market* bubble*")))”. After obtaining the list of 632 manuscripts, screening was conducted to eliminate unrelated manuscripts. For this purpose, the title, abstract, and keyword of the manuscripts were reviewed. Manuscripts removed covered areas outside the scope of the current research, such as thin-film bubbles in physics. From the initial 632 manuscripts, 71 articles remained after screening and were retrieved and coded using the NVivo 12 software package.

Within the text associated with each coding node (Table 1), many of the textual connotations were the same but used different words; thus, contextual sensing was incorporated (Dey, 2001). For example, the terms ‘bailout’ and ‘rescue package’ used interchangeably, are synthesized under the same category. The final results were discussed with a subject matter expert to incorporate their knowledge and practical experience (Given, 2008; Marks & Yardley, 2004).

5. Results and discussion

The list of the top 10 journals with the highest number of appraised manuscripts is given in Fig. 2, which indicates the topical focus on real estate, housing, finance, urban studies, and economics. Fig. 3 shows the chronology of the synthesized manuscripts from 1994 to 2018. In terms of the tools and techniques used for analysis, majority of the manuscripts are from the financial stream of the housing research, as expected in the research gap. Within the appraised manuscripts, the methodologies as implied by the authors of each manuscript, include statistics (30%) and qualitative methods (27.14%), as the most commonly used tools and techniques, followed by econometrics (12.86%), economic modeling (7.14%), real estate economics (7.14%) and empirical research (5.71%). Modeling and simulation were also present but with limited application, including mathematical modeling (4.29%), behavioral systems (1.43%), computational modeling (1.43%), geographical methods (1.43%), and mathematical optimization (1.43%). With the prevalence of simulation in the system resilience literature, this observed gap may be a potential future direction to simulate urban resilience in view of future scenarios of the housing market performance.

5.1. Structure of the housing system: actors and their interactions

The housing system is outlined in terms of its structure through identifying the diverse array of actors and their interactions from the appraised articles. The structure of the system is framed based on the involved actors (identified in Table 2), their position in the lifecycle of the housing establishment (presented in Fig. 4), and their interactions (highlighted in Table 3) within the housing system.

The general structure of the housing system is framed by mapping the role of identified actors at various stages throughout the lifecycle of houses (Fig. 4). This lifecycle includes the delivery processes within five main phases of planning, acquisition, construction, sales, and occupation and maintenance (O&M) (Cox & Ireland, 2002) (The phases and their order are subject to change based on the type of procurement method for project delivery). The dynamics associated with sales are typically cyclic, where after an initial sale, a safe-wait cycle may originate as the owners/investors may speculate price increase and wait for a favorable return as a repeat sale (Mikhed & Zemčik, 2009). Furthermore, some of the actors may change their roles at different stages, such as a buyer becoming an investor if a purchase is made to resell for profit. Mapping the structure of the system facilitates in-depth understanding of the underlying dynamics that collectively shape and drive the variations in the housing market and impacts urban resilience. Such an
understanding can be further used to situate more hidden actors, such as private equity firms, and explore their impact on urban resilience.

Stakeholders interact within the system to optimize their outcomes which are also the basis of the variations in the performance of the market. We used Foskett’s (1999) suggestion to categorize interactions as delivery (where a service or product is provided), transaction (where the financial exchange is involved), and influence (where one actor may influence without exchanging products, services or finance). An Actor Interaction Matrix (AIM) was then created from the description of the actors, their position in the overall housing market, and their interactions (Table 3) where ‘D’ represents delivery, ‘T’ represents a transaction, and ‘I’ represents influence interactions. These relationships are grounded in the understanding of the appraised manuscripts and represent a unidirectional relationship where the rows represent the source (starting end of a relation), and the columns are the sink (the receiving end of the relation). For example, FGO (Federal Government) has a delivery relationship with BUY (Buyer), and in reciprocation, BUY has a transaction relationship with FGO. This matrix depicts more detailed interactions of the actors within the housing market. The relationships are subjected to change depending on the region, the housing market in question and the role and responsibilities assumed by each actor. For example, in the case of development investors, the developers and the buyers can have a direct relationship as denoted by an asterisk (*) in Table 3. Generally, the feedforward and feedback loops drive the performance of a system and may drive its resilience (Holling, 1996). Therefore, the interactional matrix can be used to depict the loop of the dynamics in the housing system to assess the general arrangement between the actors for the delivery of housing. Such AIMs can be used as a baseline to assess alternative structural changes and to examine the impact on the performance of the housing market.

5.2. The Performance Of The Housing Market

The performance of the housing market can be explored within the housing system based on a range of indicators depending on the intention of the assessors and their focus. The most common indicators relate to value, transactional data, and market dynamics. Within a housing market, house prices are determined based on market fundamentals including income, interest rate, employment rate, supply and demand characteristics, median house prices and discount rates, costs of owning, and construction costs, demographics and location indices. As highlighted in various studies in the appraised articles, the performance of the housing market can be explored through price-to-income ratios, debt levels, cost of mortgage, mortgage affordability indices, average housing price, number of sales, vacancy rates, supply indices and transactional indices. Furthermore, such performance indicators have also been used to observe resilience characteristics within the housing market.

Considering the wider dynamics associated with housing bubbles, it is also highlighted that ex-ante prediction of a potential bubble in an existing market is still a significant challenge, causing delays in forming policies associated with urban resilience. That is, the price boom is usually accompanied by a wave of complimentary market fundamentals, which may artificially influence the asset value and drive it away from its true fundamentals. This is further complicated by challenges in the identification of the

| Node | Definitions | Discussed concepts |
|------|-------------|--------------------|
| Dynamics of the system | Identified actors, interactions, emergent issues, and consequences of the bubble, such as socioeconomic and political issues. | System structure: actors and their interactions |
| Response | Details of the intervention strategies, countermeasures, and policies – what is usually done to respond to market bubbles. | System resilience framework |
| Factors | Factors that contributed to the market behavior: stressing the market towards a high and fast rise in prices and shocking the market in a rapid decline. | Equilibria |
| Sub-nodes | | Consequences and spillovers of housing market bubbles |
| Leading indicators | Leading indicators for bubbles – how bubbles are hinted during a period of boom leading up to a bust. | Responses |
| | | - System structure: actors and their interactions |
| | | - System resilience framework |
| | | - Equilibria |
| | | - Consequences and spillovers of housing market bubbles |
| | | - Responses |
| | | | - Performance measurement of the system |

Table 1
Coding framework with nodes and definitions.

![Fig. 2. Top 10 journals identified from the 71 appraised manuscripts.](#)
trigger that starts the trading frenzy to form the bubble, along with the tipping point from boom to bust (Schoen, 2017). Some studies suggested potential early signs as proxies of market bubbles during a period of high price fluctuations in the housing market, such as an increase in vacancy rates (Dehesh & Pugh, 1999; Haila, 1999), the backlog of unsold dwellings (Boelhouwer, 2017), decline in corporate profits (Hui, Wang, & Wong, 2014), the decline in rents (Dehesh & Pugh, 1999) and reduced or stagnant household incomes (Huang & Chiang, 2017). The structure of the housing system contributes to the bubble based on the speculation within the market, e.g., building more houses to profit from the hyped-up market (Case, Shiller, & Thompson, 2012; Hendershott, 2000). Various market actors, such as regulatory organizations may utilize early warning indicators to employ countermeasures in response to the trajectory of the housing market performance. Building on the work of Lind (2009), followed by Camilleri (2011), a summarized list of such indices that can be used by decision-makers in the urban context is presented in Table 4.

### Table 4

| No. | Actor group          | Code | References                        |
|-----|----------------------|------|-----------------------------------|
| 1   | Architect            | ARC  | (Gaffney, 2009)                   |
| 2   | Buyer/Investor       | BUY  | (Holtemoller & Schulz, 2010; Hui, Dong, Jia, & Lam, 2017) |
| 3   | Community-Based      | CBO  | (Shiller, 2009)                   |
| 4   | Contractor/Builder   | CON  | (Gaffney, 2009)                   |
| 5   | Developer            | DEV  | (Hui et al., 2017)                |
| 6   | Federal Government   | FGO  | (Walks, 2014)                    |
| 7   | Financier            | FIN  | (Roy & Kemme, 2012)               |
| 8   | Local Government     | LGO  | (Byrne & Norris, 2018)            |
| 9   | Non-Governmental     | NGO  | (Shiller, 2009)                   |
| 10  | Occupant             | OCC  | (Arce and Lopez-Salido, 2011)     |
| 11  | Owner                | OWN  | (Kanoh & Murase, 1999)            |
| 12  | Real Estate Agent    | REA  | (Arce & Lopez-Salido, 2011)       |
| 13  | Researchers/Academics| RES | (Jackson, 2018)                   |
| 14  | Solicitor            | SOL  | (Shi & Kabir, 2013)               |
| 15  | Supplier             | SUP  | (Williams & Nedovic-Budic, 2016)  |
| 16  | Tradesmen            | TRA  | (Ivanova, 2017)                   |
| 17  | Valuer               | VAL  | (Hendershott, 2000)               |

### 5.3. Resilience in the context of the housing system

Let us now discuss the resilience of the housing market in view of shocks and stressors, together with equilibria and response mechanisms within the housing system.

### 5.4. Stressors and shocks

An overview of the stressors and shocks are identified from the appraised literature is presented in Appendix-1. Major categories based on their influence on particular domains of the housing market include (1) demand and supply dynamics, (2) global influence, (3) cash flow, (4) interest rate, (5) intermarket dynamics, (6) mortgage and financing, (7)
Table 3
Actor interaction matrix for housing market transactions.

| SOURCE | Code | ARC | BUY | CBO | CON | DEV | FGO | FIN | LGO | NGO | OCC | OWN | REA | RES | SOL | SUP | TRA | VAL |
|--------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|        | ARC  | D   |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|        | BUY  | T*  | T   | T   | T   |     | D   | T   | T   | T   |     |     |     |     |     |     |     |
|        | CBO  | I   |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|        | CON  | I   |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|        | DEV  | T   | D*  | T   | D   | T   | D   |     |     |     |     |     |     |     |     |     |
|        | FGO  | D   |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|        | FIN  | T   |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|        | LGO  | D   |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|        | NGO  | I   |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|        | OCC  | I   |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|        | OWN  | I   |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|        | REA  | D   |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|        | RES  | I   |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|        | SOL  | D   |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|        | SUP  | D   |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|        | TRA  | D   |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|        | VAL  | D   |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |

Table 4
Examples of bubble indicators.
Adopted from Lind (2009) and Camilleri (2011).

| No. | Index | Bubble categorization |
|-----|-------|-----------------------|
| 1   | Presence of bubble | Real prices increased 100% in 5 years or Real prices increased 50% in 3 years |
| 2   | Sale price | Average house price is up to 6 years of average income |
| 3   | Price elevation | Rate of price increase to rate of income increase is more than 1 and less than 1.3 |
| 4   | Types of properties | Bubble categorization only possible by property type affected. Bubble size classification not possible. |
| 5   | Investor's psychology | Quite optimistic |

5.5. Responses

In the wake of shocks and stressors, countermeasures can be employed within the housing market to respond to disturbances and reduce fallout (Squires & White, 2019). A list of responses is presented in Table 5, indicating that responses broadly fall into two types of proactive and reactive (Shaw, 2012; Vale, 2014). The responses can be proactive, where upfront changes are made in the system in view of possible future shocks and stressors, and reactive responses are employed during or after the time of crisis to sustain systemic performance and reduce negative consequences and fallout (Vale, 2014). In the time of market boom and peak speculation, property tax, frequent appraisal of property prices, and introduction of house sale restrictions have been suggested as effective mechanisms to curb excess market speculation and strengthen market performance. Many of the responses, identified in Table 5, fall in the reactive category like quantitative easing, restricted bank loans, and limiting foreign investment. Such decisions are often seen as short-term measures to reduce the sale activity at the time of uncontrolled price hike and correct housing prices (Yan & Ouyang, 2018). Other than reactive measures, a proactive response such as an increase in affordable housing projects, introduction of new institutional systems, such as land-trust systems and promoting industry transfer, are also employed to support sustainable market performance. These response categories (Table 5) also include cases where policy and regulatory institutions can favor one market actor over another, such as favoring developers and investors over homeowners and renters (Squires & White, 2019). Such responses can undermine broad urban resilience because of their inherent bias. As an example, capital injections can help a market in the short term as a reactive response that may...
| No. | Category                        | Response Strategy                                                                 | References                                                                 |
|-----|---------------------------------|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------|
| 1   | Speculation                     | Curbing general market speculation                                               | (Gaffney, 2009; Hui et al., 2017; Lai, 2017; Oizumi, 1994; Shiller, 2009; Wu & Li, 2018; Yu, 2015) |
| 2   | Housing Policy and Facilitation | Equalization of basic public services                                              | (Yu, 2015)                                                                |
| 3   |                                  | Expansion of the rental market                                                     | (Arce & Lopez-Salido, 2011; Byrne & Norris, 2018; Czerniak & Rubaszek, 2018; Esteban & Altuzarra, 2008; Holtemoller & Schulz, 2010; Wu & Li, 2018) |
| 4   |                                  | Increase in affordable housing projects by local governments                       | (Byrne & Norris, 2018; Kim & Renaud, 2009; LaCour-Little, Calbourn, & Yu, 2011; Li & Xu, 2016; Walks, 2014; Yu, 2015) |
| 5   |                                  | Increase in affordable housing projects by real estate developers                 | (Byrne & Norris, 2018; Kim & Renaud, 2009; LaCour-Little et al., 2011; Li & Xu, 2016; Walks, 2014; Yu, 2015) |
| 6   |                                  | Offering rental living on the same property                                        | (Shiller, 2009)                                                           |
| 7   |                                  | Regulations stimulating demand for renting                                          | (Czerniak & Rubaszek, 2018; Holtemoller & Schulz, 2010; Wu & Li, 2018)      |
| 8   | Institutional Changes           | Public-Private Partnerships                                                        | (Oizumi, 1994)                                                           |
| 9   |                                  | Improvement of housing guarantees system                                           | (LaCour-Little et al., 2011; Yu, 2015)                                    |
| 10  |                                  | Introduction of land-trust system                                                  | (Oizumi, 1994)                                                           |
| 11  |                                  | Establishment of real estate institutions                                          | (Oizumi, 1994)                                                           |
| 12  |                                  | Regulatory oversight                                                              | (Goddard et al., 2009)                                                   |
| 13  |                                  | Restraint over executive compensation                                             | (Goddard et al., 2009)                                                   |
| 14  | International Investors          | Limiting foreign investment                                                       | (Dehesh & Pugh, 1999; Haila, 1999; Hui et al., 2014; Li & Xu, 2016)       |
| 15  | Land Policy Changes             | Planned land-use                                                                   | (Jackson, 2018; Oizumi, 1994; Zhang & Wang, 2016)                         |
| 16  |                                  | Prioritization of land-use                                                         | (Li & Xu, 2016; Oizumi, 1994)                                             |
| 17  |                                  | Profit-sharing from landowners to the public                                       | (Oizumi, 1994)                                                           |
| 18  |                                  | Promoting industry transfer                                                        | (LaCour-Little et al., 2011; Yu, 2015)                                    |
| 19  |                                  | Reduced fiscal reliance on land sales by local governments                          | (Yu, 2015)                                                               |
| 20  |                                  | Forbidding land hoarding                                                           | (Lai, 2017; Li & Xu, 2016)                                               |
| 21  | Market Intervention             | Rescue packages                                                                    | (Dehesh & Pugh, 1999; Oizumi, 1994; Shiller, 2009)                        |
| 22  |                                  | Capital injections                                                                 | (Goddard et al., 2009)                                                   |
| 23  |                                  | Qualitative easing                                                                 | (Case et al., 2012; Garino & Sano, 2004; Goddard et al., 2009; Huang & Shen, 2017; Richmond & Roehner, 2017; Walks, 2014) |
| 24  | Mortgage and Lending Regulations | Increasing interest rates                                                          | (Li & Xu, 2016; Richmond & Roehner, 2017; Williams & Nedovic-Budic, 2016) |
| 25  |                                  | Rescheduling of mortgage payments                                                  | (Goddard et al., 2009; Shiller, 2009)                                    |
| 26  |                                  | Tightening of mortgage lending                                                     | (Boehmberger, 2017; Kim & Renaud, 2009)                                  |
| 27  |                                  | Higher mortgage rates for a second home                                            | (Berkovec, Chang, & McManus, 2012; Esteban & Altuzarra, 2008; Huang & Chiang, 2017; Wu & Li, 2018) |
| 28  |                                  | Lending at competitive rates                                                       | (Goddard et al., 2009)                                                   |
| 29  |                                  | Minimum down payment ratio                                                         | (Czerniak & Rubaszek, 2018; Gjerstad & Smith, 2009; Li & Xu, 2016; Wu & Li, 2018) |
| 30  |                                  | Restricted bank loans                                                             | (Esteban & Altuzarra, 2008; Li & Xu, 2016; Redmond, 2013; Schoen, 2017; Teng, Chang, & Chen, 2017) |
| 31  |                                  | Securitization of property financing                                               | (Oizumi, 1994)                                                           |
| 32  |                                  | Suspension of lending in the sub-prime sector                                       | (Kim & Renaud, 2009)                                                    |
| 33  |                                  | Tighter housing credit regulations                                                 | (Czerniak & Rubaszek, 2018; Duca, Muelbauer, & Murphy, 2010; Lai, 2017)   |
| 34  | Taxation                        | Property tax                                                                       | (Brunnermeier & Julliard, 2008; Duca et al., 2010; Gaffney, 2009; Himmelberg, Mayer, & Sinai, 2005; LaCour-Little et al., 2011; Lai, 2017; Li & Xu, 2016; Oizumi, 1994; Shi & Kabir, 2018; Williams & Nedovic-Budic, 2016; Yu, 2015) |
| 35  |                                  | Increasing taxes on short-term sales profit                                        | (Richmond & Roehner, 2017)                                               |
| 36  |                                  | Landholding tax                                                                    | (Oizumi, 1994)                                                           |
| 37  | Trade Regulations               | Restricted housing purchase                                                        | (Li & Xu, 2016; Wu & Li, 2018; Yan & Ouyang, 2018; Zhang & Wang, 2016)     |
| 38  |                                  | Reserve requirements for purchase                                                  | (Li & Xu, 2016; Zhang & Wang, 2016)                                       |
| 39  |                                  | Monetary control over excess liquidity                                             | (Tazi, 2017)                                                             |
| 40  |                                  | Raising the entry threshold for the real estate agency market                      | (Yu, 2015)                                                               |
| 41  |                                  | Ceilings on housing sizes                                                          | (Kim & Min, 2011; Li & Xu, 2016)                                         |
| 42  |                                  | Restricted sale prices, construction periods and market access                     | (Li & Xu, 2016; Richmond & Roehner, 2017)                                 |
favor corporations and existing homeowners (Goddard et al., 2009). On the other hand, improving housing market guarantee schemes is a proactive response for potential shocks and stressors that has broader implications for urban resilience, focusing on communities rather than private organizations (Yu, 2015). The proactive responses provide an opportunity for long-term development in the housing system that does not result in immediate change but acts towards the transformation of the system. This could be achieved by, for example, diversification in housing or improving information flow between actors to make informed decisions (Bone & O'Reilly, 2010). Examples of such responses, highlighted in the appraised articles, include leasehold options, improving rental and social housing, and improving information sharing.

5.5.1. Leasehold options

In various studies, a correlation is observed between the size of housing bubbles and property status as a leasehold or a freehold. It has been observed that markets with leasehold properties along with freehold options are more stable than the markets with just freehold properties, because leasehold options act as a counterforce to the rising prices of freehold properties and improving market resilience (Teng et al., 2017).

5.5.2. Efficient rental market

Apart from homeownership, the general housing market that is supported by an effective rental market (in terms of its size and affordability) has often shown more stability and responsiveness to shocks and stressors (Byrne & Norris, 2018; Czerniak & Rubaszek, 2018; Tu, de Haan, & Boelhouwer, 2018). Stable rental market supports the overall housing market by providing an intermediate option of housing to the demand actors. It acts as a buffer in times of various shocks like upward trends and supply variations of housing (Byrne & Norris, 2018).

5.5.3. Efficient social and alternative housing

In addition to a stable rental market, a well-maintained social housing sector within the overall housing market provides a buffer from intensive shocks (Byrne & Norris, 2018). Prior cases, such as Ireland (Byrne & Norris, 2018), suggest that the development of the social housing sector may have a positive impact on the overall market performance. However, social housing should be substantial in order to have any stabilizing effect (Czerniak & Rubaszek, 2018). It can be hypothesized that the resilience goals can be achieved through a less interconnected social housing market if it provides affordable options when unaffordability increases (Byrne & Norris, 2018).

5.5.4. Improved information sharing

The quality and availability of information results in market cohesion, while lack of information increases speculation and the chances of bubbles (Schoen, 2017). Associated issues related to information within the market range from information asymmetry (Shi & Kabir, 2018), misleading information (Redmond, 2013), information failure (Levitt & Syverson, 2008), and bounded rationality (LaCour-Little et al., 2011). Examples have been observed in several markets, such as the case of Illinois (Levitt & Syverson, 2008) and North Carolina (Pope, 2008) in the US.

In this regard, alternative interactions between actors through introducing new or changing current interactions (identified in Table 3) can be the basis of the systematic response. For example, homebuyers and owners can interact with various government agencies, designers, and other community groups and participate in the planning processes of new developments. This, in turn, empowers them to share concerns, convey needs, and actively inform decisions. Such advocacy is often associated with the employment of alternative planning and development approaches, like participatory planning, where crucial stakeholders are involved in the planning processes, which can improve information sharing between diverse actors and foster trust (Laurian, 2009), which may impact broader urban resilience.

5.6. Equilibria

Equilibria are associated with a steady state of the system and a predictable trajectory (Gunderson, 2000). Synthesizing the appraised manuscripts, four distinct equilibria states have been identified, namely: Ep, E1, E2, and E3. To visualize these, Fig. 5 presents the US bubble using the S&P/Case-Shiller Home Price Index from 1995 until 2012. The curve Cp represents the actual performance (based on house prices) of the housing market during that time. E3 represents planned growth, which can be considered as the desired system performance on the basis of long-term development goals.

The line E1 represents the trend of the boom phase of the bubble and the combined E2 and E3 zone can be referred to as the adaptability and recovery of the market over the timespan. This reflects the housing market reacting to the disturbances in terms of market response, identified in Table 5. The E1 trend is used to anticipate an early indication of performance variation (Camilleri, 2011), which can be used by policymakers in urban resilience.

In many cases, the housing market's rapid shift in states of equilibriums, especially towards a downturn (from E3 to E2), may be referred to as a price correction or a collapse depending on the span of time. The divergence of housing demand and supply shifts the market towards potential instability and disruption that may instigate rapid price decline (Himmelberg et al., 2005). Therefore, at the macro level, there is often a concern to reduce the imbalance of supply and demand or potential lags. For example, supply delays can be reduced by the use of innovative and efficient construction techniques such as prefabrication and modular housing, which can reduce the construction time and close the supply-demand gap (Jiang, Mao, Hou, Wu, & Tan, 2018). On the other hand, after shocks, such as the impacts of recent COVID-19 pandemic on the housing and real estate sector, the aim would be to stimulate the demand through incentives, such as quantitative easing and capital injections, to recover to a stable state (Shiller, 2009).

Decision-makers can use the housing market indicators to develop policies to prevent rapid collapse and ensure urban resilience through gradual price correction. The broader connection to urban resilience can provide other actors, such as home buyers (market entrants), the ability to benefit from the correction, adding to the social aspects of urban resilience. For example, after a downturn, new home buyers can benefit from minimum down payment ratios (Czerniak & Rubaszek, 2018) for taking out mortgages while the overall decline in house prices can improve affordability. This can support urban resilience through the transient system of the housing market during the bust period.

5.7. Systemic structure and collapses

As discussed, the holistic performance of the housing market emerges from the interaction of the actors that are identified in Tables 2 and 3 in the context of the housing system and its associated social, political, and institutional arrangements (Case & Shiller, 2003; Mitchell & Harris, 2012). In this context, the dynamics of the housing market presented in the appraised articles suggest that an impact on one actor may pass directly or indirectly to another actors, which can instigate a wider market downturn and have implications for urban resilience (Henneberry, McGough, & Mouzakis, 2005; Tsolacos, Keogh, & McGough, 1998).

Studying these interactions in view of market structures and their associated collapse mechanisms facilitates systematic development of effective response strategies and promotes systemic structural transformation (Cumming, 2016; Cumming & Peterson, 2017). A visual representation of
a range of systemic structures based on the interconnectedness of actors and hierarchy is presented in Fig. 6. The housing systems can be hierarchical, with the presence of major established development players, and non-hierarchical, when development is mostly informal and based on individual cases (Watkins, 2001). The topology of the structure of the housing systems can range from a polycentric structure to a non-hierarchical and unconnected, individualistic structure. As an example of the implications of this topology for collapse, it can be observed that individualistic systems may experience collapses on an individual level, such as loss of wealth or individual foreclosure. However, because of the lack of connections, the overall impact on the housing system is low (Barceló & Villanueva, 2019). On the other hand, issues such as misinformation (Redmond, 2013; Shi & Kabir, 2018) are much more prevalent in reticulated systems.

Examples of the responses to shocks and stressors (identified and presented in Table 5) with the focus on structural improvement and modifications in the existing market, such as expanding the rental market, adding affordable housing provisions, and establishing new real estate institutions suggest a close link between market structure and performance stability. These responses to market performance

Fig. 5. Anatomy of equilibrium states in housing markets.
Adopted from S&P/Case-Shiller Home Price Index from the year 1995 till 2012 for the US - Data source FRED (2019).

Fig. 6. Structural typology of the housing system.
Adapted from Cumming (2016); Cumming and Peterson (2017).
variations then require an understanding of the basic principles of urban resilience, where the tension between diversity and efficiency in the systemic structure exists (Crabtree, 2018; Kraatz, 2018). For example, alternative housing options may allow a diverse array of actors to be involved in the housing market catering to a wide range of needs (Bone & O'Reilly, 2010), which may then compromise the efficiency of the market. Similarly, actions such as the launch of new mortgage instruments (Duca, Johnson, & Muellbauer, 2009) may introduce diversity in the market by providing various actors, but on the contrary, may also reduce efficiency because of their novelty. Likewise, delocalization in an urban setting (Hall, 1999) may be done to consolidate services and employment opportunities for better management (efficiency) but with the consequence of losing diversity. As a result, actions formed to optimize a segment of the system may diminish the system's overall resilience (Walker & Salt, 2012). In the broadest view, a focus on solely optimizing the housing market may have an adverse impact on urban resilience (Salat, 2017).

6. Discussion

Implications of performance variations in the housing market on market actors were observed in the appraised manuscript with their direct and indirect association with urban resilience. These variations increase foreclosures rates and diminish the quality of life by reducing household wealth and financial safety nets (Bostic & Ellen, 2014; Gaffney, 2009). Within the affected communities, depression, stress, and increased suicide rates are also observed (Houle & Light, 2014). Increasing rental costs, housing unaffordability, diminishing wealth, lack of trust, job losses and mortgage defaults increase the vulnerability of various community groups and instigate wider societal consequences (Ellis, 2011; Schoen, 2017) such as homelessness (Byrne & Norris, 2018), increased social disorder (Bone & O'Reilly, 2010), and decline in social capital and community cohesion (Kingsley, Smith, & Price, 2009). The variations in the performance of the housing market that result in the loss of capacities, such as financial security, safety, and physical and mental health, have adverse impacts on individual, institutional and societal levels (Burayid, Allen, Twigg, & Wamsler, 2019) and ultimately has implications for urban resilience.

The impact on urban resilience also extends to spillovers, such as in emergency response and healthcare sectors: The demand for such services surge due to elevated health and social needs for the community during the periods of extreme variation in the market, stressing emergency and health services, where they potentially fail to cope with individual and community needs (Schoen, 2017). The stress, which is rooted in the housing market, influences urban resilience because of the loss of social and economic capital, and the pressure on essential infrastructure. Other examples of the interconnectedness between the performance of the housing system and urban resilience include the implications of homeownership and increased economic and social capital, which in turn suggests improved market stability and urban resilience (Rosenthal, 2008). The French housing market remained stable after the subprime crisis due to changes associated with income distribution, including efficient social, rental, and finance systems (Tutin & Vorms, 2014). These examples indicate the interdependencies (in the form of reciprocal impact) between the financially driven housing market and urban resilience. These interdependencies can be further highlighted in future research by comparing the impact of housing market indicators on urban resilience, or further prioritizing policies that focus on urban resilience within policies to stimulate the performance of the housing market.

7. Conclusions

In this paper we aimed to frame the housing system and explore the variation of the performance of the housing market in relation to urban resilience. For this purpose, we focused on bubbles as an extreme case of performance variation in the housing market and mapped them within the overall housing system. We examined the case of the housing market crisis and the consequent societal spillovers. We also highlighted possible market indicators to explore the housing market’s financial performance and the socioeconomic consequences for urban settings. This interdisciplinary endeavor can be further used as a basis for the analytical exploration of housing markets and their implications for urban resilience. The scope of the research is limited in terms of its exploration of political and institutional resilience within the urban systems. Different aspects, such as connection to urban and rural subsystems, are not proportionally discussed due to the limitation of scope on the housing market performance within the urban resilience discourse. Furthermore, synthesizing data from one citation index, i.e., Web of Science, poses a challenge in preparing an extensive list of factors such as stressors, shocks, and responses.

Since our synthesis was agnostic to a range of regulatory, social, political and historical contexts, the variety of inputs within the synthesis provides a wide range of contextual factors and issues related to housing market bubbles and their implications for urban resilience. The aim of the synthesis was to offer a broader perspective by focusing on the cumulative contribution of factors in diverse cases rather than developing a comparative view in terms of cross-market contextual differences and similarities. But on the other hand, as a limitation of the study, it is also acknowledged that specific contextual factors are influential in driving the bubble dynamics for each individual market and the result of the synthesis should be contextualized for each case. Due to the inherent differences in the nature of diverse housing markets, the findings are generalized and presented as a broader framework to explore implications of the housing market variations for urban resilience rather than a prescription for specific markets. Further studies can include other sources and indices to create more exhaustive lists of factors and identify further categories. Although the appraised manuscripts for the current research concern the study of formal housing markets, research should be carried out, making a clear distinction between the studies of factors between formal and informal markets specially for global south. Furthermore, the case does not discount the local factors that shape the dynamics of a transient state of bubbles and implications for urban resilience. Instead, it aims to provide a framework built upon prior studies that can be used to examine the urban resilience discourse in view of the variations in the performance of the housing market.

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CRedit authorship contribution statement

Bilal Ayub: Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Visualization; Writing - original draft; Writing - review & editing.
Nader Naderpajouh: Conceptualization; Investigation; Methodology; Supervision; Project administration; Validation; Visualization; Writing - original draft; Writing - review & editing.
Frank Boukamp: Conceptualization; Supervision; Writing - original draft; Writing - review & editing.
Tony McGough: Validation; Writing - original draft; Writing - review & editing.

Declaration of competing interest

The authors declare no conflict of interest.
Appendix 1. Categorization of stressors and shocks in the housing market

| No. | Categories                        | Factor                                      | References                                                                                                                                 |
|-----|-----------------------------------|----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | Demand and supply dynamics        | Increased housing demand                    | (Czerniak & Rubasek, 2018; Duca et al., 2010; Esteban & Altuzarra, 2008; Kim & Renaud, 2009; Paciorek, 2013; Riddel, 1999; Teng, Chang, & Chau, 2013; Teng et al., 2017; Williams & Nedovic-Budic, 2016; Zhou & Sornette, 2003) |
| 2   | Inelastic housing supply          | (Berkovec et al., 2012; Duca et al., 2010; Ellis, 2011; Huang & Shen, 2017; Kim & Renaud, 2009)                                    |
| 3   | Delay in housing supply           | (Berkovec et al., 2012; Duca et al., 2010; Ellis, 2011; Huang & Shen, 2017; Kim & Renaud, 2009)                                    |
| 4   | Increased housing reconstruction  | (Kim & Min, 2011)                            |                                                                                                                                                        |
| 5   | Global influence                  | International investment from non-natives   | (Dehesh & Pugh, 1999; Ellis, 2011; Kim & Renaud, 2009)                                                                                          |
| 6   | Overseas investment from natives  | (Brueckner, Calem, & Nakamura, 2012; Haila, 1999; Oizumi, 1994)                                                                              |
| 7   | Cashflow                          | Increased per capita income                 | (Esteban & Altuzarra, 2008; Gjerstad & Smith, 2009; Kim & Renaud, 2009)                                                                       |
| 8   | Abundance of capital from lenders and investors | (Byrne & Norris, 2018; Dehesh & Pugh, 1999; Gjerstad & Smith, 2009; Goddard et al., 2009; Kim & Renaud, 2009; Oizumi, 1994; Shiller, 2009; Zhou & Sornette, 2003) |
| 9   | Excessive monetary surplus        | (Dehesh & Pugh, 1999)                        |                                                                                                                                                        |
| 10  | Increased profits for investors and developers | (Gaffney, 2009; Ivanova, 2017; Oizumi, 1994)                                           |
| 11  | Lack of other investment opportunities | (Redmond, 2013)                             |                                                                                                                                                        |
| 12  | Oversupply of idle money          | (Ivanova, 2017)                              |                                                                                                                                                        |
| 13  | Interest rate                     | Low interest rates                           | (Brueckner, 2005; Haila, 1999; Holtemoller & Schulz, 2010; Hui et al., 2010; Jackson, 2018; Kim & Min, 2011; Kim & Renaud, 2009; Lai, 2017; Mähönen & Zemcik, 2009; Redmond, 2013; Roy & Kemme, 2012; Tu et al., 2018) |
| 14  | Fall in discount rate             | (Dehesh & Pugh, 1999; Gjerstad & Smith, 2009; Oizumi, 1994)                                                                               |
| 15  | Low rate foreign loans            | (Dehesh & Pugh, 1999; Esteban & Altuzarra, 2008; Haila, 1999; Li & Xu, 2016; Wong, 2001)                                              |
| 16  | Government bonds                  | (Ambrose, Eichholz, & Lindenthal, 2013; Dehesh & Pugh, 1999)                                                                             |
| 17  | Inflation                         | Increased interdependency between markets   | (Gjerstad & Smith, 2009; Haila, 1999; Jackson, 2018; Kim & Renaud, 2009; Mähönen & Zemcik, 2009; Redmond, 2013; Williams & Nedovic-Budic, 2016; Wong, 2001) |
| 18  | Increase in home prices           | (Case & Shiller, 2003; Case et al., 2012; Dus et al., 2010; Roy & Kemme, 2012; Shiller, 2009; Starr, 2012)                           |
| 19  | Highly subsidized housing market  | (Byrne & Shiller, 2012; Haila, 1999; Richmond & Roeher, 2017; Shiller, 2009)                                                              |
| 20  | Structural macro-economic changes | (Baur & Jalland, 2003; Dehesh & Pugh, 1999; Fraser, Hoeft, & Mcalevey, 2008; Kim & Renaud, 2009; Redmond, 2013; Tu et al., 2018) |
| 21  | Mortgage and financing            | Increased sub-prime mortgage market         | (Beesley & McQueen, 2009; Gochoco-Bautista, 2009; Shiller, 2009)                                                                           |
| 22  | Structural macro-economic changes | (Baur, Heany, 2017; Dehesh & Pugh, 1999; Fraser, Hoeft, & Mcalevey, 2008; Kim & Renaud, 2009; Redmond, 2013; Tu et al., 2018) |
| 23  | Easier access to finance          | (Hui et al., 2010; Oizumi, 1994; Williams & Nedovic-Budic, 2016)                                                                          |
| 24  | Financial deregulation            | (Kim & Min, 2011; Kim & Renaud, 2009; Xiao, 2010)                                                                                           |
| 25  | Aggressive lending policies       | (Arci & Lopez-Saldaña, 2011; Berkovec et al., 2012; Boesch et al., 2017; Brueckner et al., 2012; Dehesh & Pugh, 1999; Gaffney, 2009; Goddard et al., 2009; Kim & Renaud, 2009; Williams & Nedovic-Budic, 2016; Wong, 2001) |
| 26  | New mortgage products            | (Duca et al., 2010; Kim & Renaud, 2009; Williams & Nedovic-Budic, 2016)                                                                   |
| 27  | Competition among mortgage lenders | (Brueckner et al., 2012; Hendershot, 2006; Kim & Renaud, 2009)                                                                             |
| 28  | Innovations in mortgage loan designs | (Berkovec et al., 2012; Duca et al., 2010)                                                 |                                                                                                                                                        |
| 29  | Decline in underwriting standards | (Berkovec et al., 2012; Bosworth & Raes, 2009; Brueckner et al., 2012; Case et al., 2012; Ellis, 2011; Gjerstad & Smith, 2009; Ivanova, 2017; Schorn, 2017) |
| 30  | Land planning and use             | Deregulated urban planning                  | (Byrne & Norris, 2018; Dehesh & Pugh, 1999; Ellis, 2011; Kanoh & Murase, 1999; Kim & Min, 2011; Oizumi, 1994; Roy & Kemme, 2012; Walks, 2014; Williams & Nedovic-Budic, 2016; Xiao, 2010) |
| 31  | Alternative uses of land          | (Kanoh & Murase, 1999)                       |                                                                                                                                                        |
| 32  | Delocalization                    | (Haila, 1999)                                |                                                                                                                                                        |
| 33  | Uncoordinated development by government | (Haila, 1999)                               |                                                                                                                                                        |
| 34  | Intensive land acquisition        | (Byrne & Norris, 2018; Dehesh & Pugh, 1999; Ellis, 2011; Kanoh & Murase, 1999; Kim & Min, 2011; Oizumi, 1994; Roy & Kemme, 2012; Walks, 2014; Williams & Nedovic-Budic, 2016; Xiao, 2010) |
| 35  | Intensive land development        | (Oizumi, 1994)                               |                                                                                                                                                        |
| Page | Monetary policy | Loose monetary policies |
|------|----------------|-------------------------|
| 36   |                | (Bosworth & Flaaen, 2009; Dehesh & Pugh, 1999; Gjerstad & Smith, 2009; Hui et al., 2014; Oizumi, 1994; Tsai, 2015) |
| 37   |                | (Kim & Renaud, 2009) |
| 38   |                | (Shiller, 2009; Xiao & Devaney, 2016) |
| 39   | Deregulated utilization of private enterprises | (Li & Xu, 2016; Roy & Kemme, 2012) |
| 40   | Liberalization of capital inflow | (Haila, 1999) |
| 41   | Paternalistic relationship between the state and enterprises | |
| 42   | Favorable condition for financial growth | (Kim & Renaud, 2009; Li & Xu, 2016; Tu et al., 2018) |
| 43   | Deregulated utilization of private enterprises | (Shiller, 2009; Xiao & Devaney, 2016) |
| 44   | Liberalization of capital inflow | (Li & Xu, 2016; Roy & Kemme, 2012) |
| 45   | Paternalistic relationship between the state and enterprises | (Haila, 1999) |
| 46   | Removal of selling price ceilings | (Goddard et al., 2009; Kim & Min, 2011; Li & Xu, 2016; Tu et al., 2018) |
| 47   | Taxation | (Fraser et al., 2008; Himmelberg et al., 2009) |
| 48   | Cognitive Speculation | (Gaffney, 2009; Ivanova, 2017; LaCour-Little et al., 2011; Richmond & Roehner, 2017; Riddel, 1999; Tsai, 2017; Xiao, 2016; Xiao & Tan, 2007; Yan & Ouyang, 2018; Yu, 2015) |
| 49   | Bullish perspectives | (Hui et al., 2014; Starr, 2012; Teng et al., 2013) |
| 50   | Expectations of lower risks on the lending | (Duca et al., 2010; Gjerstad & Smith, 2009; Kim & Renaud, 2009) |
| 51   | High expectations of the investor | (Duca et al., 2010; Garino & Samo, 2004; Gjerstad & Smith, 2009; Hui et al., 2017; Ivanova, 2017; Iai, 2017; Schoen, 2017; Tu et al., 2018; Wang, 2016) |
| 52   | Money illusion | (Braunmeier & Julliard, 2008; Case et al., 2012; Li & Xu, 2016; Shi & Kihir, 2018; Tu et al., 2018) |
| 53   | Overenthusiasm for new financial instruments | (Case et al., 2012; Huang & Chiang, 2017; Ivanova, 2017; Roy & Kemme, 2012; Wang, 2016) |
| 54   | Overoptimistic lenders | (Case et al., 2012; Wong, 2001) |
| 55   | Psychology of the involved actors | (Case et al., 2012; Shiller, 2009) |
| 56   | Uncertainty in expectations of the outcome | (Himmelberg et al., 2005; Kanoh & Murase, 1999) |
| 57   | Demographic changes | |
| 58   | Population growth | (Braeckner et al., 2012; Byrne & Norris, 2018; Czerniak & Rubaszek, 2018; Ellis, 2011; Gaffney, 2009; Jackson, 2018; Lai, 2017; Roche, 2001; Tu et al., 2018; Wang, 2016; Williams & Nedovic-Budic, 2014) |
| 59   | Returning emigrants | (Case et al., 2012; Duca et al., 2010; Gochoco-Bautista, 2009; Hendershot, 2004; Starr, 2012) |
| 60   | Biased forecasts | (Czerniak & Rubaszek, 2018; Gaffney, 2009; Roche, 2001; Williams & Nedovic-Budic, 2016) |
| 61   | Lack of information | (Himmelberg et al., 2005; Redmond, 2013) |
| 62   | Positive boom forecasts | (Gochoco-Bautista, 2009; Huang & Chiang, 2017; Starr, 2012; Tu et al., 2018; Wong, 2001) |
