Urbanisation and Housing Finance Nexus: Evidence from Australia

Abstract

The rapid urbanisation being experienced in major cities across the globe has occasioned greater housing demand and brought to the fore the importance of understanding housing finance systems to support the housing market. However, current literature on the nexus between urbanisation and housing finance is limited. Further, existing literature about housing finance is aggregated and assumed symmetric effects. We used a NARDL model to examine the asymmetric effects of housing variables on loan commitment over 1980Q2 to 2022Q2 and documented the following findings. First, we decoupled the housing finance market into owner-occupier and housing investment and found asymmetric effects of key housing variables on loan commitment for each of these submarkets. Second, urbanisation has a telling effect on loan commitment for owner-occupier but not for investors. Third, the asymmetric results highlighted the importance of promoting economic prosperity and reducing the housing lending rate to boost loan commitment for both owner-occupier and housing investment by varying magnitudes. However, increasing the approval rate of private dwellings and boosting the household savings ratio can enhance loan commitment for owner-occupiers but not investors. These findings could aid the formulation of more targeted housing finance policies, in turn, helping develop a more resilient housing market especially in countries with high urbanisation rates.

Key Words: Urbanisation; housing demand; housing finance; asymmetric effects; NARDL model; loan commitment

1.0 Introduction

The population living in urban areas is increasing globally. According to the United Nations (UN), 68% of the world population is expected to live in urban areas by 2050 (United Nations' Department of Economic and Social Affairs [UNDEC], 2018). A World Bank report on urban development also projected the world's urban population to increase by 1.5 times to 6 billion by 2045 (World Bank, 2020a). More recently, Ganau and Rodriguez-Pose (2022) reported that 55% of the global population are living in urban areas and attributed the concentration of people in cities to the rapid urbanisation that occurred from 1950 to 2018. This sentiment is supported by Lei et al. (2022) who further highlighted the high rate of urbanisation in global cities. Urbanisation is therefore a process where new populations move to cities thereby expanding these cities in population size and land mass (Liu et al. 2022). As earlier postulated by Lee (1966), this migration flow of people is triggered by push and pull factors between the origin and destination areas. This has been supported by empirical evidence that generally shows strong movements towards urban centres which results in urbanisation. This corollary has significant implications for the housing market. Evidence of this is provided in a World Bank (2020a) report which underscored that the current scale and speed of urbanisation are generating significant challenges that include a greater demand for housing. As stated in a Department for International Development (DFID) report, part of the fiscal challenge facing cities is to meet the rising demand for new and more severe needs including housing that is created by the pressures of urbanisation (Nixon et al. 2015). Liu et al. (2018) supported these findings and added that rapid urbanisation could trigger investment and financing activities in the residential housing market. Urbanisation and housing demand are therefore intertwined which in turn relates to housing finance for both ownership and investment.

Central to the operationalisation of these housing submarkets is the existence of an efficient housing finance system. In the United States, for instance, the Federal Housing Finance Agency (FHFA) recently announced the conduct of a comprehensive review of the current housing finance system to address emerging needs from the changing housing market (Federal Housing Finance Agency [FHFA], 2022). Such policy recalibration offers a deeper insight into housing finance systems that can potentially facilitate access to housing credit and promote home ownership and housing investment (Cerutti et al., 2017). Also, understanding the workings of housing finance can help minimise the propensity of a house price boom-bust situation (Agnello et al., 2019). Moreover, sound knowledge of housing finance systems is fundamental for achieving an efficient and less risky housing market (Phang and Dol, 2015). Blackwell and

Kohl (2018) reiterated that housing finance systems have a significant impact on various housing types. Further, the vicissitudes of global politics and economic trends have heightened the need to examine housing finance with a new lens. Even with the rising levels of migration to urban centres, coupled with the growing uncertainties in an evolving housing market, the literature on the link between urbanisation and housing finance is still limited. Moreover, no study has ever scrutinised the asymmetric effects of the key determinants of housing finance. Exploring the nexus between urbanisation and housing finance by examining both positive and harmful effects of key housing market variables on housing finance could offer a new strand of literature in the housing market.

The Australian housing market offers a compelling case study to examine the asymmetric effects of the major drivers of housing finance for both owner-occupier and investment submarkets. The Australian population is heavily urbanised. The number of people living in urban areas of the country increased from 60% in 1911 to about 90% by 2016 (Australian Bureau of Statistics [ABS], 2019). At an international level, using World Bank (2021) urban population data that expresses urban population as a percentage of total population, as shown in Figure 1, Australia (86%) ranks above other advanced economies and regions of the globe such as Canada (82%), France (81%), Germany (78%), United States (83%) and United Kingdom (84%), Euro Area (78%), East Asia and Pacific (61%), North America (83), OECD members (81%), and Sub-Sahara Africa (42%). Based on its rapid urbanisation, Australia is therefore an interesting case to demonstrate the positive and negative effects of key market variables on housing finance.

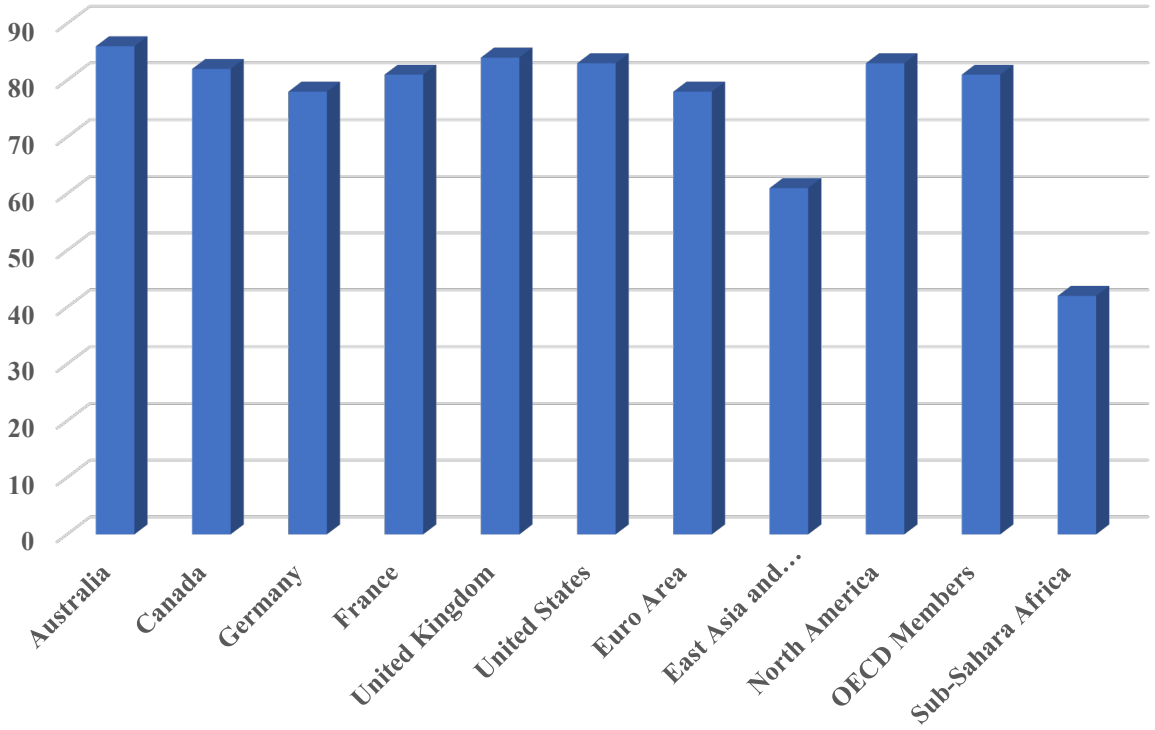

Fig. 1. Percentage (%) of urban population to total population.

We adopted a macro approach since market variables such as real Gross Domestic Product (GDP), urbanisation, savings, cash rate, and home lending rate have broad monetary and fiscal implications in a country. By deploying this approach, we make the following contributions to the literature. This is the first quantitative study to examine the relationship between housing finance and urbanisation. We disaggregated housing finance into owner-occupier and investment and found that urbanisation has a significant effect on loan commitment for owner-occupiers but not for investors. Urbanisation is therefore a key driver of housing demand which in turn stimulates the desire for home ownership and demand for owner-occupier loans. Our study shows that a percentage increase in urbanisation is expected to increase loans for owner-occupiers by 0.89%, while a percentage drop in urbanisation would lower loans by 0.15%. These heterogenous effects have offered a deeper understanding of how changes in the level of urbanisation would affect housing finance for owner-occupier. These findings offered more precision in modelling housing finance systems that seek to address current and emerging financing issues in the housing market.

Second, we found that increasing the approval rate of private dwellings and improving the household savings ratio can enhance loan commitment for owner-occupier but not for housing

investors. Increasing the supply of private dwellings will be welcome by first homebuyers to help minimise the cutthroat competition with housing investors in the housing market. Savings can be critical for first homebuyers in entering the market but not necessarily for housing investors as the latter may use an alternative route such as using their equity on existing mortgage to access additional loan for an investment property. On the other hand, promoting economic prosperity and reducing the housing lending rate can boost loan commitment for both owner-occupiers and investors. Generally, the difference in terms of impact of these drivers of loan commitment on both owner-occupier and housing investment should be noted for greater understanding and regulation of housing finance systems. Policy makers should consider these factors in promoting home ownership especially in the face of rapid urbanisation. These findings could also aid the development of policies that seek to stabilise the overall functioning of the housing market. Our study has complemented existing works of recent studies on urbanisation such as Lei et al. (2022), Ganau and Rodriquez-Pose (2022), and Wang et al. (2017) by examining the link between urbanisation and housing finance.

The remaining sections of the paper are structured as follows. Section 2 is the literature review, and Section 3 presents the conceptual framework and hypothesis development. Section 4 covers both the data and methodology. Sections 4 presents and discusses the results, while Section 5 contains the concluding remarks.

2.0 Literature Review

We examined two strands of housing literature in this study – urbanisation, and the connection between housing finance and financialisation of housing.

2.1 Urbanisation

Urbanisation has become topical among housing policy actors in various countries across the globe. Ritchie and Rose (2018), for example, found that global urban population has been growing at a rapid pace since the 1950s particularly in developing countries. In 2018, around 4.52 billion residents live in urban areas globally, accounting for almost 57% of the global population. Importantly, it is also estimated that more than twice as many residents will be living in urban setting and urban residents will increase to 6.68 billion by 2050 (Ritchie and Rose, 2018). This trend is not only confined to developing countries, but it is also evident in

developed countries. For instance, Australia, an advanced economy, has witnessed a rapid rate of urbanisation in which its urban population increased by 2.5 million from 2011 to 2021, representing an increase of 17% (ABS, 2022e). Further, Australia's urban population has increased gradually from 77% in 2011 to around 87% in 2022 (Ritchie and Rose, 2018). In addition, Australia also has a strong history of immigration which also contributes to its high level of urbanisation (James et al. 2021). For instance, statistics from ABS (2021b) show that, between 2019-2020, net overseas migration resulted in an increase of 194,4000 people in Australia's population. This strong immigration trend in Australia is also highlighted by Bangura and Lee (2023). Liu et al. (2022) highlighted that the saturation point of these cities is reached when the average urbanisation rate is almost 75.94%. This coterie of findings shows urban forms are rapidly changing, and this calls for new approaches to better understand urbanisation processes and how to deal with the resulting complexities in these areas (Schmid et al. 2018).

Several push and pull factors have contributed to this rate of urbanisation (2016) pointed out economic activities and productivity, while Cheng et al. (2006) found that the backwardness of industrial technology in rural areas results in the migration of rural workers to cities for non-farm work. Zhao (1999) also attributed urbanisation to numerous push factors including the lack of employment opportunities and unavailability of land in rural areas. Torres et al. (2013) showed that urban amenities such as accessibility and the cleanliness of the neighbourhood and quality of education are attractive to migrants in Santiago. Specifically, cities have been characterised by a higher quality of education as schools in urban settings often have greater autonomy in resource allocation and tend to benefit from better educational facilities. Other studies have also shown that a higher quality of education is driving urbanisation (Zhang et al., 2021, Zhao, 2013). Overall, these studies have clearly demonstrated that rural migrants do prefer urban living with more job opportunities, a higher quality of life, higher urban amenities and higher wages. However, it is a pattern of migration that could result in numerous challenges which include housing affordability (Zhang, 2016), and a backlog of residential properties (Ahmad, 2015).

2.2 Housing Finance and Financialisation of Housing

Since the 19th century, housing finance has played a critical role in the developmental trajectories of many major cities across the globe, which has resulted in diverse residential

urban forms (Blackwell and Kohl, 2018). Monkkonen (2019) found that cities with housing systems financed more by the federal government tend to have greater vacancy rates, emphasising the need for redeveloping such credit policies for new suburban housing. Cerutti et al. (2017) found a direct link between housing finance and house price booms, and further highlighted that this is more likely to occur in countries with higher loan to value ratios. Favilukis et al. (2017) promoted the minimisation of financing constraints to mitigate any chance of a big boom in housing prices. As such, Agnello et al. (2019) advocated for a more informed housing finance regulation to curb any undesirable fluctuation in housing prices.

Extensive studies have demonstrated that housing is increasingly dominated by financial actors since the global financial crisis (Aalbers, 2016; Engelen et al., 2009). This is also known as the financialisation of housing which refers to 'the increasing dominance of financial actors, markets, practices, measurements, and narratives at various scales, resulting in a structural transformation of economies, firms including financial institutions, states and households' (Aalbers, 2017, p. 544). Importantly, homeownership has been widely regarded as financial investment and a source of private wealth for the majority of households across the globe (Aalbers and Christophers, 2014; He et al. 2020). This has transformed the way housing is viewed, leading to the formation of housing 'investor subjectivities' in which homeowners are seen as financial players and housing is gradually treated as an effective instrument of wealth accumulation (Watson, 2010; Morris, 2018). The effectiveness of housing as an investment vehicle is due to its relatively low risk compared to other assets such as stocks (Lee, 2008). Further, housing has emerged as a crucial element of the retirement income system in Australia (Stebbing and Spies-Butcher, 2016) as Morris (2016) found that retirees with outright ownership are less likely to be in financial stress. Aalbers et al. (2021) argued a shift from a debt-driven to a wealth-driven model of financialisation in the housing market. Housing, therefore, emerges as an attractive sector for investment.

The financialisation of housing also reflects mortgage deregulation whereby housing has become the primary activity of the financial sector (Ronald et al., 2015), resulting in a rapid increase in housing finance in many countries (Morris, 2018). Fields (2017) separated owner-occupier loans from investor loans as mortgages have been viewed by the rental sector as the new frontier of housing financialisation since the GFC. In Australia, for instance, the investor share of housing finance in New South Wales increased from about 32% in January 2001 to

almost 60% in October 2022 (ABS, 2022). This can be attributed to the favourable tax incentives to Australian housing investors and the ready access to mortgage debt for equity-rich borrowers (e.g., housing investors) (Blunden, 2016). Housing investors also contribute to almost 27 per cent of Australian dwelling stocks by number, reinforcing the role of investor loans in shaping the Australian housing markets (CoreLogic, 2016).

Although a house purchasing decision can be both a consumption decision and an investment decision (Shiller, 2007), the motives of homeowners and property investors are heterogenous (Kohler & Rossiter, 2005). Specifically, income and wealth factors are dominant motives for housing investors, whilst the demand from owner-occupiers is largely explained by consumption motives. Comparable evidence is found by Brown et al. (2008) and Bloxham et al. (2011). The empirical evidence of Brown et al. (2008) found that the demand for investment properties is largely driven by wealth-related factors instead of life-cycle factors. Bloxham et al. (2011) also confirmed that the demand for investment properties in Australia is mainly driven by wealth-related factors. This is further validated in a survey of housing investors by Pawson and Martin (2020) in which income and wealth factors (e.g., unusually large capital gains) are the most important motivation for housing investors in Western Sydney. Thus, the composition of owner-occupiers and investors impacts the return-risk relationship of housing (Lee, 2017).

Given the differences in motives and other characteristics of housing finance among owner-occupiers and investors, a close examination of how urbanisation and other market variables impact these submarkets is needed. Despite these important characteristics, to date, there is no dedicated study on the linkage between urbanisation and housing finance.

3.0 Theoretical Framework and Hypotheses Development

We adopt the Push-Pull migration theory proposed by Lee (1966) which posits that the decision to migrate is often determined by push and pull factors. The push factors are adverse economic and non-economic factors that exist in the area the people live before they migrate, while the pull factors are the attractions in the destination area such as job opportunities, better standard of living, superior housing financing opportunities, and better educational facilities. Few years after the postulation of Lee's (1966) theory, Todaro (1969) reported that the expected gain in earnings largely causes rural-urban migration particularly in developing countries. As the

income level in urban areas is significantly higher than rural areas, this incentivises rural-urban migration. The wage differential hypothesis has also been empirically validated by numerous empirical studies (Agesa and Agesa, 1999; Levy and Wadycki, 1974; Lucas, 1988; and Zhu, 2016). As such, the pronounced income gap between rural and urban areas is a pull factor that contributes to urbanisation and facilitates access to housing finance for these migrants.

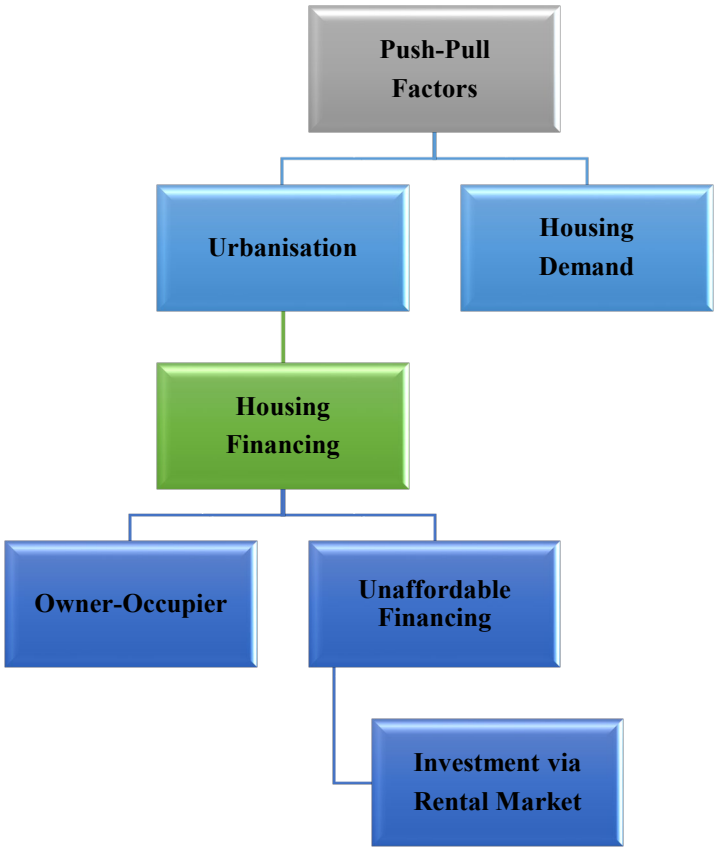

Fig. 2. Theoretical framework of urbanisation and housing finance.

Further, Kavalnis and Kasnauskiene (2022) recently found push and pull factors to be important explanatory variables of the migration flow between Lithuania and 24 European destinations between 2010 and 2019. Domestically, Pânzaru and Reisz (2013) found evidence of the applicability of the push-pull factors model in Italy and Spain each, and Doerschler (2006) documented similar evidence in Germany. Additionally, as reported by the United Nations Population Fund (2016), the world is experiencing rapid urban growth in history as more than 50% of the world's population now lives in cities and towns. Wang et al. (2017) further reveal that urbanisation will continue at a high speed and many more rural residents are expected to migrate to urban areas. A report from the World Bank (2020b) reiterated that approximately 3 billion people will need new housing by 2030. In Hong Kong and Paris, for

instance, Kockelkorn et al. (2022) found that urbanisation process kicks off significantly in post-war economic boom which triggered economic and technical efforts that produced an accelerated housing construction to meet the rising housing demands. In Australia, following the Canadian National Occupancy Standard for housing utilisation, virtually 1 in 25 Australian households require at least one extra bedroom to meet the requirements of the household (ABS 2022d). This scale of urbanisation, prompted by push and pull nexus, has significant housing demand implications. This shows the inseparable link between urbanisation and housing demand, a tie that can potentially impact the financing system of residential properties (Liu et al., 2018). This is summed up in Figure 2 which exhibits the interplay between rapid urbanisation and housing finance for both owner-occupier and investor, a connection that is generated by housing demand (Wang et al. 2017). Based on this discussion, we state the first hypothesis:

- *Hypothesis 1a: Urbanisation is likely to impact owner-occupier housing finance more than investor finance*

Apart from urbanisation, due to the complexity of urban systems (Liu et al 2022), various factors may have varying impact on housing finance systems. For instance, Gonzalez et al. (2013) found that the variation in prices for various residential property types may have diverse housing financing implications. As Saiz (2007) highlighted rent, Zhang (2016) asserted that the varying levels of economic activities and productivity may generate diverse housing financing capabilities. Using the Chinese dataset from 2008 to 2012, Su et al. (2018) offers some empirical evidence to support that higher wage differentials, higher employment growth rate and higher GDP per capita (an indicator of quality of life) can attract migration to a city and this can produce different levels of purchasing power for these migrants. Liu et al. (2018) highlighted the heterogenous effects of urbanisation on real estate investments across regions of the same country. From these findings, we postulate the second hypothesis:

- *Hypothesis 1b: There are asymmetric effects of market variables on housing finance.*

In this framework, we examined the strong link between urbanisation and housing demand using the push and pull factor model developed by Lee (1966) and link this to housing finance. This situation raises the question of whether households would face affordable or non-

affordable housing financing. With affordable financing, households are likely to enter the housing market and become homeowners, while unaffordable housing suggests they would continue in the rental market which could expand investor financing. Our study therefore examines whether there are asymmetric effects of urbanisation on each of owner-occupier and investor financing.

4.0 Data and Methodology

4.1 Data

We used quarterly time series data spanning 1981Q2 to 2022Q2. The data on new loan commitments for dwellings (LC), real Gross Domestic Product growth rate (RGDPR), private dwelling approvals (PDA), population of Australia's eight capital cities, and household saving ratios (HHSR) were collected from the Australian Bureau of Statistics (ABS), while housing lending rate (HLR) was obtained from Eikon. Loan commitment is the total value of new loan commitment, excluding refinancing, for both newly erected and existing dwellings. Loan commitment is disaggregated into owner-occupier loan commitment (OWNLC) which is the total loan committed for owner-occupier, and investment loan commitment (INVLC) which is the total loan commitment for a dwelling investment. The values of these loan commitments have been seasonally adjusted by the ABS to account for any inflationary effect. Figure 3 reveals a similar trend between owner-occupier loan and investment loan commitments over time. However, loan commitment for owner-occupiers is consistently higher than that of investors. On average, loan commitment for owner-occupier accounted for almost 65% of total loans, while dwelling investors take around 35%. The more pronounced gap occurs from March 2009 to March 2010 during the Global Financial Crisis (GFC), and in 2021 during the pandemic. These wide variations between the two sets of loan commitments can be attributed to the execution of the First Homeowners Grant Boost intervention policy during the GFC and the historically low lending rate which respectively inspired homebuyers to enter the market. Generally, these statistics indicate that lending institutions are providing more loans to owner-occupiers than investors.

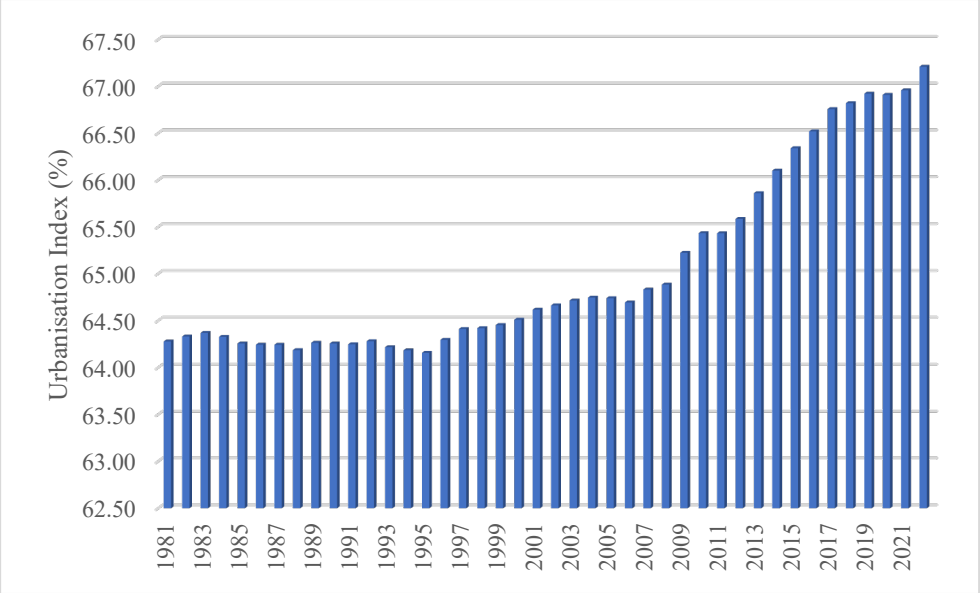

Fig. 3. Urbanisation Index of Australia

Urbanisation Index is defined as the ratio of the total population of Australia's eight capital cities (Adelaide, Brisbane, Canberra, Darwin, Hobart, Melbourne, Perth, and Sydney) to the total population of Australia in a given year

Private dwelling approval is the sum of residential building proposals approved by the relevant municipal or state authority, while household saving ratio is the ratio of household net saving to household disposable income (ABS 2022a, b, c). Following the World Bank (2021), we define our variable of interest, urbanisation (URB), as the ratio of the total population of Australia's eight capital cities to the total population of Australia. As shown in Figure 4, there is a steady increase in the rate of urbanisation in Australia and the index ranges from 64% to around 68% throughout the study period, indicating the sustained increase in the proportion of Australian population living in the country's major cities. This is supported by James et al. (2021) who reported that the bulk of the population of Australia is concentrated in the country's major cities.

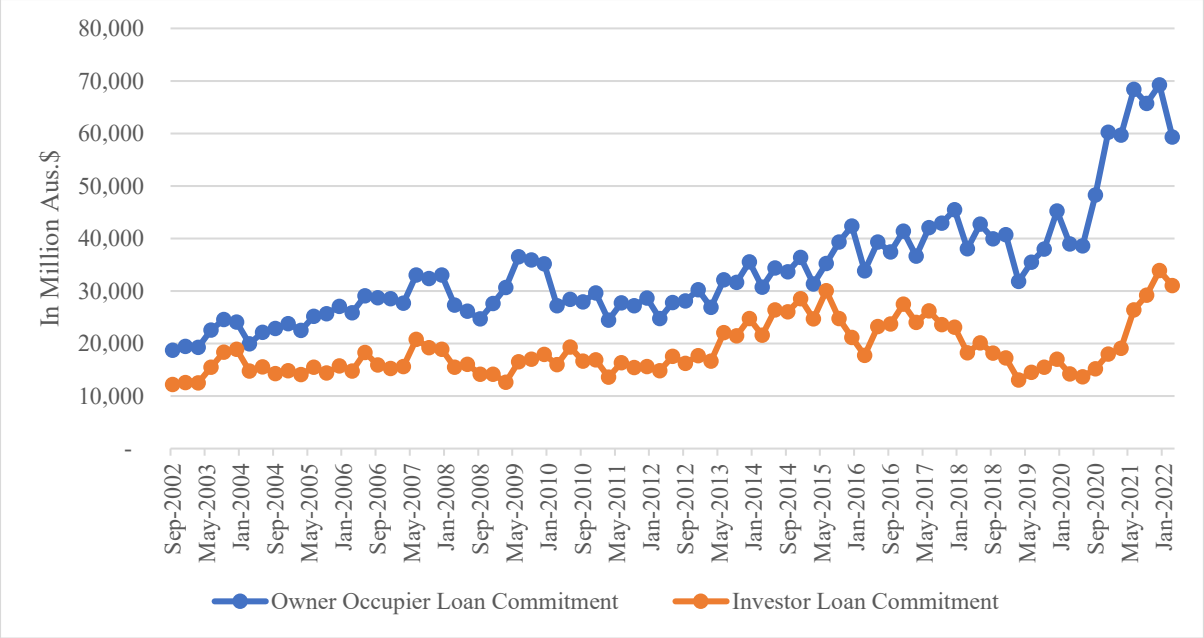

Fig. 4. Owner occupier and investor loan commitments.

As a preliminary screening of the dataset, we calculated the correlation coefficient between pairs of the variables used in the study. The results are reported in Table 1. Clearly, there is no evidence of correlation between the variables that could engender endogeneity in the model. We then evaluate how an increase or decrease in each of these variables would impact new loan commitment for both owner-occupier and housing investors.

Table 1
Correlation matrix between variables.

	Investor Loan Commitment	Owner Occupy Loan Commitment	Real GDP Growth Rate	Private Dwelling Approvals	Household Savings Ratio	Housing Lending Rate	Urbanisation Rate
Investor Loan Commitment	1.00	0.64	0.21	0.48	0.22	-0.46	0.21
Owner Occupy Loan Commitment		1.00	0.16	0.49	0.47	-0.51	0.45
Real GDP Growth Rate			1.00	0.16	-0.22	0.00	0.44
Private Dwelling Approvals				1.00	0.17	-0.48	0.49
Household Savings Ratio					1.00	0.10	0.20
Housing Lending Rate						1.00	0.17
Urbanisation Rate							1.00

4.2 Methodology

Preceded by a unit root test, we employed the auto-regressive dynamic lag (ARDL) Bounds test developed by Pesaran et al. (2001) to check for cointegration of the variables. The ARDL Bounds test allows for a mix of first-degree stationary I(1) and non-stationary I(0) variables in the model and it performs better even in small samples (Narayan and Narayan 2005). Premised on the ARDL, we then applied the nonlinear auto-regressive dynamic lag (NARDL) which was developed by Shin et al. (2014) to explore the asymmetric effects of real GDP growth rate, private dwelling approvals, household saving ratios, urbanisation, and housing lending rates on each of owner-occupier and investment new loan commitment. The advantages of NARDL over other dynamic models include the model's capacity to examine the asymmetric effects (as it captures both positive and negative changes) of the explanatory variables on the dependent variable. Furthermore, it can estimate the long-run relationship between variables whether stationary or not (Yeap and Lean, 2017). Therefore, the NARDL is the asymmetric supplement of the linear ARDL, and it overcomes the assumption that explanatory variables often have a symmetric effect on the dependent variable (Makun, 2021). The NARDL is appropriate in this study because the selected variables exhibit positive and negative changes over the study period. Following Pesaran et al. (2001), the study's linear ARDL model becomes:

$$\Delta LC_t = \alpha_0 + \alpha_{1i}LC_{t-1} + \alpha_{2i}RGDPR_{t-1} + \alpha_{3i}PDA_{t-1} + \alpha_{4i}HHSR_{t-1} + \alpha_{5i}URB_{t-1} + \alpha_{6i}HLR_{t-1} + \sum_1^k \beta_{1i}\Delta LC_{t-i} + \sum_0^k \beta_{2i}\Delta RGDPR_{t-i} + \sum_0^k \beta_{3i}\Delta PDA_{t-i} + \sum_0^k \beta_{4i}\Delta HHSR_{t-i} + \sum_0^k \beta_{5i}\Delta URB + \sum_0^k \beta_{6i}\Delta HLR + \varepsilon_t. \quad (1)$$

From Equation (1), α_0 is a constant, $\alpha_{1\text{-}6}$ are the long-run parameters, $\beta_{1\text{-}6}$ are the short-run parameters, and k is the optimal lags of the variables in difference. From Equation (1), the cointegration test requires an error correction model defined as follows:

$$\Delta LC_{it} = \lambda\pi_{-1} + \sum_1^k \beta_{1i}\Delta LC_{t-i} + \sum_0^k \beta_{2i}\Delta RGDPR_{t-i} + \sum_0^k \beta_{3i}\Delta PDA_{t-i} + \sum_0^k \beta_{4i}\Delta HHSR_{t-i} + \sum_0^k \beta_{5i}\Delta URB_{t-i} + \sum_0^k \beta_{6i}\Delta HLR_{t-i} + \varepsilon_t \quad (2)$$

From Equation (2), $\lambda\pi_{-1}$ is the error correction term (ECT), λ is the cointegration parameter, Δ denotes difference factor and it represents the short-run effects. We test the null hypothesis of no cointegration as follows H_0: $\alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = \alpha_5 = \alpha_6 = 0$ against the alternative hypothesis of cointegration H_1: $\alpha_1 \neq \alpha_2 \neq \alpha_3 \neq \alpha_4 \neq \alpha_5 \neq \alpha_6 \neq 0$. The optimal lag k is determined using the Schwarz information criteria (SBC), Akaike information criterion (AIC), and Hannan-Quinn

information criteria (HQ). As recommended by Pesaran et al. (2014), we use the F-test to show the joint significance of these coefficients and compare with the critical values of the upper and lower bounds that are provided. The null hypothesis is rejected if the F-statistic is greater than the upper bound, suggesting the existence of cointegration, while a rejection of the null hypothesis occurs when the F-statistic is below the lower bound, indicating the lack of cointegration between the variables. If the F-statistic is between these two bounds, the results become undefined (Pesaran et al., 2001).

The previous discussion on the ARDL prefaced the NARDL which is used to capture the short-run and long-run asymmetric effects of market fundamentals on loan commitment. According to Shin et al. (2014), the asymmetric equation is defined by decomposing the vector of explanatory variables (V_t) into their positive (+) and negative (-) partial sums of increases and decreases as follows:

$$V_{it} = V_{io} + V_{it}^{+} + V_{it}^{-}, \text{ where} \qquad (3)$$

$$V_t^{+} = \sum_1^k V_i^{+} = \sum_1^k max\ (\Delta V_{i,}0) \qquad (4)$$

$$V_t^{-} = \sum_1^k V_i^{-} = \sum_1^k min\ (\Delta V_{i,}0) \qquad (5)$$

Following the methodology by Shin et al. (2014), the nonlinear asymmetric ARDL model can be represented as:

$$V_{it} = \alpha^{+} V_{it}^{+} + \alpha V_{it}^{-} + \mu_t \qquad (6)$$

From Equation (6), α^{+} and α are the long-run coefficients associated with positive and negative changes, respectively, from the vector of explanatory variables (which are real gross domestic product growth rate, private dwelling approvals, household saving ratios, urbanisation, and housing lending rate). Shin et al. (2014) further demonstrated that by incorporating Equation (6) in the ARDL model presented in Equation (1), we obtain the following nonlinear asymmetric NARDL equation as follows:

$$\Delta LC_t = \alpha_{0i} + \alpha_{1i}LC_{t-1} + \alpha_{2i}^{+}RGDPR_t^{+} + \alpha_{2i}^{-}RGDPR_t^{-} + \alpha_{3i}^{+}PDA_t^{+} + \alpha_{3i}^{-}PDA_t^{-} + \alpha_{4i}^{+}HHSR_t^{+} + \alpha_{4i}^{-}HHSR_t^{-} + \alpha_{5i}^{+}URB_t^{+} + \alpha_{5i}^{-}URB_t^{-} + \alpha_{6i}^{+}HLR_t^{+} + \alpha_{6i}^{-}HLR_t^{-} + \sum_1^k \beta_{1i}\Delta LC_{t-i} + \sum_0^k \beta_{2i}^{+}\Delta RGDPR_{t-1}^{+} + \sum_0^k \beta_{2i}^{-}\Delta RGDPR_{t-1}^{-} + \sum_0^k \beta_{3i}^{+}\Delta PDA_{t-1}^{+} + \sum_0^k \beta_{3i}^{-}\Delta PDA_{t-1}^{-} + \sum_0^k \beta_{4i}^{+}\Delta HHSR_{t-1}^{+} + \sum_0^k \beta_{4i}^{-}\Delta HHSR_{t-1}^{-} + \sum_0^k \beta_{5i}^{+}\Delta URB_{t-1}^{+} + \sum_0^k \beta_{5i}^{-}\Delta URB_{t-1}^{-} + \sum_0^k \beta_{6i}^{+}\Delta HLR_{t-1}^{+} + \sum_0^k \beta_{6i}^{-}\Delta HLR_{t-1}^{-} + \varepsilon_t \quad (7)$$

From Equation (7), the elasticity of coefficients of the vector of variables V_t^+ and V_t^- are computed as:

$\pi^+ = -\frac{\alpha_{i2-6}^{+}}{\alpha_{1i}}$ and $\pi^- = +\frac{\alpha_{i2-6}^{-}}{\alpha_{1i}}$

The error correction model (ECM) of Equation (7) becomes:

$$\Delta LC_t = \varphi\psi_{t-1} + \sum_1^k \beta_{1i}\Delta LC_{t-i} + \sum_0^k \beta_{2i}^{+}\Delta RGDPR_{t-1}^{+} + \sum_0^k \beta_{2i}^{-}\Delta RGDPR_{t-1}^{-} + \sum_0^k \beta_{3i}^{+}\Delta PDA_{t-1}^{+} + \sum_0^k \beta_{3i}^{-}\Delta PDA_{t-1}^{-} \sum_0^k \beta_{4i}^{+}\Delta HHSR_{t-1}^{+} + \sum_0^k \beta_{4i}^{-}\Delta HHSR_{t-1}^{-} + \sum_0^k \beta_{5i}^{+}\Delta URB_{t-1}^{+} + \sum_0^k \beta_{5i}^{-}\Delta URB_{t-1}^{-} + \sum_0^k \beta_{6i}^{+}\Delta HLR_{t-1}^{+} + \sum_0^k \beta_{6i}^{-}\Delta HLR_{t-1}^{-} + \varepsilon_t \quad (8)$$

From Equation 8, ($\varphi\psi_{t-1}$) estimates the equilibrium asymmetric relationship and (φ) captures the speed of adjustment aftershocks. The short-run asymmetric effects are captured by the coefficients β_{i2-6}^{+} and β_{i2-6}^{-} for positive and negative changes, respectively. According to Allen and McAleer (2021), this ECM form of the NARDL will correct the endogeneity of any non-stationary explanatory variables and the use of appropriate lag structure will free the model from any residual correlation. This suggests that the model has in-built features that minimise the likelihood of the occurrence of endogeneity. Since the estimation procedure of the NARDL is the same as the linear ARDL, we test the existence of cointegration in the NARDL model following the steps discussed earlier. The Wald test is used to obtain the long-and-short-run symmetries. For the long-run symmetry, the null hypothesis H_0: $\pi^+ = \pi^-$ is tested against the alternative hypothesis H_1: $\pi^+ \neq \pi^-$. For the short-run symmetry, the null hypothesis becomes H_0: $\sum_{i=0}^{k} \beta_{i2-6}^{+} = \sum_{i=0}^{k} \beta_{i2-6}^{-}$.

5.0 Results and Discussion

5.1 Presentation of Results

The results of the Augmented Dickey Fuller unit root are reported in Table 2. Both real GDP growth rate and private building approvals are stationary on level at the 1% and 10%

significance levels, respectively. While owner-occupier loan commitment is first differenced stationary at the 5% significance level, investment loan commitment, household saving ratio, urbanisation, and housing lending rate are first differenced stationary at the 1% significance level. The mixed results of stationarity in the variables validated the appropriateness of the NARDL Bounds cointegration test.

The results of the NARDL Bounds cointegration test are reported in Table 3(a, b). In Table 3a, we found evidence of cointegration between owner-occupier loan commitment and the explanatory variables as the F-statistic of 11.14 is greater than all the upper bound levels of significance including at 1%. In Table 3b, there is also evidence of cointegration between investment loan commitment and the market variables since the F-statistic of 5.46 is above all the upper bound critical values including at 1%. The results confirm the existence of a strong link between the explanatory variables with both owner-occupier and investment loan commitments over time. The long-run and short-run error-correction NARDL results for owner-occupier and investment loan commitment are reported in Table 4a and Table 4b, respectively. These results represent the asymmetric effects of each of real gross domestic product growth rate, private dwelling approvals, household savings ratio, urbanisation, and housing lending rate on owner-occupier and investment loan commitments. We evaluate the positive and negative partial sums of each of these explanatory variables and their effect on owner-occupier and investment loan commitments. The variables are in logarithmic form and, as such, they represent elasticities.

Table 2
Results of augmented dickey fuller unit root.

Variable	Level		First Difference	
	Lag length	t-statistics	Lag length	t-statistics
Owner Loan Commitment (OWNLC)	9	-0.61	8	-3.48**
Investor Loan Commitment (INVLC)	5	-1.49	4	-4.26***
Real GDP Growth Rate (RGDPR)	7	-3.90***		
Private Dwelling Approvals (PDA)	2	-2.87*		
Household Savings Ratio (HHSR)	8	-1.44	7	-4.71***
Urbanisation (URB)	6	-1.21	4	-4.11***
Housing Lending Rate (HLR)	1	-1.58	0	-7.34***

*, **, and *** denote the rejection of the tested hypothesis of no unit root at the 10%, 5% and 1% significance levels, respectively.

Table 3A
NARDL bounds conintegration results for owner-occupier loan commitment.

NARDL Equation	F-Statistic	Bounds	1%	2.5%	5%	10%
Eq 7: OWNLC=F(OWNLC/ $RGDPR^{pos(+)}$, $RGDP^{neg(-)}$, $PDA^{pos(+)}$, $PDA^{neg(-)}$, $HHSR^{pos(+)}$, $HHSR^{neg(-)}$, $URB^{pos(+)}$, $URB^{neg(-)}$, $HLR^{pos(+)}$, $HLR^{neg(-)}$)	11.14***	Lower Bound	2.62	2.33	2.11	1.85
	11.14***	Upper Bound	3.77	3.42	3.15	2.85

***, **, and * denote the existence of ARDL bounds cointegration at the 1%, 5%, and 10% significance levels, respectively.

Table 3B
NARDL bounds conintegration results for investor loan commitment.

NARDL Equation	F-Statistic	Bounds	1%	2.5%	5%	10%
Eq 7: INVLC=F(INVLC/ $RGDPR^{pos(+)}$, $RGDP^{neg(-)}$, $PDA^{pos(+)}$, $PDA^{neg(-)}$, $HHSR^{pos(+)}$, $HHSR^{neg(-)}$, $URB^{pos(+)}$, $URB^{neg(-)}$, $HLR^{pos(+)}$, $HLR^{neg(-)}$)	5.46***	Lower Bound	2.62	2.33	2.11	1.85
	5.46***	Upper Bound	3.77	3.42	3.15	2.85

***, **, and * denote the existence of ARDL bounds cointegration at the 1%, 5%, and 10% significance levels, respectively.

5.1.1 Results of Owner-occupier Loan Commitment

From the long-run results in Table 4a, real GDP growth rate is statistically significant at the 1% level for the positive and at 5% for the negative asymmetric changes. The results demonstrate that, over time, a percentage increase in $RGDPR^{pos(+)}$ is expected to boost owner-occupier loan commitment by 2.21%, while a percentage drop in $RGDPR^{neg(-)}$ will reduce the country's owner-occupier loan commitment by 1.52%. This indicates that the positive impact of a percentage increase in RGDPR on owner-occupier loan commitment is far greater than the effect of a percentage drop in RGDPR. These asymmetric effects highlight that the promotion of economic activities is fundamental in boosting housing finance and this is expected to support home ownership in areas that are experiencing rapid urbanisation. Private dwelling approval also demonstrates asymmetric effects, as increasing the approval rate of private dwellings ($PDA^{pos(+)}$) by a percentage is expected to increase loan commitment for Australian owner-occupiers by 0.27%, while a percentage drop in ($PDA^{neg(-)}$) does not have any significant impact on housing finance for owner-occupiers. Household saving ratio is significant and has

a direct relationship with owner-occupier loans for both asymmetries. However, the 0.13% increase in loans for owner-occupiers, resulting from a percentage increase in $HHSR^{pos(+)}$, outstrips the 0.01% drop in loan commitment for owner-occupiers resulting from a percentage decrease in $HHSR^{neg(-)}$. This is intuitively appealing since increasing household saving ratios will certainly improve housing deposits and reduce the loan-to-value ratio in securing loans from lending institutions. Further, a percentage increase in housing lending rate ($HLR^{pos(+)}$) is expected to reduce loans for owner-occupiers by 0.66%, while a percentage drop in this variable ($HLR^{neg(-)}$) will boast loans by 0.12%. This shows that homebuyers are more sensitive to rising housing lending rates than a drop in this rate. Urbanisation, our variable of interest, also exhibits asymmetric effects on loan commitment. We found that a percentage increase in urbanisation ($URB^{pos(+)}$) is estimated to increase loans for owner-occupiers by 0.89%, while a percentage drop in urbanisation ($URB^{neg(-)}$) will lower loans by 0.15%. As argued by Lei et al. (2022) and Ganau and Rodriguez-Pose (2022), urbanisation is driving housing demand, and this is expected to generate greater demand for loan commitment for owner-occupiers. This is evidence of the direct effect of urbanisation on loan commitment for owner-occupiers, which reflects the World Bank (2020a) assertion on the impact of population concentration on housing finance.

Table 4A:
Long-run NARDL ECM-Based results for owner-occupier loan commitment.

Long-run Estimates	**Coefficients**	**P-value**
$lnRGDPR^{pos(+)}$	2.21	0.00***
$lnRGDPR^{neg(-)}$	1.52	0.00**
$lnPDA^{pos(+)}$	0.27	0.00***
$lnPDA^{neg(-)}$	0.08	0.48
$lnHHSR^{pos(+)}$	0.13	0.00***
$lnHHSR^{neg(-)}$	0.01	0.00***
$lnURB^{pos(+)}$	0.89	0.01**
$lnURB^{neg(-)}$	0.15	0.03**
$lnHLR^{pos(+)}$	-0.66	0.00***
$lnHLR^{neg(-)}$	-0.12	0.03**
Short-run ECM Results		

$lnRGDPR^{pos(+)}$	0.64	0.00***
$lnRGDPR^{neg(-)}$	0.14	0.22
$lnPDA^{pos(+)}$	0.12	0.84
$lnPDA^{neg(-)}$	0.36	0.14
$lnHHSR^{pos(+)}$	0.12	0.21
$lnHHSR^{neg(-)}$	0.03	0.16
$lnURB^{pos(+)}$	0.21	0.05*
$lnURB^{neg(-)}$	0.10	0.17
$lnHLR^{pos(+)}$	-0.75	0.00***
$lnHLR^{neg(-)}$	-0.20	1.16
ECM_{t-1}	-0.31	0.00***

***, **, and * denote the variable is statistically significant at the 1%, 5%, and 10% significance levels, respectively.

The short-run results in Table 4a shows that only positive change in ($RGDPR^{pos(+)}$), and positive change in urbanisation ($URB^{pos(+)}$) and ($HLR^{pos(+)}$) are significant. These results indicate that a percentage increase in economic activities is expected to increase loan commitment for owner-occupiers by 0.64%, while a percentage rise in urbanisation and home-lending rate are expected to increase and reduce loans available for owner-occupiers by 0.21% and 0.75% respectively. The estimated error-correction term (ECM_{t-1}) is negative and empirically significant at the 1% level, indicating that 31% correction to the equilibrium is done in the following quarter.

5.1.2 Results of Investment Loan Commitment

The results of both long-run and short-run asymmetric effects of the explanatory variables are reported in Table 4b. The long-run results show that real GDP growth rate is statistically significant at the 1% and 5% levels for positive and negative asymmetric changes respectively. These results indicate, in the long run, a 1% increase in $RGDPR^{pos(+)}$ is likely to increase loans for dwelling investment by 1.64%, while a percentage drop in $RGDPR^{neg(-)}$ will lower the loan commitment for housing investment by 1.37%. As is the case for owner-occupiers, economic prosperity has no small effect on housing finance for dwelling investments. Even though private dwelling approvals, urbanisation, and household saving ratio exhibited asymmetric

effects, they are insignificant drivers of loan commitment for housing investments. However, a percentage rise in housing lending rate ($HLR^{pos(+)}$) is expected to reduce loan commitment for housing investments by 0.46%, whereas a percentage decline in this rate will reduce loan commitment for dwelling investments by 0.15%.

Table 4B:
Long-run NARDL ECM-Based results for investor loan commitment.

Long-run Estimates	**Coefficients**	**P-value**
$lnRGDRP^{pos(+)}$	1.64	0.00***
$lnRGDPR^{neg(-)}$	1.37	0.02**
$lnPDA^{pos(+)}$	0.21	0.17
$lnPDA^{neg(-)}$	0.12	0.34
$lnHHSR^{pos(+)}$	0.03	0.11
$lnHHSR^{neg(-)}$	0.01	0.88
$lnURB^{pos(+)}$	0.11	0.16
$lnURB^{neg(-)}$	0.08	0.19
$lnHLR^{pos(+)}$	-0.46	0.00***
$lnHLR^{neg(-)}$	-0.15	0.04**
Short-run ECM Results		
$lnRGDPR^{pos(+)}$	3.39	0.00***
$lnRGDPR^{neg(-)}$	0.33	0.21
$lnPDA^{pos(+)}$	0.52	0.11
$lnPDA^{neg(-)}$	0.21	0.34
$lnHHSR^{pos(+)}$	0.02	0.15
$lnHHSR^{neg(-)}$	0.34	0.61
$lnURB^{pos(+)}$	0.11	0.12
$lnURB^{neg(-)}$	0.02	0.21
$lnHLR^{pos(+)}$	-0.96	0.00***
$lnHLR^{neg(-)}$	-0.31	0.04**
ECM_{t-1}	-0.36	0.00***

***, **, and * denote the variable is statistically significant at the 1%, 5%, and 10% significance levels, respectively.

From the short-run results in Table 4b, a percentage increase in $RGDPR^{pos(+)}$ will significantly increase loan commitment for investment by 3.39%, indicating that the improvement in GDP activities has a huge impact on loans committed for dwelling investment in the short run. For housing lending rate, the effect of a percentage increase in ($HLR^{pos(+)}$) will result in a reduction in loan commitment by 0.96%, while a drop in $HLR^{neg(-)}$ will enhance loan commitment by 0.31%. Higher housing rate is therefore a disincentive for loan commitment for housing investment in both the short and long run because of the resulting high interest expense. The estimated error-correction term (ECM_{t-1}) is negative and statistically significant at the 1% level. This indicates that 36% correction to the equilibrium is done in the following quarter.

Table 5A
Model diagnostics for owner-occupier loan commitment

Diagnostics	**Statistics**	**P-value**
R-Squared	0.90	
Durbin Watson	1.77	
H_{null}: No serial correlation	1.02	0.39
H_{null}: No heteroskedasticity	0.90	0.58
H_{null}: Data is normally distributed	1.20	0.55

***, **, and * denote the variable is statistically significant at the 1%, 5%, and 10% significance levels, respectively.

Table 5B
Model diagnostics for investor loan commitment

Diagnostics	**Statistics**	**P-value**
R-Squared	0.88	
Durbin Watson	2.23	
H_{null}: No serial correlation	1.49	0.23
H_{null}: No heteroskedasticity	1.15	0.33
H_{null}: Data is normally distributed	1.02	0.19

***, **, and * denote the variable is statistically significant at the 1%, 5%, and 10% significance levels, respectively.

Table 6A
Asymmetric tests for owner-occupier loan commitment

	Short run		Long run	
Null Hypothesis	**Statistics**	**P-Value**	**Statistics**	**P-Value**
Symmetric effect of RGDPR on OWNLC	1.89	0.91	3.77	0.00***
Symmetric effect of PDA on OWNLC	17.36	0.00***	3.36	0.04**
Symmetric effect of HHSR on OWNLC	1.44	0.42	12.39	0.00***
Symmetric effect of URB on OWNLC	1.56	0.65	9.29	0.00***
Symmetric effect of HLR on OWNLC	7.53	0.00***	14.91	0.00***

***, **, and * denote the variable is statistically significant at the 1%, 5%, and 10% significance levels, respectively.

Table 6B
Asymmetric tests for investor loan commitment

	Short run		Long run	
Null Hypothesis	**Statistics**	**P-Value**	**Statistics**	**P-Value**
Symmetric effect of RGDPR on OWNLC	8.42	0.00***	7.89	0.00***
Symmetric effect of PDA on OWNLC	1.98	0.23	4.04	0.02**
Symmetric effect of HHSR on OWNLC	1.78	0.22	4.21	0.02**
Symmetric effect of URB on OWNLC	1.76	0.21	11.19	0.00***
Symmetric effect of HLR on OWNLC	4.52	0.02**	8.87	0.00***

***, **, and * denote the variable is statistically significant at the 1%, 5%, and 10% significance levels, respectively.

Our diagnostic results for the owner-occupier model are reported in Table 5a. The results show 90% explanatory power of the model as revealed by the R-square. The p-value failed to reject the tested hypothesis of no serial correlation, and the null hypothesis of no heteroskedasticity is also not rejected. The result also failed to reject the null hypothesis of the normality test, showing that the data is normally distributed. Similar results were revealed for the investment loan commitment model in Table 5b. The Wald test results reported in Table 6a and 6b show empirical evidence of asymmetric effects of all the explanatory variables on each of owner-occupier and investment loan commitments. The diagnostic results reveal that the model is

generally a good fit, and the Wald test shows that the NARDL is reliable and appropriate. Our diagnostic results support Hypothesis 1b which posits the existence of asymmetric effects of market variables on housing finance. It shows the disproportionate levels of impact that positive and negative changes of these variables have on housing finance.

5.2 Discussion of Results

This study examines the importance of housing finance in addressing housing demand, whether owner-occupier or investment, that arises from rapid urbanisation. As reported by the World Bank (2020b), without the existence of housing financial solutions, many households in urban areas will not be able to access decent houses to live. Therefore, to better situate housing needs on the capital market agenda, we need to understand the asymmetric effects of the key drivers of housing finance. As such, we examine the positive and harmful effects of both the demand and supply side factors of the housing market on loan commitment for both owner-occupiers and housing investors.

Starting with owner-occupier, we documented that urbanisation is a significant driver of loan commitment for this form of housing market. As more people move to big cities, the desire to own a home heightens and this translates to higher demand for owner-occupier loans. This is supported by the home loan commitment statistics from ABS (2022a), which reported that Greater Sydney, being the most urbanised city of Australia, is attracting more owner-occupier loan commitment than any other city of Australia. This speaks to the direct link between urbanisation and loan commitment for owner-occupiers. This result further explains the greater proportion of loan commitment for owner-occupiers over investors in recent years. The ABS (2021a), for instance, show that loan commitment for owner-occupiers in March 2021 rose to Aus$22.4 billion, and reached Aus$7.8 billion for investors in the same period. Hence, urbanisation drives housing demand which stimulates the desire for home ownership and demand for loans. We also found that boosting economic activities is critical in addressing the housing needs generated by urbanisation. As more people migrate to urban areas, economic growth becomes highly essential in terms of not only providing livelihood but exploring the path to homeownership over time. As the results clearly show, people tend to take more loans to buy a house to live when there is an improvement in real GDP growth rate than when economic activities decline. Our findings are supported by statistics from ABS (2022d) which show homeownership tends to improve during periods of economic boom.

Boosting the supply side building approval rate of private dwellings is also significant in enhancing owner-occupier loan commitment. This stems from the glut in housing demand over supply (Bangura and Lee 2023) and, as a result, improving the supply side will be welcome news for prospective homebuyers. This is practically appealing as first homebuyers are currently facing cutthroat competition with housing investors in the housing market (Adkins et al., 2019; Stiglitz, 2015). Stiglitz (2015), for instance, asserted that since the 1970s, the accumulation of wealth in advanced economies has been largely sourced from capital gains of residential properties and very little from the profits derived from the production of goods and services. This shows housing investment is now a key frontier of household investment which highlights the importance of increasing the approval rate of private dwellings to boost home ownership. Thus, as the results show, an increase in the approval rate of dwellings could help to cushion the effect of this competition.

Housing deposits represent a critical part of borrowing capacity assessment often done by lending institutions for prospective homebuyers. Therefore, the positive impact of household saving ratio on owner-occupier loan commitment symbolises greater chances of loan approval because it reduces both the loan-to-value of the property and the chances of obtaining mortgage lending insurance during loan negotiations. More broadly, higher household saving rates may also contribute to the supply of loanable funds of lending institutions. We found that a rise in housing lending rate is likely to reduce loan commitment by more than five folds when compared to declining lending rate. This highlights the sensitivity of higher home lending rates to homebuyers.

For housing investment, there is no evidence of any effect of urbanisation on loan commitment for investors both in the short and long run. In Australia, the decision to invest in dwellings is sometimes beyond the demand side activities of the market. The Australian taxation system, for instance, allows investors to offset any rental loss that incurred in a given financial year against other income like wages and salaries. This shows negative gearing mechanism is used to reduce taxable income by interest payments on investment loans. Hence the benefits of negative gearing can help minimise the sensitivity of housing investors to changes in rental income that is determined by population change or urbanization. In the financial year of 2015-16, for example, three out of five Australian dwelling investors claimed a net rental loss and made use of negative gearing (Blunden 2016). The existence of such tax solace for investors could contribute to the insignificant effect of urbanisation on loan commitment for investors.

However, the impact of positive GDP growth on investment is similar to owner-occupier though with varying magnitudes. This again emphasises the role of positive GDP growth in boosting housing finance to meet the housing demand generated by urbanisation. Private housing approval is insignificant, reflecting the inequality between homeowners and investment in terms of access to the housing market raised by Adkins et al. (2019). Housing investors tend to increase their share of the housing market using their existing equity and capitalising on the growing financialisaton of the housing market. Household saving ratio is insignificant for investment because prospective investors with existing mortgages can use the equity on their mortgage to apply for an additional loan for an investment property. This means prospective investors can apply the rule of 4 that uses a maximum value of up to 4 times their useable equity to buy an investment property (National Australia Bank [NAB], 2022). Rising housing lending rate also adversely affect housing investment, though the magnitude of this effect is comparatively less than that of owner-occupier. It is likely the case that investors would shift the increase in lending rate to the tenant and can also possibly access negative gearing when mortgage payment is more than rental revenue from the investment property.

In conclusion, we have documented that urbanisation is a significant determinant of loan commitment for owner-occupiers but not for investors. In the owner-occupier market, the positive effect of urbanisation is larger than its negative effect. Urbanisation is therefore a key driver of housing demand which can heighten the desire for home ownership and demand for owner-occupier loans. This supports Hypothesis 1a. Further, increasing approval rate of private dwellings as well as household savings ratio can enhance loan commitment for owner-occupier but not for housing investors. However, economic boost and lower lending rate can impact both owner-occupier and investors financing. These findings reveal the nature and scope of asymmetric effects of these variables on housing finance of owner-occupier and investment markets.

6.0 Conclusion and Implications

There is rapid urbanisation in many countries across the globe and this has become a subject of discussion among scholars, policy makers, and advocacy groups. This rapid urbanisation has diverse socio-economic, spatial, and financial implications. One of the key issues raised in the literature is the resulting housing need occasioned by the speedy urbanisation across the globe. This means the resulting housing demand surge from urbanisation requires a deeper understanding of housing finance systems. However, current literature on the nexus between

urbanisation and housing finance is limited. Further, existing literature about housing finance is aggregated and assumed symmetric effects. We departed from previous approaches and employed the NARDL model to examine the asymmetric effects of both demand and supply side factors of the housing market on loan commitment for both owner-occupiers and investors over 1980Q2 to 2022Q2 and documented the following findings.

First, we decoupled the housing finance market into owner-occupier and housing investment and examined the drivers of loan commitment for each of these submarkets. This has provided insight into how each of these submarkets is positioned in the housing finance system. Second, we found asymmetric effects of key housing variables on loan commitment for both owner-occupier and housing investment. This could help to situate the housing finance system in an ever-evolving housing market. Third, the asymmetric results underscore the effect of urbanisation on loan commitment for owner-occupiers but not for investors. Similarly, increasing the approval rates of private dwellings and boosting household savings ratios can enhance loan commitment for owner-occupiers but not for investors. This shows savings can be critical for first homebuyers in entering the market but not necessarily for housing investors as the latter may be able to apply alternative means like using their existing equity on their mortgage to obtain loan for an investment property. However, promoting economic prosperity and reducing the housing lending rate can boost loan commitment for both owner-occupiers and investors.

These findings have significant policy implications for the housing markets of both developing and advanced economies. The disaggregation of the housing finance market could support the formulation of more targeted policies in the housing market to help develop a more resilient housing finance system in countries with high urbanisation rates. The evidence of asymmetric effects has offered substantial information that could aid the design of policies that seek to address emerging issues in the housing finance market of both developing and developed nations. By highlighting the factors that promote loan commitment for both owner-occupiers and investors, we have catalogued important factors that could help policy makers to seek more of a balance in the financing structures of both homeownership and housing investment.

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