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Article

Local House Price Effects of Internal Migration in Queensland: Australia's Interstate Migration Capital

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Abstract

We examine the causal impact of internal migration on housing prices across 82 Statistical Areas Level 3 regions in Queensland, Australia from 2014–2019. The primary findings are: (i) an annual increase in the inflow of migrants equal to 1 per cent of a region's initial population leads to a 0.6 to 0.7 per cent annual increase in Queensland's house prices across different empirical specifications; (ii) this effect differs between the Greater Brisbane metropolitan area and Rest of State areas; (iii) migration from New South Wales fails to produce a significant influence on house price growth in Queensland.

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1. Introduction

Overseas migration has been the main driver of metropolitan population growth in Australia over the last four decades, and it has become a critical factor in the country's urban housing market growth. Internal migration, on the other hand, has been reshaping the geographical distribution of population in the country, leading to growth on the fringe of the major cities, as well as in particular coastal centres, but also loss from parts of remote Australia. Internal migration is a neglected component of population changes as researchers and policy-makers generally focus on natural increase (the excess of births over deaths) and net overseas migration components of population growth or decline. Australia has the highest level of residential mobility through internal migration amongst other developed countries in Europe and the United States. Queensland has become the country's interstate migration capital over recent decades mainly because an increasing number of residents (natives and long-term immigrants) have been leaving mainly from New South Wales (NSW) and moving to Brisbane (the capital city of Queensland) and second-tier cities such as the Gold Coast and the Sunshine Coast, and also smaller towns in the rest of Queensland. According to the *Population Growth Highlights and Trends* reports published by Queensland Treasury, net interstate migration increased by 233 per cent, from 6,860 people in 2015 to 22,830 people in 2019.

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This article provides some of the first empirical evidence on the housing market outcomes of internal migration in Australia with a particular focus on Queensland—Australia's interstate migration capital. Using Australian Bureau ofd Statistics (ABS) data by region, we study annual house price changes in the 2014–2019 period across 82 Statistical Areas Level 3 (SA3), which are geographical areas that generally have a population of between 30,000 and 130,000 people and are designed to provide a regional breakdown Australia's population. The panel data comprise six years, because house price data for small areas (across SA3 regions) have been available since 2014. Our data allow us to measure house price changes and the spatial concentration of migrants yearly instead of relying on discrete census data, as is typically the case in the literature. Besides, working with SA3-level disaggregated data, rather than state-, metropolitan area- or city-level data is crucial for studying the local economic impact of internal migration, which is the primary channel through which the population adjusts to regional labour and housing market conditions (Greenwood and Hunt 1984; Vermeulen and van Ommeren 2009). Hence, we estimate the impact of the migration inflow rate rather than population growth on house price changes.

The relationship between migration and local housing markets is theoretically ambiguous. The influx of migrants into a region is likely to increase the demand for housing and the impact on prices would depend on supply and demand adjustments. The housing sector's stock-flow model differentiates between short-term and long-term effects. In the short term, when housing stock is fixed, house prices rise due to the influx of migrants to a region. In the long term, however, housing supply expands. If housing markets are unregulated, prices are expected to repond positively to an influx of migrants in the short run while the long-run effect depends on the responsiveness of housing supply to changes in market conditions. Housing markets are often practically regulated, and price adjustments may be constrained, potentially delaying supply adjustments. An additional challenge arises due to the simultaneous causality between migration flows and house price changes. On the one hand, house prices may increase due to migration. On the other hand, house prices could influence immigrants' location choices. All else being equal, especially economic conditions, migrants may choose to settle in a region with more affordable housing (Sá 2015; d'Albis, Boubtane and Coulibaly 2019).

Reflecting these considerations, the present study uses a spatial correlation approach in which the annual change in house prices in different geographic areas is regressed on the annual inflow of migrants in that same area along with appropriate local area controls. To address the potential endogeneity problem due to simultaneous causality between migration and house price changes we employ a manually constructed instrument that matches the shift–share instrument used in the immigration literature.

To date, only a limited number of studies have examined the impact of internal migration on house prices and/or rents for the United States, China, New Zealand and Sweden. These studies all find a positive effect of internal migration on housing prices and/or rents. For example, Howard and Liebersohn (2021) examined the effect of internal migration on housing markets through the aggregate rent increase in all US cities and found that changing migration demand explains 54 per cent of rent increases and 75 per cent of CPI rent increases in the United States from 2000–2018. For Chinese cities, a 1 per cent increase in inter-regional migrants (rural-to-urban migration) results in a 0.70 per cent (0.34 per cent) increase in housing prices when controlling other relevant factors (Wang, Hui and Sun 2017). Stillman and Mare (2008) examined how population change in New Zealand, through international and internal migration flows, has affected rents and sales prices of apartments and houses from 1996–2006. The authors used data from five censuses and found that increases in internal migration flows are associated with higher house prices—that is, a 1 per cent increase in the New Zealand-born population is associated with a 0.81 per cent to 1.31 per cent increase in house prices. Increases in the immigrant population, in contrast, are negatively associated with house price changes as a 1 per cent population increase from immigrants is associated with a 0.48 per cent to 0.98 per cent decrease in house prices. Finally, Tyrcha (2020) examined the impact of both internal migration and immigration on the housing market across 284 Swedish municipalities from 2000–2015 and concluded that house prices in an area increase by 0.91 per cent with an internal migration impact equal to 1 per cent of the initial population of the same local area.

Despite overseas migration being the primary driver of metropolitan population growth in Australia over the last four decades, only a limited number of studies have explored the impact of immigration on house prices within the country. For instance, recent studies by Moallemi et al. (2021) and Moallemi and Melser (2020) have found that a 1 per cent increase in the local population due to immigration results in an annual increase of 0.7 per cent to 0.9 per cent in home prices, but only in significant urban areas. Additionally, through the use of a panel vector autoregressive error correction model, Gopy-Ramdhany and Seetanah (2022) determined that immigration has a positive and significant impact on housing prices in the short term, while no significant relationship was observed in the long run.

Existing research on the Australian experience of internal migration has mainly focused on characteristics of internal migrants—for example, age, gender, birthplace, labour force and education; the determinants of migration flows (Jarvie 1989; Bell and Cooper 1995; Bell and Hugo 2000); and the relationship between international migration inflow and internal outmigration within the context of global gateways cities (Burnley et al. 2007; Ley 2007). Some other studies examined the impact of population ageing on house prices. Among those, Guest and Swift (2010) foresee that from 2008 to 2050, the ageing population may result in a decrease in real house prices by 3 per cent to 27 per cent compared to what it would have been, according to a life-cycle optimisation and econometric model, respectively. As opposed to this study, Day (2018) predicts that population ageing contributes to excess demand for housing and higher house prices by employing an overlapping generations framework. Furthermore, Cho, Li and Uren (2021) provide a discussion on rising house prices and falling home ownership rates and evaluate housing affordability issues across capital cities in Australia since the early 2000s. The study concludes that low interest rates, zoning regulations that place constraints on housing supply, and political economy (politicians being avid investors in housing) are among the long-term barriers to housing affordability in Australia.

Unlike previous studies, this article provides the first empirical evidence for the causal relationship between internal migration and house price changes in Queensland, Australia. To gain a broader understanding of the effect of population mobility on housing markets, it is essential to carry out more case studies and explore housing market responses to internal migration in different national and local contexts. Australia is a noteworthy case study because the country has the highest level of population mobility through internal migration,[1] and it is still increasing at a modest rate, unlike the United States and other developed countries in Europe (Charles-Edwards et al. 2018). In this sense, to date, only Erol and Unal (2022) have studied the relationship between internal migration and house price changes in Australia. Yet, although similar methodologies are employed, this study intuitively differs from that one in at least two ways. First, the present article focuses specifically on Queensland, which has been Australia's interstate migration capital for decades. Second, this study further considers the increasing share of outmigration from NSW to Queensland and its impact on local housing markets.

Our findings indicate that there is a local economic impact of internal migration in Queensland. Internal migration pushes up the demand for housing in migration-receiving areas and results in house price increases. We find that an immigration inflow that amounts to 1 per cent of the initial local area population is associated with a 0.6 per cent to 0.7 per cent increase per year in house prices across Queensland. Population mobility within the state has a significant positive effect on house price changes in the Brisbane metropolitan area (or Greater Capital City regions) rather than non-metropolitan areas (Rest of State regions).

The findings of the study have significant policy implications for promoting sustainable local economic development, which can primarily be achieved by attracting newcomers to cities/towns and their participation in the local labour and housing markets. This is because house price growth is a vital factor in human capital accumulation and local economic growth as previously noted by Miller, Peng and Sklarz (2011) and Edward and Gyourko (2005).[2] Internal migration and its positive impact on house prices are therefore critical factors in local economic development, predominantly in Queensland's Greater Capital City Statistical Areas. When we benchmark our results against the results reported by previous research on the impact of internal migration on house prices, we see that the local housing market in Queensland behaves similarly to those in China, New Zealand and Sweden as house prices respond positively to internal migration flows. Finally, our results suggest that conditional on local area controls and time fixed effects, migrants tend to move towards regions where house prices grow more slowly.

The next section reviews migration dynamics in Australia between 2004 and 2019, and Section 3 covers the empirical specification. Section 4 presents the results of the data analysis, and a discussion of the findings, including robustness checks. Section 5 concludes the article.

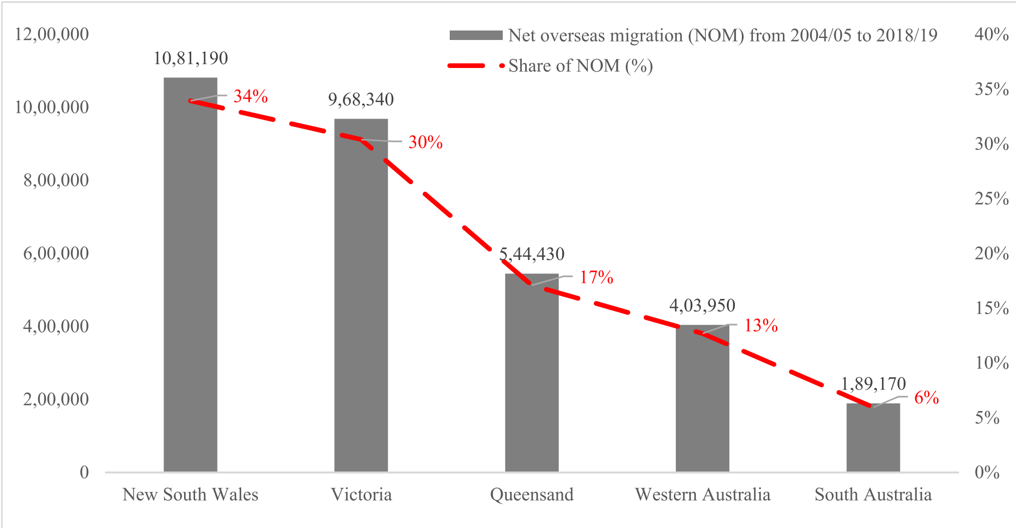
2. Population Mobility in Australia

Overseas migration has been the main driver of Australia's population growth, totalling 63 per cent of population growth in 2017–2019, whereas it represented only 27 per cent to 30 per cent of population growth in 1983–1984.[3] Internal migration, in contrast, has been reshaping the geographical distribution of the population within the country. According to the ABS, internal migration is the movement of people from one defined area to another within a country, and it is measured by interstate migration and regional internal migration. While the former is the net gain or loss of population through the movement of people from one state or territory of usual residence to another, the latter is the movement of people from one region to another within the country and includes both interstate and intrastate movements.

Figure 1 exhibits population mobility during the 2004/5–2018/9 period in five leading states of Australia. In the last 15 years, NSW had the largest number of overseas migrants, that is, 1,081,190 people, 34 per cent of total immigrants, followed by Victoria with a 30 per cent share of total immigrants (968,340 people) and Queensland, which had a 17 per cent share of total immigrants (544,430 people). NSW had a strong countervailing population flow of net overseas migration and net interstate migration as the arrival of a large number of overseas immigrants to the state can be associated with offsetting departures of the resident population through interstate migration, especially from Sydney (Figure 2). South Australia has also experienced a countervailing population flow of overseas and interstate migration by relatively small numbers compared to NSW—that is, the state recorded the arrival of 189,170 net overseas migrants and, at the same time, suffered a net loss of 62,794 interstate migrants. Queensland, in contrast, had a substantial gain in interstate migration (238,558 people) and received far fewer immigrants over the same period. Western Australia recorded a net gain of 403,950 overseas immigrants, but the state had a negative number of (−2,721) net interstate migration (Figure 2).

Hence, the link between overseas migration and interstate migration within Australia's

Figure 1 Net Overseas Migration Across the Main States of Australia, 2004/05–2018/19



Note: The figure displays population mobility in five leading states of Australia through net overseas migration flows during the 2004/5–2018/9 period. Net overseas migration is the net gain or loss of population through international migration to and from each state of Australia. The share of net overseas migration (NOM) in each state over the same period is indicated with dashed lines.
Source: ABS, 34120 Migration, Australia.

Figure 2 Net Interstate Migration, 2004/05–2018/19

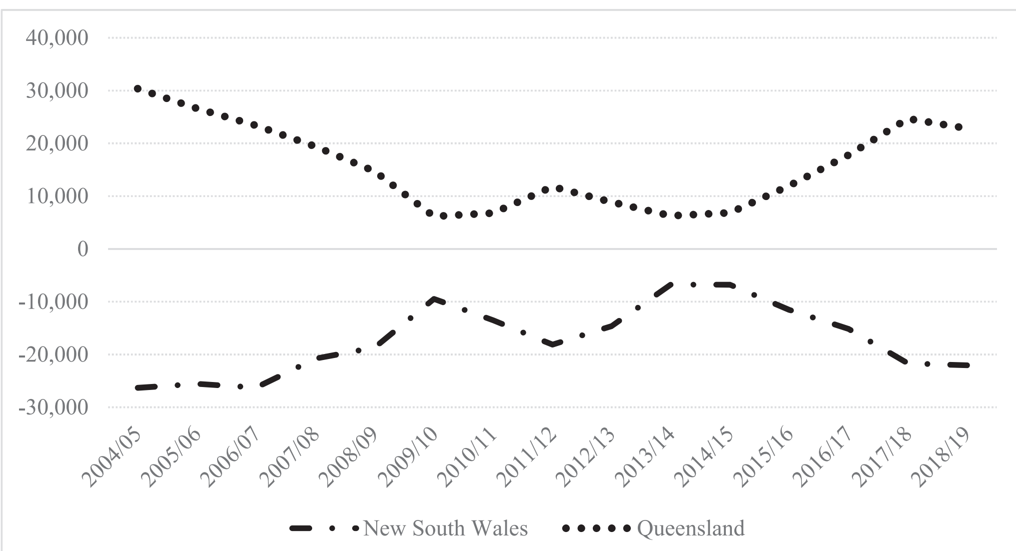
Note: Net interstate migration is the difference between the number of people moving into a state (or arrivals) and, and the number moving out (departures). The figure displays the total or cumulative number of migrant arrivals minus the total number of migrant departures from each state.
Source: ABS, 34120 Migration, Australia.

urban system varies widely across the states. NSW and South Australia have experienced offsetting migration flows as net interstate migration losses are seemingly associated with net overseas migration gains. Victoria and Queensland, in contrast, have attracted both overseas and interstate migration. Queensland has overstepped Victoria and become the nation's interstate migration capital mainly due to the improving economy and its year-round sunny weather attracting migration inflow from southern parts of Australia. The state recorded the highest gain in interstate migration with the annual average net interstate migration at 17,129 people from 2004–2019. Queensland has been remarkably influenced by NSW's massive loss of internal migrants—that is, there is a strong negative correlation of –0.91 between interstate migration flows in NSW and Queensland between 2004/5 and 2018/19 (see Figure 3).

Evidently, from state-level aggregate data, net interstate migration is equal to net regional internal migration as intra-state migration flows cancel out each other. In each state, every movement 'in' to a region is matched by a movement 'out' of another region. However, the two measures of internal migration certainly differ at the disaggregated statistical area level. The present study uses regional internal migration inflows across the SA3 areas to investigate how both net interstate and net intrastate migration flows have affected house prices in Queensland during the last six years.

As per the latest ABS data, Queensland records the highest population growth primarily due to the significant number of residents relocating to the state from NSW and Victoria. In the year leading up to June 2021, Queensland secured over 90 per cent of net interstate migration. Queensland is the largest state in Australia in terms of land occupancy, and it is also the most decentralised mainland state, with the majority of its population located along the eastern coastline.

Figure 3 Net Interstate Migration in NSW and Queensland Across the Years



Note: Net interstate migration flows in NSW and Queensland are negatively correlated between 2004/05 and 2018/19. Net interstate migration to Queensland accelerated in 2015/16 with 11,986 people and Queensland's net migration gain increased to 22,831 people in 2018/19. Over the same period, NSW's net interstate migration losses were 11,539 people in 2015/16 and increased to 22,063 people in 2018/19.
Source: ABS, 34120 Migration, Australia.

Queensland's improving economy is supported by a network of strong regional economies and communities, making it the most regionalised of all the mainland states. Interestingly, over half of Queensland's population resides outside of the greater metropolitan area of Brisbane—a significant percentage compared to the rest of highly urbanised Australia.[4] The state's relaxed lifestyle and climate are the primary reasons for people's migration, along with the fact that Brisbane is becoming a viable destination with its strong economy and employment opportunities, especially in tourism and mining industries.

3. Empirical Specification

The dominant spatial methodology used in the empirical literature on migration impacts is the spatial correlation approach. The primary concept behind this approach is to compare the housing market outcomes of regions with high levels of migration to those of regions with low levels of migration. In a way, the latter regions act as a substitute for the missing hypothetical situation: it is assumed that the observed housing market outcomes in regions with little migration are indicative of the housing market outcomes that would have occurred in regions with high levels of migration if they had not received additional migrants. By comparing the observed housing market outcomes in regions with high levels of migration to those in regions without migrants, it is possible to interpret the difference as the housing market impact of internal migration (Glitz 2014).

In practice, we regress the change in house prices in different geographic areas on the inflow of migrants in that same area and appropriate controls (Saiz 2007). In the absence of a well-identified exogenous shock to migration—that is, ethnic German migrants who were exogenously allocated upon arrival to specific regions by government authorities (Glitz 2012) or immigration shock after the Mariel boatlift in Miami (Saiz 2003)[5]—there are four main problems in estimating the causal effect of migration on housing prices: the time-invariant unobserved heterogeneity or local area fixed effects; simultaneous causality between migration and house prices; omitted variables; and house price adjustment to migration.

The first problem arises due to the fact that migration and house prices may be spatially correlated because of common fixed influences such as the climate or local amenities. To address this problem, in line with previous research by Sá (2015), Saiz and Watchter (2011) and Saiz (2007), our regression model is estimated with the dependent variable in first differences. This eliminates or differences-out time-invariant, area-specific factors that affect migration flows and the level of house prices. The second problem is the endogeneity issue that arises due to the simultaneous causality between migration flows and house price changes. The direction of causality is not clear because migrants are not randomly allocated across geographic areas—that is, there is a self-selection endogeneity problem. The sign of the bias is difficult to predict ex-ante. On the one hand, migrants may locate in more prosperous areas where house prices are growing faster. On the other hand, it is reasonable to expect that, controlling for economic conditions, migrants would choose to locate in areas where house prices are growing more slowly. To address the second problem, we use an instrument for the recent distribution of migrants based on past spatial concentrations of migrants. The validity of this instrument relies on the underlying assumption that the past settlement pattern of migrants is uncorrelated with recent or current changes in the economic performance of geographic areas. In that case, lagged values of migrant inflows are correlated with changes in house prices only through their relations with the current flows of migrants (Sá 2015).

Another source of endogeneity may occur due to omitted variables explaining both growths in migration and house prices. For example, changes in job opportunities and/or wages in different regions affect both house prices and migration, and there is a problem in identifying the separate effect of migration flows from the effect of other factors. In this article, we use lagged change in the number of jobs and also lagged changes in local income

(Saiz 2007) and local wages (Sanchis-Guarner 2017; Howard and Liebersohn 2021) to capture omitted variables and establish causality between migration and house prices. The fourth problem concerns the length of time that it may take for migration to affect house prices; housing prices cannot adjust immediately. Following Saiz (2007), we estimate the change in house price from $t-1$ to t as a function of one-year lagged migration inflow at $t-1$ divided by the total resident population at $t-2$. Using lags of the control variables, we accept that house prices do not adjust instantaneously to changes in fundamentals.[6] The following model is used to estimate the effect of internal migration on house prices:

$$\Delta \ln(HP_{i,t}) = \beta\left(\frac{\text{Migrants}_{i,t-1}}{\text{Population}_{i,t-2}}\right) + \alpha X_i + \delta Y_{i,t-1} + \rho\,\Delta Z_{i,t-1} + \Lambda_t + \Delta\varepsilon_{i,t} \quad (1)$$

where $\Delta \ln(HP_{i,t})$ is the change in the log of the median house sales price in each SA3 area i between years $t-1$ and t. The main independent variable is the annual inflow of migrants in year $t-1$ divided by the initial population in year $t-2$ in a local area. Given the nature of housing markets, the main specification uses migration inflow lagged one period with respect to changes in house prices. The coefficient β can be interpreted as the percentage change in house prices corresponding to an annual inflow of migrants equal to 1 per cent of the initial local population (Sá, 2015). Following the literature, the independent variable of interest is the normalised migration flow as it is defined as the inflow of migrants into SA3 area i during a particular year divided by the local area's initial population. As highlighted by Sanchis-Guarner (2017), standardising migration flows by initial population stock deals with the fact that regions of different sizes have different population and house price dynamics (Peri and Sparber 2011; Wozniak and Murray 2012), and it eliminates any unobservables that might equally affect both the numerator (migration flow) and the denominator (original local population).

In equation (1), X_i stands for initial local area attributes such as having a coastline and the land area. The log of SA3-level land area captures supply factors related to land availability (Saiz 2007). In order to isolate the impact of migration on house prices via its demand impact (for example, keeping housing supply constant), one may need to include time-varying changes in housing supply as an additional control variable (Sanchis-Guarner 2017). This variable would remove the bias arising from the fact that immigrants might be locating in areas where construction is growing faster (to work in this sector or due to higher availability of homes) and that house construction also affects housing costs via the increasing supply of housing units. Therefore, in our model, we include both time-varying housing supply (dwellings approved or the number of approved houses divided by local population) following Sá (2015) and the time-invariant area attribute of the log of total land area to capture supply factors related to land availability (Saiz 2007). $Y_{i,t-1}$ stands for one-year lagged local area characteristics, which may affect house prices. It includes the ratio of the number of building approvals (new housing construction) to the local population to control for the time-varying housing supply. $\Delta Z_{i,t-1}$ stands for time-varying area characteristics—that is, changes in local income, wages and the number of jobs that may affect the housing demand. The variables of job opportunities and local income/wages variables are well-known essential determinants of housing prices/rents (Jud, Benjamin and Sirmans 1996; Saiz 2007). Since the model is written in first-differences, time-invariant factors specific to each SA3 area and which affect the level of house prices have differenced out. Finally, Λ_t are year dummies, which capture national trends in inflation and other economic variables.

3.1 Instrumental Variable

Internal migrants tend to move to areas where other migrants have previously settled (Thomas 2019). Empirical evidence on internal migration dynamics has hinted at the importance of non-resident family members and/or friends as a factor that encourages and directs migration towards locations where the family/friends live even as a motive for long-distance (for example, interstate) migration in addition to employment and education motives.[7] Relying on such evidence, an instrumental variable (IV) based on the settlement pattern of migrants in an earlier period is constructed. More specifically, we use the settlement pattern of migrants in 2007 to predict the geographical distribution of migrants in the current period. Our identification strategy is based on the tendency of newly arrived migrants to settle in areas where previous migrants from the same area have already settled. We construct and use the following instrument for the inflow of migrants in SA3 region i as a share of the initial local population that matches the shift–share instrument used in the immigration literature.

$$\frac{\sum_r \gamma_{ri0} \quad \text{Migrants}_{rt-1}}{\text{Population}_{it-2}} \tag{2}$$

where γ_{ri0} is the share of migrants departing from SA3 region r who live or settle in SA3 region i in the base year t_0. Indeed, γ_{ri0} gives the direction of migration, namely, flows from and to SA3-level geographical areas and provides a measure of the size of the network from region r in each region i. We take the year 2007 as the base year because regional internal migration estimates data at the SA3 level are available from 2007. Migrants_{rt-1} is the total number of migrants that move out of region r in year $t-1$; therefore, the predicted inflow of migrants from region r in year $t-1$ who choose to locate in region i is $\gamma_{ri0} \times \text{Migrants}_{rt-1}$.

Summing across all SA3 regions of origin across the country, we obtain a measure of the predicted migration inflow in region i in year $t-1$. We consider 322 SA3 regions of origin across all states and territories of Australia. As migrants' country of birth information is not available in ABS Data by Region, SA3 level, it is not possible to analyse the separate impact of native versus foreign-born residents' mobility on house prices.

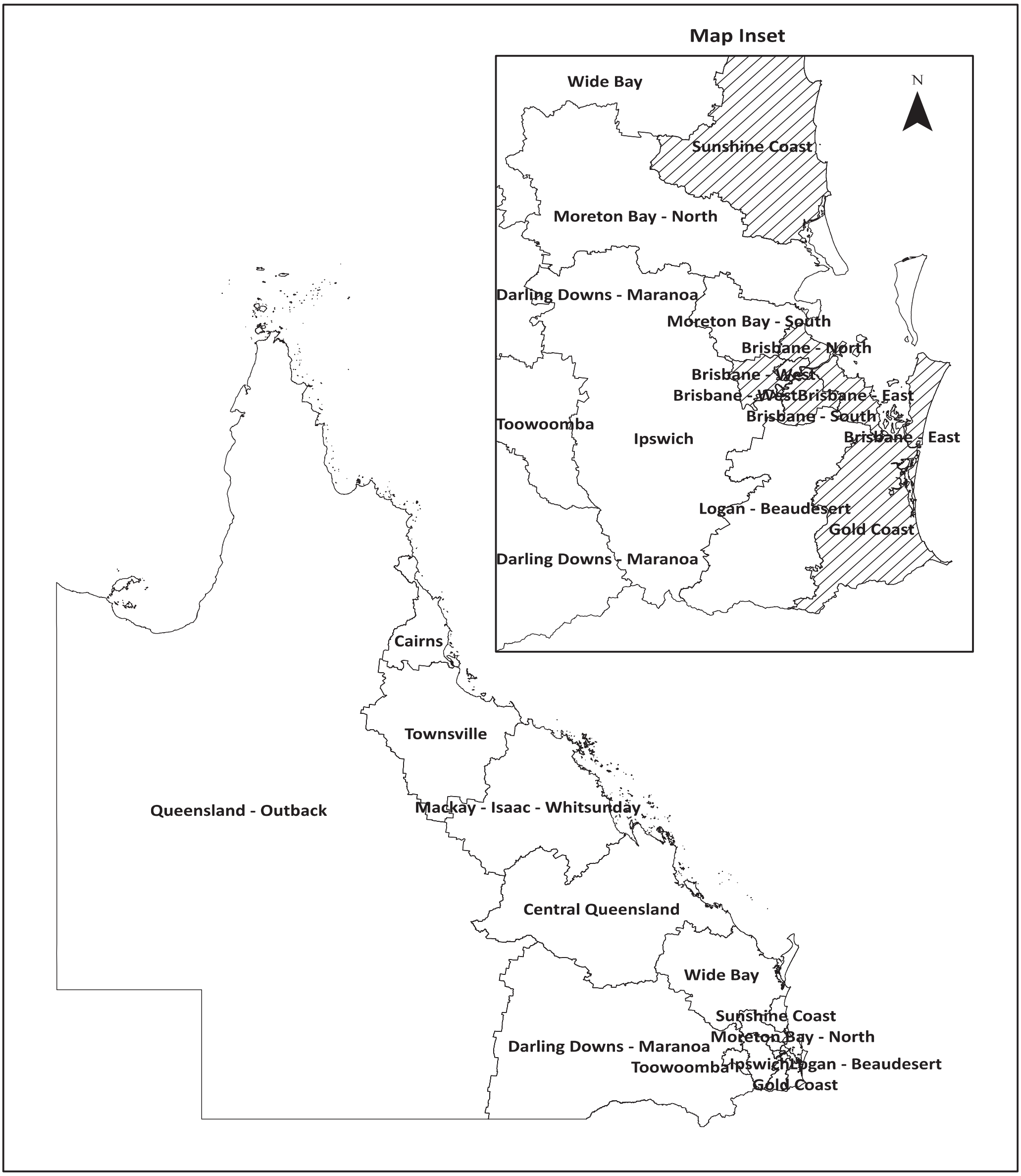
4. Empirical Results

4.1 Data and Descriptive Analysis

This study uses two main sources of data. ABS Migration, Australia (cat. no. 3412.0) comprises estimates of internal migration in statistical areas, representing local areas and sub-populations. Data by region (cat. no. 1410.0) provide an overview of selected social and economic characteristics, and land area data across Queensland, from 2013–2019. The data were collected for the SA3s, which are geographical areas that generally have a population of between 30,000 and 130,000 people and are designed to provide a regional breakdown of Australia's population. SA3s are classified into two groups: Greater Capital City Statistical Areas (GCCSA) and Rest of State Statistical Areas (RSSA). GCCSA are geographical areas designed to represent the functional extent of capital cities (Greater Brisbane) to reflect labour markets using the 2011 Census travel to work data. As shown in Figure 4, the Greater Brisbane metropolitan area includes Brisbane City and the surrounding cities of Ipswich and Logan-Beaudesert and the Moreton Bay region. In each state and territory of Australia, the areas not defined as being part of the GCCSA are represented by the RSSA. Rest of Queensland includes major regional cities/centres such as Cairns and Townsville in the north, the Sunshine Coast and the Gold Coast in the east, Central Queensland and Darling Downs in the southwest and Wide Bay in the southeast.

We study median house sale price changes across 82 SA3s and observe that housing prices increased by 15 per cent, on average, in Queensland during the 2014–2019 period. Whilst house prices in GCCSA increased by almost 20 per cent, the average house price increase in RSSA was only 9 per cent. During the same time period, 64 out of 82 SA3 regions (78 per cent) experienced increases in housing prices. The top ten regions for the highest (cumulative) house price growth are the Gold Coast, Sunshine Coast and Brisbane inner-city regions, respectively, ranging from

Figure 4 Map of Queensland



Source: Produced by authors using ABS data on the largest sub-state regions with a population of over 100,000 people, in general.

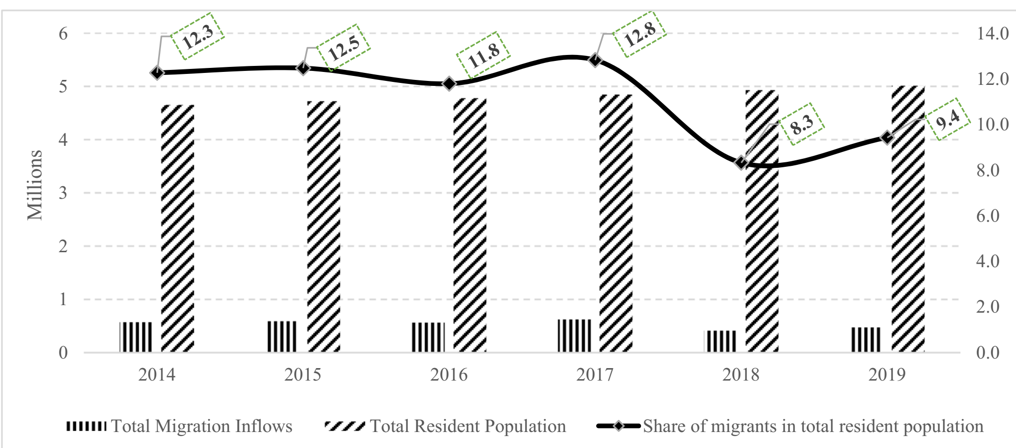
44 per cent in Surfers Paradise to 40 per cent in Gold Coast-North and 30 per cent in Brisbane Inner-North. The SA3s that have experienced the largest declines in housing prices (from −38 per cent to −15 per cent) are mostly in the northern parts of Queensland, including the Central Highlands, Bowen Basin, Queensland Outback and Mackay (Figure 4).

We examine price changes for separate houses rather than attached dwelling types such as semi-detached/terrace houses and apartments/flats because Australia's capital cities are all highly suburbanised with low-density urban expansion. Almost 75 per cent of the housing stock consists of separate houses, with very little high-density housing except in Sydney (Forster, 2006). According to ABS data, detached houses comprise 79 per cent of housing stock in Queensland, whereas flats/apartments and semi-detached/terrace houses comprise 10.6 per cent and 10.4 per cent of housing stock, respectively. If the capital city of Brisbane is excluded from the dataset, the ratio of separate houses increases to 81 per cent, while the share of apartments decreases to 8.7 per cent. Hence, this research examines the growth in detached house prices as they represent the dominant housing type in Queensland.

Total migration inflows in Queensland are shown in Figure 5. The share of migrants in the total resident population decreased from 12.3 per cent to 12.5 per cent in 2014–2015 to 8.3 per cent to 9.4 per cent in 2018–2019. The lowest level of internal migration occurred in 2018 when migration inflows were 8.3 per cent of the total resident population. Kalemba et al. (2020) studied the decline in internal migration levels in Australia and found that the strong impact of population ageing on the decline in internal migration has been fully counteracted by the positive effects of education and immigration. Furthermore, behavioural effects are found to be the principal factor explaining this downward trend. It is important to note that the share of migrants in the total resident population decreased significantly in the RSSA by 19 per cent, whereas there was only a 4 per cent decrease in migrants' share across GCCSA between 2014 and 2019.

Table 1 provides further summary statistics for our dataset. House prices, on average, increased 2.4 per cent per year across our sample during the period under consideration. However, there are considerable variations behind this average. The most significant increase was registered in 2015 in Brisbane inner, where house prices increased by more than 22 per cent. Turning to our variable of interest, the SA3s received an average annual inflow of 10.8 per cent of their initial population, indicating a high variation. The largest increases were registered in Brisbane-inner and Ormeau-Oxford where, in 2017, the inflow of migrants increased by 17.9 per cent. In contrast, the lowest increase was in Rockhampton and Charter Towers–Ayr-Ingham, which recorded a

Figure 5 Total Migration Inflows in Queensland



Note: Total internal migration inflows in Queensland were 571,418 people in 2014 and decreased to 472,908 people in 2019. The highest level of internal migration occurred in 2017 when migration inflows were 12.8 per cent of the total resident population with 622,097 people.
Source: ABS, 34120 Migration, Australia.

Table 1 Descriptive Statistics

Variables	*Observations*	*Mean*	*Std. dev.*	*Min.*	*Max.*
ΔLog house median sale price	398	0.024	0.066	−0.416	0.223
Migrants at $t-1$/Resident population at $t-2$	410	0.108	0.028	0.043	0.179
Number of approved houses at $t-1$/Population at $t-1$	492	0.008	0.007	0.000	0.073
ΔLog mean wage at $t-1$	328	0.017	0.017	−0.094	0.089
ΔLog median income at $t-1$	328	0.017	0.015	−0.100	0.057
ΔLog median wage at $t-1$	328	0.020	0.017	−0.078	0.081
ΔLog number of jobs at $t-1$	328	0.010	0.034	−0.117	0.176
Log of land area	82	10.749	2.759	7.212	17.951
Coastal dummy	82	0.305	0.463	0.000	1.000
Rest of states × [Migrants at $t-1$/Resident population at $t-2$]	410	0.055	0.055	0.000	0.174
NSW share of total migrants to Queensland	720	9.622	3.705	4.33	30.54

Note: Δ represents first difference. The table displays the summary statistics of our sample. ΔLog house median sale price is the change in the log of the median house sales price in each SA3 area i between years $t-1$ and t. The main independent variable is the annual inflow of migrants in year $t-1$ divided by the initial population in year $t-2$ in a local area. Given the nature of housing markets, the main specification uses migration inflow lagged one period with respect to changes in house prices. Log of land area and coastal dummy stand for initial local area attributes involved so as to capture supply factors; the former is related to land availability and the latter is a dummy controlling for the impact of having a coastline on prices. Number of approved houses per person at $t-1$ is included as an additional variable to control time-varying housing supply. Changes in logs of income and wage measures as well as the number of jobs are included as time-varying area characteristics that are likely to affect housing demand. Rest of states × [Migrants at $t-1$ /Resident population at $t-2$] is an interaction dummy variable to investigate the impact of internal migrant shares across Rest of State regions. Finally, we control for the effect of migration inflows from NSW, where the variable of *NSW share* gives the ratio of migration flows from NSW to Queensland in year $t-1$ divided by the total number of internal migrants to Queensland from all other states and territories of Australia in year $t-1$.

yearly inflow of migration equivalent to 4.8 per cent and 4.3 per cent of their initial populations, respectively. In our sample, 30 of the 82 SA3s have a coastline. The median income and median wage rose by 1.7 per cent and 2.0 per cent, respectively, with considerable variations across the sample. Finally, the annual average change in the number of jobs differs substantially, ranging from −11.7 per cent to 17.6 per cent, respectively.

4.2 Regression Analysis

The estimation results of the first-differenced ordinary least squares (OLS) specification in equation (1) using 82 SA3s across Queensland are presented in Table 2. The dependent variable is the change in the log of the median house sales price, and the main independent variable is the inflow of internal migrants relative to the total population in the previous year. The results show that migration inflow is a significant explanatory variable for house price changes as the estimated coefficient ranges from 0.250 to 0.572 across seven different model specifications. In all specifications, the standard errors are clustered at the SA3 level and robust to heteroscedasticity. The first and the second columns display the results obtained when we only include the main independent variable without and with the year dummies, respectively. In model 3 we include a set of controls, including the initial local area attributes, one-year lagged values of and changes in local area characteristics, and time effects in our estimations. We find that the estimated value of β coefficient increases to 0.521 in model 3, including all local area controls.

Queensland is the second-largest state in Australia by area with a network of strong regional economies and communities. Hence, we further investigate whether or not the impact of migration on housing prices varies between the capital city of Brisbane (GCCS SA3 areas) and the rest of Queensland (RSS SA3 areas), where several regional cities have taken on new roles in the urban system, such as enhancing sustainable tourism development, specialising in food and agribusiness,

Table 2 OLS Estimation Results for Internal Migration Inflows and House Price Changes

Variables	*[1]*	*[2]*	*[3]*	*[4]*	*[5]*	*[6]*	*[7]*
Migrants at $t-1$/Resident population at $t-2$	**0.250*****	**0.372*****	**0.521*****	**0.557*****	**0.572*****	**0.462*****	**0.472*****
	[0.032]	[0.060]	[0.089]	[0.086]	[0.083]	[0.097]	[0.092]
Log of land area			**–0.006*****	**–0.005*****	**–0.004*****	**–0.005*****	**–0.005*****
			[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
Coastal dummy			0.002	0.002	0.004	0.001	0.000
			[0.005]	[0.005]	[0.005]	[0.005]	[0.005]
Number of approved houses at $t-1$ /Population at $t-1$			–0.632	**–0.774***	–0.648	–0.685	–0.544
			[0.464]	[0.432]	[0.447]	[0.424]	[0.444]
ΔLog median wage at $t-1$			**1.349*****	**1.252*****		**1.359*****	
			[0.405]	[0.407]		[0.447]	
ΔLog mean wage at $t-1$					**0.908*****		**1.016*****
					[0.245]		[0.262]
ΔLog number of jobs at $t-1$			**0.675****	**0.670****	**0.627****	**0.694****	**0.647****
			[0.268]	[0.266]	[0.263]	[0.271]	[0.267]
NSW share of total migrants to Queensland at $t-1$						**0.002*****	**0.002*****
						[0.001]	[0.001]
Rest of states × [Migrants at $t-1$ /Resident population at $t-2$]				**–0.160*****	**–0.179*****	**–0.144*****	**–0.162*****
				[0.046]	[0.045]	[0.044]	[0.042]
Observations	398	398	316	316	316	314	314
R^2	0.16	0.20	0.47	0.48	0.46	0.49	0.47
Year fixed effects	No	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Δ indicates first difference. SA3-level clustered standard errors in brackets. Across all specifications, our dependent variable is the log of the median house sales price in each SA3 area *i* between years $t-1$ and *t*. The variable of interest is the annual inflow of migrants in year $t-1$ divided by the initial population in year $t-2$ in a local area. Log of land area and coastal dummy stand for initial local area attributes involved so as to capture supply factors; the former is related to land availability and the latter is a dummy controlling for the impact of having a coastline on prices. Number of approved houses per person at $t-1$ is included as an additional variable to control time-varying housing supply. Changes in logs of income and wage measures as well as number of jobs are included as time-varying area characteristics that are likely to affect housing demand. Rest of states × [Migrants at $t-1$/Resident population at $t-2$] is an interaction dummy variable to investigate the impact of internal migrant shares across Rest of State regions. Finally, we control for the effect of migration inflows from NSW, where the variable of *NSW share* gives the ratio of migration flows from NSW to Queensland in year $t-1$ divided by the total number of internal migrants to Queensland from all other states and territories of Australia in year $t-1$. The estimation technique is OLS across all specifications. The first and second columns display the results obtained when we only include the main independent variable without and with the year dummies, respectively. In model 3 we include a set of controls, including initial local area attributes, one-year lagged values of and changes in local area characteristics, and time effects in our estimations. In models 4 and 5 we provide the estimation results of the original model 3 with an interaction variable to measure the simultaneous effect of the migration inflow rate and the RSSA. Finally, in models 6 and 7 we control for the effect of migration inflows from NSW. We also run models 4 and 6 with median income. Our independent variable has consistent and significant estimates with coefficients of 0.608 and 0.519, respectively.
***$p < 0.01$;
**$p < 0.05$;
*$p < 0.1$.

and improving health and aged-care industries. In models 4 and 5 we provide the estimation results of the original model 3 with an interaction variable to measure the simultaneous effect of the migration inflow rate and the RSSA. This allows for a thorough consideration and understanding of metropolitan versus non-metropolitan region effects, and the analysis of whether the impacts of migration flow could differ across SA3 regions with different characteristics. We find that a 1 per cent increase in migrant stock (per cent of population) has a negative effect of 0.16 per cent to 18 per cent on house prices in RSSA regions. It appears that internal migration is influential in housing price increases in the Brisbane metropolitan area but not in Rest of State areas.

Finally, in models 6 and 7 we control for the effect of migration inflows from NSW, where the variable of *NSW share* gives the ratio of migration flows from NSW to Queensland in year $t-1$ divided by the total number of internal migrants to Queensland from all other states and territories of Australia in year $t-1$. The estimated value of β coefficient is 0.002 and statistically significant at 1 per cent, indicating that outmigration from NSW to Queensland has a very small (negligible) positive effect on housing price growth. Changes in local median/mean wage, number of jobs, total SA3 land area, and NSW migration share seem to be robust correlates of house price growth for the OLS estimations. In contrast, the evidence for the coastal dummy, housing approvals, is not significant or very strong.

The estimation results using the instrument defined in equation (2) are displayed in Table 3. The estimated coefficients for the first-stage IV regressions are significant at the 1 per cent level. Such a result suggests a strong correlation between the current geographic distribution of migrants and past settlement patterns. Overall, regarding the full models with local area controls, an increase in migrant inflow equal to 1 per cent of an SA3's initial population leads to an increase of approximately 0.61 per cent (model 6) to 0.69 per cent (model 5) in annual house price changes across the model specifications. The median house price for the sample data is $450,700, hence an annual increase in migration inflow equal to 1 per cent of an SA3's initial population leads to a $2,704 to $3,155 annual increase in house prices. It is possible to argue that housing prices across Queensland would have been around 0.6 per cent nd 0.7 per cent lower per annum had there been no internal migration. The extended models in 6 and 7 present instrument estimation results with the interaction variable, where we disentangle the effects of migration on housing prices across the Rest of State SA3s. The results suggest that migration inflow has a negative impact on house price changes in Rest of State areas; the estimated coefficient ranges from −0.159 to −0.179 and is significant at the 1 per cent level. Furthermore, the increasing migration flow from NSW to Queensland does not have any significant effect on house price changes.

The IV estimates are higher than those obtained by OLS estimation of all model specifications, suggesting a negative (or downward) bias in the OLS results. Such an outcome suggests that conditional on local controls and time fixed effects, migrants tend to move towards regions in which house prices are growing more slowly (Sá 2015; Sanchis-Guarner 2017). We argue that estimations with instruments better capture relevant behaviour because, in all cases, our instrument is strong.

4.3 Robustness

Across all specifications in both Tables 2 and 3, neither the exclusion or inclusion of control variables alters the results, which are fairly robust across different specifications. Such a finding suggests that our results are not sensitive to the specific choice of control variables used in the analysis, and that the relationships of interest are not being driven by any particular control variable and are not just coincidental correlations. This robustness further indicates that the relationships between the independent and dependent variables are not sensitive to the specific set of control variables used, which also provides support for the causal interpretation of the results. We also note that the 2SLS and OLS estimates are relatively close to each other. Although such a similarity does not indicate that the 2SLS estimation is unnecessary or invalid, it does suggest that the specific model and data under consideration may not require the use of 2SLS (Guest and Rohde 2017).

Table 3 IV Estimation Results for Internal Migration Inflows and House Price Changes

Variables	*[1]*	*[2]*	*[3]*	*[4]*	*[5]*	*[6]*	*[7]*
Migrants at $t-1$/Resident population at $t-2$	**0.248*****	**0.380*****	**0.662*****	**0.658*****	**0.693*****	**0.607*****	**0.647*****
	[0.032]	[0.074]	[0.184]	[0.178]	[0.181]	[0.200]	[0.204]
Log of land area			**−0.007*****	**−0.005*****	**−0.005*****	**−0.006*****	**−0.006*****
			[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
Coastal dummy			0.001	0.002	0.003	0.001	0.000
			[0.006]	[0.005]	[0.006]	[0.005]	[0.005]
Number of approved houses at $t-1$ /Population at $t-1$			**−1.014***	**−1.057****	**−0.976***	**−1.017***	−0.931
			[0.574]	[0.530]	[0.570]	[0.534]	[0.573]
Δ Log median wage at $t-1$			**1.307*****	**1.240****		**1.232****	
			[0.499]	[0.503]		[0.497]	
Δ Log mean wage at $t-1$					**0.860****		**0.850****
					[0.340]		[0.331]
Δ Log number of jobs at $t-1$			**0.655****	**0.659****	**0.610****	**0.662****	**0.612****
			[0.283]	[0.280]	[0.274]	[0.281]	[0.275]
NSW share of total migrants to Queensland at $t-1$						0.001	0.001
						[0.001]	[0.001]
Rest of states × [Migrants at $t-1$ /Resident population at $t-2$]				**−0.165*****	**−0.185*****	**−0.159*****	**−0.179*****
				[0.046]	[0.045]	[0.046]	[0.044]
First-stage IV coefficient	1.067***	0.975***	0.785***	0.787***	0.761***	0.728***	0.707***
	[0.068]	[0.167]	[0.212]	[0.210]	[0.214]	[0.215]	[0.217]
Observations	394	394	314	314	314	314	314
R^2	0.16	0.20	0.47	0.48	0.46	0.48	0.46
Year fixed effects	No	Yes	Yes	Yes	Yes	Yes	Yes
Durbin–Wu–Hausman test—p value	0.01	0.02	0.01	0.01	0.01	0.02	0.03
Kleibergen–Paap F test	244.2	34.06	13.69	14.00	12.63	11.46	10.62
Kleibergen–Paap rk LM test—p value	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Kleibergen–Paap rk Wald test—p value	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Anderson-Rubin Wald test—p value	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Stock–Wright LM S statistic—p value	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Notes: Δ indicates first difference. SA3-level clustered standard errors in brackets. Across all specifications, our dependent variable is the log of the median house sales price in each SA3 area i between years $t-1$ and t. The variable of interest is the annual inflow of migrants in year $t-1$ divided by the initial population in year $t-2$ in a local area. Log of land area and coastal dummy stand for initial local area attributes involved so as to capture supply factors; the former is related to land availability and the latter is a dummy controlling for the impact of having a coastline on prices. Number of approved houses per person at $t-1$ is included as an additional variable to control time-varying housing supply. Changes in logs of income and wage measures as well as number of jobs are included as time-varying area characteristics that are likely to affect housing demand. Rest of states × [Migrants at $t-1$/Resident population at $t-2$] is an interaction dummy variable to investigate the impact of internal migrant shares across Rest of State regions. Finally, we control for the effect of migration inflows from NSW, where the variable of *NSW share* gives the ratio of migration flows from NSW to Queensland in year $t-1$ divided by the total number of internal migrants to Queensland from all other states and territories of Australia in year $t-1$. The estimation technique is 2SLS across all specifications where we instrument the number of migrants with the predicted number of migrants. The first and second columns display the results obtained when we only include the main independent variable without and with the year dummies, respectively. In model 3 we include a set of controls, including the initial local area attributes, one-year lagged values of and changes in local area characteristics, and time effects in our estimations. In models 4 and 5 we provide the estimation results of the original model 3 with an interaction variable to measure the simultaneous effect of the migration inflow rate and the RSSA. Finally, in models 6 and 7 we control for the effect of migration inflows from NSW. We also run models 4 and 6 with median income. Our independent variable has consistent and significant estimates with coefficients of 0.690 and 0.643, respectively.
$^{***}p < 0.01$;
$^{**}p < 0.05$;
$^{*}p < 0.1$.

In this context, we ran a Durbin–Wu–Hausman (Durbin 1954; Wu 1973; Hausman 1978) test to compare the estimates from OLS and IV estimates and to determine whether the OLS set would be subject to any significant biases, the null hypothesis for which states that an OLS estimator of the same equation would yield consistent estimates, that is, any endogeneity among the regressors would not have deleterious effects on the OLS estimates. A rejection of the null indicates that endogenous regressors' effects on the estimates are meaningful, and IV techniques are required. As indicated in Table 3, in all specifications, we reject the null hypothesis, which indicates that OLS is not consistent.

We test the validity of the instrument used in our regressions using various statistical tests. In this context, to address potential issues of under-identification, weak identification and weak-instrument-robust inference, we provide additional support for our linear 2SLS regressions by conducting statistical tests that are standard and crucial for determining the robustness of IV and 2SLS regression. As suggested by Baum, Schaffer and Stillman (2007), we use the Kleibergen–Paap rk LM test and the Kleibergen–Paap rk Wald test for under-identification, the Kleibergen–Paap *F*-test for weak identification, and the Anderson–Rubin Wald test and the Stock–Wright LM *S* statistic for weak-instrument-robust inference.

The Kleibergen–Paap rk LM test and the Kleibergen–Paap rk Wald test produce the null hypothesis that the estimated equation is under-identified, and the alternative hypothesis is that the estimated equation is fully identified. The results of these tests can be found in Table 3, and it is clear that the null hypothesis of under-identification is rejected at a significance level of 1 per cent. The Kleibergen–Paap *F*-test produces the null hypothesis that the estimated equation is weakly identified. The results, presented in Table 3, are compared to the critical value table in Stock and Yogo (2005) and imply that our estimated equations do not suffer from a problem of weak identification as we have values fairly exceeding the critical value of 10.

The Anderson–Rubin Wald test and the Stock–Wright LM *S* statistic test whether the estimated coefficients of the endogenous variables are compatible with the data used, regardless of the strength of instruments used. The null hypothesis is that the estimated coefficients of the endogenous variables are jointly equal to zero. The results in Table 3 reject the null hypothesis at a significance level of 1 per cent. Such a finding implies that our estimated coefficients are compatible with the data used, independent of the strength of instrument used (Baum, Schaffer and Stillman 2007).

5. Conclusion

This article shows that internal migration flows in Australia's interstate migration capital, Queensland, has increased house prices in migration-receiving areas in the last six years, from 2014–2019. Using disaggregated data from ABS non-census and intercensal statistics we find that an internal migration inflow equal to 1 per cent of a region's initial population is associated with increases in average housing prices of about 0.6 per cent to 0.7 per cent in Queensland. Considering the upper bound of the median house price in Queensland is $1,200,000 for the sample period, an annual increase in migrant inflow equals 1 per cent of an SA3's initial population leading up to an $8,400 annual increase in house prices. Our findings are in line with previous research including Tyrcha (2020) who found that house prices in Swedish municipalities increased by 0.91 per cent with an internal migration impact equal to 1 per cent of the initial population of the same local area. Wang, Hui and Sun (2017) found that a 1 per cent increase in inter-regional migration resulted in a 0.701 per cent increase in housing prices in Chinese cities, and Stillman and Mare (2008) concluded that internal migration is associated with a 0.81 per cent to 1.31 per cent increase in house prices in New Zealand.

The results suggest that the increasing share of outmigration from NSW to Queensland does not have any significant effect on housing prices. Thus, there is no spill-over effect of outmigration from NSW, mainly from Sydney, on Queensland's local housing market (for example, housing price growth). Internal migration delivers a negative impact on housing prices in non-metropolitan (Rest of State) areas, whereas it generates house price growth across SA3 areas in the capital city of Brisbane (metropolitan Queensland). Our OLS estimations produce downward biased results, which implies that conditional on local controls and time fixed effects, migrants tend to move towards regions where house prices grow more slowly.

The COVID-19 pandemic has had significant social, economic and technological impacts that have altered migration patterns in Australia. Indeed, the possibility of a longer-term shift in migration patterns between capital cities and regional areas has arisen. The Australian Government's Centre for Population[8] has reported that net internal migration has shifted away from capital cities and towards regional areas, and this trend has been accelerated by the pandemic—that is, 105,100 out-of-state arrivals were estimated to move to Queensland from Australia's southern states in 2021. Queensland is predicted to see an even larger increase in net interstate migration since it has been a highly sought-after destination for interstate migrants in the past and has avoided lengthy COVID-19 lockdowns.

Hence, the accelerated interstate migration to Queensland and its positive impact on housing prices—the main finding of this study—will have important policy implications. Demand for housing in Brisbane, the Gold Coast, the Sunshine Coast and Moreton Bay regions (the most popular destinations in Queensland seeing the biggest gains in new residents) due to new arrivals will further increase housing prices. In some desired destinations of newcomers, where housing supply is an ongoing and complex issue, prices may increase further into record levels. If wages do not increase as quickly as property prices, this gap will make housing unaffordable to some segments of the population. Hence, policy-makers should consider the other economic benefits that migrants bring such as human capital, technological spill-over and physical capital.

In this context, local government and policy-makers should focus on not only attracting new residents to their cities/towns but also integrating them in local labour and housing markets to achieve sustainable economic development. House price increases are an essential source of human capital accumulation and economic growth, and policy-makers should consider this when making decisions.

This study has some limitations due to the limited data availability—that is, house price data for small areas or across SA3 regions are only available from 2014. Future research might investigate longer-term effects of migration on housing prices and changes in patterns of internal migration during the COVID-19 pandemic. Additionally, different estimation techniques like Local Projections (LP) methodology could be used to measure the diffusion of migration shock to housing prices accumulated over time. Anecdotal reports of unusually large net migration losses in large cities and net migration gains in less populated and/or rural areas have emerged, but there is no empirical evidence to supportthis hypothesis yet.

Endnotes

1. Bernard et al. (2017) show that Australia exhibits the highest level of residential mobility among the 16 countries, including the United States and 14 European countries, with an average of 5.1 moves per individual. Australia is among the most mobile societies in the world with 39 per cent of the population changing their address within Australia in the year before the 2016 Census. Across the world, on average, 7.9 per cent of people move each year domestically, while 21 per cent move at least once every five years (Bell et al., 2015).

2. Areas with low housing prices tend to exhibit human accumulation declines as well as regional economic declines (Edward and Gyourko, 2005), Miller, Peng and

Sklarz (2011) found that house price changes have significant effects on local gross metropolitan product in the United States.

3. 3101.0 Australian Demographic Statistics, Table 1. Population Change.

4. https://www.qld.gov.au/about/about-queensland/statistics-facts/facts

5. Saiz (2003) examined the impact of an exogenous immigration shock after the Mariel boatlift on changes in rental prices in Miami, which added an extra 9 per cent to Miami's renter population in 1980.

6. The way that housing markets adjust when houses differ in terms of their quality is essential; however, we do not have data on the size and quality of dwellings across SA3s to estimate models with different housing quality levels.

7. Cooke, Mulder and Thomas (2016), Das, de Valk and Merz (2017), Silverstein and Giarrusso (2010), Pettersson and Malmberg (2009) and Burnley et al. (2007).

8. <https://population.gov.au/sites/population.gov.au/files/2021-09/the-impacts-of-covid-on-migration-between-cities-and-regions.pdf>

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