

Does Immigration Affect Residential Real Estate Prices? Evidence From Australia

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Abstract

Worldwide migration flows have been gaining momentum over the past years, leading to population increases in some countries. Consequently, the population increase might have led to more housing demand in the host country. This study investigates the effect of immigration on housing prices in Australia by using data for eight states on a quarterly basis from 2004 – 2017. To study the possible dynamic and endogenous relationship between housing prices and immigration, a panel vector autoregressive error correction approach (PVECM) is adopted. Analysis of the results indicates that in the short run immigration positively and significantly affects housing prices, whereas in the long run no significant relationship was observed. From the regional breakdown and analysis, it is discerned that in some states there is significant and positive effect of immigration on residential real estate prices in the long run. Interestingly, analysis of reverse causation indicates that housing prices affect migration in a negative and significant way.

1. Introduction

The globalization of the economy is an important aspect that could explain the growth in the level of worldwide migration. The UN, International Migration Report 2017 notes that migration has been increasing, for example in year 2000 international migration was at 173 million and it has increased to 220 million in 2010 and further increased to 258 million in 2017. Different factors have contributed to these migration movements, for example political instability/ civil wars in the domestic countries, foreigners seeking better job prospects or a better education system. In general, the native country attracting immigrants is perceived as offering better living conditions. On the other hand, some countries have been encouraging migration to increase their population size, to lessen their ageing population issue or to attract skilled or cheaper labor. The domestic countries have been formulating and adapting their migration policies as per their needs, for instance in Australia, initially foreigners could mainly apply for permanent visas, and then the policies were modified to allow for temporary visa allocations. The countries which have been welcoming the highest number of migrants in 2017 are ranked as follows: the United States, Saudi Arabia, Germany, Russian Federation, United Kingdom, and Australia among others.

It is noteworthy that past studies relative to immigration have mainly been geared towards finding the nexus between immigration and the labor market (see Scheve and Slaughter, 2001; Card, 2001, 2005; Dustmann and Glitz, 2005; Card and Lewis, 2007; Dustmann and Glitz, 2011; Manacorda, Manning and Wadsworth, 2012; Ottaviano and Peri, 2012; Dustmann et al., 2013). Given the growing importance of worldwide migration, the latter should be impacting the domestic country beyond its labor market and over the past decade a few researches have been conducted to discern the impact of immigration on the housing market in different contexts such as the US (Saiz, 2007; Saiz, & Wachter, 2011), UK(Sá, 2015; Braakmann, 2019) and Canada, (Akbari, & Aydede, 2012) among others and the results are at best mixed. Theoretically, it is stipulated that the presence of more immigrants in a country/ region should lead to an increase in housing demand and this could result in an increase in housing prices. Larkin et al. (2018) who consider studies on the link immigration-housing prices, using a meta-regression approach, mention that an increase in housing demand should lead to an increase in housing prices. However, rising levels of immigrants in particular regions^[1] has also been argued to cause natives to shift to other regions, thus housing demand and consequently housing prices will not necessarily increase (Sa, 2015).

The main objective of this study is to identify if an increasing migration level affects housing prices. Past studies on migration and residential real estate prices (housing prices/ rents) have depicted different types of results; where immigration has either affected residential prices positively (Saiz 2003, 2007; Ottaviano and Peri 2006; Mussa et al., 2017) or negatively (Sa, 2015; Green, 2018; Zhu et al., 2018) or no significant relationship was found between the two variables (Saiz and Wachter, 2011; Braakmann, 2019). The study context which has been chosen is Australia given the importance of immigration for this country, with a reported immigrant share over total population standing around 29%

in 2017. Available statistics from the Australian Bureau of Statistics (ABS) shows that the Australian population has undergone consequential increase, of around 40% from 1990 till date. This is mainly due to net overseas migration (NOM), for example in 2017 population growth was at 388 000, out of which 240 000 was from NOM. Data from the Australian Bureau of statistics (ABS) also illustrate that residential prices have undergone significant price increases over the past years; mean residential prices in Australia have increased by approximately 35% from 2013 till 2017 (from a mean price of 500000AUD to 680000AUD). Most of the studies (Karantonis and Ge, 2007; Otto, 2006; Hatzvi and Otto, 2008) on the determinants of housing prices in Australia have focused on demographic and economic factors as explanatory variables, with only a preliminary study conducted by Bourassa and Hendershott (1995). The latter used immigration as an explanatory variable for housing prices and detected a positive relationship between the variables. In a subsequent study, Ge (2014) depicted that there is a strong relationship between immigration and house prices in Australia.

Following a general analysis of immigration on housing prices in Australia, a regional breakdown is used to discern if NOM has a different consequence on the housing markets in the different regions. Past studies (Zhu and al., 2018) on migration have demonstrated that immigrants tend to cluster and therefore if housing prices are being affected by their arrival, it should be more on regional basis rather than a national basis. Over the past decades, the proportion of immigrants within particular Australian regions has increased by quite consequential amounts (for example in Sydney and Melbourne). Recently the Australian government has suggested that migration restrictions might be implemented in particular regions; following the concerns of residents, relative to rising housing prices, relatively stagnant salaries or even traffic issues. A regional analysis of the data is advocated as the immigrants are usually spatially concentrated (Green, 2018), therefore within the same country, the nexus between immigration and housing prices in different regions might not be the same.

This study is believed to build on the few related previous works and contribute to the literature in several ways. In addition to assessing the impact of immigration on housing prices from comparative regional perspective, it also analyses the hypothesized link in both the short and long run. Indeed, according to economic theory, if housing demand (for example due to an increase in population size) increases, this should lead to an increase in prices, which should be attenuated as housing supply increases in the market. Given that in the short term housing supply will tend to be inelastic; the equilibrium in terms of demand and supply will normally be restored in the long term. Hence the effect of immigration on house prices should be more pronounced in the short term. To our knowledge, most of the past studies (except Latif, 2015 and D'Álbis et al, 2019) on immigration and housing prices have used methodologies focusing on the long run relationship. Moreover, another aspect which has received little attention until recently (see Braakmann, 2019; Green, 2018) is the analysis of the bi-directional causal relationship between the two variables. In this study, it would be analyzed if the housing prices in the native country affect immigrant inflows. As such this study contributes to the literature by analyzing the mediating or indirect role of immigration on housing prices through wage levels. Indeed, Saiz (2007) highlighted the importance of wages when explaining the relationship between immigration and housing rents, and posited that immigration can affect the wage level following which the latter is likely to impact on housing prices. To empirically analyse the above, we use dynamic panel data analysis namely a Panel Vector Autoregressive Error Correction (PVECM) framework, which also account for dynamism in housing prices modelling but interestingly allows the study of short and long effects in the presence of cointegration as well as bi-causality and other feedback effects in the immigration-housing price nexus.

The rest of this work is organized as follows: section 2 reviews both the theoretical underpinnings and the related literature, section 3 dwells in a contextual analysis of immigration and housing prices trends in Australia, section 4 discusses the methodology and findings while section 5 concludes.

[1]Past studies have illustrated that immigrants tend to cluster in particular regions (Meen et al., 2016; Munshi, 2003; Saiz, 2007)

2. Literature Review

Theoretical Underpinnings

From market economy theories, housing prices would be established through the interaction of demand and supply. Population increase, for example with an increasing net overseas migration, should entail an increase in housing demand and hence housing rents/ prices (Sa, 2003; 2007). Given that housing constructions necessitates time, there will not be a spontaneous adjustment of supply to demand in the short term and housing market prices will not be at equilibrium. According to Latif (2015) in the short run, housing prices are more significantly affected by immigration; whereas in the long run as supply increases to adjust to demand there should normally not be significant housing price increases. From Sa (2015), it is noted that if supply is more elastic, then immigration (measuring increase in housing demand) will be having lower impact on house prices.

When undertaking a study on a regional basis, a positive net overseas immigration would mean an increase in the population size in the region. This population increase might be offset through the interregional movements of the natives within the country. When more immigrants move to a particular region (immigrants cluster), this might make the natives shift to other regions in their home country (Sa, 2007). One of the main explanations suggested is that the immigrants might depress the salary level and this induces the natives to move to other regions with the objective of maintaining their living standards. Therefore region wise, the population inflow (immigrants) and outflow (natives) should either result in no changes in population size and hence immigration would not be affecting housing prices. According to Gonzalez and Ortega (2009), there should either be a positive relationship between housing prices and immigration, if the population size increases as a consequence of immigration or no relationship between the two variables as the population increase due to immigration (foreign) gets offset by native outmigration. There could even be a negative relationship as immigrant clustering (immigrants usually rent or several families share a house) and low-skilled immigrants usually lead to decrease in wages (Carter, 2005) and as a consequence housing prices would be decreasing. As natives find the regions where immigrants settle less desirable, this should entail a decrease in housing demand and thus prices in those regions.

Apart from the demand side factors, the supply side factors will also be affecting housing prices; such as construction cost, supply of houses or availability of land. If supply of houses decreases or land used for construction becomes scarcer then according to Braakmann (2019), the increasing housing demand by immigrants would lead to a higher increase in housing prices. Accetturo and al. (2014) pinpoint that housing supply will tend to be more inelastic in central city areas as compared to other regions. One of the explanations put forth by Tumbarello and Wang (2010), to explain increasing house prices in urban regions in Australia is the scarcity of land in those regions; as well as a lower level in terms of housing supply.

Empirical Review

Past related studies have yielded mixed result on the link between immigration and housing prices, with two broad strands of the literature, depending mainly of the contexts and/or type of regional specification. The first strand of the literature have validated a positive link in the immigration-housing prices nexus and includes the pioneering work of Saiz (2003) who used data from 1979 – 1983 in a fixed effects regression approach for the case of Miami. The author found that in the short term, immigration caused both rents and house price to increase, though the latter at a

decreasing rate. Following the increase in unskilled immigrants, a decrease in wages was also noted. Using data over the period 1983-1997 for the case of US metropolitan areas in an instrumental variable (IV) regression approach, Saiz (2007) confirmed his previous results. Carter (2005) in his study of the three global cities of Canada namely Toronto, Vancouver and Montreal found that immigration has led to an increase in housing demand and prices in these cities and interestingly argued that rising housing prices might have out-priced some natives from the housing market and made them move to other regions (interstate migration). In a subsequent study Akbari and Aydede (2012) used census data for Canada from 1996, 2001 and 2006 also observed that immigration had a positive significant impact on private dwelling prices. Given the important immigration flow to Canada, Latif (2015) also used more recent data in a panel data setting to confirm the significant positive relationship between immigration and house rents. Similar findings are confirmed for Spanish market over period 1998 – 2008 as Gonzalez and Ortega (2009), using a spatial correlations approach found that immigration inflow has led to an increase of around 30% in housing prices over the study period. Accetturo and al. (2014) who studied the nexus for the case of 20 large Italian cities, reported that immigration increased average housing prices at city level. However, a regional breakdown also illustrated that some districts which were more affected by immigration inflows were associated with decrease in house price growths. They posited that there may have been a native outflows from those districts towards other areas (with less immigrants) within the city, justified by a downgrade in terms of amenities due to increasing immigration. In a more recent study of the US housing market, Mussa and al. (2017) analyzed the immigration-real estate link using the IV method and reported that in those regions benefiting from increased immigration, housing rents and prices were positively affected. Further analysis demonstrated that immigration in particular regions led native outflow to adjacent regions and the authors empirically found that the housing price rise in the adjacent regions is comparatively more significant.

Other studies have either, however, found either a negative or statistically non-significant relationships while assessing the hypothesized link. For instance, Saiz and Watcher (2011) used decennial census data for years 1980, 1990 and 2000 and established a negative relationship between immigration and housing prices for a sample of American metropolitan areas. The authors discussed the fact that as increased immigrants in a region might have led to a delocalization of natives. Another argument put forward by Saiz and Watcher (2011) was that in certain regions in the US, the immigrants are from relatively lower socioeconomic status and the type and value of dwelling they would be requesting would be lower. It was also suggested that the reverse causality between the variables could explain the negative relationship that is foreigners would inspect for countries with relatively lower housing prices before immigrating. Sa (2015), for the case of England and Wales, studied the immigration-house prices link over period 2003 – 2010 for 170 local authorities using simple regression analysis also found that immigration negatively affected house prices in general. The regions where the negative relationship was depicted mainly consisted of low skilled (lower education level) immigrants who depressed the salary level which in turn pushed the natives to migrate to other regions, thus causing a decrease in housing demand and prices. Such results for England and Wales were confirmed in a subsequent empirical work by Green (2018) who used several regression techniques within a sample of 80 local authorities over the period 2010-2016). Zhu and al. (2018) further studied the nexus, taking into account the labor market in England and Wales, and observed that in areas where job density was high, mainly in terms of low-skilled job opportunities, house prices have been decreasing. The authors posited that such price depreciation could be explained by the fact that the low-skilled job seeking immigrants were renting and clustering in particular regions, from which the natives were be moving away. Braakmann (2019) also found that a regional increase in immigration would result in either a decrease or no change in property prices for the case of England and Wales. They explained such relationships through an outflow of the natives from particular regions and also by the fact that immigrants would be more inclined towards renting instead of purchasing properties and that they would also tend to live in smaller houses and there would be more property sharing. More recent evidence from D'Albis and al. (2019), based on 22 regions in France over period 1990 to 2013 and on a dynamic regression analysis, found that immigration did not have any significant impact on housing prices.

It is noteworthy that few authors also studied the impact of housing price on immigration, that is the reverse causality. Saiz and Wachter (2011) for instance, in addition to have found that more immigrants movement to a region resulted in a decrease in house price in US, also observed a reverse causal effect as decreasing housing prices encouraged more immigrants. Using a panel VAR approach and by studying 277 US metropolitan areas, Zabel (2012) noted that an important factor affecting the migration decision of individuals and their acceptance of jobs in other cities, was housing prices.

3. Overview: Immigration And Housing In Australia

Australia is an interesting context to study the nexus between immigration and housing prices. Over the past years, both the levels of immigration and housing prices have been increasing by quite consequent amounts in Australia. The available statistics show that these increases are more pronounced in particular regions, for example from mid-2016 till mid-2017, the population in Melbourne has increased by 11953 and in Sydney the increase amounted to 9006; where 75% of the population increase in Melbourne was due to NOM and in Sydney it accounted for 94% of the population increase.

The rising levels of immigrants can be justified by the immigration policies instituted by Australian authorities to encourage foreigners to settle in the country. From Australia's Migration Trends 2017 – 2018 Highlights, those who obtained permanent visas were categorized under three major migration programs namely: skilled stream, family stream and special eligibility stream. From figures available from the report, it is estimated that around 70% of the migrants are from the skilled stream and the remaining 30% from the other two streams. The figures highlight that Australian authorities have been encouraging skilled foreigners to settle in the country. Over the years, another change in terms of the migration policies which has been observed is the type of visa allocated, where previously mainly permanent visas were granted and in the recent past, there has been a shift towards temporary visas

Figures 1a, 2a, and 3a below illustrate the evolution of the level of immigration in different regions of Australia over period 2004 – 2017. Two regions having the most significant increase in immigration are Victoria and New South Wales (Melbourne and Sydney); while in the other regions there has been a gradual increase in immigration and in Western Australia over the study period, immigration has decreased. Available statistics indicate that the main foreign destinations from which the immigrants come from are India, UK and China

When looking at house prices in Australia over the past decades, Tumbarello and Wang (2010) for instance noted that real house prices have increased almost by 120% over the past 20 years. In their study, Birrell and Healey (2018) suggested that housing prices in Sydney and Melbourne have almost doubled since 2012. This is confirmed from figure 2b given below, where it is noted that residential price index in NSW and Victoria have had a consequential increase over the study period. From figures 1b and 3b, it is noted that housing prices have increased to a lesser extent and more gradually in the other six capital cities in Australia. Available statistics indicate that there is a housing affordability issue in Sydney and Melbourne, with relatively high ratios of median housing prices over median household income (Birrell and Healey, 2018). According to KPMG Report (2017), in the short term, factors have caused housing prices in Sydney and Melbourne to be above their equilibrium prices by around 14% and 8% respectively.

4. Methodology & Analysis

Model Specification

The main objective of this study is to discern the relationship between immigration and housing prices in Australia. In an endeavor to assess this relationship, the following conceptual model, grounded from past studies (Akbari and Aydede, 2012; D'Albis et al., 2019), is specified:

$$\text{Residential Index} = f(\text{NOM}, \text{Unemployment Level}, \text{Residential Building Approvals}, \text{Housing Finance}, \text{Wage Rate Index}) \quad [1]$$

The econometric model is thus written as follows:

[Please see the supplementary files section to view this equation.]

[2]

Where i and t represent the regions and the time dimensions respectively.

All the variables in the above regression function are converted into their logarithmic values, with the aim of facilitating the interpretation of the regression results (i.e. to be interpreted in % change terms) and for comparative purposes.

The dependent variable used in the study is the residential property price index, which measures relative changes in house prices, with respect to a reference time period. The residential property price indexes of the eight capital cities of Australia have been collected on a quarterly basis. $\ln P_{it}$ represents the logarithm of residential property price index in region i and in year t .

The variable of interest in the study is the net overseas migration flow (NOMF) and is obtained by dividing the NOM (with permanent visa) for one period by the population of the previous time period. It measures the increase in permanent immigrants relative to the total population. The NOM with permanent visa has been chosen as it represents all the foreigners who have decided to reside in Australia and are more likely to purchase houses in Australia. In equation [2] above, $\ln \text{NOMF}$ represents the logarithm of net overseas migration flow in the region. Past studies (Saiz, 2007; Sa, 2015) have demonstrated that NOM can either have a positive impact or a negative impact or no impact on housing prices.

Other common economic fundamentals which have been used as explanatory variables in past studies on the determinants of house prices include namely unemployment level, building applications (used to represent housing supply), the cash/ lending rate (interest rate for housing) and the wage rate index among others.

Unemployment level (LUNEMP) has been used as control variable in other studies (Saiz, 2007; Akbari and Aydede, 2012; D'Albis, 2017), when testing the link between immigration and housing prices. The

authors found that a rising unemployment level would be negatively affecting housing prices; Housing demand would decrease as the unemployed individuals would not have a guaranteed income or fulfill the required conditions to be able to borrow for housing purchases (Li and al., 2018).

The elasticity of housing supply also affects housing prices/ rents. The variable used as a proxy for housing supply is building approvals (RBA) for residential dwellings, with more building approvals representing a rise in housing supply. Studies (Saiz, 2007; Sa, 2015) have also demonstrated that when housing supply is inelastic this tends to lead to higher housing prices.

Another macroeconomic indicator being used in the study is the mortgage rate (LRCR), measured by the Cash Lending Rate which is fixed by the Reserve Bank of Australia. Tumbarello and Wang (2010) found that the real mortgage rate has a significant and negative relationship with house prices in Australia. They found that a 1% increase in interest rates should be leading to a decrease of 5-9% in housing prices in the long run.

From the housing price literature, when wage, as measured by the wage rate index in the region (LWRI) increases, this should generally lead to an increase in house prices (Abraham and Hendershott, 1996; Malpezzi, 1999; Capozza et al., 2002; Meen, 2002; Gallin, 2008). It is interesting to note that immigration may also influence wages with the latter subsequently impacting on housing prices or rents. In fact the effect of wages on housing prices is not a definite one and depends upon how immigration affects wages. According to Saiz (2007) immigration can lead to a decrease in wages (due to an increase supply of labour) which would drive native outmigration and therefore a decrease in housing demand (prices). On the other hand, Ottaviano and Peri (2006) argued that immigration could also entail a rise in wages, for example if the immigrants enable skill complementarity with natives (high skill immigrants); then the increase in wages would lead to a rise in housing demand and prices (rents). Thus the indirect impact of wages on housing prices via immigration remains a mixed issue.

Data

The data used in this study is quarterly in nature and spans over time period 2004-2017 for the 8 Australian capital cities and have been extracted from the website of the Australian Bureau of Statistics (ABS). Most of the variables used in the study were already recorded on a quarterly basis; for the variables which were available on a yearly basis, cubic interpolation was used for estimating the quarterly data. The figures for the internal migration of natives are also available from the ABS and it represents an important aspect to consider when studying the nexus housing prices-immigration.

The link between immigration and housing prices is studied at the national level for Australia, by using a panel dataset consisting of eight capital cities. In order to have a comprehensive idea of how immigration has been affecting residential prices, a regional breakdown is subsequently used (given that immigrants have a tendency towards favoring clustering), where each region will be analyzed individually for more insights.

A Panel Autoregressive Error Correction Model framework is used to analyze the causal link which exists between immigration and housing prices, whilst taking into consideration the dynamic nature of housing price modelling and the existing of potential endogenous influences (for instance reverse causality or indirect effects). Indeed, according to Braakmann (2019) and Green (2018), the direction of causation between the two variables is not definite, that is whether it is immigration which affects housing prices or it is the opposite. Braakmann (2019) asserts that the location choice of immigrants might depend upon housing prices, they will either choose housing in regions where prices are growing or their displacement decision will depend upon low housing prices. Such causal relationship has been studied by Zabel (2012) in the US context and more recently by D'Albis et al. (2019) using annual data from France's 22 administrative regions.

Empirical Results and Analysis

Panel Unit Root Tests and Panel Co-Integration

Before establishing the short run and long run dynamics, it must be verified if the data is cointegrated. The other pre-requisite before conducting a panel cointegration test is to ascertain the order of integration of the variables by undertaking unit root tests. We employ the Im, Pesaran and Shin (IPS) and the ADF-Fisher chi-square unit root tests for panel data for this purpose. When performing the unit root tests on all the samples, it was observed that all the variables are integrated of order 1 (I(1)) and stationary at their first difference, thus indicating that the variables contain a unit root. Subsequently, we examine the long run relationship between the variables by using the Kao panel co-integration test and since the null hypothesis of no co-integration is rejected, it is concluded that there exists a long run relationship between the variables.

Analysis

Immigration and Housing Prices in Australia

In the long run, from the results given in table 1 below, it is noted that immigration has an insignificant effect on housing prices. Recent studies in other contexts (D'Albis and al., 2019 and Green, 2018) have also concluded that immigration does not affect housing prices. This could be explained by the fact that immigration is more a regional phenomenon, with the immigrants having a tendency to cluster in particular regions (for example cities) and therefore the national housing prices might be unaffected. Other studies (Saiz and Watcher, 2011) have suggested that immigrants might prefer to rent property instead of buying housing^[1] and they have a tendency to share properties among families. Such explanations could be used to explain why there is no significant relationship between immigration and housing prices in the long term.

Some past studies (Sa, 2015 and Latif, 2015) have highlighted the importance of housing supply elasticity in the establishment of housing prices. In the short term housing supply tends to be more inelastic and as demand increases due to immigration, this should lead to an increase in housing prices. In the Australian context, it is found that in the short run (refer to column 3 in Table 1), there is a positive and significant impact of immigration on housing prices; thus suggesting that housing supply might be inelastic in the short term in Australia^[2]. In their report Birrell and Healey (2018), have established that immigration has been positively and significantly affecting housing prices. They suggested that one way to reduce the impact of migration on housing prices is by increasing housing supply. In the Australian context, Bourassa et al. (1995) underline that a lack of construction when income and population is increasing should lead to increase in housing prices.

When studying the link housing price-immigration and including wages as control variable, it will either be directly or indirectly (through immigration) affecting housing prices. From the regression results in table 1 the direct influence of wages on housing prices is a strong positive significant one, similar to the results obtained by Malpezzi, 1999; Capozza et al., 2002 and Meen, 2002. The interpretation of these results is that as individuals' salary level increase, they will tend to purchase more housing and consequently housing prices would be increasing. The results illustrate that the level of interest rate will also be influencing housing prices in the long term; there is a significant negative relationship between the variables (similar to Tumbarello and Wang (2010)). As interest rate on housing loans decreases, this would encourage people to borrow more for house purchase and ultimately lead to house price increase.

Unemployment incorporated as a control variable depicts a positive and insignificant relationship with housing prices, although a negative relationship is expected (Li et al., 2018). Saiz (2007) also found an insignificant relationship between unemployment and housing prices. To control for housing supply in

the model, RBA was included and it had a positive insignificant relationship with housing prices. As immigration brings an increase in housing demand and this is consolidated by a rise in housing supply, then according to Saiz (2007) there should be a rise in housing prices / rents.

In the short term, it is noted that there is a positive relationship between housing supply (building approvals being used as proxy) and housing prices. A housing affordability study conducted in Sydney and Melbourne (KPMG, 2017) illustrates that there exists a 'building cycle', when housing prices are increasing this would entail an increase in terms of housing supply. This could justify the positive relationship which has been obtained in the short term in this study. From KPMG (2017), as a consequence of the increasing housing supply, house prices will tend to decrease (or stay unchanged) and over time the excess supply will be resorbed through increasing demand. The lower (or stable) housing prices would promote housing demand, which should once again entail an increase in housing prices.

Table 1. Long run and short run results for Australia (Dependent variable: Housing Prices)

Independent Variables	Long Run	Short Run
Immigration Flow	-0.11616	0.017*
Unemployment Level	0.0466	0.00814
Building Approvals Residential Dwellings	0.0364	0.004246**
Housing Finance	-0.03711**	-0.00068
Wage Rate Index	6.0958***	1.17162***

Significant at 10% (), 5% (**), 1% (***)*

Reverse Causal Effect

Our estimation framework interestingly enable the analysis of reverse causality, that is the impact of land prices on immigration in our case. It is noted that both in the short run and long run, there is an inverse link between the two variables, implying that when individuals are migrating to other countries, they will tend to go to countries where lower housing prices prevail. Such a finding is consistent with the work of Zabel (2012). The other explanatory variable which is important in determining the level of immigration is wages, the latter having a positive link with the level of immigrants both in the short and long run. From the regression results, the level of mortgage interest rate is also observed to negatively

affect immigration in Australia. As the loan becomes more expensive, immigrants would be deterred to move to the country, as their house purchase costs (if taking loan) would increase. In order to proxy housing supply, building approvals has been used and it is noted that the availability of housing infrastructures has been encouraging immigration.

Table 2: Long run and short run estimates (Dependent variable: Immigration)

Independent Variables	Long Run	Short Run
Housing Prices	-8.6091***	-0.2758*
Unemployment Level	0.4016	-0.0385
Building Approvals Residential Dwellings	0.3136*	0.0141
Housing Finance	-3.1946**	-0.0498
Wage Rate Index	5.2479***	2.4664*

Significant at 10% (*), 5% (**), 1% (***)

Mediating effect of Immigration on Housing Prices through Wages.

From past studies, it has been highlighted that one of the main markets which is affected by immigration is the labor market. The results in table 3 below, show that immigration has a positive impact on wages in Australia^[3]. Some past studies (Dustmann et al., 2008 and Ottaviano and Peri, 2012) have suggested that the skill level of natives and immigrants is a key determinant in establishing the link between immigration and wages. In the Australian context, in an endeavor to attract skilled workers, the remuneration packages might have been made more interesting. It can be recalled that from the regression results in Table 1 that an increase in wages was associated with a rise in housing prices. Since it has been established that immigration positively impact of Australian wage level, therefore immigration should also be positively and indirectly affecting housing prices through wages, at least in the short run.

Table 3: Long run and short run estimates (Dependent variable: wages)

Independent Variables	Long Run	Short Run
Immigration Flow	0.019055*	0.000208
Housing Prices	0.164046***	0.002105
Building Approvals Residential Dwellings	-0.005976	0.000430
Housing Finance	0.060873	0.000557
Unemployment Level	-0.007652	-0.003365***

Significant at 10% (*), 5% (**), 1% (***)

Immigration and Housing Prices: A region wise Analysis

On the national basis no significant impact of immigration on housing prices was noted in the long run, although in the short run a small positive impact was observed. A more in-depth analysis of the link between the variables was undertaken by using a regional breakdown and using a similar econometric approach as above. Table 4 below summarizes the regression results for the eight Australian capital cities.

	New South Wales	Victoria	Queensland	South Australia	Western Australia	Tasmania	Northern Australia	Capital Territory
Immigration Flow	-1.6338	0.16077**	2.2733***	-0.5753***	-1.9044***	-1.3915	0.4434***	-0.06963
Unemployment Level	-4.2652***	-0.16228***	-0.2395	-2.2225***	1.2051***	-0.9867***	-0.2557***	-0.1038***
Building Approvals Residential Dwellings	-0.9807 **	0.3204***	-0.2169	0.823134***	-2.291206	-0.8030***	0.02169	0.07306***
Housing Finance	0.6196	-0.11533***	0.7274***	0.5783***	2.4862	0.8971***	0.5619***	0.0411
Wage Rate Index	-7.2986***	2.2328***	-0.1711	3.0170***	14.6326**	0.966	0.74736***	1.60816***

The three states where a positive and significant link is noted are Victoria, Queensland and Northern Australia, implying that the increasing level of immigrants in those regions has led to an increase in housing prices. Such a relationship is justified by the fact that an increase in population size due to immigration would lead to an increase in housing demand and thus housing prices.

Table 4: Regression results using regional breakdown

Significant at 10% (), 5% (**), 1% (***)*

Two other cities where housing prices have been significantly affected by immigration are South Australia and Western Australia, however an inverse relationship is established between immigration and housing prices. Illustrating that as more immigrants have moved to those regions, this has resulted in a decrease in the housing prices. The regression results in table 4 above thus indicate that the effect of immigration has more of a regional bearing.

When studying immigration and housing prices in the two Australian global cities, namely Sydney (Capital of New South Wales) and Melbourne (Capital of Victoria), over the past years both immigration and housing prices (figures 2a. and 2b.) have been following an increasing trend. A positive significant link between immigration and housing prices is obtained in Victoria; justifying the theory that as demand (population size) increases, housing prices would be increasing. Although immigration has been increasing in NSW (from figure 2a. increase in immigration is higher in NSW as compared to Victoria), a negative insignificant relationship is established with housing prices. One plausible justification could be that in NSW over the past decade, interstate migration has been negative (figure 4 below), meaning that the natives from NSW have been moving to other regions (selling their property). The type of housing and the prices that natives and immigrants are ready to pay might not be the same; past studies (Saiz and Watcher, 2011; Braakmann, 2019) have highlighted the fact that immigrants will tend to cluster and share housing and look for cheaper housing prices. This might explain why there is an inverse relationship between housing and immigration in NSW.

Queensland represents the state where immigration has had the highest positive impact on housing prices. In other study contexts (Saiz and Watcher, 2011; Sa, 2015), it has been illustrated that immigration can lead natives to shift to other regions and this can actually cause a decline in housing prices. In Queensland, over the past years, there has been quite a consequent rise in interstate migration (as illustrated in figure 4), implying that immigration must have contributed to the

development and in upgrading the living standards in that particular state. In South Australia and Western Australia, housing prices have declined as a consequence of immigration. Such a relationship could be explained by the fact that more natives from these states have been moving to other regions (negative interstate migration).

In the Northern Territory, the level of immigration is lower as compared to the other states, however it has been increasing over the past years. The Government has set up schemes to attract skilled immigrants with the possibility of obtaining a permanent visa after working and residing in the region over a given number of years. This scheme in the Northern Territory also aims at decreasing the high level of immigration in other states such as Sydney or Melbourne. It is noted that in the Northern Territory, with increasing immigration and housing demand, there has been a positive significant effect on housing prices.

[1] In this study the type of immigrant being considered is those having a permanent visa and are more apt to purchase housing. More recently, there has been an increase of migrants with temporary visas (stay one year or more in Australia) and this category of migrants would normally be renting property.

[2] From the Reserve Bank of Australia (The Housing market and economy, 2019) one of the main justifications put forth to explain the increasing housing prices is that the growing population has led to an increase in housing demand, without a matching increase in housing supply.

[3] In the Australian context, the lack of labour in specific fields has made the Government set up visa schemes for skilled immigrants, so as to encourage them to come and settle in Australia.

5. Conclusions

This study investigated the impact of immigration housing prices in Australia over time period 2004-2017 using dynamic panel data analysis, namely a PVECM approach which also takes into account the possibility of endogenous and long/short run relationships. In the first instance, the research used data on an aggregate basis to study the link between the two variables. It subsequently, in an attempt to obtain deeper insights of the influence of immigration on housing prices, the study is also extended to analyse the nexus as the regional level. Although some past studies (Saiz and Watcher, 2011; Sa, 2015) have recognized that immigration has more of a regional bearing, most studies have tested the national influence of immigration on housing prices.

Analysis of the results revealed that immigration has a positive and significant bearing on housing prices in the short term. It is believed that an increasing housing demand and an inelastic housing supply in the short term may have resulted in an increase in housing prices[1]. In the long term, although an inverse relationship is observed between immigration and housing prices, however the relationship is not significant. Past studies (Saiz and Watcher, 2011; Sa, 2015) posited that native shifts have been observed from regions containing high immigration concentration to other regions. Thus, although a rise in immigration should lead to an increase in housing demand, the native outmigration will reduce the demand and therefore housing prices will not be affected by change in demand.

Further analysis with respect to reverse causality indicated that immigration would increase with low housing prices, confirming a reverse causal effect as well. As such, wages may be a mediating factor in the immigration –housing price nexus since there the study concluded that there was a positive and significant relationship between wages and housing prices while simultaneously confirming a positive impact of immigration on wage level.

The regional analysis revealed a positive significant link between housing prices and immigration. In the states where immigration and interstate migration has been high (Victoria and Queensland), while a negative link is observed for the case of states where there was relatively high immigration coupled with natives moving to other states (NSW, South Australia and Western Australia). These results confirm that an increasing (decreasing) housing demand will lead to an increase (decrease) in housing prices. When using the national aggregate sample, the regional influences (positive/negative effects) will tend to cancel out, such that at the national level no significant link is observed between immigration and housing prices, at least in the long run.

The implications of this study are interesting. Past studies on the Australian housing market (Ellis and Andrews, 2001; Birrell and Healy, 2018) have ascertained that the population tends to be concentrated in the two major cities, namely Sydney and Melbourne, leading to high demand in terms of housing and consequently high housing prices. Australian authorities in an attempt to counterbalance the excessively high housing prices in those two specific regions have been encouraging individuals (natives/ immigrants) to shift to other states. This study confirms that such policy should be useful, as native outmigration (in the presence of immigration) has been leading to a decrease in housing prices. This research also pinpoints the importance of the labor market (more specifically wages) for the immigrants, who would be willing to pay higher housing prices if they are earning higher salaries. Therefore the local authorities should be judiciously fixing salary levels in order not to lead to price hikes in the housing markets.

This work considered all the immigrants with permanent visas; although in the recent past mainly skilled immigrants have been obtaining visas in Australia. Subsequent studies could consider segregating the immigrant type (unskilled/skilled) and analyze whether both have been affecting housing prices in a similar way. A more in-depth analysis could also be undertaken to accurately measure the effect of interstate migration on housing prices.

[1] From the Reserve Bank of Australia (The Housing market and economy, 2019) one of the main justifications put forth to explain the increasing housing prices is that the growing population has led to an increase in housing demand, without a matching increase in housing supply.

Declarations

- Availability of data and materials

The data and materials used in this research can be made available upon request

- Competing interests

There are no competing interests with regards to this research

- Funding

No funding was obtained for this research,

- Authors' contributions

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Figures

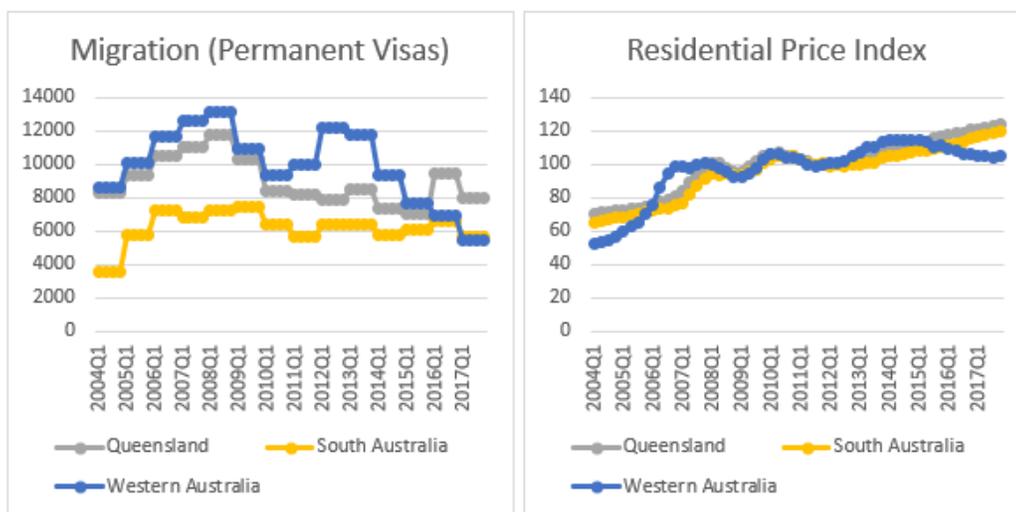


Figure 1a. Immigration with Permanent Visa **Figure 1b. Residential Price Index**

Figure 1

Figure 1a. Immigration with Permanent Visa Figure 1b. Residential Price Index

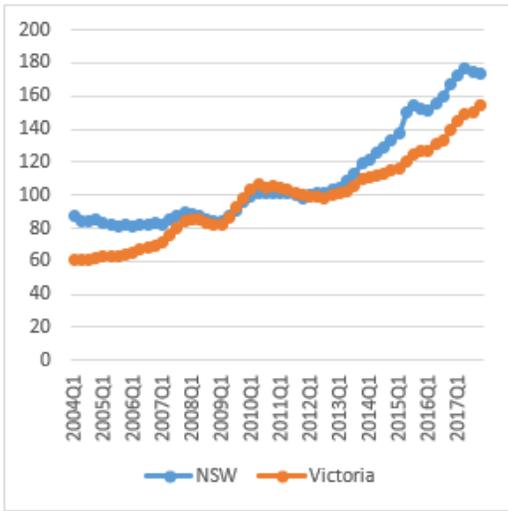


Figure 2a. Immigration with Permanent Visa

Figure 2b. Residential Price Index

Figure 3

Figure 2a. Immigration with Permanent Visa Figure 2b. Residential Price Index

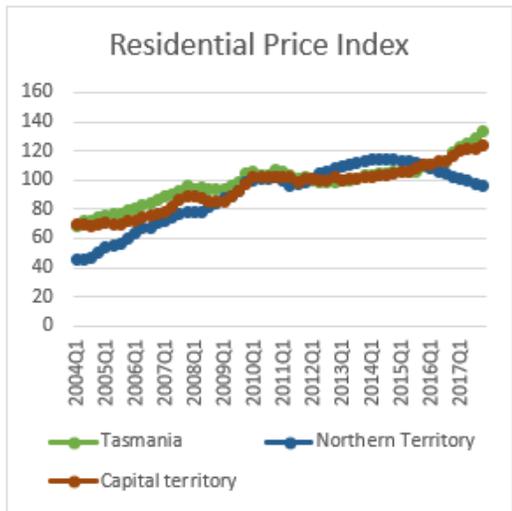
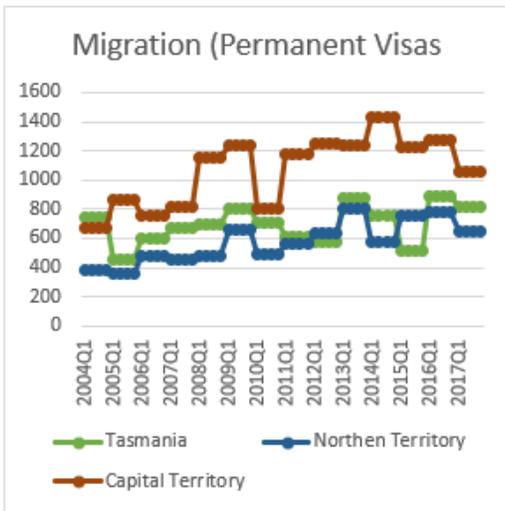


Figure 3a. Immigration with Permanent Visa

Figure 3b. Residential Price Index

Figure 5

Figure 3a. Immigration with Permanent Visa Figure 3b. Residential Price Index



Figure 7

Interstate Migration in the Eight Capital States

Supplementary Files

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