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The Effects of Immigration on Real Estate Prices in Cyprus

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The Effects of Immigration on Real Estate Prices in Cyprus.

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Summary

The aim of this study is to explore the effects of immigration on residential real estate prices in Cyprus. This aim has been addressed by the methods of multiple regression analysis, correlation analysis, Granger Causality Testing among other tests. These methods have been applied to quarterly data on immigration inflow rate, real estate prices and macroeconomic factors including the construction cost index, GPD, interest rates and consumer price index. The results revealed slightly positive correlation between immigration and real estate prices. The Granger Causality Test revealed that the direction of causation was from real estate prices to Gross Domestic Product and interest rate, implying that the former influenced the latter. The research, however, has limitations such as small sample size and further expansion of the study is required.

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1. Introduction

1.1 Background

The real estate market is a complex system that is affected by a multitude of factors, which include macroeconomics such as GDP growth, investment activity, interest rates and external forces such as immigration, regulatory changes and government subsidies. This dissertation investigates the impact of immigration on real estate prices in the Republic of Cyprus and the relationship between migration flows and real estate prices. Cyprus is an island in the Eastern Mediterranean, a member of the European Union (EU) and the Eurozone. The republic inherited British legislation and has a relaxed tax policy, which makes Cyprus an attractive destination for people in the Western and Northern Europe, as well as post-Soviet countries. Furthermore, Cyprus is situated in the south-eastern part of Europe and has great climate which makes it a popular tourist destination. In addition, the country's standard of living is one of the highest in the region.

The existing legislation is attractive to foreigners and this contributes to increasing flows of immigrants. Cyprus attracts qualified immigrants through the Cyprus Investment Program (CIP), which targets high net worth individuals that invest in the economy and the real estate market. According to Cyprus Ministry of Interior (2019), one of the options under which the country grants citizenship is by making an investment of at least €2,000,000 in real estate.

It is also important to note that the island suffers from a migration crisis resulted from instability in the Middle East and proximity to the region struggling to cope with wars and continuous insecurity (Smith, 2018).

The country's immigrants include both asylum seekers that have been increasing in recent years and professionals, as well as investors who are likely to have a positive impact on the economy. The latter group of immigrants move to the island due to its liberal taxation policies and more favourable climate. However, Gregoriou, Kontolemis and Matsi (2010) argue that climatic factor does not impact immigration flows to the island, whereas GDP per capita correlates positively. This suggests that on average, immigrants come from countries with relatively high-income levels. This implies that the rate of immigrants is likely have a positive impact on real estate prices in the republic. In addition, Gregoriou, Kontolemis and Matsi (2010) mention that non-economic factors explain most of the immigration flows to Cyprus. The study finds that the EU membership had a modestly positive effect on migration flows to the republic (Gregoriou, Kontolemis & Matsi 2010). As a result, the real estate

prices in Cyprus were ballooning in the 2000s, though retraced considerably in the last decade due to a more challenging economic environment.

1.2 Rationale for Research

The determinants of housing prices are widely researched in academic literature - there is a consensus that the real estate market is impacted by a variety of factors that include both economic and non-economic, as well as immigration policy, which has also been found to affect real estate prices. This dissertation aims to study the relationship between immigration and real estate prices in Cyprus.

The island faces a migration crisis and struggles to cope with increasing flows of asylum seekers. Cyprus has the 3rd highest immigration rate in the EU, therefore it is important to investigate the impact of immigration on house prices (Eurostat, 2019). The research considers the impact of immigrants on the island's real estate market to help develop better policies that will improve its wellbeing, as immigration and refugeeism often result in problems for the native population, thus affecting the country's housing and urban policy.

Investment programs in Cyprus, such as CIP, are also an important source of revenue and it is important to examine the impact of immigration on the country's housing market.

1.3 Aim and Objectives

This dissertation aims to analyse the effects of immigration on real estate prices in Cyprus. The objectives are:

- to estimate the impact of macroeconomic factors on real estate prices;
- to discuss the linear association between immigration and real estate prices;
- to check the direction of causality between the rate of immigration and real estate prices growth in the country.

The main research question being answered in this dissertation is to what extent does immigration affects real estate prices in Cyprus?

1.4 Outline of Chapters

This research consists of seven chapters: the first chapter provided the introduction that details the aim and objectives and provides overall background of the research and its justification. The second chapter comprises of literature review - it consists of two sub-

sections, namely: the determinants of real estate prices and the impact of immigration on the real estate prices in Cyprus. The first sub-section reviews the previous studies on most important factors affecting property prices. The second sub-section focuses on the relationship between immigration and real estate prices in more detail. The third chapter describes the data and presents estimated descriptive statistics based on the data employed. The fourth chapter explains the methodology of the research, which includes the description of statistical methods implemented to answer the main research question. The fifth chapter presents key findings and results using graphical and tabular format. The sixth chapter discusses the attained results comparing them to the previous literature reviewed, and also accounts for limitations encountered in the research. Finally, the seventh chapter outlines the final conclusions and policy implications that stem from this research.

2. Literature Review

The literature review focuses on two questions –price determinants in the housing market of Cyprus and the relationship between immigration and house prices. As a result, this part consists of two sub-sections and a summary. The first sub-section is devoted to the housing market in Cyprus and reviews literature on determinants of house prices. The next sub-section reviews previous studies on impact of immigration on the island's real estate prices. The summary concludes the literature review summarising key findings.

2.1 Determinants of House Prices

The housing market is determined by a number of macroeconomic and microeconomic factors. Pashardes and Savva (2009) studied house prices determinants in Cyprus over 1988-2008 period. The authors found that house prices in the country are sensitive to both micro- and macroeconomic factors. The study finds that population of the country impacts house prices (Pashardes & Savva, 2009). In addition, the study finds that there is a strongly positive correlation between cost of materials and labour and house prices in Cyprus (Pashardes & Savva, 2009). This suggests that growing costs of construction result in an increase in house prices, which is consistent with common wisdom. In addition, Pashardes and Savva (2009) argue that GDP per capita has a positive impact on house prices in the country.

On the other hand, the study finds that an increase in the number of foreign workers and stock market performance negatively impact the real estate market (Pashardes & Savva, 2009). Hence, the study finds that macroeconomic variables play an important role in the real estate market.

The regression analysis results identified that the population was the most important factor affecting house prices. Pashardes and Savva (2009) argue that a 1% change of population is expected to cause a 3.7% change in house prices. A 1% increase in per capita GDP is found to increase house prices by about 0.6% (Pashardes & Savva, 2009).

Sensitivity to foreign workers is negative, which suggests that immigration is likely to have a negative impact on house prices.

The role of macroeconomic variables in the housing market was studied by Sivitanides (2015). The author analysed the determinants of house prices over a period from 2006 to 2014. The study finds that nominal GDP per capita affects the prices positively, whilst interest rate was found to have a small negative impact (Sivitanides, 2015). Hence, the study confirms the findings obtained by Pashardes and Savva (2009) earlier.

However, it is important to note there are substantial changes in the impact of macroeconomic factors in pre-crisis period and after the 2008-09 crisis. As suggested by Sivitanides (2015), abundance of equity in pre-crisis period magnified the impact of GDP per capita on house prices. Therefore, Pashardes and Savva (2009) found that population was a key driver of the growing house price index in Cyprus, whilst Sivitanides (2015) attributed the growth in index to GDP per capita.

It is also important to note that the housing market is sensitive to the economic cycle in the country. Sivitanides (2015) mentions that interest rates have a small impact on house prices and there are significant variations over time, meaning that the housing market's sensitivity depends on the economic phase in Cyprus.

The same conclusion is suggested by Savva (2015), who studied the impact of macroeconomic variables on house prices in two periods – booming economy and busting economy. Savva (2015) linked house price dynamics to consumption, stock returns, lending rate, exchange and unemployment rates as well as inflation (In Cyprus, inflation is measured by the Consumer Price Index). Furthermore, the author used the Markov's two-state switching model to examine the impact of variables on the housing market in two periods from 2001 to 2014. The study finds that house prices are sensitive to the economic regime (Savva, 2015). During a booming economy, there is a positive relationship between major

macroeconomic variables such as GDP growth, consumption and inflation (Savva, 2015). However, the recession leads to statistically insignificant results of the regression analysis. The study finds that macroeconomic variables are found to have no impact on house prices during the economic burst (Savva, 2015). In addition, the study confirms that interest rates play an important role in the housing market. Savva (2015) suggests that the lending rate is inversely related to the house prices at a 90% confidence level. This suggests that lower interest rates are found to spur growth in house prices in normal economy when the economic growth rate is positive. The study also shows that the exchange rate affects the economy during both periods. This variable impacts the house prices positively during economic booms and recessionary periods and the relationship is statistically significant at a 90% confidence level (Savva, 2015).

An international study conducted by Savva (2018) on a sample of 24 European counties, including Cyprus, also confirms the impact of macroeconomic variables on the real estate market. The regression analysis suggests that GDP growth and construction costs positively affect real estate prices. On the other hand, the unemployment rate and interest rate are negatively correlated with house prices. In addition, Savva (2018) finds that the population has a positive impact on the market. The study's results are consistent with the findings of Pashardes and Savva (2009).

Apergis (2003) studied the impact of different macroeconomic variables on the housing prices in Greece. The study applied the error correlation vector autoregression (ECVAR) model to the data on Greece. The results suggest that the housing loan rate has the highest explanatory power (Apergis, 2003). In addition, inflation and employment are found to correlate negatively with real estate prices (Apergis, 2003). At the same time, a stronger macroeconomic environment is expected to have a positive impact on the property prices.

2.2 Immigration and House Prices

As discussed by Pashardes and Savva (2009), immigration is one of the drivers of real estate prices. The previous studies suggest that immigration is one of the determinants of house prices. The influx of migrants affects the labour market and housing market as well. On the one hand, immigration can reduce the cost of labour due to more competition in the labour market. On the other hand, an increase in the population has a positive impact on the demand for housing thereby driving real estate prices higher. As mentioned by Pashardes and Savva (2009), the population correlates positively with house prices. The same findings are

suggested by Savva (2015) and Sivitanides (2015). However, foreign workers are found to have a negative impact on real estate prices (Pashardes & Savva, 2009).

Contrary to these findings, Alola and Alola (2019) studied Cyprus and Malta to find the relationship between the tourism and house prices and examine the impact of the number of refugees on the country's housing prices over 2005-2016 period. The study used a cross-study regression analysis with the country's home price index as a dependent variable and two independent variables attributable to the number of tourists and refugees, respectively. The results suggest that tourist activity is found to negatively impact the housing market, whilst refugeeism has a positive impact on real estate prices in both countries (Alola & Alola, 2019). Therefore, the study indicates a positive impact of immigration on housing prices, suggesting that immigration has mixed effects on the real estate market in Cyprus.

Many studies have been conducted to analyse the impact of immigration on real estate prices - international evidence is mixed. According to Gonzalez and Ortega (2013), immigration to Spain positively affected the housing market. The authors covered Spanish real estate prices and construction activity over 2000-2010 period. The results indicate that immigration increased housing prices by about a quarter of growth in prices through a more working-age population (Gonzalez & Ortega, 2013). The study shows that immigration was one of the key factors responsible for higher real estate prices in Spain. The growth in house prices was mostly proportional to the increase in foreign-born population in the country, over a period from 2000 to 2010.

The study of the UK finds opposing evidence on immigration and its impact on the housing market. Sa (2015) investigated the effect of immigration on house prices in the UK. The author applied an econometric analysis on the house price index, the results of which suggest that immigration leads to lower house prices. The negative impact of immigration comes from the mobility of local population and an unfavourable income effect (Sa, 2015). As a result of immigration, locals with above average income move to other areas thereby reducing demand for housing and lowering property prices. The study finds that the influx of migrants does not fully replace the decline in demand for housing from the local population. Hence, the net effect of immigration on house prices in the UK is negative.

Akbari and Aydele (2012) studied the impact of immigration on the real estate market from a Canadian perspective. The authors considered data on migration and house prices over a

10-year period. Statistical analysis confirmed that immigrants have a positive impact on house prices. It is estimated that a 1% increase in immigrant population, results in a 0.66% growth in housing demand (Akbari & Aydele, 2012). Hence, the data from Canada confirms that immigrations leads to an increase in demand for housing. However, the impact of real estate prices is not so straightforward - price reaction to immigration also depends on the supply of housing that can offset growth in demand due to immigration. As suggested by Akbari and Aydele (2012), the supply of housing reacts to the actual influx of migrants and expectations of migrant flows. The authors applied econometric modelling to investigate immigrants' contribution to housing prices. The study shows that the influx of the immigrant population has a small impact of 0.1-0.12% (Akbari & Aydele, 2012). Potential explanations of the results include the out-migration of local residents to new areas and the increased supply of housing in response to expectations of higher immigration. According to Akbari and Aydele (2012), these two forces may fully offset the growing demand from the immigrant population.

The impact of immigration on the real estate market in Vancouver shows slightly different results. Moos and Skaburkis (2010) studied the regional property market in Vancouver and its response to immigrant flows in the region. The results find de-coupling of effects in the labour and property markets. Moos and Skaburskis (2010) argue that immigration leads to changing housing demand in the metropolitan area. The study applied econometric analysis to the data from 1981 to 2001 in Vancouver, finds that recent immigration is not tied to local labour market and the impact on house prices is different from that in the past (Moos & Skaburkis, 2010) - the influx of wealthy immigrants from Asia might have contributed to the sharp growth in new suburbs. Therefore, the local impact of immigration on the housing market in Vancouver is strongly positive. However, the influx of wealthy migrants is not the only factor responsible for the spike in house prices in the Vancouver area.

Ley and Tutchener (2001) studied the impact of immigration on Canada's real estate market over the period from 1971 to 1996. The research finds that globalisation heavily impacted the Canadian housing market and that house prices in Vancouver and Toronto experienced abnormal gains compared to the rest of the nation, despite poor economic performance (Ley & Tutchener, 2001). The authors confirm that immigration in the two metropolitan areas had a positive impact on overall house prices in Canada. It is not surprising since immigration accounts for most of the population growth in the country and the two cities, which means that immigration boosts demand for housing and leads to higher house prices.

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The role of immigration in the regional real estate market was also studied by Ley (2015). The author investigates the Canadian Business Immigration Program (BIP) and its impact on the housing market in Vancouver. The study finds that the investment boom spurred by BIP and immigration to Vancouver contributed to a rapid growth in real estate prices (Ley, 2015). This illustrates a positive impact of immigration of wealthy investors on the housing market, thereby creating problems for the local housing policy.

Immigration plays an important role in urban policy. According to Carter (2005), three leading Canadian cities that attract most of the immigrants diverge from the national trend in the housing market - population aging and slower household growth should have resulted in declining house prices, however, Canadian data suggests that there is a positive correlation between immigration rates and house prices (Carter, 2005). The growth in immigrant population had a positive impact on housing demand and prices, in addition, immigration is found to cause segregation as neighbourhoods change. Carter (2005) also mentions that increasing house prices due to the growing demand create problems for urban and housing policymakers. Therefore, the Canadian context confirms a strongly positive impact of immigration on housing demand and real estate prices.

Foreign investors consider investing in real estate of developed countries as a decent strategy. According to Rogers and Koh (2017), global real estate is an asset class and rich investors from emerging countries seek opportunities to purchase properties in developed nations. This explains a positive relationship between immigration and house prices in countries such as Canada, Australia, Hong Kong and Singapore (Rogers & Koh, 2017). Furthermore, there are different cohorts of immigrants and property investments - the impact of one group of immigrants is different from that of another group. High net worth immigrants are more likely to have a positive impact on house prices because of more capital they invest in real estate (Rogers & Koh, 2017).

The Australian context illustrates the above - Rogers, Lee and Yan (2015) studied the impact of immigration and individual investment in real estate from Asia. The results indicate that property investments from Asian countries complicate housing affordability in Australia. The impact of immigration on housing prices is strongly positive and this leads to declining affordability of housing (Rogers, Lee & Yan, 2015). Furthermore, the relationship between immigration and house prices is even higher in global cities such as Sydney. Burnley (2005)

suggests that housing affordability in the city declined in response to increased immigrant flows and a spike in demand for housing. The situation is similar to that of Vancouver in Canada. Therefore, there is international evidence that immigration is partially responsible for higher real estate prices, though the relationship depends on a range of factors.

Immigration is closely linked to segregation of population and this helps explain its impact on house prices. Ley, Tutchener and Cunningham (2002) studied the impact of immigration on house prices in Canada over the 1971 to 1996 period. The authors applied multivariate analysis to find spatial disaggregation. The results indicate that immigration has a complex impact that leads to higher house prices and segregation at a district level (Ley, Tutchener & Cunningham, 2002). Hence, the data reflects the segregation effect on the housing market.

Accetturo, Manaresi, Mocetti and Olivieri (2014) studied a sample of 20 Italian cities to estimate the impact of segregation on the housing market. The authors applied a spatial equilibrium model to account for the locals' perception of the quality of local amenities. Results show that immigration has a positive impact on house prices in the cities studied (Accetturo et al., 2014), however, the positive impact results from a shift of local people from the districts that are densely populated by immigrants. Hence, the study confirms the same pattern that Sa (2016) found in the case of the UK. The mobility of locals is a key factor that contributes to an increase in house prices due to immigration. Accetturo et al. (2014) mention that the positive impact of immigration occurs at a city level and it comes at the cost of districts, to which migrants come to, to experience lower house prices. Therefore, the impact of immigration on the perception of local amenities is negative.

The role of native internal mobility among locals is crucial in understanding the impact of immigration on the housing market. Mocetti and Porello (2010) studied internal mobility among natives to explain the effects of immigration on the housing market in Italian cities. The study finds that there is an existence of complementarities as the native population migrates in response to the influx of migrants (Mocetti & Porello, 2010). In the housing market, this leads to a growing demand for housing in the urbanised regions due to the segregation effect.

2.3 Summary

Real estate prices are determined by a variety of factors and immigration is one of them. The previous studies suggest that GDP, customer price index, unemployment and lending rate,

all influence the house prices. The lending loan rate correlates negatively with the property prices and is found to have the strongest impact in Greece. In Cyprus, there is evidence that during the period of positive economic growth, the lending rate correlates positively with house prices through housing demand. However, the relationship is sensitive to the economic phase in the country. Similarly, the GDP growth impacts positively housing demand, though the effect is sensitive to the economic regime. The literature also confirms that population size has a positive impact on real estate prices, but the foreign workers are found to have a negative effect on the prices.

The relationship between immigration and house prices varies across countries and is sensitive to immigrant groups and immigration policies of host countries. Generally, there is a consensus that immigration has a positive effect on housing demand, however, there is evidence that the increased demand and prices result from internal mobility of native population.

In addition, immigration is found to cause segregation in urban areas as the native population migrates in response to the increased flows of immigrants. The segregation effect is closely linked to immigration and is typical across various countries. The review also finds that immigration's impact is sensitive to immigrant cohort. The evidence from Canada and Australia suggests that rich investors contribute to growing property prices, thereby increasing the impact of immigration on house prices, which in turn leads to lower house affordability and creates problems for urban and housing policies. Therefore, the impact of immigration on house prices is not straightforward and is sensitive to many determinants such as immigrant cohorts, the response from natives and the property type.

3. Data and Descriptive Statistics

3.1 Data

The data for the research has been gathered primarily from the International Monetary Fund's International Financial Statistics Database (IMF, 2019), Central Bank of Cyprus Statistics Database (2019), Republic of Cyprus Statistical Service and Economic Research Division of Federal Reserve Bank of St. Louis (Federal Reserve, 2019). The time period for the research analysis is taken on a quarterly basis from 2009 to 2017.

The paramount variables used in the study include Real Estate Price Growth rate and long-term immigrants in Cyprus. Apart from these variables, several control variables are

incorporated in the research analysis to account for macroeconomic determinants of real estate prices as reported in previous literature (Salkind, 2010; Pashardes & Savva, 2009). The research includes macroeconomic factors such the construction cost index, GDP, consumer price index and interest rates. All of the variables taken in account in the calculations of the research, are in a percentage change per quarter form.

The following is a list of all variables included in this research study:

Real Estate Price Growth rate (RPG): The residential property price index is taken as proxy for the Real Estate Housing Prices. The Real Estate Unit of the Central Bank of Cyprus created an index to gauge the change in market prices of residential properties in various areas of Cyprus. Since 2006, the data on valuation of properties in various districts of Cyprus were collected by different contracted banks. The data were collected by independent property surveyors and valuators in line with mortgage-related valuations including property loans, refinancing and loans on collateral. The data on house prices is taken for the following five districts: Famagusta, Limassol, Larnaca, Nicosia, and Paphos. The base year for the index has been set at the first quarter of 2010 (Q1 – 2010 = 100). The growth rate in house prices is calculated with reference to the corresponding period previous year. This is the dependent variable.

The independent variables are as follows:
Long-Term Immigrants (IML): Long term immigrants is taken as a primary regressor. A long-term immigrant is defined as a person who has moved out of his/her own country of residence and moved into a new country for a period of at least 12 months (United Nations, 1998). Based on the country of departure, a long-term immigrant becomes a long-term migrant. Saiz (2003), Barbu, Vuţă, Străchinaru and Cioacă (2017) and Larkin et al (2018) have used long-term immigrants as a primary factor in the research analysis to determine the impact on housing prices.

Construction Cost Index (CCI): The Construction Cost Index (CCI) is taken as a key independent variable for the regression model of real estate prices in Cyprus, in order to identify the supply of real estate in Cyprus.

GDP Growth Rate (GDP): The annual percentage growth rate of GDP at market prices is taken as a control variable for the regression analysis employed in this dissertation. This

control variable has been chosen because GDP growth is a barometer of the health of the economy and it encompasses other constituents such as consumer spending, business investments and government expenditures, which can all affect real estate prices. Moreover, this variable was often used as an important macroeconomic determinant of real estate prices as shown in Chapter 2 of this dissertation.

Consumer Price Index (CPI): The consumer price index has been used a control variable. According to International Monetary Fund (IMF, 2019), consumer price indices are used to measure the changes in prices of various goods and services purchased by the consumers and households, directly or indirectly. These indices are the weighted averages of the change in percentage prices of a predetermined basket of consumer products. Piazzesi and Schneider (2009) and Zandi, Mahadevan, Supramaniam, Aslam and Theng (2015) used inflation rate as a vital control variable explaining real estate prices. It is worth noting that in Cyprus, inflation is based on Consumer Price Index.

Interest rates for Euro Area (INT): The interest rate set by the European Central Bank (ECB) is taken as a proxy for interest rates in Cyprus, since the island is in the Eurozone and is subject to monetary policy conducted by ECB. It is the interest rate on the main refinancing operations (MRO), which focuses on the majority of the liquidity to the banking system in the region. Therefore, the benchmark rate of interest rate is determined by the European Central Bank. According to the European Central Bank, the governing council of the ECB set vital interest rates in Euro area including the rate on deposit facility, marginal lending facility and main refinancing operations. The benchmark interest rate is employed instead of mortgage rates that directly influence house prices because mortgage rates vary greatly depending on the bank, and there are no direct observations for historical data on such rates. At the same time, the ECB interest rate determines mortgage rates that commercial banks can charge. Moreover, the choice of this proxy is justified by the previous researchers such as Barakova, Bostic, Calem, and Wachter (2003) and Zandi et al (2015) who used central bank interest rates as determinants of real estate prices.

3.2 Descriptive Statistics

In this section, descriptive statistics are the main data exploratory techniques to understand the variables before fitting regression model to assess the impact of immigration on real estate prices in Cyprus.

Descriptive statistics are properties of data that show their central tendency, volatility and probability distribution. Central tendency is assessed by the mean and the median values. Volatility is measured by statistics such as the range between extreme values and the standard deviation. Probability distribution is assessed by looking at skewness and kurtosis of the data. The former demonstrates the symmetry in the data and the latter demonstrates the peak of the distribution. The joint properties of skewness and kurtosis are seen in the Jarque-Bera statistic that has a null hypothesis that the data are not normally distributed. This hypothesis is rejected if the p-value is smaller than 0.05. Table 1 presents the descriptive statistics for the employed variables.

Table 1: Descriptive Statistics of Variables

	RPG	IML	CCI	GDP	CPI	INT
Mean	-0.00922	0.075371	0.002386	0.224358	0.000753	-0.05641
Median	-0.00895	0.02865	-0.0114	0.5645	-0.00025	0
Maximum	0.0208	1.3434	0.3091	2.5968	0.027	0.1429
Minimum	-0.0519	-0.6338	-0.3049	-6.2696	-0.0281	-0.4667
Std. Dev.	0.013455	0.413709	0.165857	1.746414	0.01349	0.129921
Skewness	-0.61357	0.840267	-0.04547	-1.57686	0.109318	-1.43736
Kurtosis	4.354677	3.804159	1.838008	6.642492	2.396789	4.597144
Jarque-Bera	5.01152	5.206297	2.037745	34.82054	0.617497	16.22224
Probability	0.081614	0.07404	0.361002	0	0.734365	0.0003
Sum	-0.3318	2.713371	0.0859	8.0769	0.0271	-2.0306
Sum Sq. Dev.	0.006336	5.990444	0.962798	106.7486	0.00637	0.590777
Observations	36	36	36	36	36	36

Jarque-Bera is used to test the following hypothesis at 5% significance level:

$$Ho: the\ data\ is\ not\ normally\ distributed$$
$$H1: the\ data\ is\ normally\ distributed$$

Real estate price growth (RPG)

During the period of Q1/2009 - Q4/2017, a total of 36 observations, the average rate of real estate price growth (RPG) reflected a decline of 0.09%. The largest decline observed was 5.19%, whilst the maximum growth was 2.08%. The standard deviation of RPG is 0.0135, whilst the skewness value of -0.61357 indicates a negative skewness. Jarque-Bera statistics is found to be 5.0115, which is statistically insignificant at 0.05 alpha levels (p-value of 0.0816). In this case, the stated null hypothesis is not rejected in favour of the alternative one at 95% confidence interval, therefore, the variable is not normally distributed.

Long-Term Immigrants (IML)

It should be noted that the variable Immigration (IML) has the first observation missing. There are two ways to deal with missing observations before fitting a model; deleting the rows with missing values and imputation method (Chhabra, Vashisht & Ranjan, 2017, p. 4). In the imputation method, one may define the imputation procedure by replacing the missing values with the mean of valid observations or the median. In this research, the imputation procedure is implied by replacing the missing observations with the mean value. From a total of 36 observations from Q1/2009 to Q4/2017, has mean and standard deviation of 0.0753 and 0.4137 respectively, whilst the skewness value of 0.8402 indicates a positive skewness. Jarque-Bera statistics is 5.2062, that is statistically insignificant at 0.05 alpha levels (p-value of 0.07404), therefor the stated null hypothesis is not rejected in favour of the alternative one at 5% significance levels. Thereby it can be concluded that the IML data is not normally distributed.

Construction Cost Index (CCI)

Construction Cost Index (CCI), from a total of 36 observations from Q1/2009 to Q4/2017, has a mean and standard deviation of 0.0024 and 0.1659 respectively, whilst the skewness value of -0.04547 indicates a negative skewness. The Jarque-Bera statistics is 2.0377, which again is statistically insignificant at 0.05 alpha levels (p-value of 0.3858). The stated null hypothesis is not rejected at 0.05 alpha levels; hence the variable is not normally distributed.

Gross Domestic Product (GDP)

The Gross domestic product (GDP), from a total of 36 observations from Q1/2009 to Q4/2017, mean stood at 0.2244 and a standard deviation of 0.1659, whilst the skewness value of -1.57686 indicates a negative skewness. The highest GDP growth rate recorded during the observed period was 2.5968, whilst the lowest value was -6.2696. Jarque-Bera statistics is 34.8205, that is statistically significant at 0.05 alpha levels (p-value is less than

0.010). In this case, the stated null hypothesis is not rejected at 5% significance levels in favour of the alternative one. Therefore, the variable is normally distributed with mean zero and a constant variance.

Consumer Price Index (CPI)

The consumer price index (CPI), from a total of 36 observations from Q1/2009 to Q4/2017, reflected mean figures of 0.000753 and standard deviation of 0.01349 respectively. The CPI reached a maximum of 2.7% and the lowest of -2.8% during the same period. Jarque-Bera statistics value is 0.6174 that is statistically insignificant at 0.05 alpha levels (p-value of 0.7343). Based on the above, it can be concluded that the stated null hypothesis is not rejected in favour of the alternative one, meaning that CPI is not normally distributed.

Interest rate (INT)

Lastly, the interest rate (INT), from a total of 36 observations from Q1/2009 to Q4/2017, has mean and standard deviation of -0.0564 and 0.1299 respectively. Jarque-Bera statistic value is 316.2222 that is statistically significant at 0.05 alpha levels (p-value of 0.0003). In this case, the stated null hypothesis is not rejected at 5% significance levels, therefore, the interest rate is normally distributed.

4. Methodology

Various theoretical and empirical studies that focused on assessing the impact of immigration on the housing market have used a combination of research techniques and econometric models. For instance, Kurschner (2019) used a spatial correlation approach to assess the impact of the fall of the Berlin wall, which created a huge influx of East German immigrants into West Germany, on the rental prices of the residential housing. Larkin et al (2018) used meta-regression and meta-analysis techniques including partial correlations to evaluate the impact of immigrants on housing prices in 14 developed countries. To streamline the research design, Hanson (2009), Peri and Sparber (2011) and Barbu, Vuță, Străchinaru and Cioacă (2017) used different types of regression analysis including panel regression analysis and multivariate regression analysis.

Thus, to assess the impact of the selected variables on real estate prices, this research has undertaken a deductive approach rooted in positivism and quantitative methods of data analysis based on statistics (Saunders, Lewis & Thornhill, 2016; Bryman & Bell, 2012). The research methods include correlation analysis, multivariate regression analysis and Granger

causation analysis in order to gather information related to the degree and direction of the causal effect of changes in the factors on housing prices in Cyprus. As the primary purpose of the research is to identify the relationship between residential house prices and rate of immigrants in Cyprus, the data on Residential house price index and rate of long-term immigrants are the key variables. The null hypothesis being tested is as follows:

$$Ho: IML \ does \ not \ have \ a \ significant \ impact \ on \ real \ estate \ prices \ in \ Cyprus.$$

The empirical model for the regression used in this research is represented by the following equation:

$$RPG_i = \beta_0 + \beta_1 IML_i + \beta_2 CCI_i + \beta_3 GDP_i + \beta_4 CPI_i + \beta_5 INT_i + \varepsilon_i$$

Where for i being the time period represented by respective quarters from Q1/2009 to Q4/2017, RPG is the Growth rate of real estate prices in Cyprus; IML is the rate of long term immigrants in Cyprus during time i; CCI is the construction cost index in Cyprus during time i; GDP is the growth rate of Gross Domestic Product in Cyprus; CPI is the consumer price index in Cyprus; INT is the interest rate set by the ECB in the Eurozone; β_0 is the constant; β_1 through β_5 are the slope coefficients; ε_i is the error term.

The aforementioned regression equation focuses on the research objectives of analysing and answering two primary questions, i.e. (1) to what degree the immigration of people influences the real estate prices in Cyprus (2) to what degree macroeconomic factors impact growth rate in the real estate prices in Cyprus.

5. Presentation of Data and Results

The primary elements of the research, i.e. growth rate of residential property prices and rate of long-term immigrants, reflect an increasing trend in the recent few years. The results and data have been presented in charts and tabular form. The first part of the results focuses on the exhibition of data related to real estate prices and rate of immigrants residing in Cyprus. The second part of the results focuses on the exhibition of different econometric tools including multivariate regression analysis, correlation analysis and causality analysis to further elaborate on the relationship and the degree of impact of immigrants and other control variables on real estate prices in Cyprus.

5.1 Graphical Analysis

During 2009-2017, a cumulative 159,541 people immigrated to the Republic of Cyprus. On average, around 17,727 people immigrated to the island every year during 2009-17. Around 22,581 people immigrated to Cyprus during 2009, which witnessed a consistent decline until 2014 to 9,212 people. However, the rate of immigrants grew at a consistent pace during the period 2014 and 2017. The number of immigrants grew from 9,212 to 21,306 during the same period (Figure 1). Some of the major reasons for the sudden increase in immigrants in Cyprus were the ease in attainment of residency and citizenship for immigrants, better standard of living, lower property rates among others. The raw data was provided by the Cyprus Statistical Department in a monthly format, which was converted by the author into quarterly series for the purposes of this research.

Smith (2018) highlighted that due to Cyprus' partition and vicinity to the Middle East nations, the trend in immigrants has gained remarkable traction. Besides, the number of claims in Cyprus had exceeded every other country in European Union during 2018. The Mediterranean island had received around 6,000 applications for a 1 million population, on per capita basis.

Figure 1: Long-term immigrants (IML) rate in Cyprus during 2009-2017
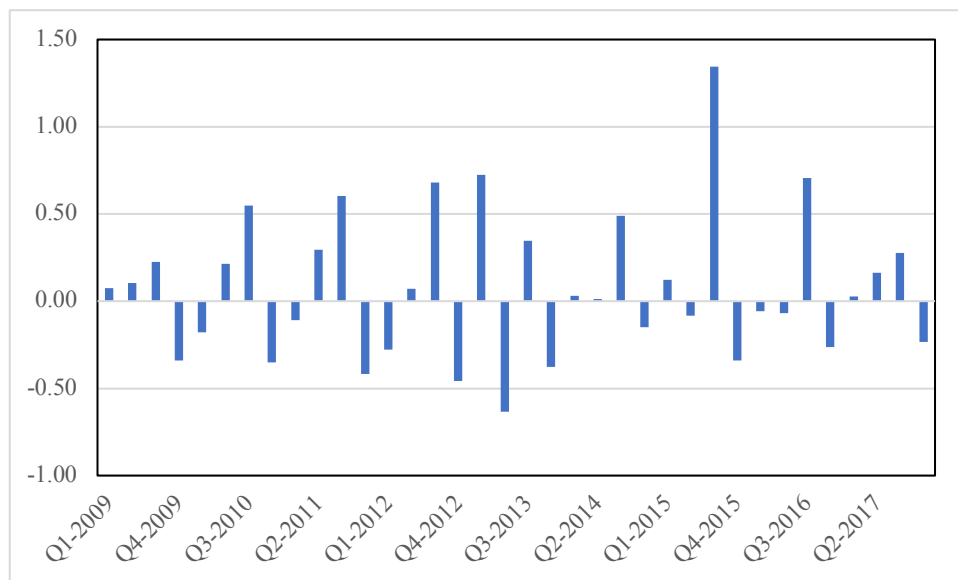
Figure 2: Long-term immigrants in Cyprus during 2009-2017
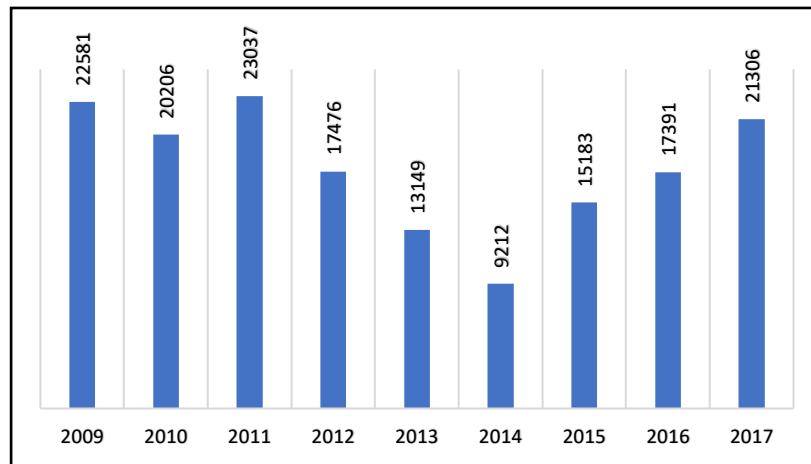
Figure 3: Gender Composition of Immigrant in Cyprus during 2009 - 2017
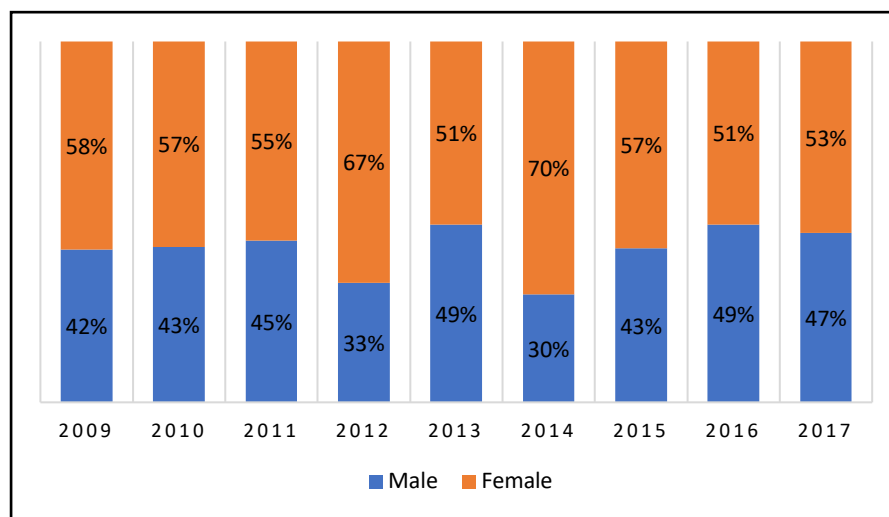
The gender composition (Figure 3) of the majority of people that immigrated to Cyprus were females. Among all the immigrants, around 57% of them were females and 43% of them were males during 2009-2017.

The next figure illustrates the trend in residential property price index in Cyprus from 2006 to 2019.

Figure 4: Residential Property Price Index in Cyprus during Q1/2006 and Q1/2019

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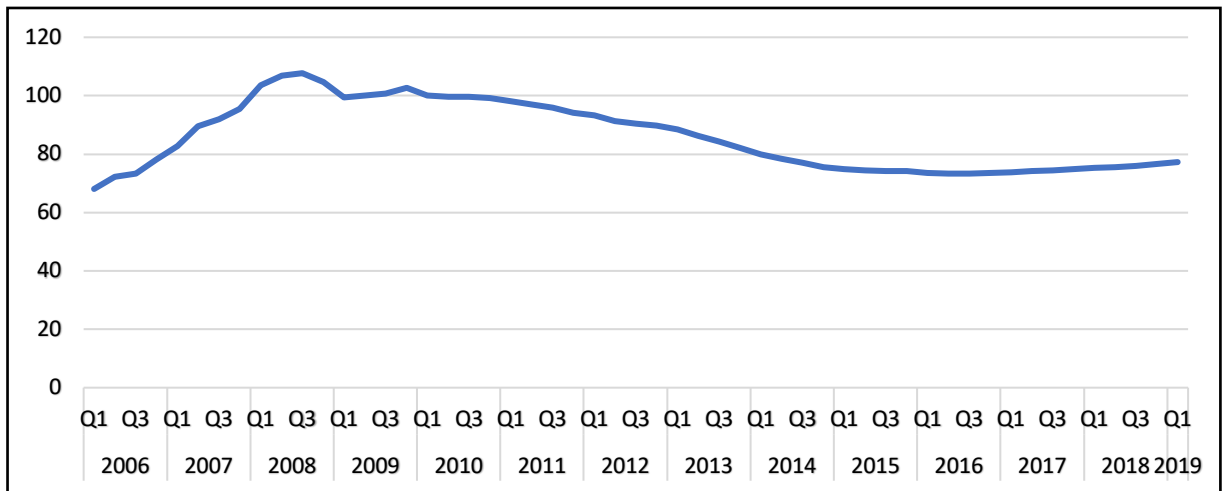
At the base year of Q1/2010, the residential property price index increased from 68.1 in Q1/2006 to 77.2 in Q1/2019 (Figure 4). Though the trend in residential property price index reached a high of 107.7 in Q3/2009, the present scenario of the property prices shows the deflationary trajectory. The decline in property price index has remained the same for flats as well as houses. Among the districts, the lowest property price index is witnessed in Larnaca at 69.9 and the highest property price index is witnessed in Limassol at 82.9 during Q1/2019. Similarly, the property prices in Nicosia, Paphos, and Famagusta reflected a strong decline due to various deflationary forces at play including low demand for property amongst the public.

**Figure 5: Residential Property Price Growth Rate during Q1/2007 and Q1/2019**
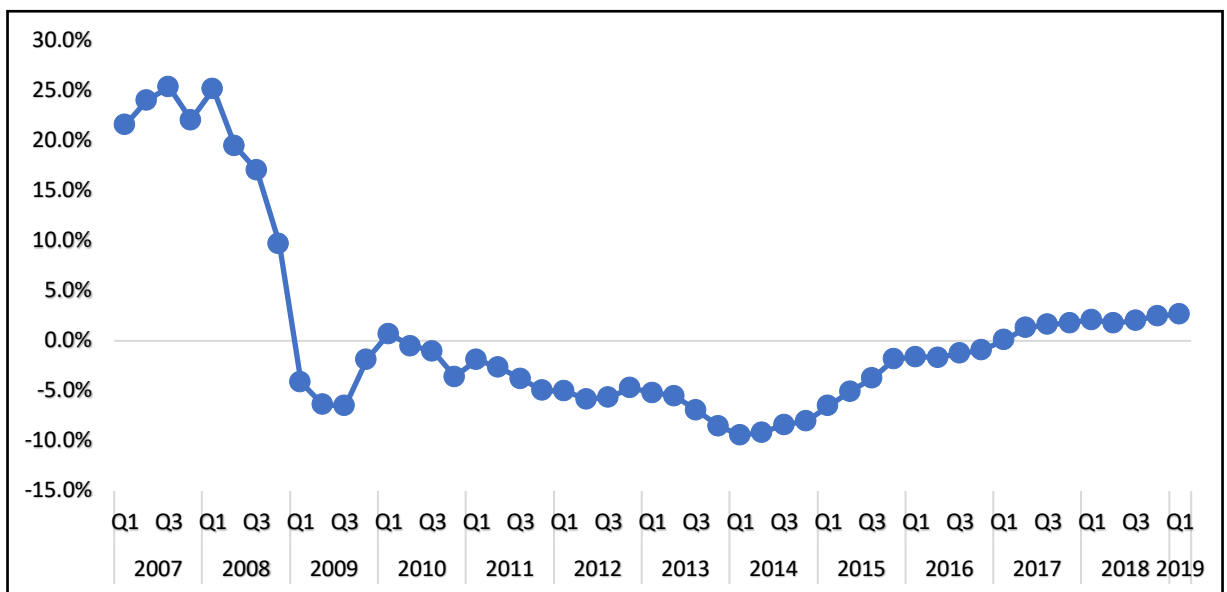
According to the data from Central Bank of Cyprus's Real Estate Unit, the consumer price index in the prices of a basket of representative residential properties in Nicosia, Limassol,

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Larnaca, Paphos and Famagusta have fallen from 21.6% in Q1/2007 to 2.7% in Q1/2019 (Figure 5). Interestingly, the growth in average prices of residential property witnessed dramatic fall during 2008-09, wherein the average CPI in residential property plummeted from a positive of 25.2% in Q1/2008 to -4.1% in Q1/2009. In the past few years, the average prices of residential properties, which were hovering in the negative region, witnessed a consistent rise from a low of -9.4% in Q1/2014 to 2.7% in Q1/2019.

The relationship between the residential house price growth and the rate of long-term immigrants in the country is further demonstrated using the following scatterplot.

Figure 6: Residential House Price growth rate and long-term immigrants in Cyprus during Q1/2009 and Q4/2017
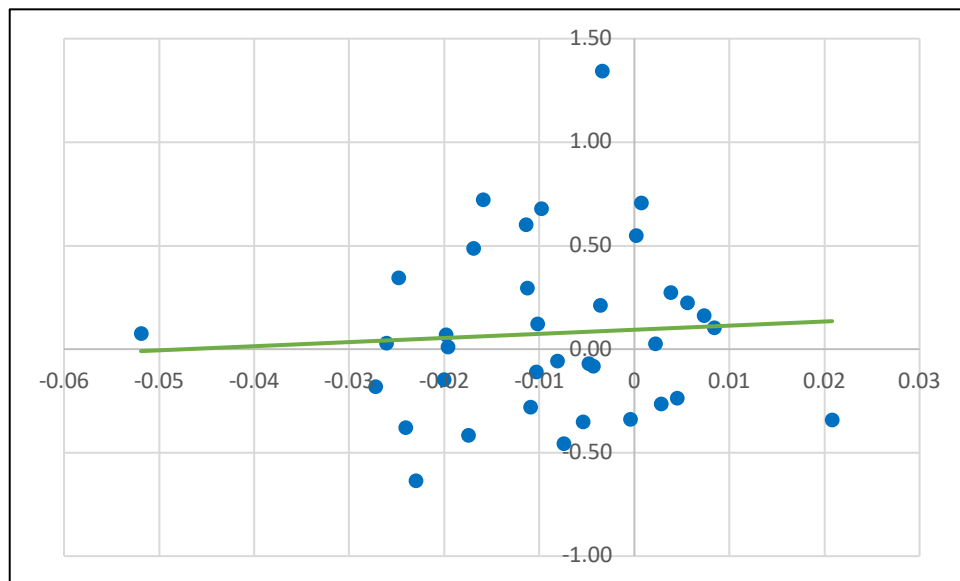
Based on the data of Central Bank of Cyprus, a positive relationship is exhibited from the X-Y plot figure above. Over the years, the relationship has moved in a positive trajectory for housing prices rate and the rate of immigrants in Cyprus.

Figure 7: Consumer Price Index in Cyprus during Q1/2009 and Q4/2017
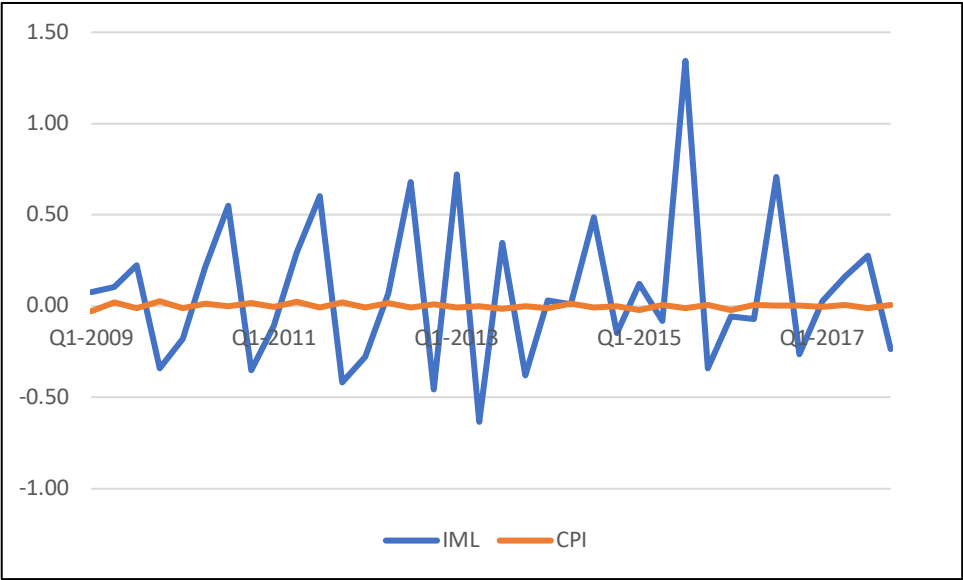
Figure 7 shows the concurrent changes in the IML and the consumer price index, during the period 2009-2017. It can be observed that the two indices move in the same direction, however, their changes vary in intensity, with the changes of the house price index being much bigger than those of the consumer price index. The large fluctuations in the consumer price index in 2009 and 2011 are likely to be attributed to fluctuations of the dollar exchange rate and the VAT increase that was implemented in preparation for Cyprus's accession to the EU, respectively.

Figure 8: Gross Domestic Product during Q1/2009 and Q4/2017
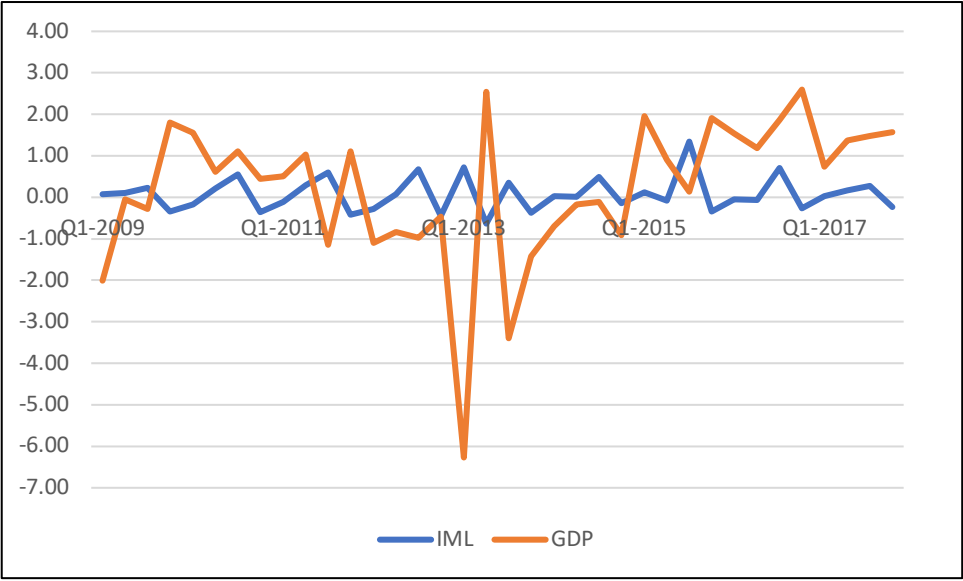
The growth rate of the Cyprus economy (per capita GD) is shown to rapidly increase during the period 2009-2017. The changes in the two indices seem to follow a similar direction,

even though the rate of growth the economy fluctuates less than housing prices. A slight change in GDP has large impact on IML.

Figure 9: Unemployment during Q1/2009 and Q4/2017

Figure 9 demonstrates that immigration has inverse effect on unemployment. An increase in number of immigrants, decreases unemployment. It shows that highly skilled immigrants create more job opportunities.

Figure 10: Construction Cost Index 2015 to 2017

Figure 11: Interest rates 2009 to 2017
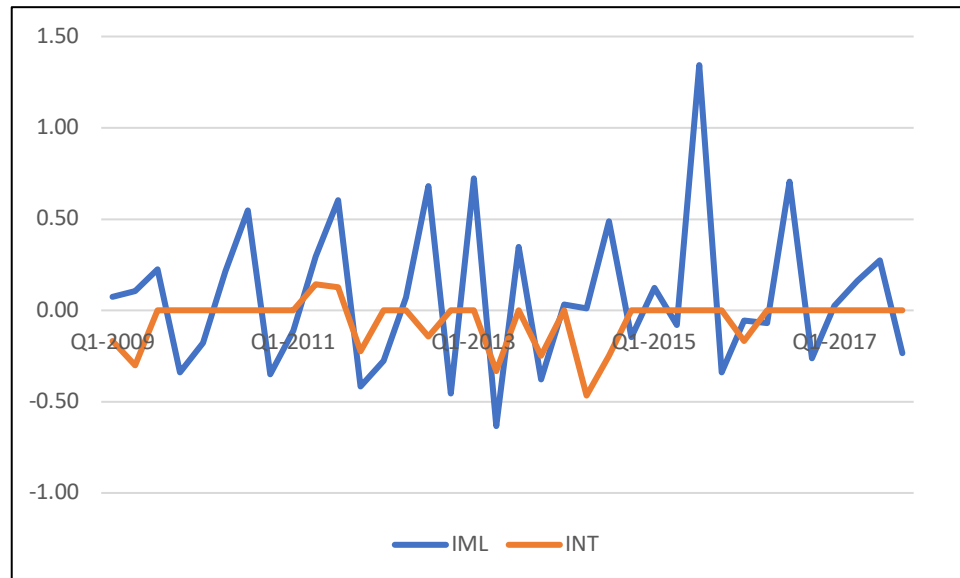
Figure 11 presents the concurrent changes in the interest rate (INT) on loans and IML over the period 2009-2017.

5.2 Stationarity Analysis
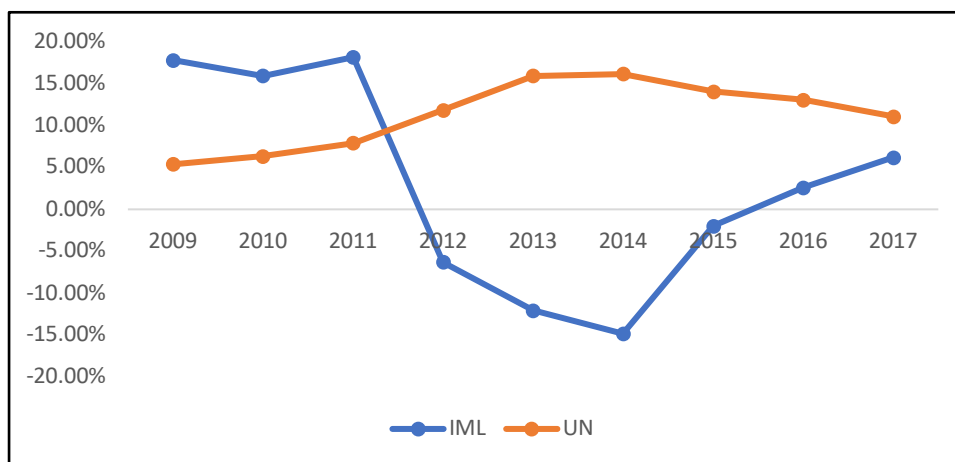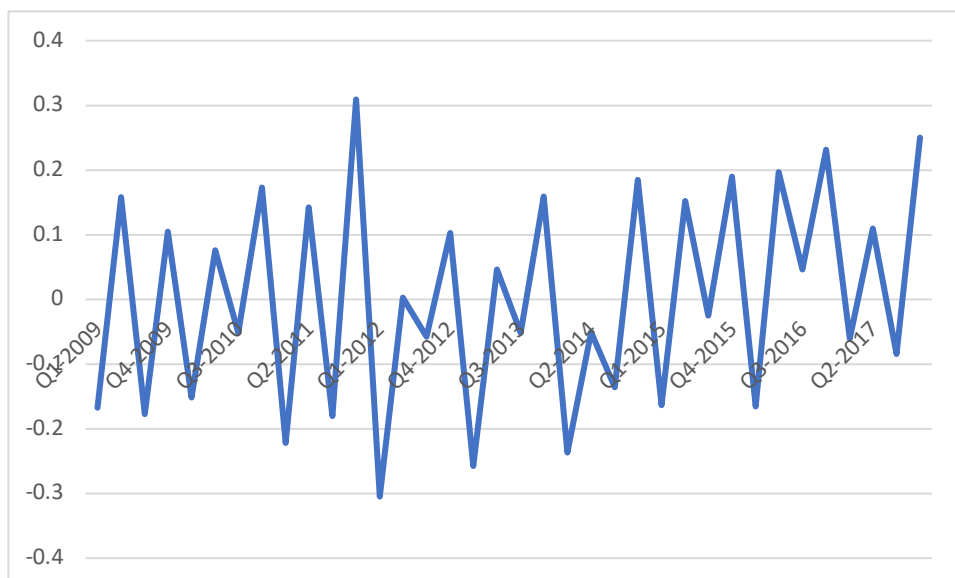
Most statistical models including regression models require the input variables to be stationary as this allows for forecasting and prediction (Brooks, 2014). In addition to this, Bai (2004) argues that non-stationary variables would produce inaccurate results and inflated R-squared statistic due to the presence of trend in the data and inconsistent mean and variance through the time period. Running multiple linear regressions on non-stationary data could also result in significant serial correlation in the model residuals and even spurious relationships (Phillips & Moon, 2007). Thus, it is important to test the stationarity of all the variables included in the analysis and this can be done by running unit root tests. Diebold and Kilian (1997) also noted that evaluation of the presence of a unit root in tested time series is important before attempting forecasting or regression modelling to explore dynamics in the relationships between variables and make proper infer about real parameters based on the estimated coefficients. This also enables the identification of the order of integration of the chosen variables.

Two types of unit root tests have been conducted to test the select time series including the conventional Augmented Dicky Fuller (ADF) by Dickey and Fuller (1981), the Phillips Perron (PP) tests by Phillips and Perron (1988). These tests have been run in both the level

form of the data and with the data converted to first differences. The results of the tests are provided in Table 2 below.

Table 2: Stationarity Tests at level without Intercept

Variable	Augmented Dickey-Fuller test (ADF Test)	Phillips-Perron test (PP Test)
RPG	-4.4600***	-4.5312***
IML	-2.1593**	-8.4200***
CCI	-1.2864	-11.867***
GDP	-1.9092*	-5.8331***
CPI	-2.2348**	-9.6227***
INT	-4.7507***	-4.7888***

Note: at level with intercept only ***, **, * significance at 1%, 5% and 10% alpha levels

The results of the stationarity tests such as ADF and PP in the table 2 above, suggest that the selected variables are stationary at level and at statistically significant 0.05 alpha levels. Therefore, due to the above results, it can be concluded that there is no need to carry out single differencing prior to fitting the regression model. According to Rhif et al., (2019) asserts, that non-stationary series lead to misleading model estimates.

5.3 Correlation Analysis

Rogers and Nicewander (1988) used the correlation analysis, also called Pearson product moment correlation, to study the relationship between two factors. Correlation coefficients have values ranging from minus one to one with zero indicating no correlation at all. The extreme values demonstrate positive or negative correlation, but values in between demonstrate the degree of linear association between the variables. Generally, correlation coefficients in excess of 0.7 are considered strong (Gujarati, 2003). The following table demonstrates the results of the correlation analysis.

Table 3: Correlation Matrix of the Variables

	RPG	IML	CCI	GDP	CPI	INT
RPG	1	0.064679	0.322502	0.458623	0.434826	0.295489
IML	0.081154	1	-0.37786	-0.33052	-0.30338	0.22224

CCI	0.322502	-0.38337	1	0.41715	0.704452	-0.06229
GDP	0.458623	-0.33731	0.41715	1	0.266698	0.008224
CPI	0.434826	-0.31465	0.704452	0.266698	1	-0.03306
INT	0.295489	0.217924	-0.06229	0.008224	-0.03306	1

In order to determine the relationship between selected factors, correlation provides a better overview of the relation between the rate of immigrants and real estate price growth (Table 3). According to Schober, Boer and Schwarte (2018), correlation can be used to measure the degree of association in the broadest manner. In layman terms, the aim of performing correlation analysis is attest whether explanatory variables are strongly correlated with the response variable.

Based on empirical data, real estate price growth (RPG) growth rate has a slightly positive, but weak relationship with rate of immigrants (IML) in Cyprus, as the correlation coefficient stood at 0.0646. On the other hand, the variable RPG and the Construction Cost Index (CCI) depict a fairly high correlation, which stood at 0.3225. RPG and the Gross domestic product (GDP) have an even higher positive correlation, as the coefficient stood at 0.4586. The consumer price index (CPI) correlation with RPG is also positive and stands at 0.4348, indicating that the recovery in the economic growth has a vital role to play in the revival of the housing market in Cyprus. On the contrary, the correlation coefficient between interest rate (INT) and housing prices (RPG) has a weak correlation of 0.2955.

Linear regression presumes that the respective independent variables should be linearly related to the dependent variable (Reid et al., 2019). However, based on the above correlation analysis, the variables are fairly related with the dependent variable.

5.4 Multicollinearity Analysis

In order to build an unbiased and robust regression model, the presence of multicollinearity should be eliminated. Multicollinearity simply explains a degree of correlation among the independent variables. The presence of multicollinearity amongst the independent variables can adversely impact the regression results. Therefore, in order to detect multicollinearity amongst the regressors, Variance Inflation Factors (VIFs) and Coefficient Variance Decomposition is calculated. According to Belsley, Kuh and Welsch (2005), Variance decomposition criteria of two or more factors with associated eigen value greater than 0.5 associated with a small condition number indicate the presence of collinearity between the

respective two variables. On the other hand, variance inflation factors range from 1 onwards. A rule of thumb used for the multicollinearity estimation in the model using variance inflation factor is that VIF in excess of five could be considered as strong evidence for multicollinearity (Gujarati, 2003).

Table 4: Variance Inflation Factors (VIF) of the Regressors

Variable	Coefficient Variance	VIF (uncentred)	VIF (centred)
IML	2.40E-05	1.345477	1.301059
CCI	0.000264	2.299375	2.298885
GDP	1.33E-06	1.303203	1.28145
CPI	0.034733	2.010005	2.003588
INT	0.000198	1.265043	1.059611

On the basis of the Variance Inflation Factors (Table 4), the regressors are within tolerable range and all the regressors lie in the band of 1 - 5, therefore, none of the variables qualify for deletion and it can be concluded that the fitted linear regression model does not suffer from multicollinearity problem, which is within acceptable levels.

5.5 Regression Analysis

The research has used multivariate regression analysis to check the effect of a percentage change in factors such as immigration rate, construction cost index rate, consumer price index, GDP growth rate, and interest rates on the rate of real estate price change in Cyprus.

The data used and compiled is in the following form:

Variable	Data input type
RPG	Percentage change per quarter, when compared to previous quarter
IML	Percentage change per quarter, when compared to previous quarter
CCI	Percentage change per quarter, when compared to previous quarter
GDP	Percentage change per quarter, when compared to previous quarter
CCI	Percentage change per quarter, when compared to previous quarter
INT	Percentage change per quarter, when compared to previous quarter

The result of the estimated multivariate regression analysis is illustrated in the table below:

Table 5: Multivariate Regression results of the model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.00963	0.002036	-4.73255	0.000
IML	0.00928	0.004897	1.894911	0.0678
CCI	-0.00539	0.016238	-0.33186	0.7423
GDP	0.003534	0.001151	3.069598	0.0045
CPI	0.455816	0.186369	2.44577	0.0205
INT	0.024908	0.014073	1.769903	0.0869
R^2	0.477197	Mean dependent var		-0.00922
Adjusted R^2	0.390064	S.D. dependent var		0.013455
S.E. of regression	0.010508	Akaike info criterion		-6.1223
Sum squared resid	0.003313	Schwarz criterion		-5.85838
Log likelihood	116.2015	Hannan-Quinn criter.		-6.03019
F-statistic	5.476609	Durbin-Watson stat		1.687511
Prob(F-statistic)	0.00107			

The table above provides estimate coefficients, standard errors and the p-values of the test. In the above regression model, RPG is set as the dependent variable, whilst IML, CCI, GDP, CPI and INT are independent variables. The F-statistic is used to test a null hypothesis that the chosen variables have a zero association with the real estate price growth in Cyprus. The F-statistic stood at 5.47 with the p-value of less than 0.0010, indicating at 95% confidence interval, that changes in real estate prices in Cyprus, may be explained by the independent variables.

The R^2 coefficient of determination is a measure that shows how well the regression line constructed by this model fits the data that underlies the model. On the one hand, very low values of the coefficient of determination would imply that there is no linear relationship between the dependent and independent variables. On the other hand, excessively higher values of the coefficient of determination are also undesirable, as they could indicate the presence of serial correlation or a unit root in data. In such cases, the regression results may not be trusted, in spite of being statistically significant. In the case of the illustrated model,

the coefficient of determination (R^2) stood at 0.4771, meaning 47.71% of the variations in the growth rate of real estate prices can be explained by the changes in the rate of immigrants and the selected macroeconomic control variables in Cyprus. When the variation is adjusted to the number of cases, the independent variable accounts for 39% variation in real estate price growth.

Since the null hypothesis stated above was rejected, then the coefficients are not equal to zero. This prompts fitting of the regression analysis model as shown below:

$$RPG = -0.0096 + 0.0092 \, (IML) - 0.0053 \, (CCI) + 0.0035 \, (GDP) + 0.4558 \, (CPI) + 0.0249 \, (INT)$$

The model intercept term C, reflected a negative value of -0.00963, which is the average long-term growth of real estate price in Cyprus, when all explanatory variables are set to zero, the model intercept is statistically significant at 0.05 alpha levels, as the p-values is less than 0.010.

Immigration (IML) has a coefficient value of 0.0092, indicating that IML has a positive impact on the growth rate of real estate prices keeping other elements constant, meaning that a 1% increase in IML is associated with 0.0092 units increase in RPG. However, this effect was is statistically insignificant, as the p-value is 0.0678 which is greater than 0.05.

On the other hand, the coefficient value of construction cost index (CCI) has a negative influence of -0.00539, reflecting that an increase of 1% in CCI would lead to a decrease of -0.00539 units in RPG. However, the p-value of 0.7423, indicates that this effect too, is statistically insignificant.

The Gross domestic product (GDP) reflected a positive coefficient of 0.0035, indicating that an increase of 1% in the GDP, can increase the growth in real estate prices by 0.0035 units, which was found to be statistically significant, based on the p-value of 0.0045 at 95% confidence interval.

The consumer price index (CPI) reflected a positive coefficient of 0.4558, indicating a positive relationship between CPI and growth rate of housing prices in Cyprus. In this case, 1% increase in CPI, resulted with 0.4558 units increase in real estate price growth. This

effect was found to be statistically significant, based on the p-value of 0.0205 for the CPI coefficient, at 0.05 significance levels.

The interest rate (INT) has a positive coefficient value of 0.0249, indicating that a 1% rise of interest rates could lead to an increase of 0.0249 units in real estate price growth in Cyprus. However, this effect was found to have statistical insignificance at 0.05 alpha levels, based on the p-value of 0.0869.

It is also important to note after conducting the multivariate analysis that regressions do not ideally measure effects because causal relationship should be deduced from theories or empirical observations. Moreover, regressions measure instantaneous relationships between variables, which implies that they should be interpreted as correlations rather than causation. In order to measure causation between the variables and the direction of causality, a further additional test based on the Granger methodology is employed in this research.

5.6 Spherical errors

A well fitted model assumes lack of spherical errors. Spherical errors are subdivided into two sections that are homoscedasticity and autocorrelation (Fan, Li & Wang, 2017).

5.6.1 Breusch-Pagan test

Homoscedasticity assert that the error term in the fitted model is constant as each new observation is included in the model. In the analysis, Breusch-Pagan test is applied to test presence of constant variance in the fitted model.

Table 6: Breusch-Pagan-Godfrey Test

Heteroscedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.564389	Prob. F (5,30)	0.7264
Obs*R-squared	3.095183	Prob. Chi-Square (5)	0.6853
Scaled explained SS	1.954388	Prob. Chi-Square (5)	0.8554

The Table 6 above displays Breusch-Pagan-Godfrey test for homoscedasticity test. Hypothesis is set as shown below:

H0: There is lack of homogeneous nature in the residuals

H1: There is evidence of homogeneous nature in the residuals

The analysis establishes that heteroscedasticity F (5,30) is 0.5643, p-value of 0.7264. The stated null hypothesis is not rejected in favour of the alternative one at 95% confidence interval. Therefore, there is lack of homogeneous nature in the model residuals (presence of heteroscedasticity). The next assumption of spherical errors is autocorrelation assumption.

5.6.2 Durbin-Watson test

In the analysis Durbin-Watson test is used to test whether the model violates the assumption. Hypothesis is set as follows:

$$H0: The\ residuals\ are\ autocorrelated$$
$$H1: The\ residuals\ are\ not\ autocorrelated$$

It is established that Durbin-Watson statistics value in the first model of regression model is 1.6875 (see table 5). Durbin-Watson evaluation relies on the rule of thumb (Lee, 2016, p. 120). The rule of thumb asserts that DW values between the ranges 1.5 to 2.5 depict lack of autocorrelation problem in the fitted model. As such, the stated null hypothesis is rejected in favour of the alternative hypothesis. Therefore, it can be concluded that the model does not suffer from autocorrelation problem.

5.7 Jarque-Bera test

A well-fitted regression model requires that normality assumption is met. Normality assumption assets that the model residuals have mean zero and a constant variance. Normal distribution assumption implies that the observations are randomly picked to enter into the analysis should depict mean zero and constant variance in the residuals (Bahmani-Oskooee & Bahmani, 2015). Jarque-Bera statistics is applied to jointly check whether the residuals are normally distributed (mean zero and a constant variance jointly). The hypothesis is set as follows:

$$H0: the\ data\ are\ not\ normally\ distributed$$
$$H1: the\ data\ are\ normally\ distributed$$

Figure 12: Normality test for residuals

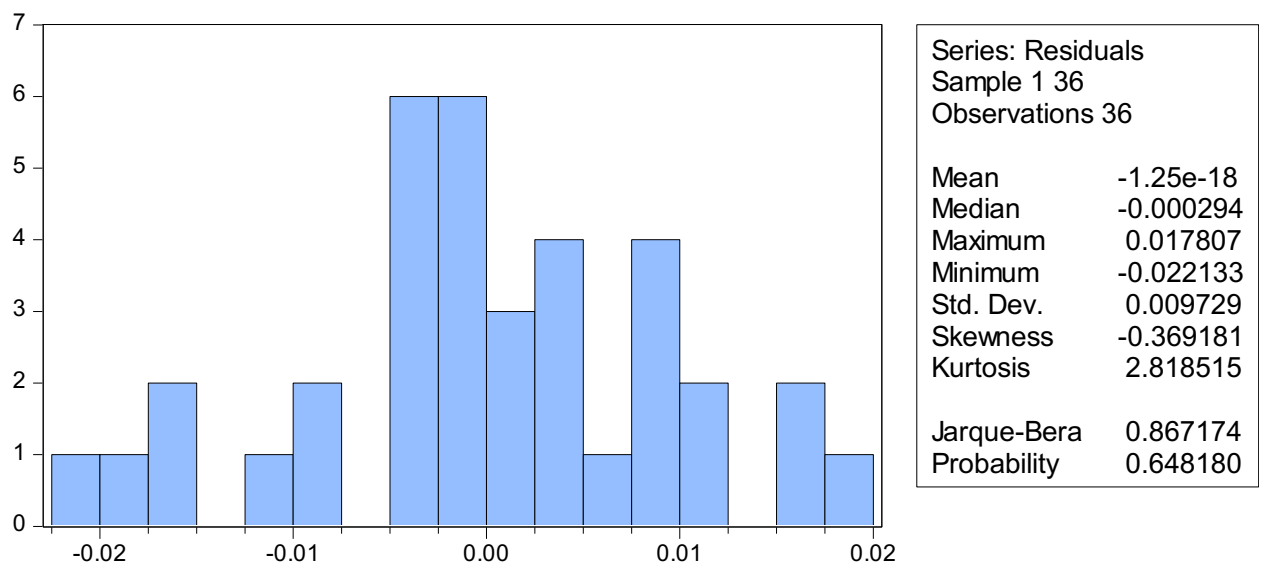|		Series: Residuals
		Sample 1 36
		Observations 36
	Mean	-1.25e-18
	Median	-0.000294
	Maximum	0.017807
	Minimum	-0.022133
	Std. Dev.	0.009729
	Skewness	-0.369181
	Kurtosis	2.818515
	Jarque-Bera	0.867174
	Probability	0.648180

Illustration in figure 12 above, displays graphical test and numerical test for normality assumption. Evidently, there is negative skewness of -0.3691, and the kurtosis value is 2.8185 (platykurtic distribution), which is less than normality value based on kurtosis that is 3.0 (mesokurtic distribution). This implies that the tails are lighter than in normal distribution. It is established that Jarque-Bera statistics is 0.8671, which is statistically insignificant at 0.05 alpha levels, as the p-value is 0.6481. In this case the null hypothesis is not rejected in the favour of the alternative hypothesis at 5% significance levels, therefore, the residuals violate normality assumptions.

5.8 Granger Causality test

Though the correlation analysis provided a brief idea regarding the direction of the relationship between Real estate prices and rate of immigrants, the method is highly rudimentary to use for causal effects. In order to assess the reasons for the change in one variable due to another, the Granger Causality Test is used. The causality analysis helps in filling that gap as the reflections of coefficients are mere correlations in multivariate regression analysis; however, the Granger Causality test is a renowned statistical test to determine whether one variable has signs of causing changes in another variable.

The null hypothesis of the Granger Causality test is that one variable does not cause changes in the other variable. If the p-value (Prob.) is less than 0.05, this null hypothesis is rejected. The causality between the immigration and real estate prices is tested in the following table:

Table 7: Granger Causality Test

Null Hypothesis:	Obs	F-Statistic	Prob.
IML does not Granger Cause RPG	35	1.4277	0.2409
RPG does not Granger Cause IML		0.01099	0.9172
CCI does not Granger Cause RPG	35	0.01652	0.8985
RPG does not Granger Cause CCI		1.66474	0.2062
GDP does not Granger Cause RPG	35	1.68306	0.2038
RPG does not Granger Cause GDP		4.40945	**0.0437**
CPI does not Granger Cause RPG	35	3.74311	0.0619
RPG does not Granger Cause CPI		0.90357	0.349
INT does not Granger Cause RPG	35	0.28461	0.5974
RPG does not Granger Cause INT		9.6274	**0.004**

A Granger causality test (Table 7) was conducted, in order to confirm whether there is a presence of unidirectional or a two-way direction between the independent variables with the dependent variable (RPG) during the observed period of Q1/2009 - Q4/2017.

The F-statistic for whether Long-term immigration (IML) Granger cause Real estate price growth (RPG) is 1.14277, at statistically insignificant 0.05 alpha level, as the p-value is 0.2409. Therefore, the stated null hypothesis is not rejected in favour of an alternative proposed hypothesis, concluding that IML does not Granger cause RPG. Similarly, RPG does not Granger cause IML, as the F-statistic is found to be 0.01099, at a statistically insignificant 0.05 significance level, as the p-value is 0.9172.

The Construction Cost Index (CCI) does not Granger cause RPG, as the F-statistic stood at 0.01652, at statistically insignificant 0.05 alpha level, as the p-value is 0.8985, thereby the stated null hypothesis is not rejected in favour of an alternative proposed hypothesis, at 5% significance level. It is also concluded that RPG does not Granger cause CCI at 5% significance level, based on the F-statistic, which is 1.6647 and the p-value is 0.2062.

The analysis evaluated that the F-statistic of whether the Gross Domestic Product (GDP) Granger cause RPG, which equals to 1.68306, however this is found to be statistically insignificant at 0.05 significance level, therefore the stated null hypothesis is not rejected in favour of the alternative one at 95% confidence interval, meaning that GDP does not Granger cause RPG. However, when evaluating if RPG Granger cause GDP, it is shown that the F-

statistic is 4.40945, which is statistically significant at 0.05 significance due to p-value of 0.437. As such, the stated null hypothesis is rejected in favour of the alternative one at 95% confidence interval, therefore, it can be concluded that RPG Granger causes GDP, which means that this is a unidirectional relationship.

When analysing whether the consumer price index (CPI) Granger cause RPG, the value of F-statistic is 3.7431 at a statistically insignificant 0.05 significance level, due to the p-value of 0.0619. In this case, the stated null hypothesis is not rejected in favour of an alternative proposed hypothesis. Similarly, the stated null hypothesis is not rejected when testing whether RPG Granger cause CPI, due to the fact that the F-statistic of 0.90357 is statistically insignificant at 0.05 significance levels due to the p-value of 0.3490.

The Interest Rate (INT) does not Granger cause RPG, as the F-statistic is 0.2846 at a statistically insignificant 0.05 significance level, based on the p-value of 0.5974. The stated null hypothesis is not rejected in the favour of the alternative hypothesis at 95% confidence interval; therefore, it can be concluded that INT does not Granger cause RPG. On the other hand, when evaluating if RPG Granger cause INT, the F-statistic is found to be 9.6274 at a statistically significant 0.05 significance level due to the p-value of less than 0.010. This provides ample evidence that the research cannot reject the null hypothesis that RPG does not Granger cause INT. Interestingly, the relationship, according to Granger Causality analysis, between real estate price growth and interest rates suggests a one-way relation between them, as the direction of the relationship flows from RPG to INT. The trend in the rate of real estate prices has actually been a causal element in the interest rate. This is a unidirectional relationship.

The next section outlines the results of the test and its interpretation. In combination with the regression analysis, it provides a fuller picture of the relationship between immigration and real estate prices in Cyprus.

6. Discussion and Limitations

The relationship between immigration and real estate prices is moderate but negative based on the correlation analysis. The overall real estate market in Cyprus is divided into two classes – one driven by local demand and other driven by foreign demand. The prices of residential houses in the districts of Nicosia, Larnaca and Limassol are driven by local demand whereas houses in Paphos and Famagusta are primarily driven by foreign demand.

The geographical appeal and conducive norms favour Cyprus for residential utilization amongst the immigrants (KPMG, 2017).

Interestingly, the Causality analysis suggests that the decline in the residential property prices in Cyprus have influenced the growth of immigrants from the around the world. The dramatic fall in housing rates during 2008 - 09 has made the housing market in Cyprus a highly demanded sector across the world, especially for the immigrants.

The reverse trend in decline in housing prices to growth in number of immigrants in Cyprus can be explained by the implementation of their streamlined FDI norms and ease in regulations to conduct operations with real estate, especially for the immigrants located in Cyprus. Under the Development Strategy of Cyprus, various schemes under eased FDI norms allow foreign nationals and immigrants to invest in the real estate market of the Cyprus economy. Moreover, any immigrant can obtain a Permanent Resident Permit (by exception) (PRP) by simply acquiring a property in Cyprus (The Sovereign Group, 2019).

The economy of Cyprus is endowed with advanced infrastructure, business friendly ecosystem, safety, beaches, sunshine, and mountains among other elements. Among all the EU nations, Cyprus is one of the most attractive destinations amongst immigrants for living purposes and conducting business. Moreover, the norms governing the granting of immigration permit have been eased and fast tracked to a greater extent. This streamlined strategy has boosted the immigration numbers as the Government of Cyprus has intended to provide permanent residency to immigrants in Cyprus, given they fulfil the necessary requirements. According to KPMG (2017), few of the measures undertaken by the Government of Cyprus to facilitate in the process of acquiring real estate by immigrants include simple application form supplemented with a sale deed or contract of sale, which can be submitted to the Department of Land and Survey at a minimum market price of €300.000 excluding VAT, single document proof of making the payment of at least €200.000 excluding VAT in lieu of purchasing a property, permission to apply for immigration permit to applicant's wife, children below the age 18, and unmarried children in the age band of 18 - 25, who are studying abroad, have at least six months left in their education, and economically dependent on the applicant. Apart from this, the applicant's parents can also apply for the immigration permit in Cyprus.

Going forward, the trend in the number of immigrants is expected to further increase in the coming years on the back of low property prices and ease in citizenship permits. However, sustaining the standard of living might become difficult as rent allowances provided by the Government are quite low at €100 per month per person and the employment opportunities are limited to few sectors including farm sector and labour work (University of Nicosia, 2018).

In line with the estimates of regression analysis, interest rate bore a negative sign with respect to growth in residential housing prices. However, the degree of impact has been weak as the transmission rate of banks in Cyprus has been slow and weak. The response of Cyprus' banks towards European Commercial Bank (ECB) rate cuts has been slow due to limited volume of inter-bank lending transactions. Presently, the loans and funding are majorly created through utilization of the customer deposits in the banks of Cyprus. Similarly, the revival in the real estate prices is also driven by the recovery in the economic activity in Cyprus, as evident from the regression analysis. The landscape of the housing market has significantly improved, partially due to the robust recovery of the economic growth in the past few years. Moreover, with streamlined and improved banking system and revived demand from locals as well as immigrants, the housing sector, especially the residential housing sector, is expected to perform better in the coming years (Delmendo, 2019).

Based on the regression analysis, immigration was not found to exhibit a significant effect on real estate price growth. This finding contradicts the previous evidence revealed by Pashardes and Savva (2009) who argued that the flow of immigrations was a strong driver of housing prices as immigrants contribute to the total demand for housing. The findings of this dissertation are also not in line with Gonzalez and Ortega (2013) and Akbari and Aydele (2012) who came to similar evidence as Pashardes and Savva (2009), that the growth in the number of immigrants tends to have a significant positive effect on real estate prices. However, it is valid to note that the impact of housing prices is not so straightforward. The prices of residential real estate depend not only on demand but also on the supply of housing, which can offset the effects.

6.1 Limitations

Due to limited availability of data related to the real estate prices, the research design had limitations. Vital factors including the climate scenario, political factors, distance, age composition of the population, job opportunities, among others have not been included in

the research design, despite their significant influence on house prices. The small sample size could pose a threat to generalisability of the research findings. In order to make them generalizable, the sample must be randomly selected and have more observations.

There are also limitations associated with the use of the regression analysis. In particular, discrepancies between the regression model and the Granger Causality test have been revealed. Linear regressions are not able to deal with problems of endogeneity effectively unless vector autoregressions are employed. The Granger Causality test revealed this endogeneity issue. Low frequency of the data is another limitation. Due to the unavailability of monthly and weekly data, it is easy to miss certain dynamics in real estate prices.

Even though it was established that the model does not suffer from multicollinearity, the fitted model violated spherical errors and normality assumptions. Lagged variables were unable to eliminate problem of autocorrelation. This brings a gap for future study whereby a powerful estimation technique, such as a 2-stage least squares (2SLS) can be used when refining model estimates.

7. Conclusion and Policy Implications

According to the Central Bank of Cyprus, the housing market in Cyprus started to witness a sudden decline due to the global financial crisis, that erupted in 2009. The decline in the housing market was tremendously steep after the growth spurt in house prices of 22% and 10% in 2007 and 2008, respectively. The demand for residential houses in Cyprus witnessed a deadlock. However, the declining trend reversed in 2014 after the impact of the global financial crisis eased and the Government of Cyprus implemented various demand boosting reforms. One of the aspects of the increase in house prices was the inflow of immigrants in Cyprus during 2009 – 2017 (Delmendo, 2019; Xinhua, 2019).

Although the impact was evidently true, the degree of impact on Cyprus' Housing market was unclear. The primary purpose of the study was to establish whether the growth in the rate of immigrants has influenced the house prices in Cyprus.

Before applying the data to the analysis, an exploratory data analysis was carried out in order to understand the variables in the model. Descriptive analysis revealed that the variable series were not normally distributed, subsequently, ADF and Philips Peron stationarity tests revealed the series to be stationary at level.

The chosen macroeconomic variables included the percent change of growth/decline in the Construction Cost index, GDP, consumer price index and interest rates, which determine the cost of borrowing and real estate mortgages.

Construction cost index has been chosen in order to identify the supply of real estate. The main rationale for using GDP was that booming economies attract more investors including real estate investors. Consumer price index was expected to be a strong factor of house prices because real estate is a potential hedge for inflation and the way in which investors can store their wealth and protect it from rising prices. Lastly, interest rates have been used because they predict mortgage rates and determine availability of housing as most household use loans to buy a home.

A multivariate regression analysis was conducted, which has revealed that there are no statistically significant effects of long-term immigration, the construction cost index and the interest rates. On the contrary, the GDP and the consumer price index had a statistically significant positive impact on real estate price growth, the latter can be explained by the fact that investors are eager to hedge inflation risks with real estate investments.

Additionally, the fitted model was found to be free from autocorrelation and multicollinearity. To check the direction of causality between the dependent and independent variables, a Granger Causality Test was conducted. The results revealed that real estate price growth Gran ger cause Gross Domestic Product and interest rates.

7.1 Policy Implications and Recommendations

The results of the research have implications for regulators and policy makers in Cyprus. The first implication is that monetary policy has a significant influence on the affordability of housing and house prices. Thus, the ECB is recommended to make decisions on changes in the interest rates with property prices in consideration. If the real estate markets are booming in the EU and there is evidence of a bubble, a rapid change in interest rates could trigger the burst of the bubble. On the contrary, if real estate prices continue to fall, ECB can stimulate housing prices recovery by lowering interest rates.

The findings revealed that residential property prices grow faster in a booming economy. Thus, policy makers should be prepared to see a house price decline when the economy

stagnates or enters a recession. In this case both fiscal and monetary policy measures should tackle both the total economy and the real estate market in the same way.

Greater employment in the economy is associated with higher real estate prices, which is explained by the ability of more people to be able to afford to buy a piece of real estate. Thus, one of the ways in which regulators can restore a healthy real estate market is by tackling unemployment and stimulating employment not only in the private sector but also in the public sector, when private companies do not hire.

In terms of the immigration policy, the government of Cyprus should not be viewing immigrants as a significant factor that would affect real estate price. Therefore, regulators should rather assess implications of immigration for the labour market, which could have a more significant effect on real estate prices in the country.

Future studies are recommended to expand this research and consider a cross-country investigation in which the real estate prices and immigration in the whole Eurozone or the EU would be analysed. This would be logical considering the open borders and a common monetary policy conducted for all Eurozone countries by the ECB.

Another recommendation is for future researchers to take a longer period of data to find possible structural breaks in the relationship between immigration and housing prices. If there is insufficient data for Cyprus, running a regression for several European economies would be a viable option.

It is also recommended that future studies should consider alternative models of measuring the relationship between immigration and real estate prices.

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