

Factors Determining Housing Demand in Saudi Arabia

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ABSTRACT

Against the backdrop of real estate development and rising prices, which affect the affordability of housing in Saudi Arabia, this study empirically estimates housing demand using time-series analysis from 1987 to 2016. To find the main factors affecting housing demand in Saudi Arabia, this study developed an econometric model with explanatory variables such as income level, housing prices, population growth rate, demand for loans, and consumer price index (CPI). The results show that demand for housing is inelastic with respect to price, income, and population growth rate; moreover, the price elasticity of demand is less than that of income and population growth rate, in absolute terms. A regression analysis suggests that the most significant factors that determine housing demand in Saudi Arabia are population growth rate, CPI and demand for housing loans. This study was conducted with a particular focus on the Saudi Arabian market and showed some surprising results, which are not consistent with popular economic theories.

Keywords: Housing Demand, Income Elasticity, Price Elasticity

JEL Classifications: E31, E32, R21, R31

1. INTRODUCTION

Housing is an essential need everywhere in the world. This sector is of importance in social, economic and financial aspects worldwide, but is especially important in developing countries due to the enormous demand for houses as a basic need and as an instrument for wealth accumulation as noted by Coşkun (2010) and OECD (2011). In developing countries, a trend of increase in housing demands has been observed. Economically, the housing sector creates an interesting field for economic research and it has been the subject of a number of studies since the contributions of Richard Muth in the 1960s. Housing can be thought of as the property type for which demand is related to population demographics and micro and macroeconomic factors such as government policies and income growth. Some of the economic factors influencing demand for new single-family houses are housing prices, interest rates, and wage rates. The demand for houses also depends on housing prices versus the cost of alternative housing options. In reality, the housing market is a complex

outcome of the cultural, economic, and regulatory environment of a country. Consistent estimation of prices and income elasticity of housing demand is fundamental to designing an effective policy. Many developing countries are trying to take measures to boost the efficiency of the housing market operations. For effective policy formulation for the housing market, it is important to understand the basic demand for housing. How many houses do people want? And, what option of housing will consumers be able to afford?

Housing has been an important issue for the Government of Saudi Arabia over the past decades because it is a visible output of the developmental progress of a country. However, Saudi Arabia's housing market is large and fast-growing. It is considered to be ten times bigger than any other Gulf market, but remains underdeveloped, with some estimates suggesting that just 30 percent of Saudi Arabia's residents own their own home (KSA Residential Market Review, 2016). The analysis of housing demand has recently become very important among Gulf cooperation council members (GCC) because of the effects of the housing market on the economy. Affordability of housing in Saudi

Arabia was hit by the rise in land prices during the economic boom period 2004–2008. Investor's and developer's demand for land and housing sector, in general, peaked as they sought high returns which were being achieved through land trading throughout Saudi Arabia. This pushed affordability beyond the reach of many new households being formed. According to the World Bank (2009), the percentage of land that is arable in Saudi Arabia is only 1.5% of the total land area. Consequently, a landowner prefers to hold on to his or her land instead of turning it into an affordable housing development. Inquisitively, studies on housing demand in Saudi Arabia are limited in literature. Some studies such as Campbell and Cocco (2007) and Tiwari et al. (1999) attempt to estimate income and price elasticity of housing demand besides various factors that determine housing demand. However, the results from these studies vary so much that there is a need for another study with the latest data and different methodology. Due to the recent drop in oil prices, reduced market liquidity, and budget tightening delivery of inexpensive housing and other critical infrastructure has been affected as per KSA Residential Market Review (2016).

The Saudi government is trying to respond to the housing demand by implementing public housing programs in which houses are either owned or allocated by a public body. In this regard and to cater to population and economic growth, the Real Estate Development Fund (REDF) was established in the late 1970s, and it has contributed to private housing and thus to the construction sector in the Kingdom. Currently, ownership is legally confined to nationals of Saudi Arabia. Nevertheless, foreigners can buy leasehold properties in designated developments. According to KSA Residential Market Review (2016), demand is being driven by overall population growth of 3.1 % and a growth rate of 2.2 % for nationals of Saudi Arabia. The growth rate of young adults in Saudi Arabia for the age group 20-34 is estimated to be at 2.7 %. The housing market across the big cities of Saudi Arabia (Riyadh, Jeddah, and the Eastern Province) has observed a shift in property demand from sales to rentals.

The prime focus of this paper is to estimate the demand for housing in Saudi Arabia. To achieve this purpose the rest of the paper is structured as follows: Section 2 is an overview presenting previous studies on the subject. Section 3 briefly presents the selected methodology and housing characteristics based on data. Section 4 establishes various variables used in the estimation of demand. Section 5 presents our results and section 6 concludes.

2. LITERATURE REVIEW

In the literature, there is considerable empirical evidence both at the micro and aggregate level on trends in housing demand. Several researches have focused on housing demand and its determinants using different statistical and econometrical approaches.

2.1. The Nature of Housing Demand

As far as housing demand in the developing countries is concerned Malpezzi and Mayo (1987b) is the most extensive literature survey in this field. In his empirical work, Rapaport (1997) introduced an econometric approach that included several factors and estimated the model using the sample of households in Florida. By adopting

long-run predictions for the demand side of the market Kenny (1999) used the co-integration analysis to determine both the demand and supply sides of the Irish housing market. He stated that in the long-run the demand side of the market can be modeled using a stable relationship between various factors. Using the American Housing Survey, Goodman (2002) introduced the demand model by owner-occupied housing to provide a panel of household stayers for a metropolitan area. In another work, Goodman (2003) introduced demand by move-stay, own-rent, and length-of-stay decisions as multi-period optimization in the existence of transaction costs using American Housing Survey data and the results stated that income and value-rent measures in different years have a significant impact on housing demand. By using the National Version of the American Housing Survey for 1993 and 2001, Zabel (2004) develop a model of housing demand as a continuous quantity that describes the flow of housing services. Empirically, Dusansky and KoA (2007) conducted another econometric analysis of housing demand using data from Florida and they concluded that an increase in housing prices increased the demand for owner-occupied housing services. In their empirical study, Ng et al. (2008) modeled private housing demand forecast using genetic algorithms and linear regression methods and they found that an integrated model provides the most accurate forecast and over a longer time horizon. Attanasio et al. (2012) modeled individual demand for housing over the life cycle and found the aggregate implications of the behavior. In the Taiwanese housing market, Tsai (2013) examined whether the self-correction pattern determined by housing demand exists and whether it can explain the housing dynamics using the data of the Taiwan housing market. She shows that when the prices increase, housing affordability falls and is followed by a decrease in self-occupancy housing demand. Moreover, in their empirical, several studies identify income as one of the drivers of housing prices (Poterba, 1991; Englund and Ioannides, 1997; Muellbauer and Murphy, 1997; Malpezzi, 1999; Sutton, 2002).

Studies such as Smith and Tesarek (1991), Mayer (1993) usually depend on average income measures such as per capita disposable income. In their studies, Lamont and Stein (1999) and Malpezzi (1999) in the case of the U.S. and Miles and Andrew (1997) in the case of the U.K. find that housing prices overreact to income shocks. In this regard, Smith and Tesarek (1991), Poterba (1991), Smith and Tesarek (1991), Mayer (1993) and Earley (1996) find evidence that the prices of cheaper properties during a boom depreciate at a higher rate than upper end properties. And during downturns the upper end properties appreciate more than the average. At the aggregate level, Hwang and Quigley (2006) and Ceron and Suarez (2006) suggested that at national and regional levels, housing prices are strongly influenced by the business cycles, and therefore driven by essential factors like income growth, industrial production, and employment rate. Furthermore, several works such as Kennedy and Andersen (1994), Englund and Ioannides (1997), and Kasparova and White (2001) specified that financial variables such as credit supply, money, and interest rate have been found to be related to the development of housing prices. For the case of Turkey, Lebe and Yusuf (2014) investigated the demand for housing using Johansen and Juselius' co-integration methods and vector error correction models for the period of 1970-2011. Their findings showed that

GDP per capita, marital status, and industrialization positively affected the demand for housing in Turkey. They conclude interest rates had no significant effect on the demand for housing in Turkey. To conclude, these studies can be separated into two groups that analyzed different countries. In the first set of studies, the researchers focused on housing demand using cross-sectional data. In the second set of studies, researchers showed the houses as consumer goods and examined housing demand using time series (Fulpen, 1988). However, these two sets tried to explain the demand for housing using economic and demographic factors with different methodologies.

2.2. Determinants of Housing Demand

Several existing literature concerning housing demand are limited to specific subtopics within the housing market. A smaller number of studies specifically target the economic factors influencing demand for housing. Based on De Leeuw (1971), Shiller (2007), and Watson (2013), the determinants of housing demand differ based on the incentive for owning a house. Sheppard (1999) and Poole (2003) stated that buildings and houses meant for individual ownership have special importance in both shaping the level of welfare in society as well as the level of economic activity. Some studies such as Marcin and Kokus (1975) have investigated demographic and economic factors affecting housing demand in the USA. However, few studies have looked at the factors influencing demand for housing at the metropolitan statistical area (MSA) level. Inflation can also cause a number of effects on the housing market. Inflation can be assumed to decrease the demand for housing during the period of inflation. However, in this regard, Goodwin (1986) suggested that housing demand may actually increase with inflation. Feldstein and Summers (1978) observed that inflation decreases the attractiveness of housing as an investment while Kearn (1979) stated that inflation's effect on housing costs serves to lower housing demand. Bekmez and Asli (2013) observed that inflation had positive influences, while interest rates have insignificant but negative influences on the demand for housing. Based on his findings, Follain et al. (1980) stated that a 1% increase in the inflation rate decreased homeownership by more than 3% for all households. In their early findings, Grebler et al. (1956) pointed out that the vacancy rate, income of residents, and CPI are the main factors causing fluctuation in property prices. By using Johansen's co-integration tests, Bekmez and Asli (2013) studied the determinants of demand for housing from 1986 to 2009. Interest rates, inflation rates, GDP per capita, unemployment rates, and the stock exchange indicator were taken as explanatory variables. They found that the most important factor affecting the demand for housing was GDP per capita. However, nationals of Saudi Arabia prefer to live in independent houses rather than apartments. Social requirements such as privacy, social solidarity of family members within the same housing unit, and independence from residential density are the main factors considered for affordable housing in Saudi Arabia that may affect housing demand.

2.3. Housing Price and Income Elasticity of Demand

Based on market fundamentals, rising home prices would tend to result in a decrease in the quantity demanded for housing. Nevertheless, as Campbell and Cocco (2007) found that a positive

relationship may exist if rising home prices increase the perceived wealth of households or lead to relaxed borrowing constraints. They suggested that a reverse causality could result with relaxed borrowing constraints increasing housing demand and therefore prices. Regarding the housing price elasticity of demand, Mayo (1981) reports that it varies depending on how housing prices are obtained as well as on the methodology adopted. The findings of Follain et al. (1980) for South Korea show that estimates vary from close to zero to almost 1 for Malpezzi and Mayo (1987a; 1987b) studies. Generally, income elasticities tend to be higher than price elasticities in absolute values. Tiwari et al. (1999) estimate the demand of housing in for Mumbai, India using a cross-section semi-logarithmic single equation ordinary least squares (OLS) model by tenure. They found that price elasticities are -0.85 for owners and 1.02 for renters. Halicioğlu (2007) follows an Auto Regressive Distributed Lag approach using macroeconomic data for Turkey from 1964 to 2004. His findings indicate that income elasticity of housing demand is close to one and the price elasticity of housing demand is 0.2 . In different dimensions, Ermisch et al. (1996) find the income elasticity of housing demand between 1.0 and 0.8 and the permanent income elasticity of housing demand between 0.87 and 0.76 . In his early work, Mayo (1981) presents a range of 0.87 to 0.36 for owners when disaggregated data is used. Ahmad et al. (2013) estimated qualitative and quantitative housing demand using the household survey in Delhi and found that the demand for housing is inelastic with respect to price and income. By using 7 different regressions for housing demand Durkaya and Rahmi (2004) determined the demand for housing using variables such as price level, real housing cost, population, and industrialization. They found that price elasticity of housing demand varied from -0.003 and -0.1 and the income elasticity of housing demand varied between 1.9 and 3.8 .

This literature review relates to the variables used in our econometrics model and establishes their explanatory power in the case of housing demand.

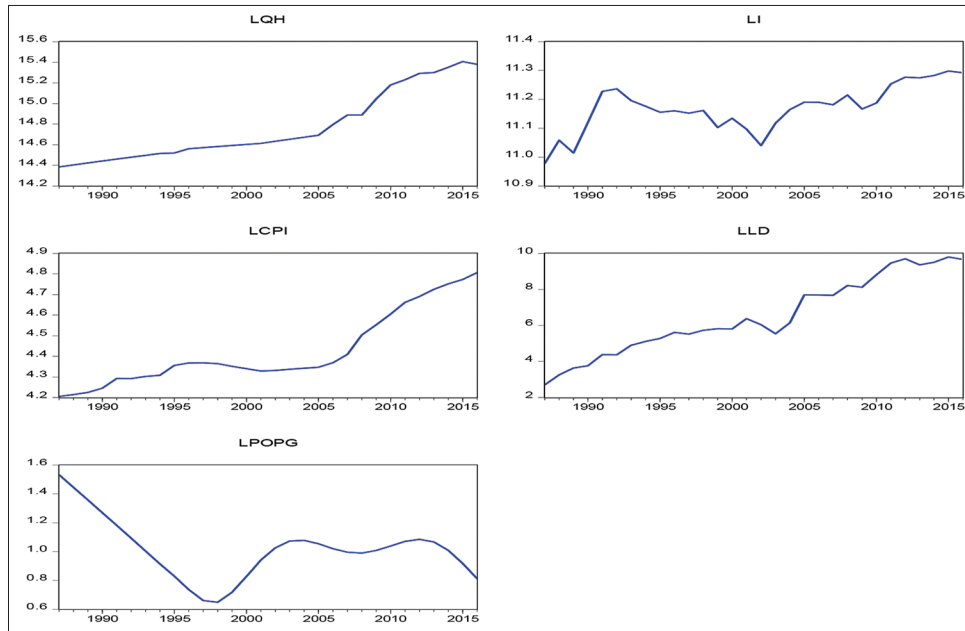
3. DATA AND METHODOLOGY

The main purpose of this paper is to determine housing demand in Saudi Arabia with the help of time series data analysis. The data for the analysis was collected from different sources: Saudi Arabia Monastery Authority (SAMA), Ministry of Housing, General Authority for Statistics (GAS), and Real Estate Development Fund (REDF) for the period of 1987 to 2016. We used the econometric models inspired by the literature such as Campbell and Cocco (2007), Kung (2014), and Lebe and Yusuf (2014).

The number (quantities) of houses was taken as dependent variables and these variables as shown in Figure 1 represent the housing demand (LQH). The explanatory variables used were Real Income Level Per Capita (I), Housing Prices (HP), Consumer Price Index (CPI), Loans Demand (free interest rate loans) Paid for Financing Houses (LD) and Population Growth Rates (PopG).

This paper's model is inspired by several contributions from the literature, especially the work of Campbell and Cocco (2007), Kung (2014), and Lebe and Yusuf (2014). Applications were

Figure 1: Housing demand variables



Source: General authority for statistics (GAS) 2016

calculated by using the latest version of the E-views software program. The model we used for this study is stated in Equation 1:

$$QH_t = \beta_0 + \beta_1 HP_t + \beta_2 I_t + \beta_3 CPI_t + \beta_4 LD_t + \beta_5 PopG_t + \epsilon_t \quad (1)$$

Where t = 1987, ..., 2016.

In this model, logarithms of the variables were taken. And the capital L represents the logarithms operator.

$$LQH_t = \alpha_0 + \alpha_1 LHP_t + \alpha_2 LI_t + \alpha_3 LCPI_t + \alpha_4 LLD_t + \alpha_5 LPopG_t + \mu_t \quad (2)$$

Consequently, α s are the coefficients and give us the elasticity of the variables and “ μ ” means the error term. Hypothetically, it is expected that there will be a negative relationship between price and demand and a positive relationship between income, demand for loans, CPI, and population growth rate on the demand for housing.

4. ANALYSIS OF ESTIMATIONS AND RESULTS

First, the stationary properties of the series were checked and the unit-root test of the variables used in the regression was conducted. The t-statistics and P-values on data level and first difference of each series in the logged terms were used. When the unit root test results were taken into account, it could be said that all series are stationary at level I(0) with constant and trend. However, augmented Dickey-Fuller (ADF) test (Dickey and Fuller, 1981) has been used in order to establish the order of integration of the variables in different forms, as shown in Equations below.

$$\Delta Y = \alpha_1 + \alpha_2 \Delta Y_{2-t} + \lambda_{t-1} + \mu \quad (1) \text{ Intercept (constant) only}$$

$$\Delta Y = \alpha_1 + \alpha_{2-t} + \alpha_3 \Delta Y_{2-t} + \lambda_{t-1} + \mu \quad (2) \text{ Trend and intercept (constant)}$$

$$\Delta Y = \Delta Y_{2-t} + \lambda_{t-1} + \mu \quad (3) \text{ No trend and no intercept (constant)}$$

4.1. Unit Root and Stationarity

According to test results, all series are stationary at the level. All series are stationary after taking the first difference but unit root tests can be calculated on the first difference with constant and trend because of short time series.

With the help of ADF test statistics at level, we gather enough evidence to conclude the trend of the null hypothesis and its alternative hypothesis as follows:

- H_0 (Null hypothesis): There is no significant relationship between the quantity of housing demanded and selected economic and demographic factors in Saudi Arabia.
- H_1 (Alternative hypothesis): There is a significant relationship between the quantity of housing demanded and selected economic and demographic factors in Saudi Arabia.

Based on stationarity analysis in Table 1, the results show that we cannot reject the null hypothesis of unit roots for all variables in level form. However, the null hypothesis is rejected when the ADF test is applied to the first differences of LQH, LPH, and LLD.

4.2. Granger Causality Test

Testing Granger causality typically uses the same lags for all variables. However, when two variables are co-integrated then Granger causality exists in at least one direction. The results of Granger causality test due to Granger (1969) procedure are demonstrated in Table 2 and can be summarized as follows. There is no bidirectional relationship between the different variables except in the case of the relationship between the lag of consumer price index and the lag of quantity of houses where Granger

casualty test shows bidirectional relationship. Based on Table 2, the low F-value of 0.0078 is statistically insignificant at 1% level of probability. Consequently, the null hypothesis that income *LI* not “Granger cause” *LQH* is accepted. However, the null hypothesis that *LQH* does not “Granger cause” is rejected as F-value of 2.937 Hence, the Granger causality test confirms a unidirectional causality from *LQH* to *LI*. Similarly, the null hypothesis that *LCPI* not “Granger cause” *LQH* is rejected where F-value of 5.397 is statistically significant at 1% level of probability. However, the null hypothesis that *LQH* does not “Granger cause” *LCPI* is rejected too as judged by the high F-value of 10.346. In this case, the Granger causality test confirms a bidirectional causality from *LQH* to *LCPI*. Similarly, the null hypothesis that does *LLD* not “Granger cause” *LQH* is rejected where F-value of 3.338 is statistically significant at 1% level of probability. Though, the null hypothesis that *LLD* does not “Granger cause” *LQH* is accepted as judged by the low F-value of 1.853.

In this case, the Granger causality test confirms a unidirectional causality from *LQH* to *LLD*. Finally, the null hypothesis that

LPOPG does not “Granger cause” *LQH* is accepted where F-value of 0.3195. However, the null hypothesis that *LQH* does not “Granger cause” *LPOPG* is rejected as judged by F-value of 3.90734. In this case, the Granger causality test confirms a unidirectional causality from *LQH* to *LPOPG*. Overall, the Granger causality test results confirm that the quantity of housing demanded has an important positive impact on selected economic and demographical factors in Saudi Arabia.

4.3. Estimation of Statistical Results (OLS Result)

As shown in Table 3, the statistical significance of the estimated parameters can be shown by the correlation coefficient of the estimated parameter. The F-statistics test, the Durbin- Watson statistic, the adjusted R-square (R^2) value for this model is very high and is pegged at 0.99 which suggests that Price of Housing (*PH*), Real GDP per capita (*I*), Loans Demand (*LD*), Population Growth Rate (*PopG*), and consumer price index (*CPI*) explained about 99% systemic variations on the housing quantity demanded. Only 1 % could be attributed to some other variables affecting the housing quantity demanded outside the model.

However, the coefficients of housing prices (*PH*) were found to be statistically low but significant and the positive signs are inconsistent with economic theory that suggests that rising house prices would result in a decrease in the quantity of housing demanded. In this result, coefficients of housing prices (*PH*) show that there are positive relationships between housing prices and demand. However, our findings are consistent with Campbell and Cocco’s (2007) findings.

A positive relationship may exist if rising house prices increase the perceived wealth of households, or lead to relaxed borrowing

Table 1: Unit root-ADF test

Variable	Level	1 st difference	I (1)
<i>LQH</i>	0.475135	-4.091126	I (1)*
<i>LPopG</i>	0.122384	-3.556651	I (1)**
<i>LCPI</i>	0.598768	-2.588233	I (1)***
<i>LPH</i>	-1.034377	-5.91547	I (1)*
<i>LI</i>	0.717125	3.066354	I (1)**
<i>LLD</i>	-1.79923	-5.437027	I (1)*

*, ** and *** denote significance at Level and 1st difference

Table 2: Granger causality results

Null hypothesis	Obs.	F-Statistic	Prob	Causality directions
<i>LI</i> dose not granger cause <i>LQH</i>	28	0.0078	0.9922	
<i>LQH</i> dose not granger cause <i>LI</i>		2.9373	0.0731	Unidirectional
<i>LCPI</i> dose not granger cause <i>LQH</i>	28	5.39734	0.012	
<i>LQH</i> dose not granger cause <i>LCPI</i>		10.3469	0.0006	Bidirectional
<i>LLD</i> dose not granger cause <i>LQH</i>	28	3.33839	0.0533	
<i>LQH</i> dose not granger cause <i>LLD</i>		1.85351	0.1793	Unidirectional
<i>LPOPG</i> dose not granger cause <i>LQH</i>	28	0.31906	0.73	
<i>LQH</i> dose not granger cause <i>LPOPG</i>		3.90734	0.0346	Unidirectional

LI, LQH, LCPI, LLD, LPopG denotes to lag of income, lag of housing quantities, lag of consumer price index, lag od loans and lag of population growth, respectively

Table 3: The estimation of statistical significance of the parameter

Dependent variable: LQH				
Method: Least squares				
Date:07/08/17		Time:12:07		
Sample:1987 2016				
Included Observations: 30				
Variable	Coefficient	Std. error	t-statistic	Prob.
C	10.80978	1.714244	6.305850	0.0000
LPH	0.021612	0.086019	0.251250	0.8038
LI	0.227684	0.127123	1.791053	0.0859
LCPI	1.269246	1.24189	10.22027	0.0000
LPOPG	0.194053	0.034783	5.578969	0.0000
LLD	0.062858	0.007698	8.165639	0.0000
R-squared	0.992444	Mean dependent var.	14.76823	
Adjusted R-squared	0.990870	S. D. dependent var.	0.337086	
S.E. of regression	0.032209	Akaike info criterion	-3.856307	
Squared resid	0.024898	Schwarz criterion	-3.576067	
Log Likelihood	63.84460	Hannan-Quinn criter.	-3.766656	
F-statistic	630.4771	Durbin-Watson stat.	2.560197	
Prob (F-statistic)	0.00000			

constraints. Our findings are consistent with those of Kung (2014), who studied the effects of the local credit increases implemented as part of the Economic Stimulus Act 2008. He finds substantial positive effect on the price of homes in Los Angeles and San Francisco that were most likely financed through a mortgage affected by this policy change.

4.4. Elasticities Behavior

Based on the model equation adopted below, we can observe the differences between elasticity values.

$$LQH_t = \alpha_0 + \alpha_1 LHP_t + \alpha_2 LI_t + \alpha_3 LCPI_t + \alpha_4 LLD_t + \alpha_5 LPopG_t + \mu_t \quad (2)$$

$$LQH = 10.80978 + 0.021612LPH + 1.269246LCPI + 0.227684LI + 0.194053LPOPG + 0.062858LLD \quad (3)$$

Theoretically, it is expected that there will be negative relationships between price and housing demand and positive relationships between income and population and the housing demand. However, some of our findings surprised us and we found that they inconsistent with other findings.

4.4.1. Price elasticity of housing demand

$$\frac{dLPH}{dQH} = 0.0216$$

The implied elasticity of housing demand with respect to house prices is 0.0216, which is positive and not consistent with demand behavior in a typical market. In particular, it was shown that house prices adjust positively in response to excess demand for housing. However, as we document above, this value is large enough to generate a positive elasticity of house prices after a spike in housing demand. The positive price elasticity of housing demand was also reported by Fontenla et al. (2009). They found a positive price elasticity of 0.3, which is considerably below the elasticities reported in the literature. Similarly, our results are consistent with Dusansky and Koç's (2007) findings. They developed an econometric analysis of housing demand using data from Florida and they concluded that an increase in housing prices increased the demand for owner-occupied housing services. Campbell and Cocco (2007) reported similar findings stating that a positive relationship may exist if rising home prices increase the perceived wealth of households or lead to relaxed borrowing constraints. Housing has a dual role as a real asset and a necessary outlay, therefore, an increase in house prices redistributes wealth within the housing sector rather than boost net aggregate wealth. Rather, the importance of housing stems from its role as collateral. Specifically, increases in house prices raise the value of the collateral available to households, loosens borrowing constraints, and supports spending. The Real Estate Development Fund (REDF) was set up to extend interest-free credit to individuals. This type of housing finance encouraged citizens of Saudi Arabia to increase their demand for housing during a period of price fluctuation. The private sector has also participated in developing private housing. Although, subsidy reform is essential to turn the economy into a more efficient and productive country.

4.4.2. Income elasticity of housing demand

$$\frac{dLI}{dLQH} = 0.228$$

Income is predicted to be positively related to housing demand. An increase in income leads to an increase in demand for housing. However, the literature concerning the relationship between income and housing demand tends to focus on the elasticity of the demand for housing rather than the assumption of a positive correlation between income and housing demand. Based on our findings, the elasticity of housing demand with respect to income is 0.228. This means that the income coefficient is statistically significant, has a positive sign, and the coefficient is smaller than 1. A 1% rise in the household income will result in a 0.23% increase in the demand for housing which shows housing demand is income inelastic. In other words, housing is a luxury good for the people of Saudi Arabia and housing demand is insensitive to changes in income level. From these findings, it can be said that expected positive shocks in the GDP per capita will cause a boom that affect the construction industry and spill over into the Saudi economy. This finding concurs with several previous findings notably those reported by Ihlanfeldt (1982) Poterba (1991), Moriizumi (1993), Englund and Ioannides (1997), Muellbauer and Murphy (1997), Malpezzi (1999) and Sutton (2002) who reported positive and inelastic income elasticity estimates for housing in Japan. Our findings are also consistent with those of Follain (1979) in a paper that used MSA data and reported positive and inelasticity of income with respect to housing demand. Our results mirror the findings of several papers that document positive effects on consumption from changes in housing wealth such as Case et al. (2005), Quigley (2006) and Campbell and Cocco (2007). In addition, low-income elasticity also reflects an underdeveloped mortgage in the real estate market of Saudi Arabia in the last two decades of the last century because households cannot translate positive income changes into new or better housing conditions due to a lack of credit.

4.4.3. Population elasticity of housing demand

$$\frac{dLPopG}{dQH} = 0.1941$$

The population growth rate affects housing demand positively and significantly as expected. Consequently, a 1% increase in population is associated with about a 0.19% rise in demand for houses. Even though the size of the families may have an impact on the number of housing units in the kingdom, this result seems to be reasonable. The results indicate that growth in population could increase demand for housing in Saudi Arabia. Additional demand comes from foreigners, particularly in the highly populated cities such as Riyadh, Jeddah, Makkah, and Dammam. The location and public transport systems represent another challenge for affordable housing. Most projects are usually built outside the boundaries of the city where land is cheaper and these places lack adequate public services. The absence of these services deters residents from moving to these new residential areas.

5. CONCLUSION

In the last three decades, the housing market in Saudi Arabia is witnessing a huge demand for the acquisition of housing units.

The main findings from this estimation suggest that the most significant factors determining housing demand in Saudi Arabia are population growth rate, CPI, and demand for housing loans. This paper presents evidence of a positive correlation between housing prices and the quantity of housing demanded in Saudi Arabia. Also, our findings identify that changes in income affect housing demand. The results show a positive effect of population on demand for housing which shows that an increase in population could increase demand for housing. This finding concurs with several previous findings notably those reported by Moriizumi (1993), who reported positive and income inelasticity estimates for rental houses in Japan.

For a sustainable housing policy and stable housing demand, the decision-makers in Saudi Arabia should continue to provide business incentives and develop economic policies to aid both the public and non-public housing funds and institutions so that they would stimulate successive investment in both the housing and construction sector.

REFERENCES

- Ahmad, S., Choi, M.J., Ko, J. (2013), Quantitative and qualitative demand for slum and non-slum housing in Delhi: Empirical evidences from household data. *Habitat International*, 38, 90-99.
- Attanasio, O.P., Bottazi, R., Low, H.W., Nesheim, L., Wakefield, M. (2012), Modelling the demand for housing over the life cycle. *Review of Economic Dynamics*, 15(1), 1-18.
- Bekmez, S., Aslı, O. (2013), Determinants of housing demand in Turkey: A dynamic analysis. *TISK Academy*, 8(16), 170-187.
- Campbell, J.Y., Cocco, J.F. (2007), How do house prices affect consumption? Evidence from micro data. *Journal of monetary Economics*, 54(3), 591-621.
- Case, K.E., Quigley, J.M., Shiller, R.J. (2005), Comparing wealth effects: The stock market versus the housing market. *Advances in Microeconomics*, 5(1), 1-32.
- Ceron, J.A., Suarez, J. (2006), Hot and Cold Housing Markets: International Evidence. England: CEPR Discussion Paper No. 5411.
- Coşkun, Y. (2010), An analysis of the strengths and weaknesses of the Turkish real estate market. MPRA Paper No.28361. Germany: University Library of Munich.
- De Leeuw, F. (1971), The demand for housing: A review of cross-section evidence. *The Review of Economics and Statistics*, 53(1), 1-10.
- Durkaya, M., Rahmi, Y. (2004), Demand-side analysis of the housing market in Turkey. *Iktisat İşletme ve Finans*, 19(217), 75-83.
- Dusansky, R., Koç, Ç. (2007), The capital gains effect in the demand for housing. *Journal of Urban Economics*, 61(2), 287-298.
- Earley, F. (1996), Leap-frogging in the UK housing market. *Housing Finance*, 32, 7-15.
- Englund, P., Ioannides, Y.M. (1997), House price dynamics: An international empirical perspective. *Journal of Housing Economics*, 6(2), 119-136.
- Ermisch, J.F., Findlay, J., Gibb, K. (1996), The price elasticity of housing demand in Britain: Issues of sample selection. *Journal of Housing Economics*, 5(1), 64-86.
- Feldstein, M., Summers, L. (1978), Inflation, tax rules, and the long-term interest rate. *Brookings Papers on Economic Activity*, 1, 61-109.
- Follain, J., Gill-Chin, L., Bertrand, R. (1980), The demand for housing in developing countries: The case of Korea. *Journal of Urban Economics*, 7(3), 315-336.
- Follain, J.R. Jr. (1979), A study of the demand for housing by low versus high income households. *The Journal of Financial and Quantitative Analysis*, 1(4), 769-782.
- Fontenla, M., González, F., Navarro, J.C. (2009), Determinants of housing expenditure in Mexico. *Applied Economics Letters*, 16(17), 1731-1734.
- Fulpen, H.V. (1988), An analysis of the housing market in the Netherlands. *Urban Studies*, 25(3), 190-203.
- Goodman, A.C. (2002), Estimating equilibrium housing demand for "stayers." *Journal of Urban Economics*, 51(1), 1-24.
- Goodman, A.C. (2003), Following a panel of stayers: Length of stay, tenure choice, and housing demand. *Journal of Housing Economics*, 12(2), 106-133.
- Goodwin, T.H. (1986), Inflation, risk, taxes, and the demand for owner-occupied housing. *Review of Economics and Statistics*, 68(2), 197-206.
- Granger, C.W.J. (1969), Investigating causal relations by econometric models and cross-spectral methods. *Econometrica*, 36(1), 424-438.
- Grebler, L., Blank, D., Winnick, L. (1956), *Capital Formation in Residential Real Estate, Trends and Prospects*. United States: Princeton University Press.
- Halicioglu, F. (2007), The demand for new housing in Turkey: An application of ARDL model. *Global Business and Economics Review*, 9(1), 62-74.
- Hwang, M., Quigley, J. (2006), Economic fundamentals in local housing markets: Evidence from US metropolitan regions. *Journal of Regional Science*, 46(3), 425-453.
- Ihlanfeld, K.R. (1982), Income elasticities of demand for rental housing: Additional evidence. *Urban Studies*, 19(1), 65-69.
- Kasparova, D., White, M. (2001), The responsiveness of house prices to macroeconomic forces: A cross-country comparison. *European Journal of Housing Policy*, 1(3), 385-416.
- Kearl, J.R. (1979), Inflation, mortgage, and housing. *The Journal of Political Economy*, 87(5), 1115-1138.
- Kennedy, N., Andersen, P. (1994), *Household Saving and Real House Prices: An International Perspective*. Basel, Switzerland: Bank for International Settlements Working Paper, No. 21.
- Kenny, G. (1999), Modelling the demand and supply sides of the housing market: Evidence from Ireland. *Economic Modelling*, 16(3), 389-409.
- KSA Residential Market Review. (2016), *The KSA Real Estate Market. JLL Research Report. Mid-year Review*. Saudi Arabia: KSA Residential Market Review.
- Kung, E. (2014), *The Effect of Credit Availability on House Prices: Evidence from the Economic Stimulus Act of 2008*. California: Working Paper, UCLA.
- Lamont, O., Stein, J.C. (1999), Leverage and house-price dynamics in U.S. Cities. *RAND Journal of Economics*, 30(3), 498-514.
- Lebe, F., Yusuf, E.A. (2014), Analysis of housing demand in Turkey: 1970-2011. *Atatürk University Journal Economics and Administrative Sciences*, 28(1), 57-83.
- Malpezzi, S. (1999), A simple error correction model of house prices. *Journal of Housing Economics*, 8(1), 27-62.
- Malpezzi, S., Mayo, S.K. (1987a), User cost and housing tenure in developing countries. *Journal of Development Economics*, 25(1), 197-220.
- Malpezzi, S., Mayo, S.K. (1987b), The demand for housing in developing countries: Empirical estimates from household data. *Economic Development and Cultural Change*, 35(4), 687-721.
- Marcin, C., Kokus, J. (1975), Economic and demographic factors affecting housing demand into the 1980s and 1990s. *American Real Estate and Urban Economics Association Journal*, 3(3), 81-93.
- Mayer, C.J. (1993), Taxes, Income, Distribution, and the Real Estate Cycle: Why all Houses do Not Appreciate at the Same Rate. Massachusetts: New England Economic Review, Federal Reserve Bank of Boston. p39-50.

- Mayo, S.K. (1981), Theory and estimation in the economics of housing demand. *Journal of Urban Economics*, 10(1), 95-116.
- Miles, D., Steven, A. (1997), *The Merrill Lynch Model of the UK Housing Market*. New York: Financials Research, Global Fundamental Equity Research Department, Merrill Lynch.
- Moriizumi, Y. (1993), Tenure choice and the demand for rental housing in Japan. *The Nomic Studies Quarterly*, 38(1), 21-35.
- Muellbauer, J., Murphy, A. (1997), Booms and busts in the UK housing market. *The Economic Journal*, 107, 1701-1727.
- Muth, R. (1960), The demand for non-farm housing. In: Harberger, A., edirtor. *The Demand for Durable Goods*. United States: University of Chicago Press. p112-114.
- Ng, S.T., Skitmore, M., Wong, K.F. (2008), Using genetic algorithms and linear regression analysis for private housing demand forecast. *Building and Environment*, 43(6), 1171-1184.
- OECD. (2011), *Housing and the Economy: Policies for Renovation in Economic Policy Reforms*. Ch. 4. France: OECD.
- Poole, W. (2003), Housing in the macroeconomy, Federal Reserve Bank of St Louis. *Economic Review*, 85(3), 1-8.
- Poterba, J.N. (1991), House price dynamics: The role of tax policy and demography. *Brookings Papers on Economic Activity*, 22(2), 143-203.
- Quigley, J.M. (2006), *Housing policy in the United States*, Program on Housing and Urban Policy. New York: The New School, Working Paper No. W06-001.
- Rapaport, C. (1997), Housing demand and community choice: An empirical analysis. *Journal of Urban Economics*, 42(2), 243-260.
- Sheppard, S. (1999), Hedonic analysis of housing markets: Applied urban economics. In: Cheshire, P., Mills, E., Editors. *Handbook of Regional and Urban Economics*. Netherlands: Elsevier. p1595-1635.
- Shiller, R. (2007), *Understanding Recent Trends in House Prices and Home Ownership*. United States: NBER Working Paper No. 13553.
- Smith, B.A., Tesarek, W.P. (1991), House prices and regional real estate cycles: Market adjustments in Houston. *AREUEA Journal*, 19(3), 396-416.
- Sutton, G. (2002), Explaining Changes in House Prices. *BIS Quarterly Review*. Available from: <http://www.bis.org>.
- Tiwari, P., Parikh, K., Parikh, J. (1999), Effective housing demand in Mumbai Metropolitan region. *Urban Studies*, 36(10), 1783-1809.
- Tsai, I. (2013), Housing affordability, self-occupancy housing demand and housing price dynamics. *Habitat International*, 40(3), 73-81.
- Watson, E. (2013), A Closer Look at Some of the Supply and Demand Factors Influencing Residential Property Markets. New Zealand: Reserve Bank of New Zealand Analytical Notes, AN.
- World Bank. (2009), *Doing Business 2009, Equal Opportunity for All*. Washington, DC: World Bank Group.
- Zabel, J.E. (2004), The demand for housing services. *Journal of Housing Economics*, 13(1), 16-35.