

The Impact of Unemployment on Housing Price Index: Evidence from Saudi Arabia:

A VAR Approach

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ABSTRACT

The causality link between house prices and the rate of unemployment presents an attractive area for research as the two variables are key macroeconomic indicators for any economy. This paper intends to investigate how the house price index (HPI) is varying under the impact of Unemployment (UNEMP) in Saudi Arabia. Quarterly secondary data for a period of six years extending from 2014Q1 – 2019Q4 was compiled from the publications of Saudi Arabian Monetary Agency (SAMA). The paper employs the VAR model. Granger causality tests, variance decomposition, and impulse response functions are also used. The results reveal that UNEMP has an insignificant negative relationship on housing prices in KSA. Results also reveals a two-way Granger causality between (UNEMP) and (HPI). Variance decomposition exhibits that (UNEMP) is taking a low explanatory power over the variations of house price index both in the short and long run. The results have deep implications for future studies of other macroeconomic factors affecting housing prices. Originality/value: There are a limited number of studies that have investigated the causality link between house prices and unemployment. Given the increased importance of labor market variables, it is important to better understand the causal linkages between house prices and unemployment.

Key words: *house price index, unemployment, VAR, Saudi.*

JEL Classification: R10 R21 F23.

1Introduction

Housing is remarkably crucial for all people, everywhere and at every time. In addition, the housing importance for the mass of households incorporates the largest volume of their wealth. It approximately constitutes almost one quarter of their disposable income (Muellbauer and Murphy, 1997). Besides, changes in housing prices turn to have an influence on economic activities through changes in house behavior types (Case, B. J., et al., 2004). Furthermore, housing prices perform a vital role in firms working in the

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financial market. Thus, house prices shape the portfolio of many other companies associated with the real estate activities (Panos, P., et al., 2009). Thus, a need appears to study and judge whether unemployment affect the housing prices in the Saudi economy.

The association between house prices and the rate of unemployment presents an attractive area for research as the two variables are key macroeconomic indicators for the whole economy. This research is mainly pertinent as the great collapse caused by the latest financial crisis in 2007 followed a long housing boom, and high unemployment rates across the globe.

Yet, this paper aims to study the problem further. It attempts to investigate the relationship between unemployment and housing price index. It is particularly interested in investigating whether or not unemployment affects housing prices in Saudi using a Vector Autoregression model (VAR). Granger causality test, impulse response functions, and variance decompositions are employed to analyze this association. It is against this backdrop that this paper attempts to answer the question: Does unemployment have any link with housing prices in Saudi economy? The paper also intends to address the hypothesis of: H_0 : Housing price index and unemployment rate have no important association.

The paper drives its significance that issues related to housing prices in Saudi Arabia has not been systematically and deeply studied and investigated. This paper, therefore, tries to fill in this gap. Moreover, it is expected that results will add to the body of knowledge in existence in the real estate sector and provide a good foundation for future research in the field.

The body of the paper consists of four sections. Section 1 presents an introduction. Section 2 provides theoretical background and literature review. Section 3 discusses data, method, and the empirical model followed by section 4 of analysis and empirical results. A conclusion closes.

2 Theoretical Background and Literature Review

2.1 Theoretical Background

2.1.1 Relationship between Housing Prices and Unemployment

This section provides theoretical survey and analysis of both unemployment and house price models of the related research and studies. For instance, Meen (2001), use the rate of unemployment as a simple indicator of labour market risk. With the risk of unemployment reducing the motivation of employed households to get credits thus reducing house prices (Reilly and Witt, 1993). This particularly affects households with unstable incomes, who will not buy houses due to possible losses in the future and it also decreases the availability of loans (Gathergood, 2011). Thus, as homeownership rates have a positive relationship with house prices, the risk of becoming unemployed surges income uncertainty and thus decreases house prices.

Reilly and Witt (1993) asserted the theory that high levels of unemployment may also help to reduce real wage growth, with obvious consequences for house prices. This theory is a reason for including unemployment as a variable. This may not be the case, however, as Cameron and Muellbauer (2001) theorize that high wages might compensate for high unemployment or high house prices in a developed economy. This implies that high unemployment may not dampen real wage growth, therefore the link of unemployment to the house prices would be broken.

Lags between changes in house price and the component variables of demand (such as unemployment) are a common feature of the housing market. The house price is normally an important indicator compared with economic output whereas unemployment is a lagging indicator. The presence of these lags means that present unemployment will not affect current house prices but, rather, future house prices. Thus, lags are particularly important because the housing market is cyclical, with movements related to the business cycle. Tsang and Edelstein's (2007) research indicated that employment growth and unexpected unemployment growth, had an impact on housing markets.

The causes for the association between house prices and unemployment could include that both shifts in unemployment and house prices are affected by the divergences of the economy from its long-term potential output. Thus, the relationship between them is from an indirect or an implicit effect, and basically

a signal of economic conditions. A further direct effect for the relationship would be higher unemployment causing more bank repossessions which would

increase the market supply of housing. Thus, reducing the average price of housing. The genuine relationship between house prices and unemployment is expected to be a combination between the direct and indirect relationships. As housing is an asset with a complex relationship with the macro economy. For example, if house prices dropped caused by unemployment, building new housing becomes less commercial. Thus, decreasing supplier activity would response via the construction industry producing high unemployment.

built spatially granular dataset of 1.4 million housing prices and FDI employment, covering Ireland 2007-2013. The main results show that 1-2 years after 1,000

2.1.2 Saudi House Price Index

House Price Index ("HPI") for the Kingdom of Saudi Arabia has been published recently by the Saudi Credit Bureau (SIMAH). It was built from a sample of over 40,000 property records supplied by some of the Kingdom's leading mortgage providers, measures changes in residential property prices quarter on quarter, from a base point of 100 set in Quarter 1, 2013. The HPI was built using a technique called Hedonic Regression, the same statistical technique employed by some of the major House Price Indices in other countries, such as the UK, Australia and the US. The objective of HPI is to control the changes of housing prices on timely basis. In addition, HPI is also helpful in creating the economic national policy for the property development.

2.2 Literature Review

Manuchehr I. (2019) examined whether there exists a long-run causal relationship between house prices and unemployment rates for eight major European countries. The study used the bootstrap panel Granger causality approach. The empirical findings support the presence of unidirectional causality running from house prices to unemployment.

Wang, J. et al (2018) intended to explore principal drivers affecting prices in the Australian housing market, to detect the presence of housing bubbles within it. The paper employed ordinary least square (OLS), Granger causality and the Vector Error Correction Model (VECM) framework. The empirical results reveal that Australian house prices are driven primarily by four key factors: mortgage interest rates, consumer sentiment, the Australian S&P/ASX 200 stock market index and unemployment rates. It finds that these four key drivers have long-term equilibrium in relation to house prices, and any short-term disequilibrium always self-corrects over the long term

Kerri, A. & Ronan, C. Lyonsb (2018) presents the first causal estimates of employment changes on housing prices, both sales and rental. The paper used a purpose-

extra jobs have been created, monthly rents in nearby properties will be between 0.5% and 1% higher. The effect on prices is at least 2% but less consistent across specifications.

Peter, G. et al (2015) conducted a quantitative assessment of the macroeconomic effects of a considerable decline in housing prices using a Bayesian VAR model in Sweden. Results show that a 20 per cent drop in housing prices would lead to a recession-like impact on household consumption and unemployment. The impact would be even greater if falling housing prices coincided with a global economic downturn. Julius (2012) studied the effect of interest rates, level of money supply, rate of inflation, employment rate and population growth affected house prices in Nairobi. Using secondary data, a multivariate regression was used to estimate the relationships. The study revealed that employment growth and the level of money supply have their clear effect upon real estate market and its influence on real estate prices. An increase in interest rates reduces residential real estate prices.

Jen-Shi Ni, et al (2011) tested the relation between interest rate and unemployment rate variables with house market index in US. The paper employed VAR model including variables, housing market index, unemployment rate, consumer confidence index, the Dow Jones industrial index, and FED interest rate. The paper found the house market index in US will be changed 11.7 due to unemployment rate, 0.49 due to consumer confidence index, -11.04 due to FED interest rate, 0.3% due to Dow Jones industry index, per one-unit change. There are also have long run stable relation between the variables.

Qingyu Zhu (2010) investigated the effect of unemployment on house prices in the UK property market. Using regional UK panel data of a fixed effects panel regression at the national level, the resulting coefficient for unemployment is compared with similar findings from other studies, resulting in unemployment being shown to be statistically significantly negatively related to house prices. Using OLS, no real relationship was found in regional house price sensitivity to unemployment, and how relatively rich or poor a region is.

data from 2014q1-2019q4 collected from the official annual statistics from the governmental authorities. The variables used in the study consist of changes in housing prices index (HPI) and Unemployment (UNEMP).

3 Data, Methodology and the Empirical model

3.1 Sources of Data

The empirical analysis was carried out using quarterly

3.2 Methodology

The paper adopted the VAR approach due to the fact that VARs are capable of dealing with possible endogeneity problems in an adequate way (Dreger and Wolters [2009a]). The VAR model allows the three variables (HPI) and (UNEMP) to influence each other.

Below is the empirical equation:

$$\text{LnHPI}_t = \alpha + \beta_1 \text{LnUEMP}_t + U_t \dots \dots \dots (1)$$

Whereas:

LnHPI t = Logarithm of housing pricing index, proxy of housing prices (dependent).

Ln UEMPt = Logarithm of unemployment (independent).

Ut= the error term.

4 Results & Discussion

4.1 Unit Roots

Variables were tested for unit root stationarity base on Dickey & Fuller (1981). Results related to unit root tests are reported in Table (1). Hypothesis that the variables (HPI and UEMP) contain a unit root could be rejected at the 5% significance level.

4.2 Establishing VAR Model

Variables found integrated of the same order. Thus, it is possible to examine the co-integration among those variables. The paper postulated Vector Autoregression (VAR) model to get a long run relationship. The lag structure of the VARs was five based on the Akaike

$$\begin{aligned} \text{dhpi} = & -0.264964250881 * \text{dhpi} (-1) \\ & 2.00694382134 * \text{duemp} (-1) + 0.471716879135 * \text{dhpi} \\ & (-2) + 4.8463064287 * \text{duemp} (-2) - \\ & 1.05238839405 * \text{dhpi} (-3) - 6.57470417077 * \text{duemp} (- \\ & 3) + 0.703423988543 * \text{dhpi} (-4) - \\ & 5.84449335387 * \text{duemp} (-4) + 221.929913717 \\ & \dots \dots (2) \end{aligned}$$

Table (1)

Unit Root Tests using ADF Tests Statistics

Variables	Levels	1 Difference
HPI	-1.784122	-6.653473*
UEMP	-1.370721	-6.15888*

Note: *represents significance at 5% level

Source: Author's Computation using EViews 11.0 Software

Information Criterion (AIC). For HPI the optimal lag length was 5, for UEMP it was 1.

Table (2)

Method: Least Squares Estimates

Dependent Variable: DHPI				
Sample (adjusted): 2015Q2 2019Q4				
DHPI = C(1)*DHPI(-1) + C(2)*DHPI(-2) + C(3)*DHPI(-3) + C(4)*DHPI(-4) +				
	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.264964	0.291228	-0.909818	0.4144
C(2)	0.471717	0.375609	1.255871	0.2775
C(3)	-1.052388	0.655201	-1.606208	0.1835
C(4)	0.703424	0.499429	1.408456	0.2318
C(5)	-2.006944	5.443096	-0.368714	0.7310
C(6)	4.846306	8.039258	0.602830	0.5791
C(7)	-6.574704	7.491806	-0.877586	0.4297
C(8)	-5.844493	5.307843	-1.101105	0.3327
C(9)	221.9299	55.28099	4.014579	0.0159
R-squared	0.972747			
Adjusted R-squared	0.918242			
F-statistic	17.84694			
Prob(F-statistic)	0.007030			
Durbin-Watson stat	1.760795			

Source: Author's Computation using EViews 11.0 Software

Equations (2) and Tables (2) indicate the relationship

between housing prices and UEMP in Saudi Arabia. Firstly, the price of commodity housing is a very crucial factor to determine housing demand. If prices are too high, the effective demand will decrease; otherwise, effective demand will increase. Secondly, unemployment affects the demand side of housing prices. Thirdly, the result shows that there is a negative insignificant relationship between housing prices and UEMP in both short-term and long-term. The signs of the coefficients are in line with the previous literature (. Abelson, P., Joyeux, R., Milunovich, G., & Chung, D. (2005), Dias-Serro (2005), Qingyu, Zhu (2010) and Turnbull et. al. (1982). This implies that the coefficients of unemployment are vital to house prices.

house prices on UNEMP matters, changes in house prices will also cause changes in UNEMP. Thus, UNEMP used in the model can serve as a proxy for a macroeconomic policy instrument. This is in line with the findings of Manuchehr, I. (2019).

4.3 Granger Causality

The paper utilized Granger causality test to check the causal relationship. Table (3) shows the results of the Granger causality test in the VAR model. Data reflects a two-way Granger causality between (UNEMP) and House Price Index (HPI). UNEMP can cause House Price Index to change, and the effect is obvious. The change of UNEMP is more reflected in the change in housing prices index since the p-value of UNEMP is 0.000 which is less than 5%. As far as the impact of

Table (3)

VAR Granger Causality

Sample: 2014Q1 2019Q4			
Included observations: 13			
Dependent variable: DHPI			
Excluded	Chi-sq	df	Prob.
DUEMP	31.04841	4	0.0000
All	31.04841	4	0.0000
Dependent variable: DUEMP			
Excluded	Chi-sq	df	Prob.
DHPI	96.26337	4	0.0000
All	96.26337	4	0.0000

Source: Author's Computation using EViews 11.0 Software

4.4 Test of Source of Volatility

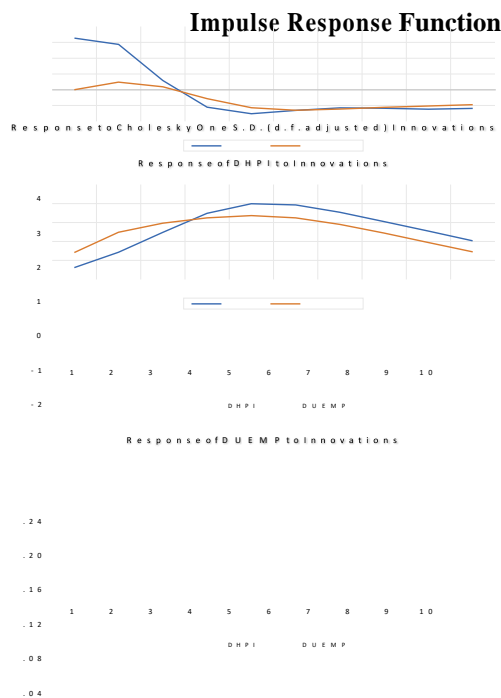
In order to provide further insight into on the relationships of house price and its determinants, the variance decomposition and impulse response function are calculated. These two approaches give an indication of the dynamic properties of the system and allow us to evaluate the relative importance of the variables beyond of the sample period.

4.4.1 Impulse Response Function

The impulse response functions assess the dynamic behavior of the model. It examines the response of the

housing price to a one standard deviation innovation of (UNEMP). For a period of 24 quarters aftershocks to the other variables using VAR. Figure 1 reflects decomposition analysis. The blue line depicts the movement of the housing price. The yellow dash line represents the confidence interval with two standard deviations. Figure 1, reflects that a positive shock to the UNEMP can cause the housing prices to decline. But the initial decline is not significant. The decline of the housing prices become significant after the 6th period. With a remarkable change in until Phase 10. The analysis ensures that the external environment exerts a certain impact on UNEMP. The effect will pass through the market to the housing price and bring it a shock in the direct direction. It has a long-term effect on housing prices. The housing prices has a slight response to a shock on UNEMP throughout the entire 24 periods. Thus, results of the impulse function demonstrated the UNEMP effects on house prices.

Fig (1)



Source: Author's Computation using EViews 11.0 Software

4.4.2 Variance Decomposition

This section determines the degree of importance of the unemployment. How does it influence housing

Table (4)

Variance Decomposition

Variance Decomposition of			
Period	S.E.	DHPI	DUEMP
1	1.536213	100.0000	0.0000
2	1.591348	99.91399	0.086007
3	1.825698	99.77663	0.223372
4	2.917679	99.77346	0.226539
5	4.183545	99.79401	0.205990
6	5.602720	99.40727	0.592728
7	8.238177	99.72014	0.279864
8	12.42761	99.78942	0.210578
9	17.77169	99.87701	0.122986
10	26.51373	99.83072	0.169275

Source: Author's

Computation using EViews 11.0 Software

4.5 Post Estimates Checks

4.5.1 Serial Correlation

The probability of the observed R- squared is less than 0.05, and is unsatisfactory, and so the null hypothesis

Breusch-Godfrey Serial Correlation LM Test:			
Null hypothesis: No serial correlation at up to 2 lags			
F-statistic	3.343310	Prob. F(2,10)	0.0773
Obs*R-	6.812196	Prob. Chi-Square(2)	0.0332

of absence of serially correlated residuals (i.e. autocorrelation) is rejected, as reflected in Table (5).

Table (5)

Serial Correlation Test

prices beyond the sample period? It is possible to decompose the total variance of housing prices in each of the future periods. Then determine how much unemployment explains. Table (4) shows the outcome of the variance decomposition for the period of 24 quarters. In the short run, the (UNEMP) cannot explain more than 0.6% of the forecast error variance of the housing price. This implies that (UEMP) has a strong exogeneity in both short-run and long-run. As shown in Table (4), in the longer horizon, 99.8% of the

variation in HPI is due to its own shocks. The rest goes to the UNEMP. This reveals that HPI has a strong influence itself, almost 100% explaining itself (a strong endogeneity in itself).

Source: Author's Computation using EViews 11.0 Software

4.5.2 Heteroskedasticity: The probability of the observed R-squared is greater than 0.05, and is satisfactory, and so the null hypothesis of absence of Homoskedasticity is not rejected as shown in Table (6).

Table (6)

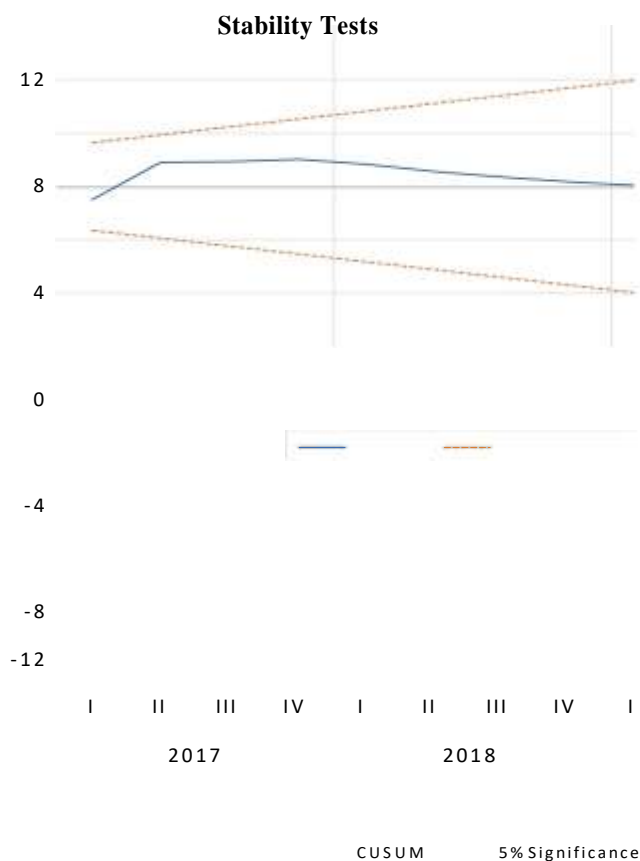
Heteroskedasticity

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
Null hypothesis: Homoskedasticity			
F-statistic	3.963696	Prob. F(4,12)	0.0282
Obs*R-squared	9.676303	Prob. Chi-Square(4)	0.0462
Scaled explained	5.583540	Prob. Chi-Square(4)	0.2325

Source: Author's Computation using EViews 11.0 Software

4.5.3 Stability Tests: The long-term coefficient stability is tested by the short-term dynamics. Once the ECM model is estimated, testing the cumulative sum of the recursive residuals (CUSUM) is applied to assess the stability of the parameters in the long-run. The plot of CUSUM lie within critical bounds at 5% significant level, which leads to acknowledge that our model specification of regression is stable and correct as shown in Figures (2).

Fig. (2)



Source: Author's Computation using

EViews 11.0 Software

5 Conclusion and recommendations

This paper examines the relationship between unemployment and housing prices. The paper utilized

Limitation of the Study: One obvious limitation of this study would be the number of observations used in the models. It has slightly inadequate number of observations due to limited secondary data that can be obtained in this study. The study as far as this paper concerns just cover quarterly data ranging from 2014q1 to 2019q4.

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the VAR model in which Granger causality, response functions, and variance decomposition are also used. The findings and contributions of this paper have both academic and policy implications. They are as follows: **First:** results show that the (UNEMP) has a positive relationship with house prices. Thus, (UNEMP) could be considered as an effective and reliable policy instrument. **Second :** Granger causality test reflects that (UNEMP) Granger cause house market index in KSA. **Third:** the impulse response functions illustrate a positive shock to the UNEMP. they have impacted the housing prices in the long run after the initial shock occurs. Based on those results, the paper

recommends the (UNEMP) as an effective macroeconomic tool. Particularly, in the long-run. The paper calls for future research and studies in the field. Other macroeconomic variables are necessary such as exchange rates.

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