Asset Price Bubbles and Macroeconomic Implications in Nigeria: A Structural VAR Model Approach

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Abstract **-** This paper develops a six-variable Structural Vector Autoregressive Model to analyze the interrelationship between asset price bubble and macroeconomic activities in the Nigerian economy. The model is applied using a quarterly data spanning from 1981:Q1 to 2010:Q4. Real estate price is used as a proxy for the asset price while GDP growth rate, Consumer Price Index, Broad Money Supply, Exchange Rate and Interest rate are used to capture other macroeconomic variables. Results from Impulse Response Function and Variance Decomposition show that GDPgr, CPI and M_2 greatly affect the real estate prices while Intr and Exr have no significant effect on the real estate prices. Also, the empirical results reveal that real estate price has no significant impact on the behaviors of relevant Macroeconomic variables

Keywords **-** *asset price bubble, macroeconomic variables, real estate price, structural VAR, Impulse Response Function, Variance Decomposition.*

I. INTRODUCTION

An economic bubble is the difference between an asset's fundamental value and its market price. The fundamental value is the amount of discounted future dividends and the price of the asset when it is sold in infinite future. If the price deviates from this level, the deviation is called bubble.

According to Larsen (1997), a bubble on an asset may arise when the market values an asset more because it previously has increased in value. The investors believe that since the asset has increased before, it will pay off to hold it for a limited period of time. The previous increase promises a continued increase in the future, since the increase in itself leads to a higher demand for the asset and hence a further increase in the price. During a bubble, investors are willing to purchase even overpriced assets based on their beliefs that the price would go up further and ignore the risk that prices are elevated due to the market's excessive and overwhelming expectations (Shiller, 2003).

Moreover, bubble is not completed until price fall down to normalized levels, this usually involves a period of steep decline in price during which most investors panic and sell out their investments. This sudden drop in price is known as a crash or a bubble burst. The first well documented examples of bubbles are the Tulipmania in Netherlands in 1637 and the South Sea company bubble of 1720 after which the term bubble was coined. The major modern examples of bubbles include the Japanese asset price bubble of 1980's which involved both real estate and equities, the dot com bubble in the United State information technology stocks and the punctured real estate and wider credit bubble which was centre in the US and UK (Allen and Gale, 2000).

Consequently, these bubbles can generate substantial macroeconomic effects in a particular country. Consumption, investment and productivity growth, all tend to surge when a bubble pops up and then collapse or stagnate when the bubble bursts (Filardo, 2001). The effect of economic bubble can be greatly felt in any of the financial investments such as investment in stocks or shares and real estate. But for the purpose of this research work, emphasis is placed on the real estate market. What really informed the choice of this particular market is as a result of the fact that bubbles in real estate market are more critical than stock market bubble. According to International Monetary Fund (IMF) World Economic Outlook (2003), equity price bubble occurs on average every 13 years, lasts for 2 years and results in about 4 percent loss in Gross Domestic Product (IMF). Real estate bubbles are less frequent, but last nearly twice as long and lead to output losses that are twice as large.

In addition, as a consumption and investment commodity, real estate exerts profound influence on the socio-economic development and psychological well-being of individuals of any nation (Ojetunde et al, 2011). Therefore, a shock to the real estate prices may affect real growth and consumer price, thereby making real estate price an important forward-looking variable that the policy maker in any country may want to monitor (Case et al, 2005).

Real estate has continued to play a significant role in man's development. In recent time, investors in Nigeria have begun to explore strongly into real estate marketing and investments which often represents the single largest investment according to Davis and Palumbo (2008). As a result of this, support for the real estate sector has become a paramount cornerstone of the policies of various governments both at Federal and State levels since independence in Nigeria.

The Nigerian government has set up different regulatory bodies for the real estate sub-sector with diverse and sometimes overlapping responsibilities. The Federal Ministry of Land, Housing and Urban Development regulates the real estate

sector; the Federal Mortgage Bank of Nigeria (FMBN) and the Federal Housing Authority (FHA) are responsible for supplying low-income housing. Despite all the policies, institutions and regulations which the Nigerian government has put in place, real estate sector is still backward. This has made the real estate sector to perform poorly when compared with its peers in other countries. For example, the Mortgage Banking/ Housing Finance sector to the Nation's Gross Domestic Product was put at 0.38% in 2010, whereas, South Africa and Malaysia have an average rate of 40% (World Bank, 2010).

It is equally sad to mention that the overall growth of the Nigerian real estate sector stood at 10.46% in the second quarter of 2010 compared to 10.48% in the corresponding quarter of 2009 (CBN, 2010). This has actually led the real estate sector to be dominated by informal and self-built housing agencies (Amidu and Aluko, 2006). These low performances in the real estate sector notwithstanding, it is still important to study this sector in relation to the price bubble.

The causes of asset price bubble have stimulated a great deal of academic research both in Nigeria and other countries. However, these research works concentrated attention more on stock prices while little attention have just being paid to real estate prices most especially in Nigeria. In addition, previous works that studied the real estate price bubble and macroeconomic variables with Vector Autoregressive (VAR) model employed restriction methods (e.g the commonly used Cholesky decomposition) which are prone to wrong causal ordering of variables (Gottschalk,2001), thereby making their works to generate inconsistent results. This research work will therefore correct these anomalies by incorporating the price of real estate and other Macroeconomic variables into the Structural VAR model which has been described as the best method for indicating the real sources of variable shocks through a theory-guided look at data (Kasai and Gupta, 2010).
The rest of the paper is organized in the following sequence: what follows this introduction is a review of recent literatures; section three discusses the methodology and specifies the model. Section four presents and discusses the results while section five concludes and makes recommendations.

II. LITERATURE REVIEW

Real estate is a broad term that encompasses natural land and man-made improvements on land. It is also referred to as the interests, benefits and right that are automatically included in the ownership of land and housing (Galaty and Allaway, 2000). But for the purpose of this study, the term real estate shall be used to mean housing. Great attempts have been made by different researchers to provide empirical evidences on the linkages between macroeconomic variables and real estate price.

Apergis (2003) examined the dynamic effects of housing loan rates, inflation and employment on the price of new houses sold in Greece. An Error Correction Vector Autoregressive (ECVAR) model is used to model the impact of the macroeconomic variables on real house prices. Variance decompositions show that the housing loan rate is the variable with the highest explanatory power over the variation of real housing prices, followed by inflation and employment.

Bhatta and Merriman (2007) made use of standard hedonic regression controlling to examine the link between Tax Increment Financing (TIF) and housing price appreciation. TIF reflects future commitment of municipalities to develop certain area and may improve property value in the vicinity. Chicago's single-family home sales data for January 1993 to December 1999 is used in this research. It is concluded that TIF influenced housing values but the influence varied positively and negatively for different type of TIF districts.

Vishwakarma and French (2010) also examined the influence of macroeconomic variables on the India real estate sector between 1996 and 2007. Using a structural break, they concluded that macroeconomic variables explain 10% of the variation in the real estate market between 1996 and 2000 with such variation increasing to 23% between 2000 and 2007. Stevenson (2000) made use of conventional Ordinary Least Square (OLS) model and Cointegration and Causality models to examine regional markets in the United Kingdom over a period of 30 years. He found strong evidence to support the hypothesis that house rents and inflation are cointegrated and that house rents lead to inflation.

Giuliodori (2005) estimated a number of VAR models separately for nine countries using the recursive ordering over the period 1979Q1 to 1998Q4 and found that real house prices fell by 0.7 percent after a 100 basis point money-market shock depending on the model used. The study showed that house prices might enhance the effects of a monetary policy shock on consumer spending in those countries where housing and mortgage markets are relatively developed and competitive. Gupta and Kabundi (2010) assessed the impact of monetary policy on real house price growth in South Africa, using a Factor Augmented Vector Autoregressive (FAVAR) over the period 1980Q1 to 2006Q4. Results from their Impulse Response Functions indicated that house price inflation was negatively related to monetary policy shocks.

Studies linking real estate price to macroeconomic activities in Nigeria are few. Amidu and Aluko (2006) in their own study argued that as inflation soars, so would the value of real estate increases. The real property value would have more than doubled, while mortgage payments will be slightly higher. As a result, the effect of inflation would cause rental values to surge.

In another related study, Ojetunde et al (2011) estimated a vector autoregressive model and suggested that macroeconomic shocks explain 20% of the variation in residential property rents. They concluded that responses of residential property rents to shocks in real GDP, Exchange

Rates and short-term Interest Rates reflect the fact that rents from direct residential property adjust slowly to changes in macroeconomic events.

III. METHODOLOGY

A. *Theoretical Framework*

The analysis of the implications of macroeconomic variables on the asset prices in this study is rested on the Arbitrage Pricing Theory (APT), which is the multifactor asset pricing model used to determine asset prices. This theory was originally developed by Ross (1976) and later revised by (Azeez and Yonoezawa, 2003). The model assumes that the return to the ith asset, Rit , can be written as:

$$Rit = \alpha_i + b_{ij}f_j + \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots b_{ik}f_k + e_{it} \quad \ldots \quad eqn.\ 1$$

Where: Rit is the return on asset i , α_i is the expected return, f_j are the macroeconomic factors, b_{ij} is the sensitivity of the return on asset i to the fluctuations in factor or factor loading and e_i is a random variable.

The equation above implies that the returns to asset are influenced by the factor sensitivity which could be positive or negative. However, the main problem associated with APT is that it has been silent about which events or factors are likely to influence all assets (Elton et al, 2003). As a result of this, the work initiated by Azeez and Yonoezawa (2003) really compliment the Ross theory by identifying the factors in the APT with macroeconomic variables they feel ought to influence asset returns.

Azeez and Yonoezawa (2003) put forward a two-step test by which APT approach can be estimated. The first step involves the use of time series data to estimate a set of factor loadings for each asset. The second step is to regress the sample mean returns on the factor loading in a cross-section regression. According to them, there is no special guidance for the choice of macroeconomic variables to be used. Thus, a researcher could decide the right variables for his specific purposes.

B. *Model Set-Up*

In our basic model set-up, we use a six-variable SVAR model. This model is similar to that used by Bjørnland and Jacobsen (2010) and Elbourne (2008). The VAR model assumes that the Nigerian economy is represented by a structural –form equation as follows:

$$B(L)y_t = U_t \quad \ldots eqn.\ 1$$

Where $B(L)$ is a matrix polynomial in the lag operator L, such that $B(L) = B_0 - B_1L - B_2L^2 - \square . B_pL^p$. B_0 is a non-singular matrix normalized to have ones on the diagonal and summarizes the contemporaneous relationship between the variables in the model contained in the vector y_t. y_t is a $N \times 1$ vector of endogenous variables which includes $\{GDP_{gr}, CPI, PREST, Exr, M_2, Intr\}$. U_t is an $N \times 1$ vector of structural disturbances with 0 mean and $Var(U_t) = \theta$ (where θ denotes a diagonal matrix) we assume that the structural disturbances are mutually uncorrelated.

Associated with this structural model is the reduced form VAR which is estimated as:

$$A(L)y_t = \varepsilon_t \quad \ldots eqn.\ 2$$

Where $A(L)$ is a matrix polynomial in the lag operator L; ε_t is a vector of the VAR residuals with 0 mean and $Var(\varepsilon_t) = \Sigma$

The relationship between the components of equations (1) and (2) are stated as follows:

$$A(L) = B_0^{-1}B(L) \quad \ldots eqn.\ 3$$

and

$$\varepsilon_t = B_0^{-1}U_t \quad \ldots eqn.\ 4$$

By normalizing $N \times 1$ diagonal elements of B_0 to ones (i.e Unity), we need at least $n\left[\frac{n-1}{2}\right]$ restrictions on B_0 to achieve identification.

There are several methods of specifying the restrictions to achieve identification of the structural parameters. This research work employs a generalized method with non-recursive structures also defined as SVAR, which impose restrictions only on contemporaneous structural parameters (Kim and Roubini, 2000).

What really informed the choice of SVAR method as against the commonly used Cholesky decomposition is that the identification approach of the latter assumes only a recursive method. This recursive method has been described as highly prone to wrong causal ordering of variables if the researcher is interested in looking at more than just monetary shocks (Gottschalk, 2001). Another justification for choosing SVAR is the argument that not all variables respond instantaneously to shocks as provided by recursive VAR. Evidence from past researchers have shown that many variables exhibit delay in their response to shocks due to financial deepening (Elbourne, 2008). All these anomalies can be conveniently taken care by non-recursive SVAR.

C. *Model Identification: Non-Recursive Approach*

The imposition of restrictions on the contemporaneous matrix of structural parameter B_o in this research paper is based on the works of Bjørnland and Jacobsen (2010) and Elbourne (2008). In this model, the endogenous vector $[Y_t: GDP_{gr}, CPI, PREST, Exr, M_2, Intr]$ is assumed to be divided into two blocks, such as vector of policy variables

and vector of non-policy variables. Policy variables comprise of $[Exr, M_2, Intr]$ which are assumed to be controlled by the Central Bank while the non-policy variables comprise of $[GDP_{gr}, CPI, LPREST]$ which are target variables. GDP_{gr} stands for real Gross Domestic Product growth rate; CPI is the Consumer Price Index, $LPREST$ represents the Real Estate Price which is a proxy for asset price and also in log form; M_2 is the monetary aggregate broadly defined; $Intr$ stands for real Interest Rate on loans; Exr is the real Exchange Rate.

The equation 5 below therefore summarizes the non-recursive identification approach as follows:

$$\begin{bmatrix} U_{GDPgr} \\ U_{CPI} \\ U_{PREST} \\ U_{Exr} \\ U_{M_2} \\ U_{Intr} \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 \\ a_{21} & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & a_{35} & a_{36} \\ a_{41} & a_{42} & 0 & 1 & a_{45} & a_{46} \\ 0 & 0 & 0 & 0 & 1 & a_{56} \\ a_{61} & a_{62} & a_{63} & a_{64} & a_{65} & 1 \end{bmatrix} \begin{bmatrix} \varepsilon_{GDPgr} \\ \varepsilon_{CPI} \\ \varepsilon_{PREST} \\ \varepsilon_{Exr} \\ \varepsilon_{M_2} \\ \varepsilon_{Intr} \end{bmatrix}$$

… *eqn. 5*

Where $U_{GDP_{gr}}, U_{CPI}, U_{PREST}, U_{Exr}, U_{M_2} U_{Intr}$ are the structural disturbances on the endogenous variables respectively and $\varepsilon_{GDP_{gr}}, \varepsilon_{CPI}, \varepsilon_{PREST}, \varepsilon_{Exr} \varepsilon_{M_2}, \varepsilon_{Intr}$ are reduced-form residuals that describe the unanticipated movements of each regressor respectively.

The first two rows in equation 5 relate to GDP growth rate and prices, which represent the commodity market equilibrium of the domestic economy. Similar to the works of Elbourne (2008), we assume that real estate price, M_2, Intr, and Exr do not affect the output and price contemporaneously. The motivation behind this identification assumption is that firms do not change their price and output unexpectedly in response to unexpected changes in financial signals or monetary policy due to adjustment cost and planning delays (Kim and Roubini, 2000). But we assume that GDP_{gr} is the main factor driving its own changes while CPI is affected by itself and GDP_{gr}.

The third row represents real estate price. We assume that the price of real estate react contemporaneously to M_2 and Intr. The fourth row stands for exchange rate which represents the financial market equilibrium. We allow exchange rates to depend on all other variables except real estate prices. Kim and Roubini (2000) assume that exchange rate is a financial variable which reacts quickly to all information. The last two rows relate to money supply and interest rate, which represent the money market equilibrium. We assume that the interest rate responds to all variables in the system while money supply is affected by itself and interest rate.

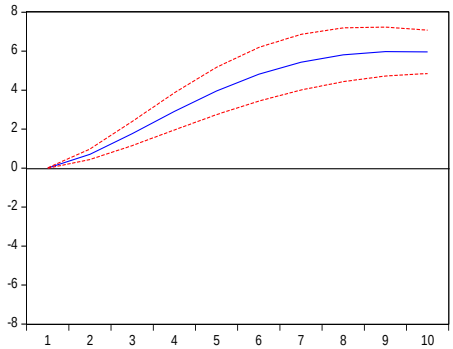
D. *Sources of Data*

This paper consists of quarterly data over the period of the first quarter of 1981 to the fourth quarter of 2010. The six variables of the SVAR model include the following: The GDP growth rate, the Consumer Price Index, the natural logarithm of the real estate price, the exchange rate, the broad money supply and the real interest rate. Data on PREST were supplied by some registered Estate Surveying and Valuation firms (Timi Kemiki & Co., Babatunde & Co. and Alagbe & Co) based on the aggregation of residential house price in most parts of Nigeria. CPI and Exr were sourced from National Bureau of Statistics year book (2010). While data on GDP_{gr}, M_2 and Intr were sourced from Central Bank of Nigeria Statistical Bulletin (2010).

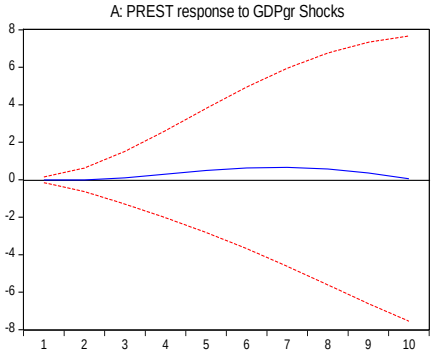
IV. RESULTS AND DISCUSSIONS

A. *Impulse Response Functions*

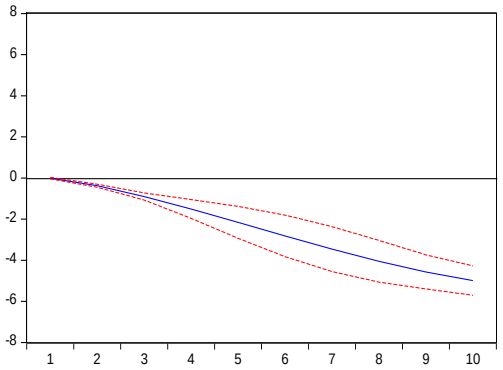
Impulse Response Functions (IRF) represents the dynamic response of a variable over time to a given shock. Figure 1 below reveals the responses of real estate price (PREST) to GDP shocks, CPI shocks, Intr shocks, M_2 and Exr shocks respectively.



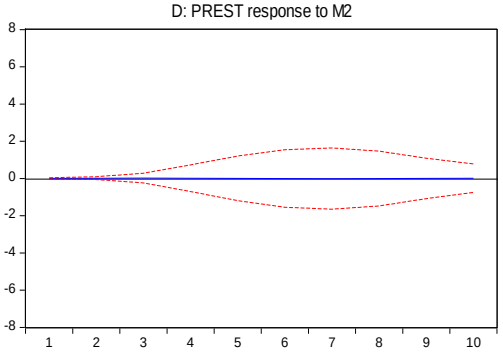
A: PREST response to GDPgr Shocks



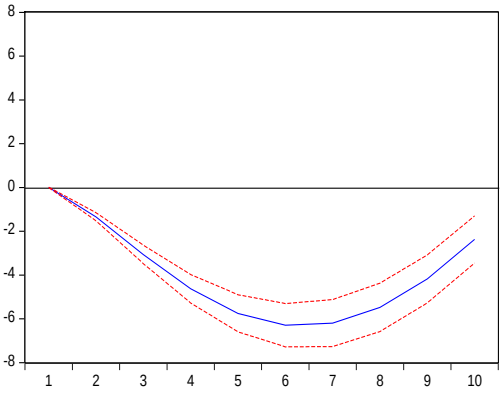
C: PREST response to Intr Shocks



D: PREST response to M2



E: PREST response to Exr Shocks



B: PREST response to CPI Shocks

Fig.1: Response of PREST to Macroeconomic Variables

Figure 1a illustrates that the response of real estate price to GDP shocks is positive and significant. This result indicates that economic development in Nigeria has a significant impact on the behavior of real estate price. This result corroborates the findings of Oikarinen (2009) that as GDP becomes better and income rises, more people will have better purchasing power and demand for real estate will increase; consequently, the increasing demand will drive real estate prices. Figure 1b also reveals a significant but negative response of PREST to Consumer Price shocks. This result is consistent with the findings of Yusof (2011) that as inflation rate increases, consumption goods will increase too; as a result, people has less disposable income to spend for property purchases. Consequently, there will be less demand for property which will have negative impact on its prices.

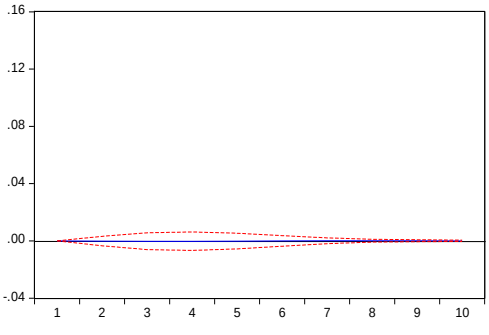
As figure 1c illustrates, the real estate price responds positively to the Intr shock from third quarter up to the ninth quarter and tends to zero thereafter. Though the response of PREST to Intr shock is insignificant but the reason for the positive result might be due to higher house prices caused by the partial cost transfer to consumers by the construction companies in the case of rising loan costs. Figure 1d shows that PREST response to broad money supply shocks is negative and significant, the result which is similar to that of CPI. The response of PREST to Exr shock in figure 1e is insignificant.

Table 1: Variance Decomposition of PREST

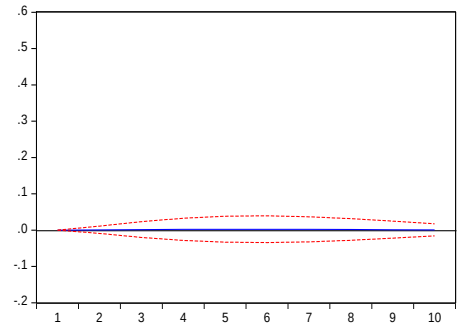
Period	*S.E*	*GDPgr*	*CPI*	*EXR*	*M_2*	*INTR*
3	3.982547	22.76741	70.53890	0.003163	6.035716	0.065766
6	13.15832	29.40797	60.83611	0.000404	9.164259	0.424498
9	20.20957	36.69961	46.81283	0.000211	15.96478	0.397962
12	24.56621	41.38061	33.59376	0.000562	24.52085	0.370199

Source: Author's Computation

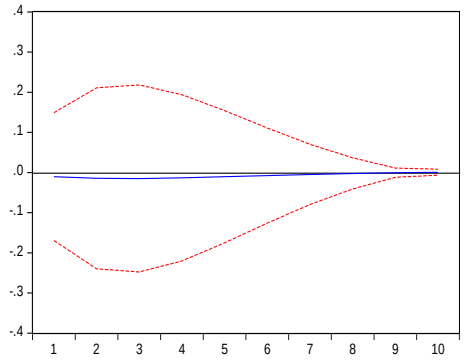
The variance decomposition of table 1 above further clarifies the contribution of each macroeconomic variable shock to real estate price. The table shows that CPI contributes the highest shock of 70% to PREST in the third quarter but eventually fell to 33% in the 12 quarter which is in line with the result got in figure 1b. GDP shock explains about 22% and 41% variation in the price of real estate in the 3rd and 12th quarter respectively. The explanatory variation of PREST to M_2 shock gradually increases from 6% in the 3rd quarter to 24% in the 12 quarter. Exr appears to have contributed the lowest percentage. The implication of this result is that real estate price is very responsive to GDP, CPI and M_2 shocks in Nigeria while the response of PREST to Intr shock is low. Exr in its own case does not show any significant impact on the real estate price behavior.



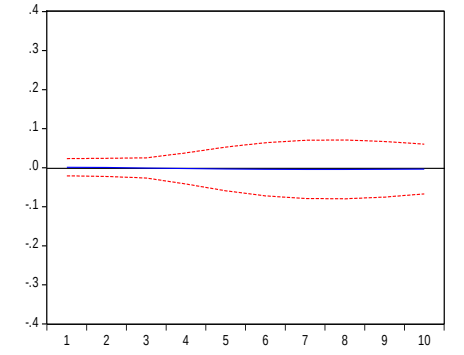
A: GDPgr response to PREST shocks



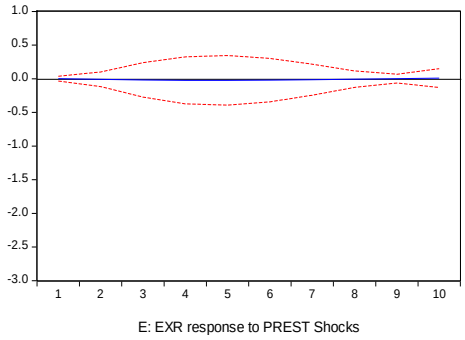
B: CPI response to PREST Shocks



C: INTR response to PREST Shocks



D: M2 response to PREST Shocks



E: EXR response to PREST Shocks

Fig.2: Response of Macroeconomic Variables to the Real Estate Price Shocks

Table 2: Variance Decomposition of Each Macroeconomic Variable and Contributions from Real Estate Price Shocks

Period	*GDPgr*	*CPI*	*EXR*	*M2*	*INTR*
3	0.000204	0.002716	0.104159	0.003437	0.935414
6	0.000262	0.004880	0.043668	0.026860	0.853213
9	0.000275	0.003457	0.016265	0.045517	0.756287
12	0.000294	0.002125	0.012301	0.043963	0.676180

Source: Author's Computation

It is equally pertinent to test whether real estate price affect macroeconomic variables. Figure 2 and table 2 represent the Impulse Response Functions and variance decomposition of each macroeconomic variable respectively. Their results reveal that apart from the interest rate which shows a little response to the real estate price shock, none of the macroeconomic variables are affected significantly by the behavior of the real estate price. The results suggest that the real estate market plays no role in the macroeconomic variables behaviors in Nigeria. The reason for this result might be due to the underdevelopment of real estate sector on the part of Nigerian government. For example, World Bank (2010) reveals that the real estate finance sector contribution to the nation's GDP was put at 0.38% in 2010 compared to other countries like South Africa and Malaysia with an average rate of 40%.

V. CONCLUSIONS AND POLICY RECOMMENDATIONS

This paper used a six-variable SVAR model to discuss the interrelationship between real estate price bubble and macroeconomic behavior in Nigeria using a quarterly data from the period of the first quarter of 1981 to the fourth quarter of 2010. The results from the Impulse Response Functions and variance decomposition showed that GDPgr, CPI and M2 greatly affect Nigerian real estate prices. This may be due to the fact that despite the informal rate of Nigeria real estate sector, it is still greatly affected by GDP, CPI and M2. While Intr and Exr have no significant effect on the real estate price behavior. This is an indication that the banking sector and external sector (exchange rate) do not affect the real estate price intensively. In an attempt to examine the role of real estate price in determining the behaviors of other macroeconomic variables, the results from the Impulse Response Function and the variance decomposition revealed that real estate price has no impact on the behaviors of relevant macroeconomic variables.

Based on the results from this research work, this paper therefore recommends that the policy makers should concentrate on policy choices that will integrate Nigerian real estate sector and its financial sector like other countries such as Malaysia and South Africa. As these will not only affect the development of the real estate sector itself but also the other macroeconomic activities in the economy.

VI. REFERENCES

[1] Allen, F. and Gale, D. 2000. Bubbles and crises. The Economic Journal. 7(3): 236—255.

[2] Amidu, J. and Aluko, O. E. 2006. Real estate returns and inflation in Nigeria. American Real Estate and Urban Economic Association Journal. 15(1): 217—237.

[3] Apergis, N. 2003. Housing prices and macroeconomic factors: Prospects within the European monetary union. International Real Estate Review. 6(1): 63—74.

[4] Azeez, A.A and Yonoezawa, Y. 2003: Macroeconomic Factors and the Empirical Content of the Arbitrage Pricing Theory in the Japanese Stock market. International Journal of Economics and Finance, 45(3), 126-140.

[5] Bhatta, S. D. and Merriman, D. 2007. Spillovers from tax increment financing districts: Implications for housing price appreciation. Regional Science and Urban Economics. 37: 259—281.

[6] Bjornland, H. C. and Jacobsen, D. H. 2010. The role of house prices in the monetary transmission mechanism in small open economies. Journals of Financial Stability. 12 (2) 218—229.

[7] Case, K. E.; Quigley, J. M. and Shiller, R. J. 2005. Comparing wealth effect: The stock market versus the housing market. Advances in Macroeconomics. 1—34.

[8] Central Bank of Nigeria 2010. Annual statistical bulletin.

[9] Davis, M. A. and Palumbo, M. G. 2008. The price of residential land in large US cities. Journal of Urban Economics. 63: 352—384.

[10] Elbourne, A. 2008. The UK housing market and the monetary policy transmission mechanism: An SVAR approach. Journal of Housing Economics.2(3) 65—87.

[11] Elton, E. J, Gruber, M. J and Brown, S. J. 2003. Modern Portfolio Theory and Investment Analysis, 6th Edition. John Wiley and Sons, Inc. USA.

[12] Filardo, A. J. 2001. Should monetary policy responds to asset price bubbles? Some experimental results. Research Division Federal Reserve Bank of Kansas City.

[13] Galaty, F. W. and Allaway, W. J. 2000. Modern real estate practice. 15th edition. Real Estate Education Company, Chicago.

[14] Gottschalk, J. 2001. An introduction into the SVAR methodology: Identification, interpretation and limitations of SVAR models. KIEL Working Paper. No. 1072.

[15] Giuliodori, M. 2005. Monetary policy shocks and the role of house prices across European countries. Scottish Journal of Political Economy. 52(4): 519—543.

[16] Gupta, R. and Kabundi, K. 2010. The effect of monetary policy on real house price growth in South Africa: A Factor Augmented Vector Auto Regression (FAVAR) approach. Economic Modelling.

[17] IMF World Economic Outlook 2003. Compilation guide on financial soundness indicators. Washington D.C.

[18] Kasai, N. and Gupta, R. 2010. Financial liberalization and the effectiveness of monetary policy on house price in South Africa. The IUP Journal of Monetary Economics. 8: 59—74.

[19] Kim, S. and Roubini, N. 2000. Exchange rate anomalies in industrial countries: A solution with Structural VAR approach. Journal of Monetary Economics. 45: 561—586.

[20] Larsen, E. S. 1997. Theories and test for bubbles. Working papers of University of Toronto. 17—19.

[21] National Bureau of Statistics (NBS). 2010. Statistical year book, 2010. National Bureau of Statistics, Abuja.

[22] Oikarinen, E. 2009. Interaction between housing prices and household borrowing: The Finnish case. Journals of Banking and Finance. 33: 747—756.

[23] Ojetunde, I.; Popoola, N. I. and Kemiki, O. A. 2011. On the interaction between the Nigerian residential property market and the macro-economy. Journal of Geography, Environment and Planning. 7(2).45-58

[24] Ross, S. A. 1976. The Arbitrage Pricing Theory of Capital Asset Pricing. Journal of Economic Theory, Vol. 13, 341-360

[25] Shiller, R. 2003. Is there a bubble in the housing market? Brooking Papers on Economic Activities. 2: 299—362.

[26] Stevenson, N. 2000. The inflation hedging characteristics of real estate and financial assets in the United Kingdom. RICS Research Report. London: SWIP 3AD.

[27] Vishwakarma, V. K. and French, J. J. 2010. Dynamic linkages among macroeconomic factors and returns on the Indian real estate sector. International Research Journal of Finance and Economics. 43 75-97

[28] World Bank 2010. World Development Indicators.

[29] Yusof, R. 2011. Determining the viability of rental price to benchmark Islamic home financing products. Benchmarking: An International Journal. 18(1): 69—85.