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Research Paper

The Impact of Macroeconomic Fundamentals on House Prices in Selected African Countries

Saliu, Mojeed Olanrewaju
Department of Economics
Faculty of the Social Sciences
Ekiti State University, Ado-Ekiti, Nigeria

Akode, Thomas Ojo
Department of Economics
Faculty of the Social Sciences
Ekiti State University, Ado-Ekiti, Nigeria

ABSTRACT.
This study examines the impact of macroeconomic fundamentals on the House Prices in twelve selected African countries, using time series data spanning from 2000 to 2020. The study employs Westerlund Error Correction Based Panel Cointegration test to examine the impact of some domestic (RINTR, RGDPGR, EXR, SP) and foreign (USRINTR, WRGDPGR, WOP) macroeconomic fundamentals on House Price Index. Findings from the study reveal that there is a long-run relationship between the House Price Index and The macroeconomic fundamentals. The research work also confirms that foreign macroeconomic fundamentals are better determinants of House Price than the domestic macroeconomic fundamentals in the selected African countries during the period under review.

Keywords: *House Price Index, Real Estate Price, Macroeconomic Fundamentals, Westerlund Panel Cointegration, Hedonic Pricing Model.*

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I. INTRODUCTION

Real estate, under which house price is embedded, is a broad term that encompasses natural land and man-made improvements on land. It also involves the interests, benefit and right that are automatically included in the ownership of land and housing. Real estate covers residential housing, commercial offices, trading spaces such as theatres, hotels and restaurants, retail outlets, industrial buildings such as factories and government buildings (Galaty and Allaway, 2000). Real estate is a very vital sector in an economy, being a major employment driver. It is the second largest employer after agricultural sector. This is quite evidenced from the chain of backward and forward relationships that the real estate has with the other sectors of the economy; particularly with the housing and construction sector. for instance, almost two hundred and fifty auxiliary industries such as cement, steel, brick, timber, building materials, just to mention but few, are reliant on the real estate industry (Adetiloye, 2013).

Compared with other assets, house price is the most vital asset for households in any industrialized economy. House price has a dual role of being both a store of wealth and an important durable consumption good. Any movement in house prices will therefore affect the wealth of house owners, which in turn may be impactful on consumption and investment. Also, as the collateral value of house price changes, this may equally impacts on the availability of credit for borrowing-constrained agents (Kummerow, 2011). Economic theory asserts that wealth is one of the key drivers of aggregate consumption in any country, in this regard, a slump in the real estate sector will lead to decrease in household consumption levels, which may in turn retard the economic growth rate. A rise in house price may enhance housing construction (due to the Tobin's Q effect). Therefore, movement in house prices may affect real growth and consumer prices, thereby making house prices an important forward looking variable that the inflation targeting central bank may want to monitor.

The 2007/2008 global financial crisis which began in USA and later spread to African countries as a result of sub-prime mortgage problems had impacted negatively on the African macroeconomic fundamentals. These areas of impacts include high inflation rates, devaluation of currency, low inflow of capital, low remittance from abroad, decline in foreign aids, low foreign direct investment and portfolio investment. This in turn retards export revenue, pressures on current account and balance of payment with negative impact on investment, Gross Domestic Product (GDP) and employment (IMF, 2020). Moreover, during this period of financial crisis on African economies, the real estate markets were badly affected as a result of the African macroeconomic imbalances orchestrated by the global financial crisis. For instance, the real estate growth rate of 33%, 21% and 31% which were recorded for Nigeria, Ghana and Tanzania respectively in 2007 later declined to -25%, -11% and 3% for the same countries due to the aftermath of global financial crisis (Rothacher, 2015).

In view of all the aforementioned points above, it is quite evidenced that movements in macroeconomic fundamentals as a result of economic crisis or financial instability will affect real estate prices through its effect on the expected future dividend stream (Harvey, 1995). In this regard, having knowledge about the relationship between macroeconomic fundamentals and real estate price is very important for investors and policy makers. Moreover, the various empirical works carried out by many researchers in Africa to examine the relationship between macroeconomic variables and asset prices have been using indicators which are not sufficient enough for the establishment of an effective relationship. This research work is unique in the sense that it incorporates both domestic and foreign macroeconomic indicators so as to assess the effect of integration of global economies on the real estate markets. In addition, this research work is expected to be of great interest to both African and foreign investors wishing to invest in African real estate market, as this will enable them to make informed evaluation as to what truly drives the changes in the prices of real estate and thus be able to make sound decisions.

The remaining aspects of this study are designed as follows: Section two focuses on relevant empirical literatures. Section three discusses the theoretical framework and estimation techniques. Section four presents and discusses results while section five concludes and proffers recommendations.

II. REVIEW OF EMPIRICAL LITERATURE

Gupta and Kabundi (2010) adopted a Factor Augmented Vector Autoregressive (FAVAR) to examine the effect of interest rate on real estate price growth in South Africa. By using quarterly data covering the period between 1980q1 and 2006q4, their results from the impulse response functions confirmed that real interest rate has negative impact on the real estate price in South Africa.

Vishwakarma and French (2010) employed structural break method to investigate the impact of macroeconomic factors on the real estate price in India between 1996 and 2007. Findings from their results confirmed that macroeconomic variables account for about 10% variation in the real estate market between 1996 and 2000 with such variation increasing to 23% between 2000 and 2007. Steveson (2011) in the same vein adopted Conventional Ordinary Least Square (OLS) model and cointegration and causality models to assess the impacts of inflation on house price in the United Kingdom regional markets. Results from the econometric analysis revealed that the house price and inflation are cointegrated and house price will on the long-run leads to inflation.

Apergis (2013) used an Error Correction Vector Autoregressive (ECVAR) model to investigate the impacts of some macroeconomic variables such as housing loan rate, inflation and employment rates on the house price in Greece. Results from the variance decomposition and impulse response function revealed that the housing loan rate is the variable with the highest explanatory power over the variation of real housing price, followed by inflation and employment rate.

Muli (2011) employed multiple regression analysis and Granger causality test to examine the relationship between housing prices and credit in Kenya. By using a quarterly data covering the period between 2006q1 and 2010q4, results from his study showed that the movements in housing prices are positively and significantly related to the long-term evolution of mortgage credit. Also, results from the granger causality test revealed that the real estate market does not really affect housing price changes, but changes in housing prices do affect the real estate credit.

Ojetunde, popoola and Kemiki (2011) adopted a vector Autoregressive model to examine the impacts of macroeconomic shocks on residential property rents in Nigeria. For this purpose, quarterly data were collected from the period of 1980q1 to 2005q4. Results from the variance decomposition showed that macroeconomic shocks explain about 20% variations in the residential property rents. Results from impulse response function therefore concluded that the effect of a standard deviation shock from the real GDP, exchange rate and interest rates on the residential property rents implies that the residential property rents respond slowly to the movements in macroeconomic variables.

III. RESEARCH METHOD

3.1 Theoretical Framework

The analysis of the impact of macroeconomic fundamentals on the real estate price in this research work is based on the Hedonic Pricing Model, which was propounded by (Miller and Geltner, 2005). Hedonic Pricing Model is a statistical approach based on multiple factor regression model with larger samples which attempts to show the relationship between house price (dependent variable) and a housing characteristics (independent variables). The model further shows that if Y represents the house price to be estimated and X represents the housing characteristics, then the regression equation can written as:

$$\boldsymbol{Y = F(x) + \varepsilon} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \mathbf{1}$$

The housing characteristics which is termed x can be related to building size, lot size, number of bedrooms etc. The property characteristics cannot be limited to the variables listed above but can equally be extended to other environmental factors or externalities affecting the market value of a property (Calhoun, 2001).

3.2 Model Specification

Based on the Hedonic Pricing Model which was propounded by Miller and Geltner (2005), with little modification, the model for this study is explicitly specified as follows:

$$\boldsymbol{HPI_{it} = \beta_{it} + \beta_1 RINTR_{it} + \beta_2 RGDPgr_{it} + \beta_3 EXR_{it} + \beta_4 SP_{it} + \beta_5 USRINTR_{it} + \beta_6 WRGDPgr_{it} + \beta_7 WOP_{it} + \varepsilon_{it}} \ldots\ldots\ldots\ldots \mathbf{2}$$

Where:
HPI = House Price Index (which proxies Real Estate price)
RINTR = Real Interest Rates
RGDPgr = Real Gross Domestic Product growth rate
EXR = Exchange Rate
(Note: RINTR, RGDPgr, EXR and SP capture the domestic macroeconomic fundamentals)
USRINTR = United State Real Interest Rate
WRGDPgr = World Real Gross Domestic Product growth rate
WOP = World Oil Price
(Note: USRINTR, WRGDPgr and WOP represent the foreign macroeconomic fundamentals)
(i) denotes the country while (t) represent the time series. ε_{it} is the error term.

3.3. Sources of Data

Data on the global macroeconomic variables such as: World Oil Price (WOP) and World Real GDP growth rate (WRGDPgr) are sourced from IMF world economic outlook statistical bulletin while data on the US Real Interest Rate (USRINTR) are sourced from World Bank data base. Data on Exchange Rate (EXR), Real Interest Rate (RINTR), Stock Price (SP) and House Prise Index (HPI) are sourced from United Nation statistical bulletin.

3.4 Estimation Techniques

Conventional panel relies mostly on the micro model that deals with large cross sectional dimension (large N) and small time series dimension (small T). But in the case of this research work, macroeconomic variables are collected for several African countries over a large period of years. In this regard, using micro panels for this kind of study would result to spurious relationships, particularly when macroeconomic variables are characterized by non-stationarity (Baltagi, 2008). For the purpose of avoiding this shortcoming, this study therefore adopts panel cointegration method (macro panel) proposed by (Westerlund, 2007). This Westerlund panel cointegration can handle both large cross sectional dimension (large N) and large time series dimension (large T) and can equally do away with spurious regression and cointegration (Baltagi, 2008).

The Westerlund (2007) panel cointegration techniques are divided into three stages: The first stage is to test for stationarity i.e panel unit root test. The second stage is the error correction based panel cointegration test and the third stage is the estimation of both the long-run and short-run equations. Moreover, the Westerlund panel cointegration method in this study captures the cross-section data for twelve selected African countries. Three countries represent each of the four major regions in Africa. Nigeria, Ghana and Cote D'ivoire represent West Africa. Botswana, South Africa and Mauritius represent South Africa. Kenya, Tanzania and Ethiopia represent East Africa while Egypt, Morocco and Tunisia represent North Africa. The African countries are selected based on their asset market values for the periods under investigation.

IV. RESULTS AND DISCUSSIONS

4.1 Results of Panel Unit Root Tests

This section tests the panel dimension of the data so as to understand the individual nature of the variables and to ascertain their suitability for the estimation techniques adopted for the study. This is carried out by testing the

stationarity of the variables which is known as the unit root test. It is quite pertinent to ascertain the order of integration before embarking on panel cointegration test, as it is very important that all the series are integrated of the same order before proceeding to the error correction based panel cointegration. Therefore, in order to perform the unit root test and determine the order of integration of all variables, this study employs the Im Pesaran and Shin (IPS) unit root test as follows:

Table 1: Im Pesaran and Shin (IPS) Unit Root Test

Variables	Unit Root Test (IPS)		
	t-statistics	P-value	Integration order
HPI	-4.9636	0.0000***	I(1)
RINTR	-6.7661	0.0000***	I(1)
RGDPGR	-6.5157	0.0000***	I(1)
EXR	-6.4663	0.0000***	I(1)
SP	-5.0543	0.0000***	I(1)
USRINTR	-5.9210	0.0000***	I(1)
WRGDPGR	-6.4421	0.0000***	I(1)
WOP	-5.9841	0.0000***	I(1)

Source: Author's Computation

(***) represent 1% level of significance. Trends and constant term are composed in each model.

The results in table 1 above indicate that at 1% level of significance, all the series are non-stationary at their levels, but are made stationary at their first difference. This implies that all the variables are integrated of order one, I(1). In this regard, the economic implication of stationary variable is that any disturbance or shock to it will not be sustained for a long period of time. The properties exhibited by the time series variables in the model create the necessary condition for panel cointegration test.

4.2 Error Correction Based Panel Cointegration Test

In this section, four basic types of tests are designed for the purpose of testing for panel cointegration. The tests are conducted based on both asymptotic distribution and cross sectional dependence, that is, bootstrapping. Results of the asymptotic distribution for the four tests are shown in table 2 below:

Table 2: Westerlund Panel Cointegration Test: Asymptotic Distribution Value

Statistics	Value	Z-value	P-value
Gt	-3.168	7.484	0.018
Ga	-0.888	7.274	1.000
Pt	-2.857	7.413	0.026
Pa	-0.714	6.143	1.000

Source: Author's Computation

NOTE: Trends and constant terms are composed in the tests, while the selection of lag and lead lengths are on the basis of Akaike Information Criterion and Bartlett Kernel Window. Width is designed on the basis of $4\left[\frac{T}{100}\right]\frac{2}{n}$.

From the results of table 2 above, the null hypothesis of no long-term relationship between House Price Index (HPI) which is the dependent variable and the other independent variables is rejected. This is an indication that there is a long-run relationship between the House Price and the macroeconomic fundamentals (RINTR, RGDPgr, EXR, SP, WRGDPgr, USRINTR, WOP). Since the long-run relationship has been confirmed, it is therefore pertinent to proceed to error correction model using fixed effect within regression.

Table 3: Fixed Effects (Within) Regression Results of House Price Index and Macroeconomic Fundamentals.

Variables	Long-run Model		
HPI	Coefficient	Standard Error	Probability
RINTR	-0.0020325	0.0022642	0.370
RGDPGR	0.0014215	0.0032737	0.664
EXR	0.0002268	0.0002246	0.314
SP	2.0143723	0.1324347	0.003
USRINTR	-0.1175723	0.2390406	0.004
WRGDPGR	-1.0438424	0.1002147	0.001
WOP	-2.1173413	0.4132148	0.014
	Short-run Model		
DRINTR	0.0008284	0.0013318	0.534
DRGDPGR	0.0007787	0.0024834	0.414

DEXR	0.0002922	0.0004466	0.905
DSP	1.0024143	0.1426009	0.029
DUSRINTR	-1.1102431	0.0143241	0.017
DWRGDPGR	-0.3241102	0.1372412	0.005
DWOP	-0.1424349	0.2304176	0.022
Constant	-0.3288986	5.285781	0.950
Sigma-u	0.04193241		
Sigma-e	0.16226281		
rho	0.06260166		

Source: Author's Computation

F(8,25) = 4.74, Prob>F = 0.0000, R-Squared: Within = 0.94, Between = 0.05, Overall = 0.94

Table 3 above shows the error correction based panel cointegration results using the fixed effect model. The results are into two segments, that is, the long-run and short-run relationships. The first aspect presents the variables in their non-differenced forms and thus indicating long-run relationship; while the second part shows the variables in their differenced forms which implies the short-run relationships. With respect to both short-run and long-run relationships, the empirical results in this study indicate that the domestic macroeconomic fundamentals such as: RINTR, RGDPGR and EXR have insignificant relationship with the House Price Index (HPI). However, under the same domestic macroeconomic fundamentals, it is equally revealed that only the Stock Price (SP) exhibits positive and significant relationship with the House Price Index (HPI). Meanwhile, in both short-run and long-run relationships, the results show that all the foreign macroeconomic fundamentals such as USRINTR, WRGDPGR and WOP have significant relationship with the House Price Index.

The overall R-squared of the results indicates that 94% variation in the House Price is explained by all the macroeconomic fundamentals. The fixed effect estimated model is also statistically significant when we consider the F-statistics of 4.74 at 1% level of significance and the F-probability value of 0.0000. The implication of this is that the macroeconomic fundamentals may jointly have a significant effect on the House Price in the selected African countries during the period under review. Moreover, because of the possibility of cross-sectional dependence among the cross-sectional units, this study therefore conducts a cross-sectional dependence test. African countries do share a common feature of being an emerging economy, thereby giving room for the tendency of similarities among the cross-sectional unit which may lead to cross-members correlation.

Table 4: Correlation Matrix of Residuals

	-e1	-e2	-e3	-e4	-e5	-e6	-e7	-e8	-e9
-e1	1.0000								
-e2	-0.0230	1.0000							
-e3	0.1781	0.0685	1.0000						
-e4	-0.0083	0.9714	0.1040	1.0000					
-e5	0.2524	-0.1564	0.1766	-0.1055	1.0000				
-e6	-0.0706	-0.2883	-0.0985	-0.2782	-0.1138	1.0000			
-e7	0.0189	0.9495	0.1184	0.9560	0.0478	-0.2996	1.0000		
-e8	-0.0962	-0.3426	0.3221	-0.3082	-0.3056	-0.0596	-0.3096	1.0000	
-e9	0.1124	0.1493	-0.1747	0.8813	-0.4832	0.5324	0.6324	-0.7314	1.0000

Source: Author's Computation

Breusch-Pagan LM test of Independence: Chi 2(29) = 181.946, Pr = 0.0000, Ho: There is no Cross-sectional dependence.

Table 4 above shows the results of cross-sectional dependence test. The results imply the presence of common factors affecting the cross-sectional units as the null hypothesis of no presence of cross-sectional dependence is rejected at the probability value (0.0000) which is less than 5% level of significance. The results actually confirms the possibility of cross-member correlation in the series. These results therefore necessitate bootstrapping in order to obtain a reliable result.

Table 5: Panel Cointegration Test with Cross-Sectional Dependence

Statistics	Value	Z-Value	P-Value	Robust P-Value
Gt	-4.185	7.484	0.018	0.000
Ga	-2.146	7.274	1.000	0.027
Pt	-3.491	7.413	0.026	0.002
Pa	-2.043	6.143	1.000	0.017

Source: Author's Computation

NOTE: Trends and constant terms are composed in the tests, while the selection of lag and lead lengths are on the basis of Akaike Information Criterion and Bartlett Kernel Window. Width is designed on the basis of 4 $\left[\frac{T}{100}\right]\frac{2}{n}$. We allow for 400 bootstrap replications.

The results in table 5 above reveals that the cointegration test is now more robust when the cross-sectional dependence is reckoned with. This is because the null hypothesis of no cointegration is rejected in all the four tests. This now reveals in stronger term that there is long-run relationship between House Price Index (HPI) and the macroeconomic fundamentals (RINTR, RGDPGR, EXR, SP, WRGDPGR, USRINTR, WOP).

4.3 Discussion of Findings

Findings from the results of Westerlund panel cointegration test with and without cross-sectional dependence reveal that there is a long-run co-movement between the House Price Index and the macroeconomic fundamentals in the selected African countries. Moreover, findings from the results of both the short-run and long-run segments of fixed effect regression confirm that only Stock Price (SP) among all domestic macroeconomic fundamentals has significant impact on the House Price Index (HPI). From this finding, Stock Price (SP) has positive and significant impact on the House Price Index. The finding confirms the applicability of wealth effect theory which asserts that a rise in the stock market price will rekindle more investment portfolios in the area of acquiring more real estate (Kapoulous and Siokis, 2005).

Findings from the same fixed effect regression results reveals that all the variables from the foreign macroeconomic fundamentals (USRINTR, WRGDPGR and WOP) exert negative and significant impacts on the House Price Index in the selected African countries. From the findings, United State Real Interest Rate (USRINTR) has negative and significant impact on the House Price Index. This finding implies a high exposure of African real estate market to the United State monetary policy shock. Likewise, the finding also confirms that World Oil Price (WOP) inflicts negative and significant impact on the House Price Index. This finding might be hinged on the incessant fall in the global oil price as a result of global financial crisis.

V. CONCLUSION AND POLICY RECOMMENDATION

Considering the results and findings in this study, the conclusion is therefore given as follows: First, there is a long-run relationship between the selected macroeconomic fundamentals and the House Price Index in the selected African countries during the period under review. Second, Foreign macroeconomic fundamentals appear better predictors and determinants of House Price Index in the selected African countries.

In view of all the aforementioned findings in this study, the following recommendations are therefore proffered so as to aid appropriate policy formulation for the real estate market in Africa. First, as the relationship between Stock Price and House Price is found to boost and enhance portfolio diversification benefits in Africa, it is therefore recommended that African government should strive even more to develop the stock and real estate market. Second, a high significant impact of US Real Interest Rate (USRINTR) on House Price Index is a good signal to the government, policy analysts and investors in Africa that US monetary policy shocks should be properly monitored. Lastly, a high sensitivity of House Price Index to the World Oil Price (WOP) is a clear indication that the policy analysts and government in Africa should take a close watch on global oil price as a relevant determinant of House Price in Africa.

REFERENCE

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

[2]. Baltagi, B. (2008). Econometric Analysis of Panel Data (Fourth Edition), John Wiley & Sons, Chichester.

[3]. Calhoun, C.A (2001). Property Valuation Methods and Data in United States. Property Valuation, Housing Finance International. International Journal of Real Estate, 23(2), 12-23.

[4]. Galaty, F. W. & Allaway, W. J. (2000). Modern real estate practice. 15th edition. Real Estate Education Company, Chicago.

[5]. Gupta, R. & Kabundi, K. (2010). The Effect of Monetary Policy on Real House Price Growth in South Africa. A Factor Augmented Vector Autoregression (FAVAR) Approach, Economic Modeling.

[6]. Harvey, C. (1995). The Risk Exposure of Emerging Equity Markets. World Bank Economic Review, 9(1), 19-50.

[7]. IMF World Economic Outlook (2020). Compilation Guide on Financial Soundness Indicators, Washington D.C.

[8]. Kapopoulos, P. & Siokis, F. (2005). Stock and Real Estate Prices in Greece: Wealth versus Credit-Price Effect. Applied Economic Journal, 12(2), 125-128.

[9]. Kummerow, M. (2011). Theory of Real Estate Valuation: An alternative way to teach real estate price estimation methods. Department of Property Studies, Curtin University.

[10]. Miller, N.G. & Geltner, D.M (2005). Real Estate Principles for the New Economy. Journal of Real Estate and Finance, 97(6), 251-330.

[11]. Muli, J. (2011). The Relationship between Property Prices and Mortgage Lending in Kenya. Unpublished MBA Project, University of Nairobi.

[12]. Ojetunde, I., Popoola, N.I & Kemiki, O.A (2011). The Interaction between the Nigerian Residential Property Market and the Macroeconomy. Journal of Geography, Environment and Planning, University of Ado-Ekiti, Nigeria. 7(2), 56-70.

[13]. Rothacher, N. (2015). Maturity of Real Estate Markets in Sub-Saharan Africa: A comparison between Tanzania and South Africa. International Real Estate Business School, IRE/BS, University of Regensburg, Germany.

[14]. Stevenson, N. (2011). The inflation hedging characteristics of real estate and financial assets in the United Kingdom. RICS Research Report. London: SWIP 3AD.

[15]. Vishwakarma, V.K. & 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(2), 75-97.

[16]. Westerlund, J. (2007). Testing for Error Correction in Panel Data. Oxford Bulletin of Economics and Statistics, 69(6), 709-748.