



Management

## **MORTGAGE FINANCING AND HOUSING DEVELOPMENT IN NIGERIA**

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### **Abstract**

This study examined mortgage financing and housing development in Nigeria. The main focus of this research was to ascertain the impact of mortgage loan in housing development in Nigeria. To achieve this objective, data were extracted from CBN statistical bulletin and National Bureau of Statistics from 1990 to 2014. Three hypotheses were formulated and tested using econometric models such as Augmented Dickey-Fuller unit root test, the co-integration tests revealed the existence of a long-run relationship among the variables. The Error Correction Model established causal links and dynamic interactions between variables by granger causality test. The result of the findings showed a significant relationship between mortgage financing and housing development in Nigeria. Variables such as mortgage loan and interest rate had positive and significant impact on housing development while cost of building had a negative effect on housing development in Nigeria. Further findings revealed that mortgage bank deposit had positive effect on mortgage investment while inflation had a negative effect on mortgage investment. The study recommended that mortgage institution in Nigeria should develop strategies to mobilize more deposits and explore new sources of fund such as funds from the capital market via housing bonds, savings and loans from co-operative societies. Government should create an enabling environment for private housing sector in housing development in Nigeria by providing infrastructure and enhancing soundness and competitiveness of mortgage institutions in Nigeria.

**Keywords:** Housing Finance; Housing Loan; Mortgage Development; Mortgage Investment Private Housing Sector.

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### **1. Introduction**

Housing is one of the basic necessities of life. It occupies a very important position in the life of man as exemplified by Maslow's hierarchy of needs, because it provides shelter, comfort and

protection (Mogaji, 2011). According to Oladapo (2008), housing is a major economic asset which has profound impact on the prosperity of the country and the productivity of individual as decent houses increases workers' health and also affects the well-being of the citizens. It is an index of measuring the standard of living of a country and a very important consumer item. Consequently, programmes of assistance in the area of finance and research have been designed by government to enhance its adequate delivery. The focus of finance has been more prominent because the provision of houses requires huge financial resources which most of the low income earners in Nigeria are unable to afford (Sanusi, 2010).

In advanced economies like the United States of America, Britain and Denmark, the common approach of owning a house is through a well-structured mortgage scheme. If the mortgage system is effectively and efficiently managed, invariably the procedure for accessing mortgage loan will be easy and faster (Olotuah, 2006). However, the delivery of housing is highly, a contentious issue in Nigeria especially to scholars, administrators and the public (Sule, 2006). The influx of people into the urban areas in search of employment opportunities, incidence of population growth, the enormous availability of essential raw materials for productivity processes in the rural areas, the emergence of deadly diseases due to poor habitation by citizens are important reasons for the provision of decent and affordable houses both in urban and rural areas in Nigeria (Ademiya & Rai, 2008).

Today, the problem of inadequate provision of housing in Nigeria stems from the inability of the national housing fund (NHF) to fund housing development. Other problems are high inflation and interest rates, high cost of building materials, insufficient wage and income distribution, low saving culture and also the problem of land tenure system in some parts of the country (Olotuah, 2006). These housing inadequacies, particularly for the low income group or the average poor citizens have been complicated by high rate of population growth, resulting in overcrowding, deplorable urban environment, degrading infrastructure, inadequate dwelling where greater number of people live in shelter built with materials such as grass matting, disused paper cartons, cornstick, as well as plastic sheet, some live in an uncompleted buildings, others live under bridges, close to refuse dump sites and to an extent, outright homelessness in most of the city centers in Nigeria (Nubi, 2008).

Thus, it is a known fact that in Nigeria the demand for housing outweighs the supply for housing. Despite all efforts made by both government and the private sector to provide affordable shelter, the fact remains that most Nigerians are not comfortably accommodated. Also, existing realities indicates that the potentials of the mortgage industries remain untapped as it is constrained by factors undermining the access and sustainability of mortgage finance by the average poor citizen in Nigeria (Omirin, 2007). The focus of this research is to examine mortgage financing and development of housing in Nigeria. Also, it intends to identify the challenges that have impeded the performance of the mortgage industry as well as considering how these challenges could be adequately addressed.

The problem of housing delivery in Nigeria is becoming a source of concern to many, as it affects the well-being of the citizens also the growth and development of the economy. Housing problem has become glaring that greater number of people living in urban areas in Nigeria live in housing environments that are dehumanizing and those that have access to decent houses do so at

astronomical cost. Onibokun (2000) confirmed that rent in major cities in Nigeria is about sixty percent of average workers' disposable income. A major threat of housing arises especially in the urban centers in Nigeria where inadequate supply of houses relative to demand is experienced. However, the major constraints inhibiting the provision of housing in Nigeria is the inability of the mortgage institutions to carry out their primary objective of providing fund for housing development in Nigeria. Other constraints include:

The high drifting of people from the rural area to urban center has made demand for houses exceed its supply and the outcome is proliferation of slums, characterized by flooding, overcrowding, dilapidated structures, existence of stagnant water in dirty and unhygienic environments as well as high cost of building materials, which contributes to increase in price of houses. Only few people are able acquire houses for themselves. where the house price is abnormally high. Also, high interest rates have constituted a serious challenge factor that discourages borrowers from accessing funds for housing development. Again, the low interest rate stipulated by the NHF, makes financial institutions especially banks reluctant to give out loan housing development especially as it turns out an unprofitable investment.

Again, the problem of land tenure and land registration lengthens the processing time of loan and delay the confirmation of ownership of land. The provision of housing is dependent on the propensity to save which is lacking in the Nigerian culture. This could be attributed to poor earning power or low income of the citizens coupled with high inflation. Absence of long-term fund is equally a serious issue as mortgage banks are reluctant to use their short-term deposits to fund long-term housing development. Also, the inability of banks to obtain collateral securities weaken the desire to grant long-term loans for housing development.

The general objective of this study is to examine mortgage financing and development of housing in Nigeria. However, the specific objectives include:

- 1) To examine the impact of mortgage financing on housing development in Nigeria;
- 2) To investigate whether there is a relationship between mortgage finance and mortgage investment;
- 3) To ascertain the effect of mortgage bank deposit on mortgage investment in Nigeria.

## **Research Hypotheses**

This study cast the following hypotheses which are in the null form as thus:

Ho<sub>1</sub>: There is no significant relationship between mortgage financing and housing development in Nigeria.

Ho<sub>2</sub>: There is no significant relationship between mortgage finance and mortgage investment in Nigeria.

Ho<sub>3</sub>: There is no significant relationship between mortgage bank deposit and mortgage investment in Nigeria.

In other to achieve these objectives, the study is divided into five sections. Section one is the introduction, section two is on review of related literature and theories. The third section is on methodology, upon which the study is built. This is closely followed by data presentation,

analysis and discussion of findings. The remaining sections draw managerial implications that emerged from the findings.

## **2. Literature Review and Theoretical Framework**

### **2.1. Theoretical Framework**

Theoretical framework is a collection of interrelated theories while theories are formulated to explain, predict and in many cases extend existing knowledge within the limit of critical bounding assumptions (Osuala, 2005). This study is guided by three relevant theories namely: Urban Spatial theory; Theory of financial intermediation and investment - Based theory

#### ***2.1.1. Urban Spatial Theory***

The theory underpinning this study is the urban spatial theory, propounded by DiPasquale and Wheaton (1994). The theory asserts that housing stock depends on urban population, series of economic factors, cost of new construction activity and more importantly on credit availability. A greater density of population in the metropolitan area leads to a high demand for housing. Basically, an increase in cost of building activity leads to abnormal increase in house price. This is because the high cost of building materials and high labour price result in a rise in house price. The urban spartial theory emphasizes that there is a relationship between stock of housing and urban population. An increase in population positively increases the demand for housing, thereby causing the price of housing to increase.

DiPasquale identified credit availability as the most important element in housing supply although studies always failed to discover a consistent relationship between finance and housing supply, the Neo-classical economists assert in the economic theory and housing demand that finance is the core product of housing investment. Also, the amount of financial resources determines the amount invested in housing. The Neoclassists also emphasized that there are factors that increase or decrease the supply of houses such as construction cost, credit availability as well as economic factors, these are the key endogenous variables in housing supply.

#### ***2.1.2. Investment Base Theory***

James Poterba in 1984 introduced this theory. The emphasis of this theory is based on the supply of housing as a function of series of economic factors such as real house price, cost of new construction, land and credit availability. Poterba specified three (3) basic assumptions in relation to this theory. First, that housing industry is composed of competitive firms and the industry's output is dependent on the real price of housing construction. Second, there are limits to materials of production and third, increase in demand for housing leads to growth in equilibrium price structure of housing.

The major determinants of housing supply are credit availability and cost of construction. An increase in the price of construction of housing, initially results in a decrease in the demand for housing while a positive change in credit availability raises housing investment. Topel and Rosen (1988), added a model to the Poterba's theory of housing and this model encompasses of

economic expectations which are interest rate, inflation rate and their lag values. However, advocates of the Poterba theory criticized urban spartial theory stating that the theory ignored land, a highly important issue because land is a unique element of housing supply. However, the difference between investment based theory and the urban partial theory is whether or not to consider the issue of land as an input in the supply of housing.

## 2.2. Empirical Review

The research examines mortgage financing and housing development in Nigeria. However, various empirical literatures relating to this study was reviewed, notable among them was that of Omirin (2007). This study examined the accessibility of mortgage finance by the low income earners and the escalating cost of housing construction in Nigeria. The study concluded that mortgage institutions are not productive in making finance accessible by the citizens especially the low income earners. Against this backdrop, he recommended that government should introduce ways of improving housing policies which will enable the citizens to easily access mortgage finance. The problem of financing real estate in Nigeria was examined by Ogedengbe and Adesopo (2003), through the administration of questionnaires, using descriptive analysis, which revealed that high interest rate and other requirements for loan application have bedeviled the financing of real estate properties in Nigeria. They recommended that government should make effort to solve economic problems such as inflation, reduce interest rates in order to eliminate or minimize the problems that plague the mortgage financing of real estate development.

Oduwaye (2008), examined the demand and supply of housing in Nigeria. Using survey analysis and secondary data, highlighted that the NHF policy, the structure of the PMIs, land Use Act, high interest rates are some of the constraints to mortgage financing in Nigeria. Mailafia (2007), commented that the poor performance of the mortgage financial system in Nigeria could be attributed to low accessibility, and underdevelopment of the land tenure system. The primary mortgage institutions are not sufficient in number and there is a wide difference between the number of people who actually applied for the loan and the amount that was approved. Omole (2001), added that “mortgage institutions should be made more proactive and accessible to the people”. Against this backdrop on the importance of mortgage finance that government should introduce ways to improve the prevailing housing as well as housing policies.

Warnock (2008) investigated the effects of housing market in the provision of housing finance in twelve different countries among them are Malaysia, China, Indonesia and came up with a result that efficient legal system, stable and condusive macroeconomic environment, existence of credit information systems had positive effects on mortgage finance system. Tomlinson (2007), corroborates that adverse legal, macroeconomic institutions and regulatory environment impact enormous effects in the provision of long term finance for housing. He opined that financial innovation in the form of mortgage - backed securities has shifted focus of mortgage from the credit worthiness of potential home owners to marketing of financial instruments which is also known as financializing of mortgage. This implies that trading mortgage instruments now becomes a driving force for source of profit rather than house itself which not only impedes the main objective of providing housing but exacerbates the risk of a financial crisis due to the spillover effects.

Iyaiya (2012), carried out a research on microfinance and mortgage financing in Nigeria. Primary source of data was used in the study and multiple regression analysis was employed to examine the impact of microfinance and mortgage finance in Nigeria. The result showed that credit facilities provided by informal microfinance were used by housing purposes by the respondents. Based on the findings, he recommended the establishment of a regulatory body that would ensure the construction of decent houses, the risk of land purchase should be eliminated and tenure security should be ensured.

Eni and Danson (2014), examined the factors affecting private sector housing supply in Calabar, using survey and systematic sampling method to select the houses along the street of the metropolis. They found out that factors such as cost of construction, population growth, inflation rate, income per capita and cost of land contribute to housing delivery in Calabar. Secondary source of data was adopted and also, percentiles and t-test as well as Pearson product moment of correlation was employed. The test result indicated that insufficient number of mortgage Institutions in Nigeria contributes to insufficient housing delivery.

### **3. Materials and Methods**

#### **3.1. Research Design**

Research design presents the structure of the study, strategy of investigation and guide the method and decision the researcher should make during the study (Adedokun, 2002). The ex-post facto research was adopted in this study. It is based on analytical examination of the dependent and independent variables. Independent variables such as mortgage loan, interest on loan and cost of building are studied in retrospect for seeking possible relations and the likely effects that the changes in variable produces on the dependent variable which is housing stock.

#### **3.2. Sources of Data and Method of Data Collection**

Secondary data were used in this study. Data were extracted from the publication of the Central Bank of Nigeria Statistical Bulletin, the National Bureau of Statistics and Ministry of Land and Housing, Nigeria. Desk survey method was used to gather relevant information from published materials, journals, articles, libraries and internet search. The time series model for the period of 1990-2014 was employed in this study.

#### **3.3. Techniques of Data Analysis**

The techniques of data analysis adopted for this research include the unit root test, co integration, error correction model (ECM) and the Granger causality test. The Augmented Dickey-Fuller (ADF) test was adopted to detect the stationarity of the variables in this study. The co integration test was adopted to detect the existence of a long run relationship among the variables using the Johansen and Julius (1990) multivariate co-integration test. The ECM was applied to identify the causal links and dynamic interactions between variables by the Granger causality test. It measured the speed of adjustment from the disequilibrium to equilibrium. The Granger causality test was used to ascertain the effect of one variable in influencing or forecasting another. It is

used to examine whether there is a causal relationship between one variable and the other various components captured in the model.

### 3.4. Model of Specification

The concept of the model in this research is to analyze the relationship between mortgage finance and housing development in Nigeria. However, housing stock being the dependent variable and other factors that affect it such as mortgage loan, cost of building, mortgage bank deposits, interest rate on loan and inflation rate as the independent variables. The models are specified as thus:

#### Model 1

$$HOS = f (MOL, COB, INT )$$

Where:

HOS = Housing stock

MOL = Mortgage loan

COB = Cost of building

INT = Interest on loan

It can be specified as:

$$HOS = \beta_0 + \beta_1MOL + \beta_2COB + \beta_3 INT + Ut$$

Where:

$\beta_0$  = The Constant

$\beta_1$ - $\beta_4$  = The coefficients of mortgage loan, cost of building and interest rate

$Ut$  = Error term

#### Model II

$$MOV = f (MOL + MOD + INF)$$

Where:

MOV = Mortgage investment

MOL = Mortgage loan

MOD = Mortgage bank deposit

INF = Inflation rate

It can be specified as:

$$MOV = \beta_0 + \beta_1MOL + \beta_2MOD + \beta_3INF + Ut$$

$\beta_0$  = The Constant

$\beta_1$ - $\beta_3$  = The coefficients of mortgage loan, mortgage bank deposits and inflation rate

$Ut$  = Error term

## 4. Results and Discussions

### 4.1. Data Presentation

Table 4.1: Housing sector macroeconomic variables

YEAR	HOS 000	MOL ₦'000	POP 000	COB ₦'000	INT (%)	MOV ₦'000	MOD ₦'000	INF (%)
1990	40331	198.4	89.2	809000	29.0	825.8	6262.2	13.0
1991	41823	208.9	91.2	615000	29.8	895.5	6554.3	44.5
1992	43132	334.7	93.5	620000	36.1	1185.3	1576.3	57.0
1993	4488	560.3	96.2	695500	21.0	611.8	1044.2	72.8
1994	46104	394.9	100.5	705000	19.7	2812.2	2489.4	29.3
1995	53938	754.8	103.6	770000	19.7	2812.2	2489.4	8.5
1996	55804	738.0	106.0	788000	13.5	2102.7	4165.9	10.5
1997	58863	785.9	112.8	812500	18.3	2267.3	4337.6	6.6
1998	62747	924.2	118.3	915090	21.3	2368.4	4596.4	6.9
1999	65647	855.1	120.8	950000	18.0	2878.3	4467.0	18.9
2000	69656	1025.7	121.5	100500	18.3	1828.3	1355.2	12.9
2001	76572	6600.6	122.4	121000	24.4	2400.1	34483	14.0
2002	81628	1289.6	124.8	143000	20.4	3229.7	36136	17.9
2003	81628	6000	126.3	150000	19.2	4087.9	6458.2	12.5
2004	86195	2100	139.8	159000	17.9	40355.0	7804.3	12.9
2005	89495	7560	143.3	167500	17.3	14909.5	8292.9	16.8
2006	90692	407.59	146.9	177900	16.9	69829.1	15591.3	17.9
2007	93592	108532	150.6	190500	15.1	61193.7	16623.6	17.0
2008	95463	118586	151.2	200000	18.9	66986.2	14809.9	16.2
2009	97372	132876	159.2	200000	17.6	89697.5	18694.5	16.2
2010	99701	122812	164.3	201500	16.0	83340.2	16319.6	16.2
2011	102410	122910	166.2	213000	16.7	72417.6	17108.3	16.2
2012	173.6	232000	173.6	232000	16.8	86440.8	16493.0	16.2
2013	124015	145501	178.5	240000	16.8	87532.0	15241.7	17.0
2014	127621	249202	182.1	264000	17.2	89201.7	16255.7	17.0

Source: Central Bank of Nigeria Statistical Bulletin, 2014

Table 4.2: Housing Stock in Nigeria (000)

Year	Above 3b/r	3b/r	2b/r	1b/r	Single room	TotalL
1990	692	18728	14641	4652	1249	39962
1991	673	19522	15014	5237	1399	41823
1992	651	20013	15493	5488	1487	43132
1993	232	20665	16267	5684	2035	44883
1994	434	21111	16621	6058	1880	46104



1995	563	23842	18796	7311	3396	53938
1996	1395	24192	19687	7590	2940	55804
1997	2242	26545	20105	7622	2809	58863
1998	2003	29164	21873	7758	2809	62747
1999	1874	31091	21873	7758	3051	64234
2000	1370	34005	22716	7896	3669	65647
2001	863	38760	24278	8412	4259	69652
2002	671	40297	27496	8590	4474	76572
2003	1548	42696	29580	8670	3751	81628
2004	1267	43702	31319	9398	4053	86195
2005	1550	44021	31600	10018	3053	89495
2006	2058	44901	32891	11116	3751	90692
2007	2079	45799	33549	11338	4653	93592
2008	2107	45901	34220	11565	3759	95463
2009	2132	46270	34767	12771	3839	97372
2010	2224	47434	35719	13092	4019	102410
2011	2312	47722	35719	13092	4617	102410
2012	2406	49681	48026	14009	5211	115318
2013	2522	50211	51732	14231	5319	124015
2014	2633	58202	59770	15204	6041	141850

Source: Federal Ministry of Land and Housing Nigeria.

Note : 3b/r = 3 bedroom

2b/r = 2 bedroom

1b/r = 1 bedroom

Table 4.3:

Augmented Dickey-Fuller (ADF) Unit root test (model one)			
Variables	At level	At 1 <sup>st</sup>	Order of integration
	Difference		
HOS	-0.539423	-4.263012	I(1)
MOL	-0.034132	-5.023480	I(1)
POP	-1.292986	-5.672163	I(1)
COB	-2.432194	-4.523011	I(1)
INT	-0.630402	-6.850172	I(1)
Test critical value at level			
1% = -3.857394			
5% = -2.910442			
10% = -2.627634			
Test critical value at 1 <sup>st</sup> Diff			
1% = -3.59661			
5% = -2.933158			
10% = -2.604867			

Source: Researcher's computation from E-views 7.1

## 4.2. Data analysis of model one

### 4.2.1. Unit Root Test (Model One)

Table 4.3 showed the result for the unit root tests of test for model one. It was revealed that no variable was found to be stationary at levels; hence, it becomes impossible at this stage to reject the null hypotheses. This is because the test statistical values of each variable at levels using ADF were below the critical values at one percent, five percent and ten percent levels of significance. However, the variables become stationary at their first differences. This is due to the fact that the test statistical values of each variables for both tests were found to be greater than the critical values at one percent, five percent and ten percent levels of significance All the variables have the same order of integration 1(I), therefore the null hypotheses can be rejected.

TABLE 4.5

Unrestricted cointegration rank test (maximum eigenvalue) (model one)

Hypothesized		Max-Eigen	0.05	
No. Of CE(s)	Eigenvalue	Statistic	Critical Value	Prob**
None*	0.911860	87.34207	64.21093	0.0012
Atmost 1*	0.774802	58.94510	46.23142	0.0000
Atmost 3	0.851604	12.46041	21.13162	0.0000
Atmost 4*	0.717694	3.91488	3.841466	0.1175

Source: Researcher's computation from E-views 7.1

### 4.2.2. Cointegration Test (Model One)

Table 4.4 showed the test result of the conintegration test. The result indicates three cointegration equations at five per cent level of significance. This is due to the fact that the trace statistical values in each of the three equations are all greater than their critical values at five percent level of significance. Base on this result, we can conclude that there exists a long run relationship among the variables.

Also, table 4.5 revealed the test result of the maximum eigenvalue. The equation indicated in the test result is three conintegration equations. The value of the test statistics in each of the cointegration equations were found to be above the critical values. This result concludes that since there is a cointegration among the variables, there is existence of a long run relationship among the variables.

Table 4.6: The normalized long-run estimates dependent variable: HOS (model one)

Variables	Coefficients	Std. Errors
MOL	0.842778	0.02718
COB	-0.024895	0.00570
INT	-0.065413	0.03010

Source: Researcher's computation from E-views 7.1

### 4.2.3. The Normalized Long-Run Estimation (Model One)

The estimation of the long-run coefficient measures the long run effects of mortgage loan, cost of building and interest rate on the housing stock. Table 4.6 showed the normalized long-run estimated from the cointegration test that is been analysed. The result showed that mortgage loan has significant and positive relationship with stock of housing in Nigeria in the long run. This means that in the long run, a rise in mortgage loan will result to a positive significant increase in stock of housing in Nigeria.

Cost of building materials and interest rate has a significant negative long-run relationship with stock of housing in Nigeria. This means that an increase in cost of building or interest rate will lead to a decrease in stock of housing in the long run. The result also revealed that the variables were statistically significant at five percent. This means that each of the variables have significant impact on the provision of housing in Nigeria in the long-run with both positive and negative effect.

Table 4.7

Pairwise Granger Causality Tests

Null Hypothesis:	Obs	F-Statistic	Prob.
MOL does not Granger cause HOS	21	4.97165	0.0720
HOS does not Granger cause MOL	21	0.28210	0.4280
COB does not Granger cause HOS	21	1.95470	0.0278
HOS does not Granger cause COB	21	0.87673	0.4302
INT does not Granger cause HOS	21	0.64872	0.5324
HOS does not Granger cause INT	21	0.52878	0.0171
COB does not Granger cause MOL	21	2.73239	0.0871
MOL does not Granger cause COB	21	0.59613	0.5324
INT does not Granger cause MOL	21	0.05229	0.9492
MOL does not Granger cause INT	21	3.33817	0.2829
INT does not Granger cause COB	21	0.81425	0.1297
COB does not Granger cause INT	21	2.01253	0.2145

Source: Researcher's computation from E-views 7.1

#### 4.2.4. Granger Causality Test (Model One)

The Pairwise Granger Causality test was employed to establish the causal dynamic link among the variables. Table 4.7 present the result of the Granger causality test. Since the variables are cointegrated, this suggests that there is some sort of causality relationship among the variables. The result showed a uni-directional relationship between stock of housing (HOS) and mortgage loan, and interest rate (INT). This indicates that an increase in mortgage loan (MOL), will result in a positive increase in housing stock; the result suggest the causality direction from MOL to HOS since at one percent, the estimated F is significant. However, the critical value of F is 4.97165. There is no reverse causality from HOS to MOL on the other hand, since the F value is statistically insignificant. Also mortgage loan granger cause interest rate (INT) but interest rate does not granger cause mortgage loan.

TABLE 4.8

Over-Parametized estimation result (model one)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.7795.76	0.1247.11	0.683490	0.0782
MOL	0.423132	0.510932	1.423759	0.0000
MOL(-1)	- 0.199357	0.165467	- 0.010067	0.1944
MOL(-2)	0.243880	0.207214	0.012330	0.4367
COB	0.000356	0.528465	0.932271	0.0074
COB(-1)	0.002782	0.013583	2.017472	0.4088
COB(-2)	0.002782	0.013583	1.159357	0.0260
INT	- 0.520030	0.125947	- 0.341781	0.3513
INT(-1)	- 1.020835	0.400794	- 0.304678	0.5780
INT(-2)	- 0.087603	0.300120	- 2.034821	0.7476
ECM(-1)	- 0.306008	0.012701	- 0.375224	0.3104
R-squared	0.973415	Mean dependent var	7.001382	
Adjusted R-Squared	0.962586	S. D. dependent var	1.640685	
S.E. of regression	0.163473	Akaike info criterion	0.762580	
Sum squared resid	0.128166	Schwarz criterion	0.101286	
Log likelihood	26.40162	Hannan-Quinn criter.	0.024661	
F-statistic	164.5059	Durbin-Watson stat	1.690728	
Prob(F-statistic)	0.000000			

Source: Researcher's computation from E-views 7.1

#### 4.2.5. Over-Parametized Result (Model One)

The coefficient of the error correction variables in table 4.8 showed 0.306, this means that 31 percent of the disequilibrium in housing stock has been corrected each year. The R-Squared value of 97 percent explains the degree of changes between the dependent and the independent variables. It follows therefore that less than 2.70 percent of the changes were accounted for by variables outside the model.

The Adjusted R-Squared of 0.962586 showed that 96 percent of the changes in the dependent variable are attributed to variations of the independent variables. However, the model showed that, it has a high explanatory power, and a good fit. The F statistic value of 164.506 showed that the model was significant at all conventional levels, this is because the value exceeded the table values. The Durbin Watson econometric test examines the level of autocorrelation of serial correction in the time series data used. The DW value at 1.690728, showed that there is no positive autocorrelation among the time series data because this value is greater than zero but it is lower than the upper limit of the DW test of 2.469 and also lower than the lower limit of 2.316 for this model.

TABLE 4.8

Over-Parametized estimation result (model one)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.7795.76	0.1247.11	0.683490	0.0782
MOL	0.423132	0.510932	1.423759	0.0000
MOL(-1)	- 0.199357	0.165467	- 0.010067	0.1944
MOL(-2)	0.243880	0.207214	0.012330	0.4367
COB	0.000356	0.528465	0.932271	0.0074
COB(-1)	0.002782	0.013583	2.017472	0.4088
COB(-2)	0.002782	0.013583	1.159357	0.0260
INT	- 0.520030	0.125947	- 0.341781	0.3513
INT(-1)	- 1.020835	0.400794	- 0.304678	0.5780
INT(-2)	- 0.087603	0.300120	- 2.034821	0.7476
ECM(-1)	- 0.306008	0.012701	- 0.375224	0.3104
R-squared	0.973415	Mean dependent var	7.001382	
Adjusted R-Squared	0.962586	S. D. dependent var	1.640685	
S.E. of regression	0.163473	Akaike info criterion	0.762580	
Sum squared resid	0.128166	Schwarz criterion	0.101286	
Log likelihood	26.40162	Hannan-Quinn criter.	0.024661	
F-statistic	164.5059	Durbin-Watson stat	1.690728	
Prob(F-statistic)	0.000000			

Source: Researcher's computation from E-views 7.1

#### 4.2.6. Parsimonious Error Correction Result (Model One)

The Parsimonious short-run error correction for equation one is presented in table 4.9. The result showed that the parsimonious short-run model has a good fit and a high explanatory power. This is shown by the high value of the R-Squared of 0.968 (97 percent) and the Adjusted R-Squared

of 0.952 (95 percent). This means that about 95 percent of variations in housing stock have been explained by changes in mortgage loan, cost of building and interest rate. The F-statistic value of 115.66 revealed the statistical significance of the overall model. In other words, it showed that the independent variables have joint effect on the dependent variable. The F-calculated value of 115.66 is higher than F-tabulated of 2.46 therefore, the null hypothesis is rejected and it is concluded that mortgage financing and housing development in Nigeria are significantly related. Result of the test further revealed that the Durbin Watson showed 1.418 which is within the acceptable region of no auto regression. The factor of the error correction model was correctly signed (negative) and statistically significant as expected theoretically. The coefficient of the error correction factor showed that about 28 percent of the short –run disequilibrium has been corrected each year. This is rather a show adjusted speed level. By this result, 3.36 (0.28 of 12months) is required to return to the equilibrium position.

Analysis of the short-run estimates further showed that changes in the current period of mortgage loan has a positive impact on the current period of housing stock in Nigeria by 0.625 or 62.5 percent *ceteris paribus*, this conform with a priori expectation. The result also showed that changes in the previous year value of population growth have positive significant effect on the current value of stock of housing in Nigeria in the short-run. This means that an increase in (lagged one) population growth increases housing stock in Nigeria by 0.394 or 39 percent. Also, the variations in the previous year value of cost of building leads to a negative significant impact of housing stock in Nigeria in the short-run by 0.048 or 4.82 percent. Finally, contrary to a priori expectation, the result showed that the previous period value (lagged two) of rate of interest have a positive significant effect on the housing stock in Nigeria in the short-run by 0.243 or 2.43 percent.

Table 4.10  
 Augmented Dickey-Fuller (ADF) Unit root test (model two)

Variable	At level	At 1 <sup>st</sup> Difference	Order of integration
MOV	-2.292006	-5.547899	I(1)
MOL	-0.625554	-4.130512	I(1)
MOD	-2.025270	-6.283218	I(1)
INF	-0.414020	-4.850014	I(1)

Test of critical value at level

1%	=	-3.573462
5%	=	-2.933145
10%	=	-2.6039441

Test of critical value at 1<sup>st</sup> Diff

1%	=	-3.752946
5%	=	-2.898064
10%	=	-2.638752

Source: Researcher's computation from E-views 7.1

### 4.3. Analysis of Result of Model Two

#### 4.3.1. Unit Root Test (Model Two)

Table 4.10 showed the result for the unit root test for model two. It was revealed that the variables were not stationary at levels. Hence, it becomes impossible at this stage to reject the null hypotheses. This is because the test statistic values at level for each variable using the ADF test were below the critical values at one percent, five percent and ten percent levels of significance. However, the variables were stationary at first difference. This is because the test statistics values for the test are found to be greater than the critical values and all variables having the same order of integration I(1). Hence, their null hypotheses can be rejected.

TABLE 4.11

Unrestricted cointegration rank test (trace) (model two)

Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None*	0.871253	61.86688	47.85613	0.0001
Atmost 1*	0.611876	40.35323	29.79707	0.0000
Atmost 2*	0.262075	16.02846	15.49471	0.0017
Atmost 3	0.011190	5.844164	3.841566	0.0000

Source: Researcher's computation from E-views 7.1

Trace test indicates 2 cointegrating eqn(s) at 0.05 level

TABLE 4.12

Unrestricted cointegration rank test (maximum eigenvalue) (model two)

Hypothesized		Max-Eigen	0.05	
No. Of CE(s)	Eigenvalue	Statistic	Critical Value	Prob**
None*	0.871253	48.94510	33.87687	0.0002
Atmost 1*	0.696927	24.32468	27.58434	0.0071
Atmost 2*	0.262075	12.46041	0.461366	0.0000
Atmost 3*	0.011190	0.461366	3.841466	0.0013

Source: Researcher's computation from E-views 7.1

### 4.3.2. Cointegration Test Result (Model Two)

Table 4.11 presents the result of the cointegration test for model two. The result indicates two cointegration equations at five percent significant level. Based on the statistical test result, we conclude that in the model, there exists a long run relationship among the variables. Similarly, there are also two equations found in the maximum eigenvalue test, because the value of the maximum eigenvalue statistic in the two equations are all greater than their critical value at five percent significant level. The maximum eigenvalue result also revealed that there is a long run relationship among the variables in the model.

TABLE 4.13

The Normalized long-run estimates dependent variable: MOV (model two)

Variables	Coefficients	Std. errors
MOL	0.65125	0.56352
MOD	-0.89610	0.78175
INF	-0.70351	0.24019

Source: Researcher's computation from E-views 7.1

### 4.3.3. The Normalized Long Run Estimation (Model Two)

Since the variables are cointegrated, the long-run coefficients are estimated. This however, measures the effect of the long-run relationship of the independent variables on the dependent variable. Table 4.13 showed the result of the normalized long-run estimates. In the long run, mortgage loan has a positive significant relationship with mortgage investment in Nigeria while mortgage bank deposit and inflation rate have a negative significant relationship with mortgage investment in Nigeria in the long-run.

TABLE 4.14

Pairwise Granger Causality Test

Null Hypothesis:	Obs	F-Statistic	Prob.
MOL does not Granger cause MOV	21	3.88210	0.4280
MOV does not Granger cause MOL	21	0.62541	0.0.219
MOD does not Granger cause MOV	21	0.69102	0.0415
MOV does not Granger cause MOD	21	1.56314	0.0109
INF does not Granger cause MOV	21	0.54201	0.5774
MOV does not Granger cause INF	21	1.93376	0.1714
MOD does not Granger cause INF	21	1.47770	0.2499
INF does not Granger cause MOD	21	0.69229	0.5107
MOL does not Granger cause MOD	21	0.59451	0.0190
MOD does not Granger cause MOL	21	5.46820	0.6323
MOL does not Granger cause INF	21	4.41066	0.6682
INF does not Granger cause MOL	21	0.93376	0.1684

Source: Researcher's computation from E-views 7.1



**4.3.4. Granger Causality Test Result (Model Two)**

The cointegration of the variables suggests that there is some sort of causal relationship amongst the variables. The Pairwise granger causality test was employed in order to establish the relationship amongst the variables. Table 4.14 showed the test result as a uni-directional relationship between mortgage investment and mortgage loan; mortgage loan and mortgage bank deposits. This means that an increase in mortgage loan will lead to a positive increase in mortgage investment but the reverse is not the case. Also, an increase in mortgage bank deposits will result to an increase in mortgage loan but the reverse is not the case, however, the result has turned out as expected.

TABLE 4.15

Over-Parametized estimation result (model two)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.704051	1.074352	5.052287	0.0012
MOL	1.130619	0.055921	0.141182	0.0001
MOL(-1)	0.005204	0.201508	3.253073	0.0072
MOL(-2)	0.202751	0.007154	0.914289	0.7665
MOD	0.006523	0.245386	1.423810	0.0201
MOD(-1)	-0.025471	0.183860	-0.332467	0.1882
MOD(-2)	-0.007235	0.004590	-2.924758	0.1401
INF	0.06 5528	0.015421	0.525331	0.0350
INF(-1)	0.020778	0.308329	0.020508	0.0350
INF(-2)	- 0.016682	0.125381	-1.001718	0.6708
ECM(-1)	- 0.250395	0.012701	- 0.378640	0.0021
R-squared	0.752119	Mean dependent var	8.482524	
Adjusted R-Squared	0.728511	S. D. dependent var	0.313246	
S.E. of regression	0.163215	Akaike info criterion	-0.671023	
Sum squared resid	0.559425	Schwarz criterion	0.523766	
Log likelihood	11.05228	Hannan-Quinn criter.	-0.631956	
F-statistic	31.85898	Durbin-Watson stat	1.727398	
Prob(F-statistic)	0.000000			

Source: Researcher's computation from E-views 7.1

**4.3.5. Over-Parametized Test Result (Model Two)**

The granger representation theorem asserts that there must also be a correction model that describes the dynamics or adjustments short-run of the cointegration variables towards their equilibrium values since the variables are cointegration. Table 4.15 showed the test result of the over-parametized estimation of the variables. This model contains more parameters than the original model. The aim is to examine the effect of past values of both the dependent variables

and the independent variables on the current value of the dependent variable. The lag value of each variable is set at 2, based on Akaike information criteria (AIC).

The result showed that the coefficient of the error correction factor is 0.250. This implies that 25 percent of the disequilibrium in mortgage investment has been corrected each year. The value R-Squared of 0.752 (75 percent) and the Adjusted R-Squared of 0.728 (73 percent) showed that the model has a good fit. The independent variables were responsible for the total variation of about 73 percent (Adjusted R-Squared) in the dependent variable, this indicates that the model has a high explanatory power. The F-Statistic value of 31.8589, showed that at the conventional significant level (one, five and ten percent), the overall model was found to be statistically significant. The F-calculated value of 31.8589 is higher than F-tabulated of 2.46. Hence, the null hypothesis is rejected and we conclude that there is a significant relationship between mortgage financing and housing development in Nigeria. However, there was absent of autocorrelation in the model due to the Durbin Watson (DW) value of 1.73.

TABLE 4.16

Parsimonious result (model two)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	41.32084	6.987882	5.913145	0.0000
MOL(-1)	0.635250	1.262590	2.300231	0.0318
MOD(-2)	0.514124	0.557298	4.728612	0.0001
INF(-2)	- 0.264803	0.376490	-0.703347	0.0087
ECM(-1)	- 0.208137	0.387012	-0.320177	0.6311
R-squared	0.757503	Mean dependent var	8482524	
Adjusted R-Squared	0.748270	S. D. dependent var	0.313246	
S.E. of regression	0.154778	Akaike info criterion	-0.519631	
Sum squared resid	0.420921	Schwarz criterion	0.628766	
Log likelihood	10.97546	Hannan-Quinn criter	-0.482012	
F-statistic	62.49720	Durbin-Watson stat	1.862192	
Prob(F-statistic)	0.000000			

Source: Researcher's computation from E-views 7.1

#### 4.3.6. Parsimonious Error Correction Result (Model Two)

Table 4.16 showed the result of the short-run dynamics. The coefficient of the error correction factor showed that about 21 percent of the short-run disequilibrium has been corrected each year.

This is rather a slow adjustment speed level. This implies that 2.52 (0.21 of 12months) is required to return to the equilibrium position.

The R-Squared of 0.757 (76 percent) and the Adjusted R-Squared value of 0.748 (75 percent) showed that the model has a good fit. The Adjusted R-Squared value of 75 percent variations in the degree of mortgage investment has been explained by changes in mortgage bank deposits, mortgage loan and inflation rate. However, the model has a high explanatory power. The F-Statistic of 62.49720 showed that, at the conventional significance level (one, five and ten percent), the overall model was found to be statistically significant. This showed that the independent variables have joint effect on the dependent variable. The DW value of 1.86 falls within the acceptable region of no autocorrelation.

The result of the short-run estimates further showed that changes in the previous year of mortgage loan have a positive significant effect on the current value of mortgage investment in Nigeria. An increase in the previous year value of mortgage loan increases mortgage investment by 64 percent, this is in line with the theoretical expectation. The result also revealed the previous two years mortgage bank deposit has positive significant impact on the current value of mortgage investment. An increase in mortgage deposit increases mortgage investment by 51 percent, while inflation rates have negative significant effect on mortgage investment. In the short run, an increase in inflation rate in the previous two years decreases the current value of mortgage investment by 26 percent. Hence an increase in inflation rate would decrease the amount of investment in housing in Nigeria.

#### **4.4. Discussion of Findings**

The cointegration test result revealed the existence of long-run relationship amongst the variables used in model one and two of this study. The Parsimonious (ECM) term for model one revealed that the coefficient of the error correction factor showed that about 28 percent of the short-run disequilibrium has been corrected each year. This is rather slow speed of adjustment while the error correction factor for model two has a statistical significant as theoretically expected. The coefficient of the error correction factor showed that about 21 percent of the short run disequilibrium has been corrected each year. This is rather an acceptable adjustment speed.

The analysis of the short-run estimates in model one showed a positive relationship between mortgage finance and housing stock in Nigeria in the current year. This findings conform to the work of Iyaiya (2013), who postulated that mortgage loan is the major determinant of housing development in Nigeria.. Similarly, the variation in the current period of cost of building materials will lead to significant but negative effect on housing stock in Nigeria, in the short-run. Finally, further analysis of the result in model one revealed that the previous period (lagged two) of inflation rate have a significant and positive impact on stock of housing in Nigeria, in the short-run. This does not collaborate with the study of Amirah (2000).This is due to the fact that increase in interest rates discourages borrowers from borrowing fund for housing development.

Further findings from the analysis of the short-run estimation in model two showed that changes in the previous year of mortgage finance have a positive significant effect on the current value of mortgage investments; this is found to be in agreement with the work of Quijano (2003). The

result also revealed that changes in the previous two periods' lag of mortgage bank deposits have positive and significant effect on mortgage investment in the short-run. The findings conforms the work of Omirin (2007) who averred that the amount of savings determine the amount of investment in housing in Nigeria. Similarly, the variation in the previous two period of inflation rate will lead to a significant but negative effect on investment in housing. This result collaborates with theoretical expectation and previous findings of Adesopo (2003).

## **Summary of findings**

From the result of these analyses, the following findings are summarized as follows:

- 1) Mortgage loan has significant and positive impact on housing development in Nigeria.
- 2) There is a significant and negative impact between cost of building and housing stock in Nigeria.
- 3) There is a positive significant impact between interest rate and housing stock in Nigeria.
- 4) There is a significant and negative effect between mortgage bank deposit and housing investment in Nigeria.
- 5) There is a positive significant impact between mortgage loan and housing investment in Nigeria.

## **5. Conclusions & Recommendations**

### **5.1. Conclusion**

This study has shown that mortgage loan has significant and positive impact on the development of housing in Nigeria. Also, the analyses of the result revealed that increase in other factors such as population growth, interest rates and mortgage bank deposits have significant and positive impact on housing stock, while cost of building material and inflation rates affect housing investment negatively. Basically, the role of finance in the development of housing in Nigeria is at minimal, as a result of government policies on housing which have been inconsistent. Though government has sought to encourage home ownership, inadequate funds have been channeled towards housing development. Funding of housing has been left in the hands of individuals who rely on the private housing sector for finance in development of housing. However, it is concluded that mortgage finance is the key element in housing development in Nigeria.

### **5.2. Recommendations**

The following recommendations are considered in line with the findings of this study:

- 1) Mortgage institutions should develop strategies to mobilize more deposits and ensure effective allocation of housing funds particularly for the low income earners. Such strategies includes: Mobilizing funds from the capital market such as housing bonds, savings and loans from co-operative societies also the introduction of special-purpose bonds designed to attract foreign investors, firm and individual in order to boost the available investible fund in the sector.
- 2) The negative effects of interest rate on mortgage loan requires that regulatory authority should determine appropriate interest rate for housing loans that would encourage an average income earner secure housing credit.

- 3) Incentive such as tax free policy for domestic building firms should be provided so as to encourage firms that produce building materials to produce at a cheaper and affordable cost.
- 4) Government should make provision for effective ways of increasing the national housing stock in its national plan, by showing commitment in executing its national housing plans and source for cheap funds that an average income earner could benefit.
- 5) Lastly, an enabling environment to encourage private housing sector participation in long-term housing finance should be created by providing infrastructure, enhancing soundness and competitiveness of mortgage institutions and assuring property.

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