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**HOUSING, FINANCING AND NATIONAL HOUSING UNIT IN NIGERIA. A VARIANCE DECOMPOSITION  
AND IMPULSE RESPONSE APPROACH (TVIR)**

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**Abstract**

This paper investigated the Measures of Financing Housing such as Mortgage Financing Investments (MFI), Federal Mortgage Loans (FML), Primary Mortgage Loans (PML), Total Mortgage Deposits (TMD) and Mortgage Interest Rate (MIT) on the National Housing Units (NHU) in Nigeria using Variance Decomposition, and Impulse Response Approach. The results of the  $(\text{Log}_e)$  series showed that in the short run of period 1, 100% percentage of forecast variance in Housing development explained itself. While in the long-run of period 10, the percent of the forecast error variance becomes 78.79% revealing that  $(\text{Log}_e\text{NHU})$  variable tends to dwindle as we further into the future. For the correlation between  $(\text{Log}_e\text{MIF})$ ,  $(\text{Log}_e\text{PML})$ ,  $(\text{MIT})$ ,  $(\text{Log}_e\text{FML})$  and  $(\text{Log}_e\text{TMD})$  on  $(\text{Log}_e\text{NHU})$  only  $(\text{Log}_e\text{FMI})$  and  $(\text{Log}_e\text{TMD})$  positively influenced  $(\text{Log}_e\text{NHU})$  in Nigeria. The shock of  $(\text{Log}_e\text{NHU})$  to  $(\text{Log}_e\text{MIF})$ ,  $(\text{Log}_e\text{FML})$  and  $(\text{MIT})$ , react positively into the future. The innovations of the shock of  $(\text{Log}_e\text{NHU})$  to  $(\text{Log}_e\text{PML})$  and  $(\text{Log}_e\text{TMD})$  exhibit negative effects into the future. However, percentage forecast error of variance of  $(\text{Log}_e\text{MIF})$ ,  $(\text{Log}_e\text{PML})$ ,  $(\text{MIT})$ ,  $(\text{Log}_e\text{FML})$  and  $(\text{Log}_e\text{TMD})$  on  $(\text{Log}_e\text{NHU})$ . Only  $(\text{Log}_e\text{FMI})$  and  $(\text{Log}_e\text{TMD})$  confirmed some percentage of negligible influence on  $(\text{Log}_e\text{NHU})$  in the long run of period 10 by aggregated of 71.4%.  $(\text{Log}_e\text{NHU})$  in Nigeria driven by  $(\text{Log}_e\text{MIF})$ ,  $(\text{Log}_e\text{TMD})$  and  $(\text{MIT})$ . The study recommended the implementation of domestic and foreign investments into RED sectors to boost the Nigeria economy.

**Keywords:** Mortgage Financing, Variance Decomposition, National Housing Units, Impulse Response Approach.

## **Introduction**

Housing is seen as one of the top three needs of man. Critical to man's ultimate survival in the society is the basic needs which housing is top the chart. This, as stated earlier may be the reasons for the consequent programs of assistance in the areas of finance, infrastructural implementation and research that have over the years, the government of Nigeria has been making efforts to implement housing policies that can cover the rising population resulting from migration of the population to the urban areas. Easy access to financing inadequate quantity accelerates property which of course allows a convenient and operational linkage between the investors, savers and the consumers of housing funds. The provision of housing units and estate development has since became the wake of independence, engaged the attention of the governments and most citizens been designed by governments to enhance adequate housing delivery (Oyedokun et al, 2013). This was further justified by their claim that financing is a critical factor in ensuring housing provision development in Nigeria, as there must be massive capital outlay to achieve this individual and government objective. Secondly, the rising demand for housing (which outweighs the supply of housing) due to modern urbanization further exerts pressure on the need for the government to develop the housing market (Windapo, 2010).

Hence, to address this demand-supply gap, individuals, firms, and government often resort to house-sharing, owning and letting of estate properties. However, in developed economies of the world such as Great Britain, the United States of America and Denmark, the collective approach of owning a house is through a well-structured mortgage scheme (Olotuah, 2006). The objective of this study is to ascertain the relationship between Housing, Financing measures (Mortgage Financing (MFI), Federal Mortgage Loans (FML), Primary Mortgage Loans (PML), Total Mortgage Deposits (TMD) and Mortgage Interest Rate (MIT) on National Housing Units (NHU) in Nigeria using Variance Decomposition, and Impulse Response Approach. (TVIR)

## **Literature Review**

### **Conceptual Frame Work**

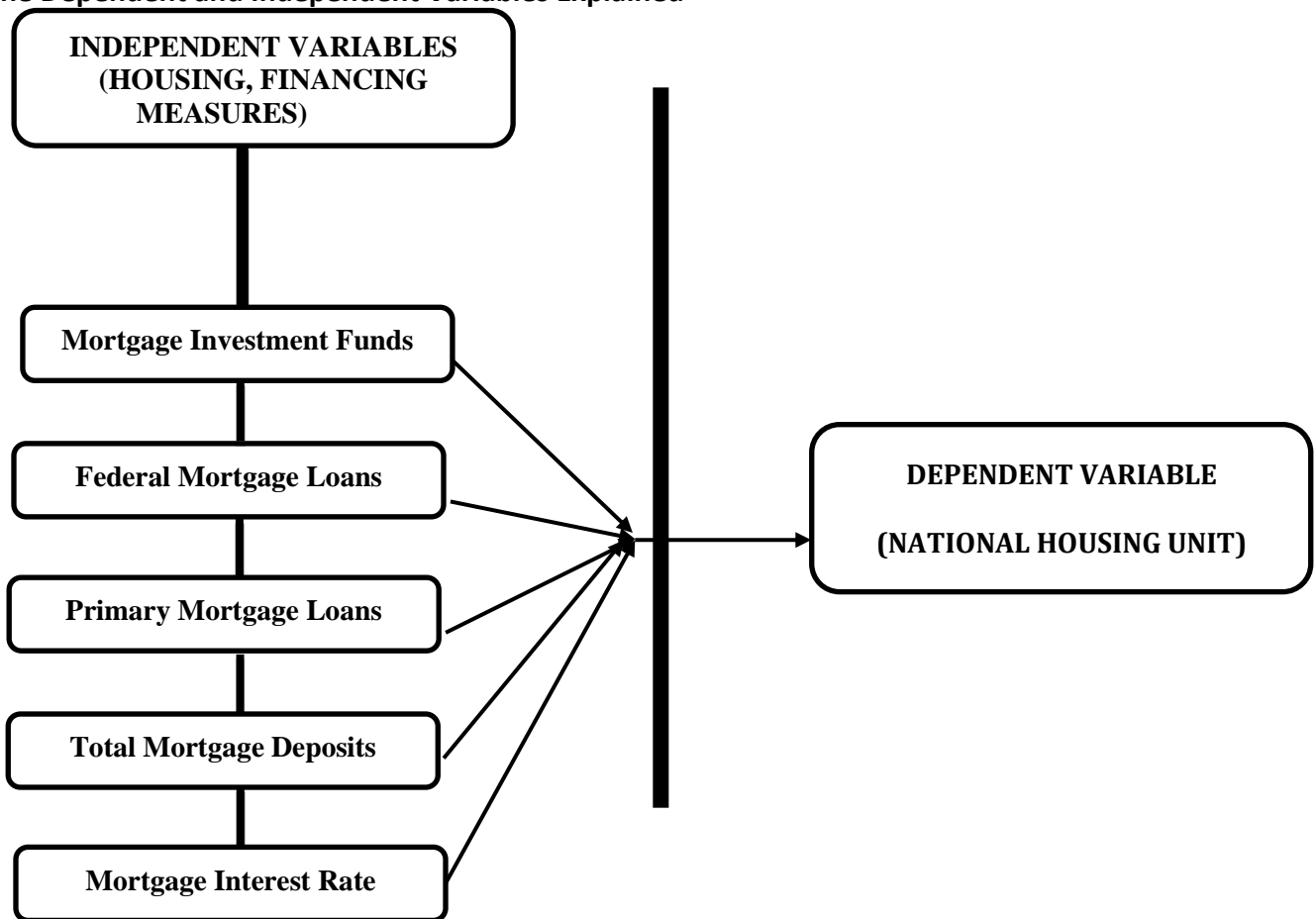
Housing arrangements in Nigeria came into operation following the National Housing Fund decree number 3, 1992 which was to ensure that every Nigerian build his own residential house at affordable price. The arrangement is that, via the pool of funds, the scheme would be given the financial leeway to mobilize affordable funds which would be given out to the Nigerian public on a long-term basis. Also, this pool of fund should collaborate with the capital markets, specialized banks, commercial banks, as well as insurance companies, to achieve these core mandates earlier stated. Again, to efficiently mobilize deposit, the NHF also relied on federal government budgetary allocations to the sector, voluntary donations, mandatory donations, and cooperative societies. Specifically, voluntary donations account for deposit mobilized by a private entity, government, and the CBN, all in an attempt to ensure that the core mandate of the scheme is achieved.

The financial arrangement is such that the PMIs (private sector) are encouraged to use both her material and financial resources to better the housing sector. In like manner, the federal government also used the contractual savings as a fiscal policy measure to safeguard the asset and liabilities of individuals that invest in the scheme. Ukwai et' al (2012) also stated

that CBN imposed mandatory donations on all commercial banks and PMIs intending to bridge the housing demand-supply gap. To participate in the scheme, all employees are expected to earn at least N3,000 yearly and must on yearly basis contribute 2.5% of their annual income into the scheme at a deposit rate of 4% in the case of saving deposit while 10% of bank credit facility to the scheme at a deposit rate of and 1% above demand deposit account. Subsequently, these funds are transferred to the FMBN through a well-structured mechanism thereby transferring the debt burden to the FMBN and not the DMBs.

Furthermore, both insurance companies and the Nigerian Social Insurance Trust Fund (NSTIF) were also directed to invest at least 20% and 40% of their general business and life funds -respectively into the scheme of which half of it must be challenged through FMBN, at a deposit rate of not more than 4%. Again, the insurance decree No. 59 of 1976 and the Trustee investment Act No 13 of 1962 also encouraged the Nigerian insurance sector to invest huge of the funds in the housing sector (Windapo, 2010). Lastly, cooperative societies also pool individual members' funds to advance credit to their members at affordable lending rate. In most semi-urban areas in Nigeria, they deal majorly on the acquisition of land and landed properties. Notably, they also aid their members to meet their housing needs by given soft housing loans (Yinusa et' al, 2017).

Moreover, the CBN over time has also encouraged and supported the NHF in actualizing this herculean task. Particularly, the CBN via her credit extension policy, at different times have directed DMBs to keep a stipulated minimum share of credit facility to the construction/housing sector. For instance, the Nigerian DMBs gave 5% of her aggregate loans and advances to the construction sector from 1978 to 1980. However, it increases from 6% to 13% in 1981 and 1982. Where DMBs did not meet the agreed target by CBN, the variance was filled by the apex bank from the DMBs' cash deposit with CBN. In 1993, the financial system was liberalized. This led to this discontinuance of the scheme(Ogu and Ogbuozube, 2011). The loan composition in the insurance sector evidenced that the insurance sector has contributed immensely to mortgage finance in Nigeria over the years(Olufemi and Oluwaseyi, 2016).



**Figure 1: Framework of Housing, Financing Measures and National Housing Unit**

*Source: Author’s Conceptual Framework 2020*

**Mortgage Investment Fund**

**Specialized Institutions**

The main specialized institutions which compete with the housing sector in the areas of housing development include mortgage banks, building societies, and semi-governmental agencies (Olufemi and Oluwaseyi, 2016).

**State/Municipal Government**

Omotosho (2018) averred that State governments have also been recognized to involve in mortgage finance through its impacts on the housing sector have been minimal. Various sources of funding include budgetary allocations coupled with credit facilities gotten from mortgage institutions. These funds are further channelled via state finance corporations. Indeed, most states set up state housing corporations in the 1960s. In a bid to achieve these objectives, the government pursued the following policy objectives:

- i. Encourage and promote active participation in housing delivery in all tiers of government.

- ii. Strengthen institutions within the system to render their activities more receptive to demand.
- iii. Highlight the housing investment that satisfies basic needs.
- iv. Encourage greater participation by the private sector in housing development.

### **Institutional Environment for Housing Delivery in Nigeria**

The Institutional environments/arrangement for Housing Delivery in Nigeria includes the federal government, state government, local government, PMIs, FMBN, etc.

Acha (2007) stated that the main functions of these institutions include policy formulation, execution, control, coordination, and provision of conduit for sourcing of funds and distribution to various individuals in the country. For example, the FHA prepares and submits the FGN all application for NHF. They as well make suggestions to the federal government on state and urban housing development, water supply, communication, and provision of houses. The FMBN also serves as the topmost mortgage institution in Nigeria. However, it is the responsibility of the PMIs to disburse such loans to the Nigerian populace. More so, most of the rules put in place by the FMBN is stringent.

Various state governments established agencies to carry out the housing scheme of meeting the housing needs of Nigerians as well as make available the needed infrastructure that enhances the real estate sector (Kabir and Bastani, 2012).

### **Appraisal/Assessment of Housing/Mortgage Finance in Nigeria**

Ezimuo et'al (2014) did a thorough investigation on the mortgage finance in Nigeria revealed that though the federal government has launched different interventions in the sector yet her contribution to the nation's GDP is minimal over the years.

In regards to deposit mobilization, the NHF initiative recorded fair performance as it contributed more than 20, 073.0 Million as 31<sup>st</sup> of December, 1997. Also, the total deposits FMBN mobilized as at 30<sup>th</sup> September 2000 was estimated at N5.8billion but was only granted a credit facility of N375 million. On the overall, available evidence reveal that house finance generally has been declining over time. The average share of GDP invested in housing declined from 3.6% in the 1970s to less than 1.7 % in the 1990s and has been declining since then. Also, the volume of time deposits and savings investment with the banks and non-bank financial institutions grew by 604.94 per cent from N 54billion to N 385.2 billion in 1992 and 2001 respectively. However, the proportion held by the housing finance institutions declined from 1.4 per cent to 0.22per cent in 1998, indicating a fall in the flow of funds into the housing finance sector (Dung-Gowom and Mallo, 2010).

### **Evaluation of Existing Methods of Finance**

**Prior Method** Before the advent of the Colonial master, the existing traditional methods of house financing in Nigeria include the Esusu, Age Grade Associations, Ajo, Town Unions, Money Lenders, Village Development Initiatives, Social Clubs, Aaro or Owe, and the likes. But as the needs of consumers became more sophisticated coupled with the advent of globalization, all these traditional methods of financing gave way for a modern source of financing to come in (Emoh and Nwachukwu, 2011).

**Modern Method** Notably, the modern sources of financing are categorized into a formal (structured) and informal (unstructured) source of funding. They are explained thus:

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**Formal Source:** Formal sources cover all institutions that are backed by law to operate under severe monitoring by the federal government. Various examples of formal sources include the FMBN, banks (commercial banks and merchant banks), specialized banks, and non-banking institutions (insurance companies).

However, political instability, inept management, policy inconsistency and the likes have also adversely affected the FMBN since its inception in 1977 (Adeniyi, 1996).

Furthermore, commercial Banks played an instrumental role in granting short-term loans to individuals in need of liquidity. However, this has not been compatible with housing finance, which requires long term finance. This has limited their success in housing finance. On the other hands, merchant Banks accept only large time deposits, from corporate organizations and high net worth individuals, with maturity, dates up to five years. They hold small cash reserve in the vault, unlike conventional banks. They offer bridge financing to property developers at very high and competitive lending rates, usually on a short-term basis. (Anthony and Uduak, 2014).

However, these banks have been financed with loan diversion, inadequate finance, inept management and the likes (Onuorah and Okafor, 2019).

Moreover, the National Providence fund amasses funds from employers and employees towards their retirement. This gives them to obtain long-term funds and put them in a good position to finance housing development.

Pension funds such as the National provident Fund (NPF) amass funds from employers (particularly government parastatals and large scale businesses) and staffs. As such it has long term undertone since employers can get their benefits or retirement gratuities only after having their jobs. Thus, they usually look for an investment that offers long term prospects and is inflation-proof like real property development or acquisition. They also offer loans on a long-term basis to building societies and mortgage institutions. (Okonkwo, 1999)

**Informal Sector:** Informal sector is sectors that are non-taxable and whose incomes are not reflected in the nation's income account. Notably, this sector account to about 60% of the labour force in the big cities of Nigeria (Nubi, 2000). Various examples of the formal sector include private money lenders, family or personal savings, as well as the charitable housing movements. As of 1979, it became crystal clear that there are wide housing gaps in Nigeria and that most homeless people both in the cities and villages were not attended to despite the huge profits companies make yearly. This forced the housing sector to make a decree in 1979 to fill the housing gaps in Nigeria. Consequently, the decree suggested that at least in three consecutive quarters, 500 employees should build 50 housing units. This decree, therefore, put in place soft loans for boards in each state of the federation. It also takes into consideration the need analysis of different categories of workers (Okonkjo, 2013).

The significant contribution of this initiative is that of easy accessibility. where there is an enabling environment in place, this program would have flourished in Nigeria but did not see the light of the day since financial intermediaries work at par with this directives. Satellite town in Lagos state is the only nostalgia of the decree with only 19 companies which agreed to this decree. The problem of ownership after the retirement of occupying staff made nonsense of the decree. More so, though various individuals have used various financing strategies such as loan syndication, Pre-letting, and, others to finance various housing schemes in Nigeria.

Unfortunately, though house finance is a herculean task yet its impacts are minimal (Mogaji, 2011)

### **Theoretical Issues**

The theoretical transmission mechanism for founding housing are presented below as:

- 1 The Loanable Funds
- 2 The Title Theory
- 3 The Lien Theory

### **The Loanable Funds Theory**

Nzotta (2004) posited that in finance and economics parlance, the loanable fund's theory is a hypothetical market approach which bridges the gaps between borrowers and savers within an economy. Again, this theory also takes into account both the funds at the disposal of the banking industry and lending institutions as well as the funds used by corporate firms and households to finance their recurrent expenditure. Within an economic system, the savers have the sole responsibility of buying government bonds and securities thereby transferring such funds to the financial institutions which serve as loanable funds (financial assets) to these financial institutions. In Like manner, these financial institutions extend these financial assets to the needy society (borrowers) in consideration for a lending interest rate plus the principal sum.

ShuaribuansAliyu (2018) stated that one of the major conduits through financial institutions especially the banking industry extends these financial assets to the deficit economic units (borrowers as the case may be) is through the sales of government bonds and securities.

### **The Title Theory**

This theory states that once the mortgagee fully meets all the rule of engagements with the mortgagor, the mortgagor is under obligation to transfer title ownership to the mortgagee and

he/she in turn pays all his/her outstanding debt before title ownership is transferred to him/her. Conversely, in a situation where in the mortgagee fails to do so, title ownership still resides with the mortgagee. However, wherein the mortgagee meets all requirements but the mortgagors voluntarily decide not to transfer title ownership to the mortgagee, he/she has the civil right to sue the mortgagor for not abiding by the rules of engagement.

### **The Lien Theory**

This is one of the most popular theories in mortgage finance and has gain prominence in many countries. This was propounded by Hester (1995). Unlike the title theory, this theory holds that, once the contract is consummated between the mortgagor and the mortgagee, title of the asset still resides with the mortgagor and as such place, a lien on the property should the mortgagee default he/she (mortgagor) have the legal right to sell the property and that the mortgagee for no reason can sell the property until the lien is removed.

The basic rule of both the title theory and the lien theory is that be it precedence of deeds the instrument recorded first where there is no fraudulent activity is the functioning and effective one. To avoid such situations, mortgages must be recorded instantly It is from the idea of having the first lien against the real estate (property) that the term "first mortgage" was

derived. The term "first mortgage" simply means that the party holding such instrument has recorded mortgage first in point of time and thus has precedence over any subsequently recorded mortgages. As such, mortgages can be in form of first, second, third, fourth, fifth as the case may be depending on the order of recording as cited by Dobson (1976)

Blasko and Sinkey (2005) observed that nations with well-established housing funding system experience lower construction costs and the use of housing assets to support broader investment opportunities through formal institutional frameworks. This suggests that the financial market is central to the development process for real estate developers and investors (Miles *et al*, 2000). Fraser (2004) suggests a lack of access to private external finance results into demand-side difficulties like a dearth of information on informal financing methods in West Africa especially Ghana. Unlike most developing countries, adopt owned sweat equity, remittances from abroad to build their houses and barter arrangements

### **Empirical Review**

Beck, Kibuuka and Tiongson (2010) use household survey and panel data technique to investigate determinants access to mortgage deposit fund in Europe and resultants effect of household mortgage indebtedness in the event of a financial crunch. Among the factors were the poor capital base of the mortgage finance institutions which is as a result of inadequate loanable funds. Freeman and Harden (2014) investigated affordable homeownership, the incidence and effect of down payment assistance. The study adopted descriptive analysis and reveals that the performance of loan incorporating assistance from the seller-funded profit was conspicuously worse than other means.

Kamau (2011) did a study on the factors that influence investment in the real estate industry in Nairobi. The research design employed by the study was descriptive research and targeted all licensed real estate enterprises are located in Nairobi. The study concluded deregulation of the real sector is a necessary condition for revival of a healthy real estate investment sector, deregulation cannot by itself ensure that a full range of real estate investment accommodation is provided

Ezimuo, Onyejiaka and Emoh (2014) studied sources of real estate finance and their impact on property development in Nigeria as a study of mortgage institutions in Lagos metropolis and real estate investments. The study paid particular attention to the analysis of performance and contributions of mortgage institutions in Lagos metropolis. The finding revealed the performance and impact in terms of property development.

In Nigeria, Yinusa, Ilo, and Elumah (2017) examines the impact of primary mortgage loan on housing development. The study employed secondary data and a time series analysis for the period of 1992-2015. Urban population growth was the dependent variable while microfinance bank loans to mortgage, primary mortgage Loans to mortgage, and government allocation to housing were independent variables. The finding reveals that microfinance Bank loans to mortgage have a negative impact on housing development

(Olufemi and Oluwaseyi (2016) examined financing housing services delivery and its challenges in Nigeria. The study adopted descriptive statistics and found out that financial system used by the government has not been effective. (Ngugi, 2004) brought out that interest rates effect on the amount of credit to the economy is largely minimal. (Muguchia, 2012) shows a negative relationship between flexible interest rates and mortgage financing.



## Methodology

The models for this study are presented thus using the approach to the data analysis in this paper is termed Variance Decomposition Impulse Response Analysis (VDIR). The growth rate of Housing Financing and Housing Units in Nigeria is the ratio of the difference between the two successive years (Current -Previous)year divided by previous year multiplied by 100. The results in indicate the percentage growth rate of mortgage financing and National Housing Unit in Nigeria from 1993 to 2019.

The calculation is explicitly explained as:

$Y_t$  = Current year,  $Y_{t-1}$  = Previous year and  $Y_R$  = Percentage growth rate

Mathematically, the growth rate is expressed as  $Y_t = \frac{(Y_t - Y_{t-1})}{Y_{t-1}} * 100$

$Y_t$  = The percentage growth rate is defined numerically as:

$$Y_t = \frac{(Y_t - Y_{t-1})}{Y_{t-1}} * 100 \quad \text{Current year} \quad 1.1$$

This means the percentage of each of the variable and

this is therefore applicable to all the variables under study as:

$$NHU = NHU_R = \frac{(NHU_t - NHU_{t-1})}{NHU_{t-1}} * 100 \quad 1.2$$

$$MIF = MIF_R = \frac{(MIF_t - MIF_{t-1})}{MIF_{t-1}} * 100 \quad 1.3$$

$$FML = FML_R = \frac{(FML_t - FML_{t-1})}{FML_{t-1}} * 100 \quad 1.4$$

$$PLM = PML_R = \frac{(PML_t - PML_{t-1})}{PML_{t-1}} * 100 \quad 1.5$$

$$TMD = DMD_R = \frac{(DMD_t - DMD_{t-1})}{DMD_{t-1}} * 100 \quad 1.6$$

$$MIT = MIT_R = \frac{(MIT_t - MIT_{t-1})}{MIT_{t-1}} * 100 \quad 1.7$$

Where,

$Y_t$  = National Housing Unit, (NHU) which represents the number of national housing units financed by federal mortgage bank in Nigeria

MIF=mortgage investment fund

FML =federal mortgage loans

PML=primary mortgage loans

DMD=total mortgage deposits

MIT = mortgage interest rate

The study operationalized the model in equation 2 by the logarithmic transformation of the model in equation 2 and it is defined as:

$$\nabla \text{LnNHU} = \beta_0 + \beta_1 \phi \text{Log}_e \text{MIF} + \beta_2 \phi \text{Log}_e \text{FML} + \beta_3 \phi \text{Log}_e \text{PML} + \beta_4 \phi \text{Log}_e \text{TMD} + \beta_5 \phi \text{Log}_e \text{MIT} + \delta \text{Ecm}(-1) + \varepsilon_t$$

$\delta$  = Speed of adjustment in error correction model (ECM)

$\text{Ecm}(-1)$  = Coefficient of Error Correction Model term

$u$  = the error term of the residual of the model

$\text{Log}_e$  = Natural logarithmic transformation of variables ( $\text{Log}_e \text{NHU}$ ,  $\text{Log}_e \text{MIF}$ ,  $\text{Log}_e \text{FML}$ ,  $\text{Log}_e \text{PML}$  and  $\text{Log}_e \text{DMD}$ ).

The independent variable of mortgage interest rate in the year (MIT) is not log-transformed in the model because the values are expressible in rates (Nzotta, 2004; Narayan and Smyth, 2005; Kemal, 2006; Nwachukwu, Abdulkadir, Ismaila, Mohammed, Solomon, Bola and Michael, 2016). The model 2 is used to enable computation of Variance Decomposition and Impulse Response Analysis (VIR).

**Analysis and Discussion of Findings**

**Result of Variance Decomposition**

The correlation ( $\text{Log}_e \text{MIF}$ ), ( $\text{Log}_e \text{PML}$ ), (MIT), ( $\text{Log}_e \text{FML}$ ) and ( $\text{Log}_e \text{TMD}$ ) on ( $\text{Log}_e \text{NHU}$ ) in Nigeria are reported in table 4.1.

**Table 4.1: Variance Decomposition of ( $\text{Log}_e \text{NHU}$ ):**

Period	S.E.	$\text{Log}_e \text{NHU}$	$\text{Log}_e \text{MIF}$	$\text{Log}_e \text{FML}$	$\text{Log}_e \text{PML}$	$\text{Log}_e \text{TMD}$	MIT
1	0.640665	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.860858	95.34512	0.011469	0.761125	3.609390	0.131101	0.141790
3	0.994455	93.24291	0.009223	3.142408	3.158924	0.298016	0.148515
4	1.075876	90.93291	0.633850	4.227866	2.972657	1.092004	0.140709
5	1.125154	86.44522	1.842379	4.301019	3.207525	3.933824	0.270036
6	1.153230	83.02690	2.462312	4.900836	3.653857	5.672279	0.283818
7	1.165923	81.23632	3.170233	5.140172	4.079363	6.094381	0.279528
8	1.174566	80.26037	3.996890	5.068044	4.230412	6.159062	0.285218
9	1.182620	79.64345	4.545513	5.139525	4.264906	6.075993	0.330614
10	1.192684	78.79939	5.096877	5.377584	4.266322	6.076468	0.383360

Cholesky Ordering:  $\text{Log}_e \text{NHU}$   $\text{Log}_e \text{MIF}$   $\text{Log}_e \text{FML}$   $\text{Log}_e \text{PML}$   $\text{Log}_e \text{TMD}$  MIT

Based on table 4.1, the percentage of the forecast error of variance of National Housing Unit ( $\text{Log}_e \text{NHU}$ ) indicates that, in the short run of period 1. While 100% percentage of forecast variance in NHU can be explained by itself while in the long run of period 10, the percentage of the forecast error variance becomes 78.79% revealing the National Housing Unit variable tends to dwindle as we further into the future.  $\text{Log}_e \text{NHU}$  is strongly endogenous. Strictly weak

exogeneity existence among the independent variables, ( $\text{Log}_e\text{MIF}$ ), ( $\text{Log}_e\text{PML}$ ), ( $\text{MIT}$ ), ( $\text{Log}_e\text{FML}$ ) and ( $\text{Log}_e\text{TMD}$ ) indicating the negligible influence on ( $\text{Log}_e\text{NHU}$ ) in Nigeria by 0.00 percentage in the short run.

**Table 4.2.2: Variance Decomposition of  $\text{Log}_e\text{MIF}$**

Period	S.E.	$\text{Log}_e\text{NHU}$	$\text{Log}_e\text{MIF}$	$\text{Log}_e\text{FML}$	$\text{Log}_e\text{PML}$	$\text{Log}_e\text{TMD}$	MIT
1	0.219954	6.617082	93.38292	0.000000	0.000000	0.000000	0.000000
2	0.351416	2.641029	70.43623	22.62288	0.007762	0.454991	3.837115
3	0.413559	3.549845	65.15645	25.23561	0.610474	1.975772	3.471847
4	0.507559	3.228298	67.08446	22.10740	3.062741	1.724063	2.793035
5	0.600558	2.320334	66.13388	21.06938	5.643452	1.476652	3.356303
6	0.683583	2.008582	64.17002	19.55049	8.009919	2.411294	3.849700
7	0.777034	2.157258	62.61083	17.89985	9.815221	3.243697	4.273146
8	0.874223	3.111363	60.22443	16.60670	11.22563	3.953162	4.878711
9	0.972317	4.536486	57.63073	15.27296	12.46357	4.792496	5.303749
10	1.074947	6.290665	55.35120	13.95595	13.49489	5.322046	5.585254

Cholesky Ordering:  $\text{Log}_e\text{NHU}$   $\text{Log}_e\text{MIF}$   $\text{Log}_e\text{FML}$   $\text{Log}_e\text{PML}$   $\text{Log}_e\text{TMD}$  MIT

In table 4.2.2, percentage of the forecast error of variance of mortgage investment fund ( $\text{Log}_e\text{MIF}$ ) reveals in the short run of period 1, there exists 93.4% forecast variance in ( $\text{Log}_e\text{MIF}$ ) explained by itself. While in the long run of period 10, the percentage of the forecast error variance becomes 55.35% revealing the ( $\text{Log}_e\text{MIF}$ ) variable tends to decrease as we further into the future concerning in Nigeria. ( $\text{Log}_e\text{MIF}$ ) is strongly exogenous. Strictly weak exogeneity existence among the independent variables ( $\text{Log}_e\text{PML}$ ), ( $\text{MTR}$ ) and ( $\text{Log}_e\text{TMD}$ ) indicating the negligible influence on ( $\text{Log}_e\text{MIF}$ ) in Nigeria by 0.00 percentage in the short run.

**Table 4.2.3: Variance Decomposition of  $\text{Log}_e\text{FML}$ :**

Period	S.E.	$\text{Log}_e\text{NHU}$	$\text{Log}_e\text{MIF}$	$\text{Log}_e\text{FML}$	$\text{Log}_e\text{PML}$	$\text{Log}_e\text{DMD}$	MIT
1	0.556963	80.15601	3.737959	16.10603	0.000000	0.000000	0.000000
2	0.724403	81.46329	3.881446	12.21998	2.434380	0.000412	0.000487
3	0.860448	82.12901	5.677434	9.680241	1.793431	0.087264	0.632623
4	0.968254	77.95265	10.46525	7.659291	3.054540	0.224527	0.643744
5	1.047179	71.71852	15.12452	6.562895	4.697994	1.301857	0.594217
6	1.106860	66.52880	18.47568	5.926491	6.839336	1.524400	0.705292
7	1.159744	61.51115	22.06211	5.416614	8.691397	1.394180	0.924551
8	1.209814	56.89560	25.26307	5.355122	9.834303	1.340105	1.311793
9	1.259308	52.77715	27.56250	5.573217	10.65296	1.629500	1.804673
10	1.314452	48.77644	29.51797	5.973340	11.28619	2.180019	2.266034

Cholesky Ordering:  $\text{Log}_e\text{NHU}$   $\text{Log}_e\text{MIF}$   $\text{Log}_e\text{FML}$   $\text{Log}_e\text{PML}$   $\text{Log}_e\text{TMD}$  MIT

Percentage of the forecast error of variance of federal mortgage loans ( $\text{Log}_e\text{FML}$ ) in table 4.2.4 confirms in the short run of period 1, about 16.1% percentage of forecast variance in

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(Log<sub>e</sub>FML) is explained by itself. However, in the long run of period 10, the percentage of the forecast error variance becomes 5.97% revealing the (Log<sub>e</sub>FML) variable tends to decrease as we further into the futures (Log<sub>e</sub>FML) is weakly exogenous. Strictly moderate exogeneity existence among the independent variables (Log<sub>e</sub>PML),(MIT), and (Log<sub>e</sub>TMD)) indicating the negligible influence on (Log<sub>e</sub>FML) in Nigeria by 0.00 percentage in the short run.

**Table 4.2.4: Variance Decomposition of Log<sub>e</sub>PML:**

Period	S.E.	Log <sub>e</sub> NHU	Log <sub>e</sub> MIF	Log <sub>e</sub> FML	Log <sub>e</sub> PML	Log <sub>e</sub> TMD	MIT
1	0.621039	1.624725	12.30522	0.177891	85.89216	0.000000	0.000000
2	0.945587	1.850214	19.39306	1.997977	73.91959	2.719602	0.119558
3	1.066186	2.317295	18.40317	2.290093	72.58834	2.188743	2.212365
4	1.148070	3.015642	15.97431	1.984052	65.99478	8.915294	4.115924
5	1.215926	3.882801	14.48676	2.325478	59.47073	14.56840	5.265839
6	1.276209	6.632270	13.16886	2.750166	54.28268	17.17837	5.987648
7	1.327962	10.67015	12.16245	2.624737	50.52233	18.07847	5.941848
8	1.376006	15.52815	11.36126	2.457703	47.55536	17.39742	5.700115
9	1.426288	20.41332	10.57965	2.499681	44.77998	16.30294	5.424432
10	1.469598	24.05947	9.965489	2.811012	42.62031	15.38312	5.160602

Cholesky Ordering: Log<sub>e</sub>NHU Log<sub>e</sub>MIF Log<sub>e</sub>FML Log<sub>e</sub>PML Log<sub>e</sub>TMD MIT

From table 4.2.4, the percentage forecast error of variance of (Log<sub>e</sub>PML) indicates in the short run of period 1, there is 85.89% percentage of forecast variance in (Log<sub>e</sub>PML) explained by itself. Therefore, in the long run of period 10, the percentage of the forecast error variance becomes 42.62% revealing the (Log<sub>e</sub>PML) variable tends to decrease as we further into the future (Log<sub>e</sub>PML) is strongly exogenous. Strictly weak exogeneity existence among the independent variables (MTR) and (Log<sub>e</sub>TMD) indicating the negligible influence on primary mortgage loans (Log<sub>e</sub>PML) in Nigeria by 0.00 percentage in the short run.

**Table 4.2.5: Variance Decomposition of(Log<sub>e</sub>TMD) :**

Period	S.E.	Log <sub>e</sub> NHU	Log <sub>e</sub> MIF	Log <sub>e</sub> FML	Log <sub>e</sub> PML	Log <sub>e</sub> TMD	MIT
1	0.5707						
1	87	0.591722	0.147798	8.108505	8.314839	82.83714	0.000000
2	0.6984						
2	11	1.500329	21.00154	5.421170	14.91917	56.31719	0.840598
3	0.8619						
3	97	18.73465	14.35329	3.763985	19.86718	38.19827	5.082627
4	0.9467						
4	14	23.81884	11.94655	3.413372	20.99556	35.37641	4.449276
5	1.0066						
5	20	28.76589	11.41759	3.164644	20.47042	31.70459	4.476865
6	1.0766						
6	1.0766	34.45287	10.00165	3.137628	19.06282	28.56530	4.779716

	16						
	1.1221						
7	43	37.63165	9.221954	3.275684	18.22854	27.10086	4.541315
	1.1543						
8	82	40.27256	8.717997	3.357165	17.61482	25.65078	4.386685
	1.1837						
9	23	42.24287	8.389437	3.685998	17.03026	24.41261	4.238824
	1.2034						
10	78	43.28180	8.216337	4.134566	16.64303	23.62058	4.103687

Cholesky Ordering: : Log<sub>e</sub>NHU Log<sub>e</sub>MIF Log<sub>e</sub>FML Log<sub>e</sub>PML Log<sub>e</sub>TMD MIT

The table 4.2.5 reveals the percentage forecast error variance of (Log<sub>e</sub>TMD) in the short run of period 1, about the appreciable amount of 82.83% percentage of (Log<sub>e</sub>TMD) explained by itself. While in the long-run of period 10, the percentage of the forecast error variance becomes 23.62% revealing the (Log<sub>e</sub>TMD) variable tends to dwindle as we further into the future. (Log<sub>e</sub>TMD) is strongly exogenous. Strictly weak exogeneity existence among the independent variables, (MIT) shows the negligible influence on (Log<sub>e</sub>TMD) in Nigeria by 0.00 percentage in the short run.

**Table 4.2.6: Variance Decomposition of MIT:**

Perio d	S.E.	Log <sub>e</sub> NHU	Log <sub>e</sub> MIF	Log <sub>e</sub> FML	Log <sub>e</sub> PML	Log <sub>e</sub> TMD	MIT
1	1.415927	3.173613	0.251125	0.199103	0.195489	3.162145	93.01852
2	2.397125	1.135644	4.414008	6.081473	0.252342	52.66153	35.45501
3	2.790757	2.091737	10.28976	18.72493	0.392652	42.34227	26.15865
4	2.962495	6.213601	10.00643	19.18570	0.510838	38.48394	25.59949
5	3.158651	11.34736	9.180823	16.92109	1.770161	37.93997	22.84060
6	3.355200	15.36160	12.25706	15.31465	2.900752	33.76640	20.39953
7	3.555212	20.84869	12.47003	13.64645	4.085365	30.11208	18.83738
8	3.717864	24.01006	12.57957	12.55797	5.428401	27.93171	17.49228
9	3.861948	25.69463	13.81767	11.63865	6.455824	25.93713	16.45609
10	3.982683	27.13873	14.32206	10.94474	7.290618	24.45945	15.84440

Cholesky Ordering: Log<sub>e</sub>NHU Log<sub>e</sub>MIF Log<sub>e</sub>FML Log<sub>e</sub>PML Log<sub>e</sub>TMD MIT

Percentage of the forecast error of variance of (MIT) in table 4.2.6 reveals in the short run of period 1, 93.01% percentage of forecast variance in National Housing Unit can be explained by itself. In the long-run of period 10, the percentage of the forecast error variance becomes 15.84% revealing (MIT) variable tends to dwindle as we further into the future. (MTR) is strongly exogenous. Strictly weak exogeneity existence among the independent variables

(Log<sub>e</sub>NHU), (Log<sub>e</sub>MIF), (Log<sub>e</sub>PML) and (Log<sub>e</sub>FML)) indicating the negligible influence on National Housing Unit in Nigeria by 0.00 percentage.

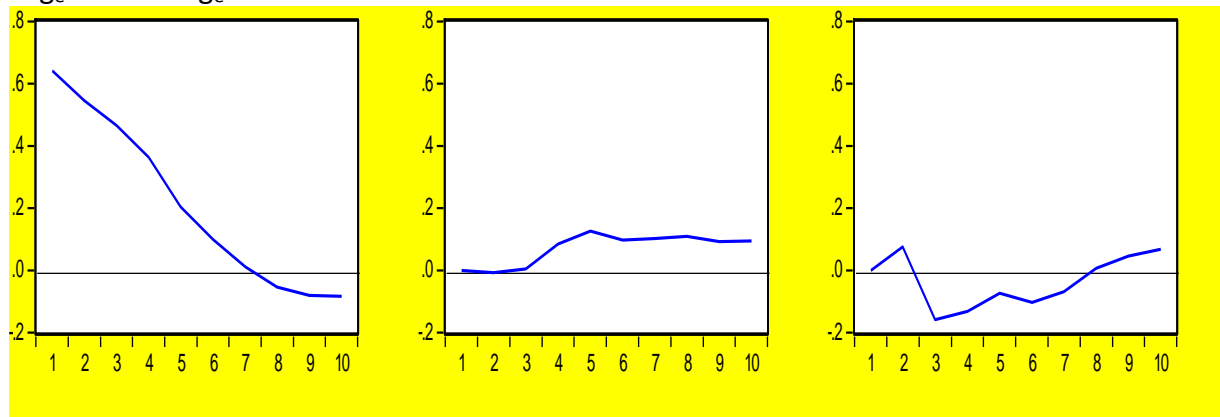
**Result of Impulse Response Analysis**

The findings of this study confirm that the impulse response function of VEC analysis to dynamic effects of the system when the model received the impulse. VEC model has six variables. The response between these variables was Performed to display the response function figure 1 and figure 2 explain the IRF of the model.

Response of Log<sub>e</sub>NHU to Log<sub>e</sub>NHU

Response of Log<sub>e</sub>NHU to Log<sub>e</sub>MFI

Response of Log<sub>e</sub>NHU to Log<sub>e</sub>FML

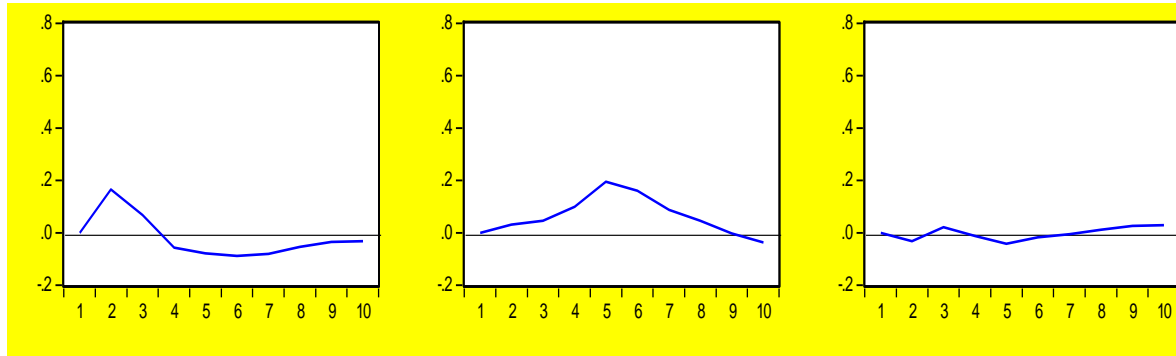


**Figure 2:** the impulse response of National Housing Unit (Log<sub>e</sub>NHU) to other mortgage variables.

From figure 2, from the left is the impulse response of National Housing Unit (Log<sub>e</sub>NHU) to National Housing Unit (Log<sub>e</sub>NHU). At period 1, the impulse of National Housing Unit (Log<sub>e</sub>NHU) response to itself positively. It begins to dwindle negative at each time responsive period. The National Housing Unit (Log<sub>e</sub>NHU) decrease gradually into the future at period 10. At every response of mortgage investment fund (Log<sub>e</sub>MIF) to National Housing Unit (Log<sub>e</sub>NHU) is positive, the value of mortgage investment fund (Log<sub>e</sub>MIF) fluctuates around the line zero, and begins to increase steadily with higher performance at period 4 through to 6 and becomes stable from period 7 into the future. Every response of mortgage investment fund (Log<sub>e</sub>MIF) fluctuates. The response of the mortgage investment fund (Log<sub>e</sub>MIF) positively increase from 1 to 2 periods and falls negatively at period 3. The response of National Housing Unit (Log<sub>e</sub>NHU) to mortgage investment fund (Log<sub>e</sub>MIF) possess negative perform for longer periods and become stable at period 8, hence increase positively from period 9 into the future period 10.

Response of  $\text{Log}_e\text{NHU}$  to  $\text{Log}_e\text{PML}$   
 $\text{Log}_e\text{NHU}$  to MITResponse of  $\text{Log}_e\text{NHU}$  to  $\text{Log}_e\text{DMD}$ 

Response of



**Figure 3:** the impulse response of National Housing Unit ( $\text{Log}_e\text{NHU}$ ) to other mortgage variables.

From figure 3, the impulse response of National Housing Unit ( $\text{Log}_e\text{NHU}$ ) to primary mortgage loans ( $\text{Log}_e\text{PML}$ ) signals a positive effect from period 1 to period 3. Primary mortgage loans ( $\text{Log}_e\text{PML}$ ) reacts negatively low to  $\text{Log}_e\text{NHU}$  within successive periods of 4 to 10 respectively. Relatively increase in 2 standard deviations of response or reactions National Housing Unit ( $\text{Log}_e\text{NHU}$ ) to total mortgage deposits ( $\text{Log}_e\text{TMD}$ ) from periods 1 to 5 with peak innovation at period 6. The effect of National Housing Unit ( $\text{Log}_e\text{NHU}$ ) to total mortgage deposits ( $\text{Log}_e\text{DMD}$ ) falls negatively into the future. Successive fluctuations exist in the reactions of National Housing Unit ( $\text{Log}_e\text{NHU}$ ) to mortgage interest rate (MIT) from period 1 to period 6 but positively stable at periods 7 and 8. The innovation or shock of National Housing Unit ( $\text{Log}_e\text{NHU}$ ) to mortgage interest rate (MIT) has a positive effect from period 9 into the future.

### Conclusion

The study concluded, that percentage of the forecast error of variance in ( $\text{Log}_e\text{NHU}$ ) indicates that in the short run of period 1, 100% percentage of forecast variance in ( $\text{Log}_e\text{NHU}$ ) explained itself. While in the long-run of period 10, the percentage of the forecast error variance becomes 78.79% revealing the ( $\text{Log}_e\text{NHU}$  variable tends to dwindle as we further into the future.  $\text{Log}_e\text{NHU}$  is strongly endogenous. Strictly weak exogeneity existence among the independent variables ( $\text{Log}_e\text{MIF}$ ), ( $\text{Log}_e\text{PML}$ ), (MTR), (LNFMLS) and ( $\text{Log}_e\text{TMD}$ ) indicating the negligible influence on ( $\text{Log}_e\text{NHU}$ ) in Nigeria by relatively smaller percentage respectively. Of the mortgage financing variables, only ( $\text{Log}_e\text{FML}$ ) and ( $\text{Log}_e\text{TMD}$ ) positively influence the ( $\text{Log}_e\text{NHU}$ ) in Nigeria. This finding is in line with the studies of Adekokun, Akinradewo, Adegoke and Abiola-Falemu (2011) who confirmed that primary mortgage institutions were not adequate in number and that there was a wide difference between the amounts the mortgagors applied for and the amounts approved. It is in line with the loanable fund's theory that states the loanable funds market is a hypothetical market that brings savers and borrowers together, also bringing together the money available in commercial banks and lending institutions. The shock of ( $\text{Log}_e\text{NHU}$ ) to ( $\text{Log}_e\text{MIF}$ ), ( $\text{Log}_e\text{FML}$ ) and (MTR) react positively into the future. The innovations of the shock of ( $\text{Log}_e\text{NHU}$ ) ( $\text{Log}_e\text{PML}$ ) and ( $\text{Log}_e\text{TMD}$ ) exhibits negative effects into the future. However, percentage forecast error variance of ( $\text{Log}_e\text{MIF}$ ), ( $\text{Log}_e\text{PML}$ ), mortgage interest rate (MTR), federal mortgage loans ( $\text{Log}_e\text{FML}$ ) and (LNTMDS) confirm some percentage of negligible

influence on (LogeNHU) in the long run of period 10 by aggregated of 71.4%. (LogeNHU) in Nigeria is driven by the level of (LogeMIF), (LogeDMD) and (MTR). This study hovers around the Nigerian election circle and has contributed one of the major setbacks experiencing in bridging the gap of housing deficit in Nigeria.

### **Recommendations**

Based on the findings and conclusion, the study recommends that:

- i. Policy on stable mortgage interest rate regime capable of attracting domestic and foreign investments into real estate sectors of the Nigeria economy should be implemented
- ii. There should be deliberate attempts on the part of mortgage bank operations by introducing a digit interest rate on mortgage loans to enable affordability and ease accessibility to mortgage loans in Nigeria.
- iii. Presidential order must be devised and seen working to charge developers in the National Housing Unit in Nigeria therefore, renewing confidence on the investors (local and foreign). Also, the issue of land use and ownership should be looked into by the government to reduce or eliminate bottlenecks.

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