

# HOUSING AND ECONOMIC GROWTH NEXUS IN NIGERIA: DATA-BASED EVIDENCE

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## Abstract

Housing is considered as one of the cardinal measures of the state of an economy. This paper employed data-based evidence to explore housing sector-economic growth relationship in Nigeria during 1980-2015. Choice variables were real estate business services (REBS), building construction investments (BCI), property rights index (PRI) and human labor (L) engaged in the sector. Anchored on perceived interactions among the variables, articulated conceptual model preceded an analytic model modified from the endogenous growth model of economic theory. Graphical and econometric techniques were employed to analyze the data sets on the variables for trends in time series values of the variables; and the effects of the housing sector variables on growth of the economy. The results showed that housing services delivery had long-run relationship and significantly spurred growth of the economy. Further, housing services delivery and growth of the economy had high speed adjustment coefficient to long-run equilibrium growth path under stable structural housing sector services delivery and appropriate human labor mix participation. Therefore, the paper concluded that housing services enhanced growth of the economy, and emphasized the need for appropriate human, capital and financial policies for the sector to engender sustainable growth and development of the Nigerian economy.

**Keywords:** housing services delivery, co-integration, error correction mechanism, economic growth.

## 1. Introduction

Housing is one of the three basic needs of mankind following closely after food, which is the most important factor for the physical survival of man. It is among the important measures of the state of an economy. Housing is considered to be one of the best indicators of a person's standard of living and place in the society (Jiboye, 2009a). The concept transcends just providing a roof over one's head (Akinmoladun and Oduwaye, 2000). It forms the base upon which people could rebuild their lives following the disruptive impacts and trauma of homelessness (Smith, Albanese and Truder, 2014). Aside socio-economic and cultural relevance, housing engenders investment opportunities capable of promoting sustainable growth and development of an economy. Therefore, provision of adequate housing is an important measure of social welfare and economic development in any nation (Igbinoba, 2011). It is obvious that access to adequate housing is an international human right. At different times, governments of developed countries have played active roles in the housing sector for economic growth and development reasons. A housing sector may support poverty reduction and inclusive growth through its contribution to economic output, employment, generation of a demand for materials and related services, and improved standard of living of occupants (Doling, Vandenberg and Tolentino, 2013). However, uneven and unplanned urban growth usually place pressure on resources and limit the capacity to deliver housing and related infrastructural services (UN-Habitat, 2014).

Activities in the sector involve the process of providing safe, comfortable, functional and affordable shelter in a proper setting within a neighborhood, supported by continuous maintenance of the built environment for the daily living activities of individuals or families within the community with commensurate reflection of socio-economic and cultural aspirations and preferences (UN-Habitat, 2007, 2009). The sector also guarantees the sustainability of attributes of energy efficiency and resource conservation for improved quality of life (UN-Habitat, 2007, 2009). It has strong linkages for stimulating economic growth and development in a depressed or stagnant economy and raising the standard of living of the people. There are evidences of positive correlation between such indices as home ownership rates, housing-GDP nexus, and proportion of total mortgage loans to bank lending, on the one hand, and a country's level of development, on the other (Martin, 2005; Valadez, 2008; Igbinoba, 2011). Obviously, therefore, it is a key driver of socio-economic development.

However, the housing-economic performance relationship operates at different spatial levels. In recent years, policy makers and political leaders have started to establish stronger links between housing and economic development at various levels of the economy. The sector can be highly labor intensive, thus providing employment for a substantial part of the labor force. It has the potential to stimulate industrial activity through its strong backward and forward linkages to equipment, building materials and other consumer durables. A large proportion of the population depends directly or indirectly on real estate for means of livelihood, making it a significant determinant of rate of economic growth and development.

Nigerian governments have attempted various policies for affordable housing in the economic development plans. Examples include the National Housing, National Construction, National Urban Development and Prototype Housing Policies. However, the federal government has been cognizant that the sheer weight of housing delivery for the country's vast populace cannot be borne by mere politicking. The many factors have been identified in the Nigerian housing sector as constraints to the ability of most Nigerians to achieve the desired housing goal include increasing cost of land, high construction cost, interest rate-induced escalating financing cost, inadequacy of mortgage loans and the zeal for higher standard of dwelling places among Nigerians (Nubi, 2009; Nnanna, 2010; Igbinoba, 2011).

More importantly, the Nigerian housing finance system has over the years remained largely undeveloped and ill-equipped to mobilize and channel savings to the sector. Thus, the purchase, rental, construction and improvement of homes for the population seem not to have been significantly facilitated. As a result, the problem of housing in Nigeria has remained enormous and complex with the country's housing need put at 14 million units (Igbinoba, 2011). This is notwithstanding the obvious that housing as well as financing the sector has the potential to constitute a veritable source of a sustained income stream for government and its agencies. For instance, housing-related tax proceeds have the potential for considerable government revenues to finance viable social welfare and economic development programs. Further, the desire to purchase housing units is a primary motivation for household savings in the financial system. In effect, savings habit is promoted among low-income earners; welfare is enhanced and, ultimately sustainable economic growth and development are engendered. Hence, the efficacy of a national housing scheme transcends beyond just the housing sector. The relationship with the broader economy is reciprocal. The entire economy suffers in the case that the housing market and finance systems fail to supply requisite services. A poorly performing housing sector retards growth potentials of any economy. The situation is more devastating in a developing country such as Nigeria where contribution of the sector to gross domestic product (GDP) is recorded to be about 0.4% (Igbinoba, 2011). Though literature suggests that no society has been able to satisfactorily cope with its housing needs (Adedeji, 2004), Nigeria seems to have one of the worst housing deficit scenarios in Africa mainly owing to huge population size at more than 140 million (Igbinoba, 2011). Olotuah (2009) observed that lack of adequate housing in Nigeria, is a manifestation of poverty; the main reason why significant proportion of the urban dwellers live in high density housing and environmental conditions which constitute serious health hazard and threat to general productivity.

This paper intends to explore housing-economic growth and development nexus from the proposition that housing did not significantly induced economic growth in Nigeria during the 1980-2015 years. Based on the available data, the role of housing in growth and development of the Nigerian economy is examined. Specifically, the contributions of real estate and allied business services, property right index,

and labor force participation in housing sector service delivery participation in relation to economic growth and development in Nigeria during the 1980-2015 periods are examined. The paper has five sections as follows: (1) section one is the introduction; (2) section two is a review of available literature; (3) section three discusses the methodology employed; (4) section four dwells on data analysis and discussion; and (5) section five draws conclusion and proffers recommendations.

## **2. Literature review**

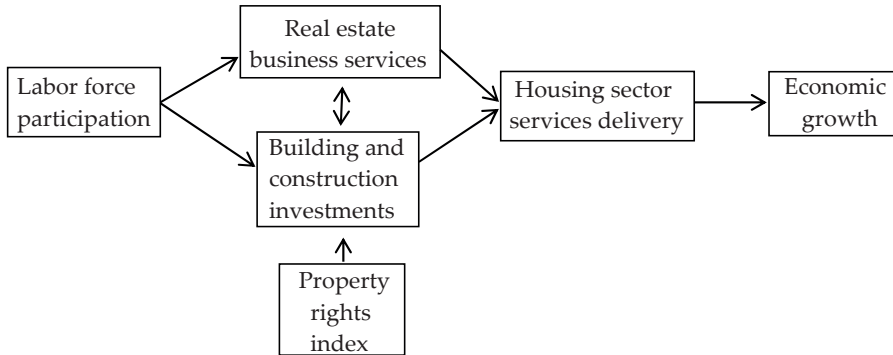
Studies have shown that the stability of affordable mortgages or rents can have far-reaching positive effects on childhood development and school performance (Brennan, Reed, Sturtevant, 2014) as well as enhance quality health indices for families and individuals (Maqbool, Viveiros and Ault, 2015; Enterprise Community Partners, 2014; Smith, Albanese and Truder, 2014). Moreover, the benefits of affordable housing extend beyond the immediate occupants of a decent house to the community at large. Affordable decent housing enhances employment and spending potentials in the economy. It is a veritable source of revenue for local governments, and reduces the likelihood of foreclosure and associated costs. These are among the proven linkages between affordable housing schemes and economic growth and development (Igbinoba, 2011).

### **2.1. Conceptual issues**

Housing has been considered as a compendium of services such as neighborhood residential homes, shelters, parks, schools, amenities and a place of comfort and security that facilitate accessibility as well as proximity to jobs, work places and other social environment (Daramola, 2006). It is an area of production or economic resources capable of generating resources to keep its maintenance as well as growth. In other words, it is a proven economic growth driver (Agbola, 1998, 2005; Chamberlain, 2005; Ikejiofor, 2005; Egunjobi, 2006; Nubi and Ajoku, 2009; Igbinoba, 2011). At international level, decent housing is a veritable indicator of the quality of life (Aribigbola, 2001; Daramola, 2006). This implies that the concept encompasses more than shelter or lodging for human habitation, and includes one's identity (Omoniyi and Jiboye, 2009). It has its roots in many areas of the world, especially as increasing proportions of the population have come to own their houses and places of shelter. In this context, shelter reinforces the idea that many other qualities derive from the place where people reside; more than a roof over one's head. As the largest single investment for most families, having very considerable demand linkages with the other sectors of the economy, housing has also played a significant role in the economies of many nations (Aaronson, 2000). Basically, Oduwaye (2009) considered the environmental and physical dimension of the concept of sustainable development.

Some other ancillary concepts are property development and housing market. Property development entails the economic activity that involves developing a bare but ripe site or upgrading an already developed site (Ojo, 2006). Providing accommo-

ation to be occupied by person engaged in development or for someone else is the basic reason for property development (Nuhu, 2007). Its essence normally includes owner-occupied, property-company, investment and local authority (Sangosanya, 1987). The concept of housing market, on the other hand, depicts the interactions between buyers and sellers of houses either directly by owners or indirectly through brokers (Investorworld, 2011). In economics exposition, it is simply the interfacing between supply and demand for houses, usually in a particular country or region (Housingmarket, 2008). An extension is the real estate marketing. The conceptual issues are reflected in Figure 1.



**Figure 1:** Housing Services Delivery-Economic Growth Model

**Source:** Authors' conceptual model (2016)

Based on the concept discussed, housing services delivery-economic growth model is conceptualized. The model considers labor force participation, real estate business services, and building and construction investments as input sources to the sector, with property rights index playing exerting moderating influences to that shape quality of housing services delivery which, in turn determines the contribution of the housing sector to national output and growth of the economy.

## 2.2. Theoretical considerations

Propositions for economic development exist in theoretical literature. These include the economic base theory, staple theory, sector theory, and classical liberty theory. Obviously, the theories vary in fundamental behavioral assumptions, approaches and processes. The economic base theory explains economic development as equivalent to the rate of local economic growth measured in terms of changes in the local levels of output, income or employment. Essentially, the theory hinges on the response of the basic sector to external demand for local exports, which in turn stimulates local growth. It strongly supports attracting industry through recruitment and place marketing. Major strengths of the theory are its popularity as a basis for understanding economic development and simplicity as a tool for prediction (Malizia and Feser, 1999). The major weakness is its inadequacy as a theory for understanding

economic development, especially in the long run. The Staple Theory explains economic development as sustained growth over the long run period, identifies industrial sectors as its basic anchorage. The main strengths are its historical relevance to North American economic development and emphasis on understanding the region's economic history. Its major drawback is that it describes, more than explains, the development process. Sector theory hinges on three aggregate sectors as basic springboard, namely: (1) the primary, secondary, and tertiary sectors. It explains that the level of development depends on sectoral diversity, with emphasis on a prominent tertiary sector, and labor productivity. The theory appears attractive and empirically testable. However, its anchorage sectors – the primary, secondary, and tertiary – seem too crude to be useful in practice (Todaro and Smith, 2009). Moreover, its overriding application is the need to attend to industries producing income-elastic commodities in order to achieve sustained growth. This theory can also be applied to the housing sector which is the primary focus of this paper. The Classical liberal theory considers economic development within the context of economic growth and capital formation. Capital formation is the driver of economic growth. Then it places emphasis on large-scale infrastructure projects as well as foreign aid and loans. Its variants are social theories of economic development which emphasize the importance of human capital in development. The drivers of economic growth include education, health, and fertility. It shifts concerns from the overall rate of economic growth to considerations of poverty, inequality, urbanization and other social ills.

### **2.3. Empirical studies**

In the literature, studies are rather somewhat scanty for the housing-economic growth and development relationships in Africa in general and Nigeria in particular. The few available studies in recent times include Ajala (2005), Adediji (2009), Oduwaye (2009), Jiboye (2009b, 2011), Olotuah and Ajenifujah (2009), Olotuah and Babadoye (2009), Jiboye and Ogunmakin (2010), Ugonabo and Emoh (2013). Some of the studies investigated the effects of housing on economic growth in Nigeria with the aim to determine the contributions of the sector to gross domestic product (GDP) of Nigeria. Tremendous effects of housing on economic growth in Nigeria via employment opportunity for those in the building business and thus increases in labor productivity, household incomes and ultimately the GDP of the country were established. While some of the studies were undertaken from macroeconomic perspective, others were from a microeconomic standpoint. The findings showed that the real estate contributed significantly to the growth and development of the economy. Similarly, Adediji (2009) examined international housing finance and world economic meltdown vis-à-vis housing delivery system in Nigeria. The author found that the presence of international housing finance scheme increased GDP growth via housing sector contributions. The study noted that the sector is among the ones undermined in the country, pointing out that government contributions to its development were still minimal. Jiboye (2011) analyzed sustainable adequate housing as the critical

challenge to effective governance in Nigeria. The author found that phenomenal rise in population and spontaneous increase in size of most Nigerian cities had led to acute shortage of affordable decent dwelling shelters. In a related study, Ugonabo and Emoh (2013) examined the major challenges to housing development and delivery in Anambra State of Nigeria. The study identified the factors inhibiting effective housing delivery to include lack of secure access to land, high cost of construction, limited access to finance, bureaucratic procedures, high cost of land registration and titling, uncoordinated policies and implementation at federal and state levels, ownership rights under the Land Use Act, lack of critical infrastructure, affordability gap, inefficient development control, youths harassment of developers, and inelegant revocation and compensation process.

#### *2.4. Overview of the Nigerian housing sector*

Despite conspicuous opportunities in the Nigerian housing market, the sector has remained largely untapped and undeveloped (Akeju, 2007). The situation is mainly owing to the constraints posed by finance, government policy, inadequate infrastructures and the excruciating poverty level. Average price of housing units has continuously increased due to the rising costs of building materials as well as inflation. The upward trend in the costs of constructing the houses has significantly affected the number of housing units constructed annually. Obviously, efforts of the governments at addressing the problems have not been successful because of policy summersaults and unsustainable approaches. The available houses are out of the reach of the larger proportion of the masses they are meant for. Despite considerable efforts by private individuals, the problem still persists, especially in the urban cities. A good number of property developers build for own use, while the few involved in building for commercial purposes seem to give preference for shops and office spaces because of the high income potentials from such type of commercial housing properties. In most cases, residential houses are informal, untitled, illegal and relatively small-sized. Fasakin and Ogunmakin (2006) noted that this is usually due to long, undue delay of title registration, and laxity in enforcing development control regulation by the official of the urban and regional planning departments.

The contribution of the private sector towards alleviating housing problem in Nigeria has been in the forms of individual efforts, cooperative societies, corporate bodies, estate agents, non-governmental and organizations as well as foreign investors. Individuals constitute the greatest contributing segment of the private sector. In the urban centers where the problem is more prevalent, greater proportions of the population live in residential houses built by private individuals. The houses are usually managed by estate agents or caretakers who are, in most cases only after their own financial and economic benefits. There are situations where the houses are not well managed thereby being of poor quality and derelict. In few cases, some private individual house owners manage their buildings themselves. The other contributing segment, cooperative societies, emanate from the age-long practice where individual

homeowners sought the help of family members, in-laws, neighbors and friends (Wahab, 1997, 1998). The practice has been very successful in countries like Italy, Sweden, the United Kingdom, Zambia, and Philippines (Daramola, 2006). It is suited to meet the needs of low income earners who constitute the vast majority of Nigerians. Members of cooperatives are able to enjoy housing loans for construction of their own housing units. Cooperatives also engage in land acquisition, processing of land title documents and building materials acquisitions for its members (Olotuah, 2009; Olotuah and Ajemifujah, 2009). Some cooperatives are specifically housing-oriented while some are not, though they engage in housing activities specifically for the benefits of their members. Also, some cooperatives are work-place based, while some others are formed along career and professional lines.

As highlighted earlier, other contributing segments are corporate bodies which house accommodation for their employees. This is in accordance with Federal Government of Nigeria's Employee Housing Scheme (Special Provision) Decree 54 of 1979, which mandates any employer of 500 employees to provide a minimum housing of 50 units of which 75% should be available for non-executive staff (Nubi, 2009). Though the gesture has been faced with serious challenge by intermediaries who increased the costs as well as the problem of ownership after retirement, it still offers better prospect for the private sector employees because the end users of housing can easily be reached (Nubi, 2009). Estate developers and or agents are yet other contributors. Activities of this group were concentrated in Lagos in early 1990s. The group plays significant role in the development of the Nigerian housing market (Efin A and FinMark Trust, 2010). They intensified efforts at providing adequate shelter to meet the demands of the increasing number of people having housing needs. Members of the segment often employ various finance techniques such as Turnkey, Pre-letting and Joint finance to construct housing units for the people (Nubi, 2009). The major challenge the group faces is that the costs of constructing housing units are usually higher than those incurred by individuals or cooperatives segments. Perhaps, this is due mainly to the group's preference for imported materials to ensure quality of construction adherence to the use of modern facilities. The result is that such housing units are usually out of the reach of the low-income earners. Owing to the gravity of housing problem in Nigeria, the impact of estate developers has been so insignificant in addressing the situation (Nubi, 2009).

In recent years, there has been increasing efforts by non-governmental organizations (NGOs) and voluntary organizations (VOs) such as religious bodies to addressing the housing problems in both rural and urban cities in Nigeria. The NGOs and VOs see to housing needs of their members and assist people displaced as a result of man-made and or natural disasters. Essentially, they assist in the aspects of homelessness and poverty (Efin A and FinMark Trust, 2010). A good example is the Multi Choice Network (MTN) Foundation Low Cost Housing Project started in Nigeria in 2005. The religion bodies such as Christian and Islamic organizations are now involved in acquiring large hectares of land and reselling it at a subsidized rate to



their members. They offer members loans at attractive interest rates, construct and let houses out to members at affordable rates. Some construct large estates with modern facilities for their members. Few of such religious bodies are the Redeemed Christian Church of God (RCCG), Living Faith Tabernacle Church (LFTC) and NAS-Nasrullahi, FAT-Faith (NASFAT). Foreign partners/investors group makes efforts towards alleviating the problem of housing in Nigeria. Through various development policies, the government encourages foreign investment in the Nigerian housing sector, especially in the form of foreign partnership with the local estate developers. The aim is to provide more capital base for the estate firms and thus enable them to undertake housing projects requiring huge capitals. The firms usually handle governments' housing projects that require large amount of financial capital, technical expertise and extensive knowledge.

All the contributing segments face the challenge of high inflation rate, which affects their performance in the real estate market development. The three tiers of government – federal, states and local – participate in housing delivery. Institutions responsible for housing delivery in Nigeria include Federal Ministry of Lands, Housing and Urban Development (FMLHUD), Federal Capital Territory Administration (FCTA), Federal Housing Authority (FHA), Federal Ministry of Works and Housing (FMWH), Federal Mortgage Bank of Nigeria (FMBN), Nigeria Building and Road Research Institute (NBRRRI), Federal Government Staff Housing Loans Board (FGSHLB), professional regulatory bodies in the built environment and multinational agencies.

### 3. Methodology

This paper employs time series analysis design based on relevant indices of housing delivery and indicators of economic growth and development. The data were generated from Statistical Bulletin of the Central Bank of Nigeria (Central Bank of Nigeria, 2015), and relevant publications of FMLHUD, FCTA, FHA, FMWH, FMBN, NBRRRI and FGSHLB. We decomposed the data into dependent and independent variables using multiple regression model of a functional relationship. The model is hinged on endogenous growth model (Romer, 1986, 1990). Romer (1986) expressed the functional relationship between output (proxy for economic growth), on the one hand, and contributions of labor and capital to growth, on the other hand, as follows:

$$Y = K^{\alpha}(AL_y)^{\beta} \tag{1}$$

where Y is output, A is stock of knowledge, K and L are capital and labor respectively. Labor use L is the sum of  $L_y$  and  $L_A$  ( $L = L_y + L_A$ ).  $\alpha$  is output elasticity of capital (K), and  $\beta$  is the output elasticity of labor use inclusive of knowledge.

Expressing the above function as a logarithmic linear equation translates to:

$$Y = \alpha K + A(1-\alpha)L \tag{2}$$

where  $\alpha$  is share of capital (K) and  $(1-\alpha = \beta)$  is the share of labor (L) in national output (Y).

In this paper, housing delivery indices are used as proxy for capital and L is assumed to be the role of human labor engaged in housing construction and allied services as an interactive variable. Equation (2) states that the growth rate of the economy depends on the contributions of housing investment and aggregate human labor participation. We indexed housing sector as H to suit the peculiarity of our analysis. We modified equation to obtain the following equation of the economic growth-housing sector relationship:

$$GDP = \beta_0 + \beta_{i,j} \sum_{i,j=1}^3 H + \beta_4 \sum L + \mu \quad (3)$$

Further, we decomposed the housing sector index into three sub-indices, namely: Real Estate and Business Services (REBS), Building and Construction Investment (BCI), and Property Right Index (PRI), while leaving the aggregate human labor component intact as L. That is, owing to the nature of data generated from the sources, L comprises skilled, semi-skilled and unskilled human labor participation in housing delivery activities. We substituted the economic growth proxy and housing indices into equation (3) to obtain the linear analytic model as follows:

$$GDP = \beta_0 + \beta_1 REBS + \beta_2 BCI + \beta_3 PRI + \beta_4 L + \mu \quad (4)$$

where GDP is economic growth and development proxy and REBS, BCI, PRI and L are as defined earlier. Intercept of the model,  $\beta_0$ , depicts level of economic growth and development that subsists in the absence of the housing sector services and human labor inputs.  $\beta_1$ ,  $\beta_2$ ,  $\beta_3$  and  $\beta_4$  respectively are the sensitivity coefficients of the respective housing indices and labor force in the housing sector, REBS, BCI, PRI and L.  $\mu$  is the stochastic variable to accommodate factors that might have influence on growth and development of the economy but which were not identified and explicitly included in the model.

Coefficients of the respective housing indices and human labor inputs were expected to be positively signed. Also, some level of economic growth and development was expected to subsist even when housing and human labor services were non-existent. Therefore,  $\beta_s$  ( $s = 0, 1, 2, 3, 4$ )  $> 0$ ; meaning that increases in growth and development were expected to increase with increases in housing services and labor force inputs.

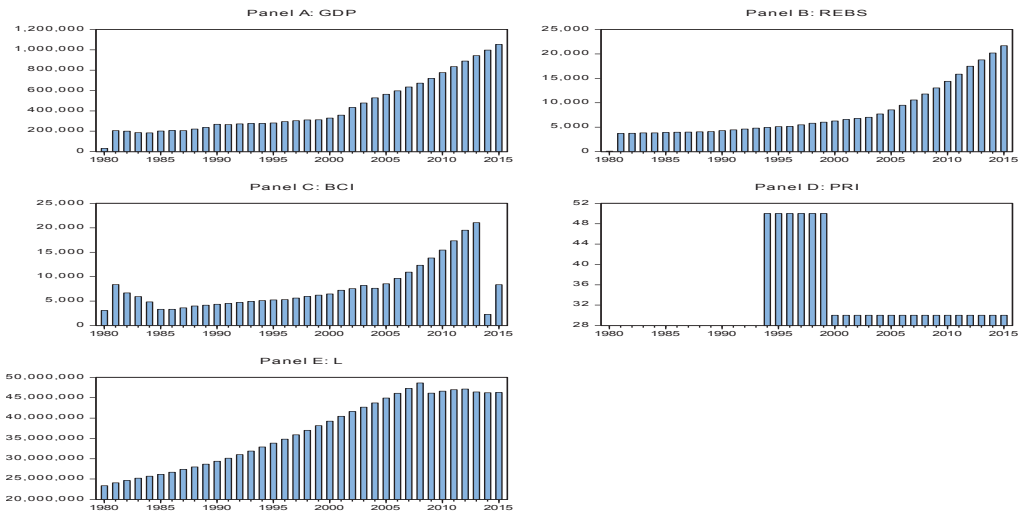
After graphical presentation of time series values of the data sets, we carried out some pre-estimation diagnostics of time series values of the housing and human labor input variables that entered the model. We employed Augmented Dickey-Fuller (ADF) unit root test procedure to ascertain the stationary property of time series values of the variables, on the decision rule that the absolute value of the ADF test statistic must be greater than the Mackinnon critical value at 5% level of significance. We also employed Johansen Co-integration test technique to examine the time series values of the variables for the existence of long run relationship. Finally, we used the

technique of error correction mechanism (ECM) to examine the adjustment speed of the variables to long run equilibrium from short run disequilibrium disturbance. One obvious limitation of the analysis is that data series on property right index (PRI) were not available prior to 1994 and as such that extrapolated values were used to augment the series for the diagnostic analysis. The analyses and results are discussed in the next section.

#### 4. Analysis, results and discussion

##### 4.1. Graphical presentation of the data sets on the variables

Trends in time series values of data sets on the variables are shown in Figure 2.



**Figure 2:** Bar charts of data sets time series values (1980 – 2015)

**Source:** Authors' computations, using Eviews8

The bar charts in Figure 2 show the graphical trends of gross domestic product (Panel A), real estate and business services (Panel B), building and construction investments (Panel C), property right index (Panel D), and human workers in housing delivery services (Panel E) in Nigeria during the years 1980-2015. Panel A indicates that gross domestic product (GDP) exhibited marginal upward trend from 1981 to 1994 before declining in 1995. Thereafter, GDP regained and sustained its upward trend through to 2015. Panel B indicates that real estate and business services (REBS) rose sharply from 1980 to 1981, but exhibited sustained declining trend from 1982 till 1995. It increased sluggishly from 1996 till 2012. However, it escalated and sustained considerable momentum through to 2015 thereby showing that real estate services delivery in Nigeria is steadily growing and increasing. That notwithstanding, building construction investments (BCI) exhibited somewhat fluctuating trend during the period as indicated by Panel C. With a sharp increase from 1980 to 1981, BCI declined steadily thereafter till 1985 only to pick up again from 1986, perhaps in response to the

Government's Structural Adjustment Program (SAP) of 1986. It sustained the tempo till 2003, aided possible by both government and private sectors' strategy of providing affordable houses across various parts of the country. BCI suffered a drastic decline after 2012, reaching an all-time low level in 2014. It rose relatively sharply from 2014 to 2015. Panel D of Figure 2 indicates that data on property right index (PRI) were not available prior to 1995. The index was from 1996 to 1999. That was perhaps owing to no government interference in the right of people to build houses, which caused many houses to be built during the period. But thereafter, the government developed rules guiding the property right of individuals in terms of registration of land and building plans among others. As a result, PRI fell significantly from 1999 to lower value in 2000 and the value remained constant through the remaining period being analyzed. Increasing number of workers got involved in the sector during greater part of the period, as indicated by Panel E. That means that as population of the country increases, a good number of people got involved in housing-related labor activities.

#### 4.2. Results of unit root tests

Results of the unit root tests are presented in the Table 1.

**Table 1:** ADF unit root tests results

Variable	At level			1 <sup>st</sup> difference			Order of integration	Stationary at
	ADF test statistic	Sig. level	t-Statistic	ADF test statistic	Sig. level	t-Statistic		
GDP	6.458943	1%	-3.639407	-6.625452	1%	-3.639407	I(1)	1 <sup>st</sup> difference
		5%	-2.951125		5%	-2.951125		
		10%	-2.614300		10%	-2.614300		
REBS	11.79257	1%	-3.639407	-5.466147	1%	-3.669407	I(1)	1 <sup>st</sup> difference
		5%	-2.951125		5%	-2.951125		
		10%	-2.614300		10%	-2.614300		
BCI	-2.520776	1%	-3.632900	-7.72136	1%	-3.639407	I(1)	1 <sup>st</sup> difference
		5%	-2.948404		5%	-2.951125		
		10%	-2.612874		10%	-2.614300		
PRI	-1.647507	1%	-3.788030	-4.472136	1%	-3.808546	I(1)	1 <sup>st</sup> difference
		5%	-3.012363		5%	-3.020686		
		10%	-2.646119		10%	-2.650413		
L	-1.417455	1%	-3.632900	-4.288487	1%	-3.639407	I(1)	1 <sup>st</sup> difference
		5%	-2.948404		5%	-2.951125		
		10%	-2.612874		10%	-2.14300		

**Source:** Authors' computations, using EViews8

The results in Table 1 show that at the 1%, 5% and 10% levels, all-time series values of the variables are stationary at 1<sup>st</sup> difference, I(1). This negates the tendency for spurious regression results (Granger and Newbold, 1974; Stock and Watson, 2011; Greene, 2012).

**Table 2:** Johansen co-integration test

Sample (adjusted): 1980 2015 Included observations: 36

Trend assumption: Linear deterministic trend (restricted)

Series: GDP REBS BCI PRI L

Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None*	0.9821	162.4504	88.8038	0.0000
At Most 1*	0.8491	82.0124	63.8761	0.0007
At Most 2*	0.6722	44.1860	42.9153	0.0371
At Most 3	0.5018	21.8803	25.8721	0.1450
At Most 4	0.3278	7.9441	12.5180	0.2563

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level

\* denotes rejection of the hypothesis at the 0.05 level

\*\* Mackinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None*	0.9821	80.4380	38.3310	0.0000
At Most 1*	0.8491	37.8264	32.1183	0.0090
At Most 2*	0.6722	22.3057	25.8232	0.1363
At Most 3	0.5018	13.9363	19.3870	0.2585
At Most 4	0.3278	7.9441	12.5180	0.2563

Max-eigenvalue test indicates 3 cointegrating eqn(s) at the 0.05 level

\* denotes rejection of the hypothesis at the 0.05 level

\*\* Mackinnon-Haug-Michelis (1999) p-values

**Source:** Authors' computations, using EViews8

There are three co-integrating equations based on Trace test statistic and Maximum Eigenvalue. Therefore, it is inferred from Table 2 that, at the 5% level of significance, long-run relationship exists among the variables in the model (Johansen, 1988; Elliott, 1998; Hjalmarsson and Osterholm, 2007). Therefore, housing delivery has long-run relationship with the growth of an economy. This implies that housing delivery and economic growth cum development variables do not move far apart, and are attracted to their long-run equilibrium.

The estimated model showed that, contrary to pre-estimation expectation, the economy would experience negative growth in the absence of housing sector and allied services as well as human labor engagement in the sector. This is indicated by negative value of the estimate of the intercept of the model ( $\beta_0 = -3.2282$ ). However, the negative growth is not statistically significant as evidenced by the standard error as well as the p-value 0.0867 of the t-statistic of the intercept. Results of the estimation show that real estate business services (REBS) significantly spurred growth of the economy during the period being analyzed. This is evident in the standard (0.0042) as well as the p-value (0.0003) associated with the t-statistic (6.3111) of the co-

**Table 3:** Error Correction Model

Dependent Variable: GDP  
 Method: Least Squares  
 Date: 08/27/16 Time: 23:14  
 Sample (adjusted): 1980 2015  
 Included observations: 36

Variable	Coefficient	Std. Error	t-Statistic	Prob.
$\beta_0$	-3.2282	1.8564	-3.0387	0.0867
REBS	0.0844**	0.0042	6.3111	0.0003
BCI	0.7328**	0.0633	5.8225	0.0034
PRI	-0.0038	0.0023	-2.5673	0.1834
L	2.3739*	0.4663	4.0767	0.0119
ECM(-1)	0.9542	0.2663	6.0215	0.0003
R-squared	0.8205	Adjusted R-squared	0.8071	
F-statistic	276.2231	Durbin-Watson statistic	1.9234	
Prob(F-statistic)	0.0000			

*Estimated Model:  $GDP = -3.2282 + 0.0844REBS + 0.7328BCI - 0.0038PRI + 2.3739L + e$*

\*Significant at 1% level; \*\* Significant at 1%, 5% and 10 levels

**Source:** Authors' computations, using EViews8

efficient of REBS (0.0844). Similarly, the standard error (0.0633) and p-value (0.0034) of the t-statistic of the coefficient of BCI show that building and construction investments significantly enhanced growth cum development of the economy of Nigerian during the 1980-2015 years. The results further show that the units of labor engaged in housing delivery services during the period enabled the sector to make significant contributions to the growth and development of the economy of the country during the period under study. This is evident in the standard error (0.4663) as well as the p-value (0.0119) of the t-statistic (4.0767) associated with the estimate of the coefficient (2.3739) of L. On the other hand, the standard error of (0.0023) and p-value (0.1834) of the estimate of the coefficient of PRI (-0.0038) shows that property rights index had a retarding though not significant effect on the growth cum development of the economy during the period. The F-statistic (276.2231) with its p-value (0.0000) provided sufficient statistical evidence that, in totality, the housing delivery services (H: REBS, BCI and PRI) and human labor units in the housing sector (L) jointly exerted significant growth and development effect on the economy of Nigeria during the period considered in the analysis.

The statistical significance is evaluated at 1%, 5% and 10%. The model passes for a good fit as suggested by the high adjusted R-squared value (0.8071) which indicates that the housing delivery services and human labor elements were very relevant and strong in explaining the total variations in growth cum development of the economy during the period, with about 81% of the total variations explained, and the Durbin-statistic value of 1.9234, which suggests the absence of the problem of autocorrelation. The negative sign of the coefficient of error correction term (-0.9542),

which is a measure of speed of adjustment of the variables to long-run equilibrium for any disturbance in short-run equilibrium, suggests that the variables will converge to a long-run equilibrium. Obviously, this is likely to subsist under structural stability of the indices of the housing sector services delivery, such as costs and profits mark-ups, as well as the human labor components, such as the composition of skilled, semi-skilled and unskilled human labor. The coefficient of the error correction term suggests that, under the conditions, economic growth cum development of the Nigerian economy and appropriate human labor mix in housing services delivery have the potential to adjust to long-run equilibrium path with the speed coefficient of about 95%.

## **5. Summary, conclusion and recommendations**

This paper has employed data-based evidence to examine the effects of housing sector on economic growth in Nigeria during 1980-2015 from the initial proposition that housing sector services delivery did not induce significant economic growth in the country. Anchored on perceived interactions among relevant variables, a conceptual framework was articulated, and an analytic model was specified as a modified version of the endogenous growth model of economic theory, after which an overview of the Nigerian housing sector was undertaken. Graphical and econometric techniques were employed to analyze the data sets on the variables to establish trends in the respective time series values of the variables, and the effects of the housing sector variables on growth of the economy.

Based on results of the econometric analysis, the paper concluded that long-run relationship exists between housing delivering and growth of the economy and that, as such housing services delivery indices and growth of the economy did not move apart during the period reviewed. Further, housing services delivery and growth of the economy has high speed of adjustment coefficient to long-run equilibrium growth path provided that structural stability of the housing sector services delivery as well as human labor components are guaranteed in the economy. Under the conditions, therefore, growth cum development of the Nigerian economy and appropriate human labor mix in housing services delivery have the potentials to ultimately adjust to long-run equilibrium growth path.

Consequently, the paper recommends that appropriate human, capital and financial policies should be continuously evolved, implemented and sustained especially in the public sector to ensure a sustainable growth and development of the Nigerian housing sector and engender sustainable growth and development of the Nigerian economy. Such policies should specifically emanate from the public sector domains and should include tax incentives and subsidies on both local and imported building materials for real estate businesses and allied services, and attraction of more foreign direct investment inflows into the housing sector.

## Authors' Contributions

Each of the co-authors contributed to sourcing and extracting of the data sets on the variables used for analysis in section four of the paper. Each author made equal contributions to the review of the literature (in section two). The third co-author wrote the introduction (section one) and conceptual issues (in section two). The first and second co-authors wrote the theoretical considerations (in section two). The methodology, analysis and discussion of the results were done by the first, third and fourth co-authors. All the four co-authors summarised the findings, drew conclusion and proffered the recommendations.

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