



An Assessment of the Relationship between Macro-Economic Indicators and Prices of Building Materials in Nigerian Construction Industry.

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Abstract

Unstable economic policies of the government have been traced to have influence on the prices of building materials in Nigeria. This study however, assessed the relationship between selected macro-economic indicators (Inflation, exchange rate and interest rate) on the prices of some building materials. Data were collected on inflation, exchange rate and interest rate from the Central Bank of Nigeria (CBN) statistical bulletin while prices of materials were obtained from the journals of Nigerian Institute of Quantity Surveyors from 1995 to 2015 and market survey from building materials merchants. Multiple regression analysis technique was used to analyze the data. It was established that a high relationship existed between the selected economic indicators and the prices of building materials. The study recommended that there is need for stable economic policies so as to stabilize the exchange rate, inflation and interest rate while banks should consider ways of bringing interest rate on loans down to the level of affordability.

Keyword: *Macro-economic indicators; exchange rate; inflation rate; interest rate and materials.*

1. Introduction

Construction industry makes a noticeable contribution to the economic output of a country; it generates employment and incomes for the people [1].

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The effects of changes in the construction industry on the economy occur at all levels [2] and in virtually all aspects of life [3].

The construction industry which is responsible for the provision of capital projects, comprises of the building works, civil engineering works (which undertakes the provision and maintenance of civil works such as roads, railways, harbors etc) and heavy engineering works. The bulk of these two interrelated sub-sectors that make-up the entire construction industry is known to be largest employer of labour in both the private and public sector of the economy. The construction sector is a crucial part of any economy because of both its size and the potential role it can play in the developmental efforts of that economy. One of the most important economic features is that it creates the facilities that are necessary for the production and distribution of all other goods and services.

The relationship between a country's state of development and the level of activity in the construction sector is one, which has been the subject of study at the macro-economic level for a number of years [4]. The author [5] claimed that it contributed an average of 5 percent to the annual gross domestic product and average of about one-third of the total fixed capital investment. This is comparable with the contribution of construction industry with the developed countries of the world. However, despite this significant role the industry plays in reshaping the economy and its substantial work force, the construction performance of the industry in Nigeria has not been impressive. This is evident from the opinion of [6] who affirmed that "most empirical studies revealed that the output of the industry is quite low when compared with construction industry of many developed countries". [7] Attributed this low output to the heavy dependence of the indigenous construction capacity of the developing countries on imported inputs such as construction materials, machinery and skilled manpower.

The distinctive feature of the construction industry in developing countries is the heavy dependence on imported construction materials and components [8]. Authors in reference [3] Posited the construction industry to be mainly a domestic industry. Thus, according to author in reference [9], construction activities generate demand for raw, semi-processed and processed materials. There, however, exist a close association between construction, the manufacturing sector and the commerce sector that supplies the materials required by the construction sector. Construction projects are dependent upon loan financing as there is a close linkage between construction and the financial operations within the economy. The construction industry also generates income through the sale of its products, the purchase of its inputs and the creation of jobs.

Authors in reference [9] Saw construction industry as a sector that is sensitive to changes in both fiscal and monetary disturbances. This is because most construction projects involve large sum of money and need to be financed through loan facilities. According to Authors in reference [10], the history of construction in Nigeria has not received a fair share of attention, while [11] viewed the industry as being important, thus with the oil boom, importation of building materials averaged about ₦2 billion annually as the nation's preference for foreign goods increased.

Studies have shown that the interdependence between the construction sector and other economic sectors is not static but changes as the nation's economy grows and develops.

A secular decline in the manufacturing sector and a growth of services will alter the state of the relationship. According to United Nation Centre for Human Settlement [UNCHS], high prices of building materials form a crucial constraint to improving housing conditions in the low-income earning countries, Nigeria inclusive. Some authorities argued that the material components of a building amounted to about 60 percent of the building cost. In the present economic circumstances of the country, the downward trend of the value of the Naira and galloping inflation, the materials cost have escalated at a far higher rate than the modest increases in labour cost. This view was shared by [12] who opined that since the deregulation of the exchange rate of Naira in September 1986, the prices of all materials and services have been increasing. It could be noted that today the exchange rate is about ₦128 to 1 US Dollar. The direct effect of this exchange rate being felt more on imported materials than the naturally occurring ones. The prices of the naturally occurring materials have also been affected by the continual rise in oil prices which affect their transportation to the final consumers.

The increase in the prices of building materials has multiplier effects on the industry in the sense that it will lead to fluctuation in construction costs and the eventual abandonment of projects.

2. Inflation in the Nigerian Construction Industry

Inflation is defined as an objectionable rise in price levels. Reference [13] defined it as ‘a situation in which there is a persistent upward movement in the general price level. While [14] saw it as when the general level of prices rises rapidly and persistently over a period of time. This is undesirable to the public and policy makers. From the point of view of the public, inflation causes uncertainty about future prices. This affect decisions on expenditure, savings and investments, and causes misallocation of resources. It also allows substantial redistributions of income and wealth from savers to borrowers. To the policy maker, inflation hampers growth and development of an economy as it discourages savings and investments. These factors explain why policy makers put in lots of effort to reduce inflation and why several authors focus attention on the issue. Reference [15] Affirmed that inflation is a world-wide phenomenon, the most serious in the history being the hyperinflation of Germany in the 1930s’. The resultant effect was the general loss of confidence in the German money and one of the worst evils of inflation is that it deprives money of its services as a store of value. Inflation is now one of the intractable problems facing the Nigeria Economy. Having registered low rates of inflation in the years immediately after independence, the country experienced double-digit inflation in 1970. This was mainly as a result of the civil war. The next period of high inflation was 1974 – 1979 when the wage freeze was discontinued as recommended by the Udoji Salary Review Commission of 1974. Other periods of high inflation are 1984, 1988, 1989 and 1992 to date. Reduction of high inflationary pressure is considered to be one of the most critical macro economic objectives in Nigeria.

Authors in reference [16] opined that the creation of money [by government] that had no regard for the absorption capacity led to a high rate of inflation in the economy. As the domestic rate of inflation became increasingly higher than international rate, the exchange rate appreciated. When the purchasing power of a currency reduces, it will make foreign currencies to appreciate. This can be explained by the theory of inflation. Inflation reduces the purchasing power (value) of a unit of money or currency.

If the rate of inflation in two countries involved in international trade is equal then the currencies exchange rate will register no change while its rate of exchange will be equal to the difference between the two rates of inflation. [17] Saw inflation in two perspectives. The 'Artificial inflation' which emanates from a share increase in the cost of a project over and above an economically acceptable limit, and 'Natural inflation' which is the increase in construction cost that result as a natural follow up to sustained increases in the general level of prices.

Inflation can be viewed in three different forms; these are 'Creeping inflation' which connotes a general price level ranging from 1-6 percent a year. To him at this level, it is just possible for rises in income to be greater or equal the general price increases. 'Rapid Inflation' was observed as the one having a sharp rise in price level above 6 percent a year. 'Hyper Inflation' was seen as connoting a situation where the price increase accelerates rapidly to the detriment of convertibility of the local currency.

In the view of [14], inflation is now one of the intractable problems facing the Nigerian economy while [18] was of the opinion that inflationary trends in the economy had a rippling effect on the construction industry. This situation was seen by the Federation of Building and Civil Engineering Contractors [FBCEC] [19] that the effect of inflation has been the reduction of interest in investing in building industry due to high cost. One of the factors that have caused decline in construction of residential houses is inflation in the cost of building materials [20].

Inflation rate has compounded the supply and utilization of construction resources so that prices of materials have risen considerably over the years. One of the resultant effects of the escalation on contract sum due to fluctuation is the prices of materials. The strategy of the government to check inflation through a reduction of aggregate income in the economy came with the economic emergency measures of the year 1986 before certain proportions of the incomes of all Nigerians in both the private and public sectors of the economy were compulsorily deducted and paid into an Economic Recovery Fund [21].

Authors in reference [22] Observed that government has made the necessary efforts to control inflation. According to them, in the face of persistent inflation and fully aware of the danger inherent in uncontrollable inflation, each succeeding Nigeria government has introduced measures aimed at controlling inflation. The following control measures have been introduced since 1971. According to him, the Nigeria government established a price control board in 1991 in an effort to control the soaring prices of essential commodities. There has been a wage freeze in workers wages and salary since 1982. Many resources have been introduced to reduce the purchasing power of the working class. The economic recovery emergency fund was implemented from October 1985 to October 1986. One percent of a worker's salary was deducted every month to build up the fund. [21] Asserted that in 1986 budget, more measure to limit the disposable income of Nigerians was implemented with government calling for a curtailment in fringe benefits. In spite of all these measures, the battle against inflation has not yet been won, prices continue to rise and people are still discussing the effect of rising prices on their standard of living. Although, their wages and salary has risen, the economy has not improved he lamented.

3. Exchange Rate

Exchange rate is the price of one National Money in terms of another. It is the number of domestic currency, the naira, to a unit of the foreign currency, the dollar. Reference [23] affirmed that the naira exchange vis-à-vis the major trading currencies had been on the downward trend since 1986, witnessing a depreciation of 66.05 per cent in September, 1986 at the inaugural bidding session. Thus, in the opinion of [11] construction industry is import dependent; therefore with the devaluation causing increase importation costs, the cost of construction will increase.

Authors in reference [24] Posited that the smuggling of currencies and commodities across the borders called for foreign exporters to mark up their prices to cover cost of waiting for foreign exchange while importers engaged in overloading of invoices and inflating of import prices in an attempt to obtain foreign exchange beyond what is legally due to them. However, with adequate adjustment of exchange rates, countries with balance of payments difficulties would be able to export more, import less and save some foreign exchange. In terms of volatility of rates, most countries have intervened in foreign exchange markets by buying or selling their currencies in the market in order to influence their exchange rates. This is because volatility in market fundamentals such as the money supply, income, and interest rates, affects exchanges rate volatility because the level of the exchange rate is a function of these fundamentals. Large changes in money supply lead to changes (wide swings) in the level of the exchange rate which in turn imply exchange rate volatility [25]. Regardless of the origin of volatility, it could impede international investment flows by reducing investment in foreign financial assets and disrupting the efficient allocation of resources by creating disincentive for movement in investment capital. To that extent, exchange rate volatility adversely affects international transactions. Therefore, countries that intervene in their foreign exchange markets expect to reduce exchange rate volatility through the reduction of expected volatility of future market fundamentals and policies, and reduction of the likelihood of speculative exchange rate movements.

In the view of Authors in reference [24], actions that will contribute to exchange rate stability and enhancement of foreign exchange inflow will include resolution of the external debt problem. A debtor country's debt service burden is bound to increase when export receipts decline. The more the proportion of the inflow that is channeled to debt service payments is, the less the amount available for purpose of investment and consumption. A rise in interest rate in a country's economy will attract foreign investor thereby increasing the demand for local currency making the local currency to appreciate. This view was supported by [23] that with relatively high interest rates in one currency, there will be an appreciation of the currency over the other currencies.

The value of naira has been depreciating and this directly affected the prices of virtually all building materials of which up to 50 percent of them are imported. Also resources that are not imported but have some of its raw materials may not be affected directly by SFEM but may rise as a result of an increase in the prices of imported spare parts for vehicle needed for the local distribution. In the opinion of [26], the fall in the value of Naira against the Dollar would lead to higher interest rate. Authors in reference [27] Established that foreign exchange market had the immediate effect on escalating costs of construction by the increase in the cost of procuring foreign exchange for the purchase of imported materials.

The rate of exchange of one currency to another is determined by some factors. While [23] agreed that primarily, the market forces determine exchange rate, [23] viewed it from many perspectives. Reference [23] Explained that a country's currency demand can be determined by the demand for imports while the supply of it depends on the country's export. The price of a currency can also be determined by the demand for the supply of it. A country demands for another country's currency arises out of the country demanding for the other's goods and services and the country seeking for investing in the other's country. When people speculate a rise in the prices of goods, this make them to buy more, thereby making demand to be higher than supply, this will result in the scarcity of the goods, This same theory is applicable to demand for exchange rate. Reference [23] agreed that speculation may predict a situation whereby there would be a devaluation in the local currencies leading to investing more money in the purchase of the appreciating currency in other to sell for a profit. When the purchasing power of a currency reduces, it will make foreign currencies to appreciate. This can be explained by the theory of inflation. Inflation reduces the purchasing power [value] of a unit of money or currency. If the rate of inflation in two countries involved in international trade is equal then the currencies exchange rate will register no change while its rate of exchange will be equal to the difference between the two rates of inflation. Thus the more devalued the local currency is, the higher the rate of inflation and vice-versa. When a country is having a deficit balance of payment whereby its import is greater than export the value of other currency will be weakened. The rate of exchange of currency of one country into currency of any other country depends upon its balance of payments position; [23] opined that a change in a country's imports and export immediately affects the rate of exchange for its currency. He explains further that an adverse balance of payment causes the country's currency to depreciate, thereby checking imports by making foreign goods more costly and encouraging export, which becomes cheaper to foreign buyers.

4. Interest Rate

Authors in reference [28] Described interest rate as the price for obtaining loanable funds and the return for parting with liquid funds. According to him, prior to the Structural Adjustment Programme [SAP] in 1986, the level of interest rate was administratively determined by the Central Bank of Nigeria at that both deposit and lending rates were fixed by the bank based on policy decisions. While in 1987 the Central Bank of Nigeria introduced a market based interest policy. This deregulation of interest allowed banks to determine their deposit and lending rates. An increase in interest rate charge by banks will make the local currency to appreciate while the currency will depreciate when lending rate charged by banks is on the increase. In the view of [29], interest rates assumed an upward trend but did not rise dramatically immediately after their deregulation in August 1987. Consequently, despite the sharp increases in deposits and lending rates triggered largely by the transfer of government deposits from bank to the CBN in May – June 1988 real interest rates were negative in 1988 and 1989. Both deposit and lending rates, however, turned highly positive in 1990 and 1991 when inflation rate fell to 7.5 and 13.0 percent respectively. Bank deposit rates rose in line with CBN minimum rediscount rate 18.5 percent in 1989 and 1990 but the margin on lending rates widened in 1990 as deposit rates were sealed down and lending rates edged up.

Authors in reference [30] Argued that when the rate of growth of money supply declines, the rate of change of real national income will not show any appreciable effect for six to nine months on the average.

During this interval, interest rates typically continue to rise at an accelerated pace. Alternatively, [31] demonstrated that monetary policy has an asymmetrical effect on real output if prices are less flexible downwards than upwards. It has been suggested that negative money supply shocks and/or increases in interest rates reduce output more than monetary expansions raise it. Monetary policy may cause asymmetric output responses if asymmetric information in the banking sector produces binding credit constraints. Thus, it is argued that increases in money supply would result in higher construction activities through a costly and time-consuming process. Moreover, the short-run effect of a monetary shock depends on whether banks think it to be transitory or permanent, whether it counterbalances the changing demand for money. Following this background, a monetary shock is expected to influence asset markets before it affects output markets.

In the view of the NDIC [32], when the interest on loanable fund (cost of capital) is reduced, investors will have more access to bank credits for expansion and this will lead to higher profit level. The rate of interest charged by banks can also determine exchange rate, in that a rise in interest rate in a country's economy will attract foreign investor thereby increasing the demand for local currency making the local currency to appreciate. [23] Agreed with this assertion that as a result of relatively high interest rates in one currency, like the dollar, more investment move into dollars, the result will be an appreciation of that currency versus the remaining currencies. A rise in a country's interest rate, other things being equal will result in the local currency appreciating, in the sense that the interest rate will attract capital from abroad and by this inducing an increase in the demand for the local currency in the foreign exchange market. But he emphasizes that this relationship between interest rate and exchange rate will tend to hold only in inflationary environments when changes in the nominal rate of interest are entirely the outcome of changes in the expected rate of inflation. On the contrary, the high lending rates of banks of banks and instability in the foreign exchange market resulting in serious depletion of the nation's foreign exchange resources have badly affected the industry with import dependence of about 60 percent of its raw materials. In conclusion, it can be said that an increase in interest rate charged by banks will make the local currency to appreciate while the currency will depreciate when lending rate charged by banks is on the increase.

Even from the international market, interest rate can also influence the forecast movements of a country's currency against other foreign currencies. According to the Financial Forecast [33], the wide gulf in interest rates between most of continental Europe including the U.K on one hand and the U.K. Switzerland and Japan on the other, the U.S dollar weakened in March although not against the Pound Sterling. To the Sterling, analyst were hard pressed to explain the difference as the indications are that the U.K economy is going to expand in the year 2002 and next at roughly the same sustainable rate as most of the rest. And the U.S three months interest rates actually edged up slightly at the beginning of March, which should have cushioned the dollar long oven-me fall. With this decline, there is the watch for a rate as low as 1.47 to the dollar in a year's lime. The euro as traded in France, Germany and Italy on the rise at last the markets are looking ahead to a rate of around 1.11 against the dollar in the northern summer and around 1.08 – 1.09 [a height fast seen in September in the run-up to currency conversion] in 12 months' time.

Financial Forecast [33] explained that 'the pound's recent bullish performance is a puzzle, most expect it to weaken over, both the next quarter and year. What's happening to the Swiss Franc is not explicable, as with interest rates there just half of what can be obtained across the border.

It is inevitable that the currency twelve months ago it was nearly 1.7 and it will be those interest rates that set the pace.” .Borrowing and lending are indispensable activities in any advanced economic system. At the present day the chief lenders are: Banks, Building societies, finance houses and money lenders.

According to [28], interest rate has an important allocative influence on the level of economic and financial activities. He further stressed that within the general framework of deregulating the economy in 1986 to enhance allocation of resources, the Central Bank of Nigeria introduced a market based interest rate policy in August 1987. The deregulation of interest rate allowed banks to determine their deposit and lending rates according to market conditions through negotiations with their customers. However, the minimum rediscount rate [MRR] which influenced other interest rates continued to be determined by the Central Bank in line with changes in overall economic condition.

Reference [28] was of the view that interest rate affects the vital operating costs of a business, changes in interest rate therefore exert a significant impact on the investment. According to Authors in reference [31], most developments are undertaken by developers' borrowed savings that attract payments for their use in form of interest charges. The decision to develop will therefore be by the relationship between the rate of net return and the rate of interest. Under such a situation, investment is likely to be encouraged where the prospective net return is more than the interest on the money to be borrowed. However, where it is less, developers are likely to be discouraged. This high rate of interest tends to restrict development and low rate of interest tends to encourage development as material prices reduce.

Authors in reference [33] opined that in the period of high interest rates when tender figures level are generally high, both the client and the contractor bear the burden, but when the rate is 'normal' there is tendency for tender figure level to get reduced this resulting in both the client and the contractors reaping the benefits. Delayed in payment and sudden rise in interest rates, may disrupt contractors' planned income and expenditures. In the era of high interest rate, profit margin of construction companies is considerably reduced, as there are less construction activities.

5. Research Methodology

This research work assessed the macro-economic indicators (inflation, exchange rate and interest rate) and the prices of some building materials. In order to achieve this, secondary data were collected on inflation, exchange rate and interest from the Central Bank of Nigeria [CBN] statistical bulletin while prices of materials were obtained from the journals of Nigerian Institute of Quantity Surveyors from 2006 to 2015. The multiple regression analysis technique was used in the analysis. This quantifies the relationship between two or more variables.

6. Result of Regression and Analysis

Table 1 shows the summary of result for the regression. The co-efficient of determination [R^2] was found to be very high for the materials selected which are;

Table 1: Summary of Regression Showing the Relationship between Prices of Materials (Dependent Variables) and Macro-Economic Indicators (Independent Variables)

VARIABLES	A	b ₁ (inf)	b ₂ (exc)	b ₃ (3int)	R	R ²	F	P val
		X ₁	X ₂	X ₃				
Cement	1445.197	3.827	6.123	19.105	0.829	0.688	8.080	0.004
Sharp Sand	10,000.810	-2.929	27.226	-89.190	0.779	0.607	5.670	0.013
Granite	24,989.047	-0.159	69.768	-258.652	0.758	0.574	4.944	0.021
Sandcrete	115,339	0.117	0.404	-1.297	0.883	0.780	12.997	0.001
Block								
Reinforcemet	122614.061	189.388	376.286	1083.269	0.766	0.586	5.196	0.018
Asbestos	455.150	1,593	9,698	-11.781	0.881	0.775	12.655	0.001
Roofing Sheet								
G.I. Roofing Sheet	8,349.088	0.272	24.379	-136.338	0.838	0.702	8.650	0.003
Nail	5,102.273	6.450	12.959	-109.100	0.868	0.751	11.251	0.001
Bituminous Felt	550.611	53.001	173.859	-187.117	0.942	0.888	29.094	0.000
Timber	1,200.743	0.308	3.547	-4.191	0.812	0.659	7.085	0.006
Cellotex	2741.183	18.588	9.707	-185.042	0.769	0.591	5.296	0.017
Celling Board								
Single Core Electric Cable	1,193.183	-1.343	2.162	-27.550	0.874	0.764	11.859	0.001
Texcote Paint	5048.389	-2.354	9.236	-110.447	0.684	0.468	3.223	0.065
Bath Tub	16,938.626	41.009	57.152	-330.119	0.805	0.649	6.768	0.008
W HB	8736.008	-33.113	-10.830	-155.905	0.645	0.416	2.610	0.104
Water Closet	7044.439	4.448	57.847	-147.350	0.863	0.745	10.722	0.001
Ceramic Tiles	3766.180	-3.240	-7.96	-36.337	0.777	0.603	5.573	0.14
PVC Tiles	2642.474	-6.010	-0.221	-30.407	0.905	0.820	16.666	0.000
Alum Sliding Window	13714.874	-77.483	65.437	-258.389	0.970	0.840	57.717	0.000
Clear Glass Louvre Blades	150.888	0.405	0.592	-3.635	0.940	0.883	27.635	0.000

Field Survey 2015

The summary of the regression analysis is as shown in Table 1. The coefficient of determination [R²] which is widely accepted as an indication of how well a model fits the population as opined by [34], was very high.

The coefficients of determination are 89 percent for bituminous felt, 88 percent for louver blade, 84 percent for aluminium sliding window, 82 percent for PVC titles, 78 percent for Sandcrete block, 78 percent for asbestos roofing sheet, 76 percent for electric cable, 75 percent for nails, 75 percent for water closet, 70 percent for galvanized iron roofing sheet, 69 percent for cement, 66 percent for Timber. This means that these percentages of the variation in the prices of selected building materials could be explained by the selected macro-economic indicators (inflation rate, exchange rate and interest rate) while the remaining percentages could be explained by other indicators outside the scope of this study – such as importation, money supply, demand for money and change in pump price of petroleum products among others. While the coefficient of determination was discovered to be low for Cellotex ceiling board of 59 percent, reinforcement of 59 percent, granite of 57 percent, texcote paint of 47 percent and wash hand basin of 42 percent. This means that other indicators have higher determination on the prices of selected materials.

It further showed that a significant relationship existed between the selected indicators and the prices of materials identified.

7. Conclusion

There is a heavy dependence of the prices of building materials on the selected macroeconomic indicators. An increase in any other indicators thus, will have a corresponding increase in the prices of some of the building materials.

8. Recommendation

This study therefore recommended that there is need for stable economic policies in order to stabilize exchange rate, inflation and interest rate. This will enhance the procurement of building projects in Nigeria and subsequent reduction in the cost of buildings. The use of locally produced materials should also be encouraged so as to reduce the heavy dependence on foreign/or imported materials. This will further enhance to a great extent the procurement of buildings.

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