Inadequate Finance: The Bane Of Mining And Quarrying Sector Development In Nigeria (1991 – 2016)

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Abstract: Relying on the secondary sources of data, this study examined inadequate finance as the bane of Mining and Quarrying sector development in Nigeria between 1991 and 2016. Data were collected from secondary sources and analysed using various inferential statistics. Thus, this study determined the stationarity of the collected time series data using Phillip-Peron approach; Autoregressive Distributed Lag (ARDL) was used to estimate the coefficients. Johansen co-integration test was carried out to determine the long run dynamic relationship among the variables of interest while Error Correction Model was estimated to determine the short run dynamic relationship among the variables. The residuals were diagnostically tested for autocorrelation and homoskedasticity. Findings showed that while negative and insignificant relationship existed between commercial banks credits and the development of mining and quarrying sector in the short-run, the relationship was positive and insignificant in the long-run; also, while there was a positive and insignificant relationship between microfinance banks credits and the development of mining and quarrying sector in the short-run, the relationship was negative and insignificant in the long run. It was therefore, concluded that supply of finance to mining and quarrying sector of the economy was insignificant to promote the growth and development of the sector, while both long run and short run dynamic relationships were found to exist among the variables of interest. Based on the findings of this study, it was recommended that government should, as matter of urgency come up with policy that can shore up the quantum of credits made available to mining sector , such as subsidizing the cost of lending to the sector as well as establishing mining credit guarantee scheme as it is being done in the counterpart sector like agriculture.

Keywords: Inadequate Finance, Mining and Quarrying, Inferential Statistics, Stationary Test, Co-integration Test, Error Correction Model.

I. INTRODUCTION

Aptly put, finance is the art and science of managing money and other financial resources. Put differently, finance is the backbone of very economy and the central nervous system of every business organisation. It is an essential catalyst that facilitates growth of individual and corporate bodies and hence, sought after by all human and corporate personalities. Hardly can any personality, either individual or corporate flourish in their daily pursuits without the required quantum of financial resources. Virtually all daily human activities require varying degree of finance to propagate, to the extent that satisfaction of basic human needs, such as food, clothing and shelter cannot be successfully achieved without the required finance in place. In the same vein, corporate personalities and other business firms cannot realized their objectives, no matter how beautifully created such objectives are, without the right amount of capital. When it comes to governance, finance is also pivotal that no operational parts of governance – agencies, parastatals or ministries can carry out its statutory functions without the right amount of votes and warrants (finance). Therefore, any formation of government without access to finance or means of finance is doomed for woeful failure ab initio. With respect to economy, economy cannot

grow without financial underpinning; various economic activities and industries such as trading, insurance, transportation, communication, manufacturing, mining and quarrying, services, etc. cannot take place unless good amount of finance is adequately available. Therefore, finance can be likened to the invisible hand that controls the way we think, talk, behave, act and react as well as rationalize our choices economically.

Just like it has been pointed out earlier, every sector of the economy needs finance to achieve booms and grow in the desired direction. Therefore mining and quarrying is an important sector of the economy that cannot afford to be an exception in terms of financial need. Mining is simply the extraction of mineral existing naturally such as coal, ores, crude petroleum and natural gas. Mining is one of the oldest economic activities in Nigeria dating back to prehistoric times when man crudely exploited iron and clay, and other metals, in order to produce his cosmetics, crude implements and utensils. The early European explorers, mainly German, Spanish and British, located and mined tin, galena, gold, etc. for export to their home countries. Available records show that organised exploration activities in Nigeria commenced in 1903 and 1904 when the Secretary of State for Colonies inaugurated mineral surveys of the Southern and Northern Protectorates respectively. The principal mineral occurrences discovered by the survey teams included lignite deposits at Asaba, lead-zinc ores at several locations, tin and columbite in the south-east, monazite, limestone and lead-zinc ores at Abakaliki district. Others were coal at Enugu, brine springs at Arufu and Awe, Galena in Jos area, iron ore deposits in Niger and Kwara districts and marble deposits in Jakura. Mining activity in regulated form, however, commenced in the country in 1915 with the production of coal at the Enugu mines. Prior to the discovery of petroleum, Nigeria was impressively sustained by agriculture and few solid minerals known at the time, namely coal, tin, columbite and gold. Coal, for example, met fully the needs of our railway system and electricity supply while tin yielded huge amount of foreign exchange earnings for the nation. In addition, these minerals also offered employment opportunities to teeming Nigerian populace. In the 1970s mining contributed 50% to the country's GDP (Fayemi, 2017). So one would ask what actually went wrong? The simple answer would be the country discovered oil in commercial quantity and consequently, other important sectors like mining and agricultural were abandoned.

Available records show that the contribution of Mining and quarrying sector to GDP over the decades has been on a very slow move while the contribution in the last six years between 2010 and 2016 are 0.09%, 0.10%, 0.11%, 0.13%, 0.15% and 0.15% respectively (CBN, 2016). Thus, the position of theis study is that the slow growth of mining and quarrying sector is attributable to both inadequate attention by the government as well as insignificant lending by the financial institutions to the sector. Government allocations to this sector have continued to wane perpetually until the present federal government came on board and deemed it fit to diversify the economy away from the dependence on oil to other sectors, especially, agricultural sector and mining sector.

Many authors have attempted to examine the relationship between finance and aggregate economic growth as well as the various sectors of the economy. For instance, Oluitan (2012), Ananzeh (2016) and Suna (2015) all focused their studies on finance and economic growth. Also, Tawose (2012), Ebi and Emmanuel (2014) concentrated on the effect of finance on industrial sectors, while ebele and Lorember (2016), Ogunmuyima, Okuneye and Amaefule (2017), Bada (2017) all focus their studies on the relationship between finance and manufacturing sector to the exclusion of the mining and quarrying sector. Although Oruonye and Ahmed (2018) carried out study on mining sector, the focus of their study was solely on challenges and prospects of mining in Taraba state. Furthermore, in the existing literature, when it comes to analysis credits to various sectors, undue attention have always been given to commercial banks alone, whereas, microfinance banks also play important role in financing various productive sectors of the economy. The pertinent question therefore, is what has been the effect of finance especially by commercial and microfinance banks in the development of mining and quarrying sector in Nigeria? This paper thus focuses on proffering answer to the forgoing question by investigating the effect of finance by commercial and microfinance banks on mining and quarrying sector in Nigeria.

RESEARCH HYPOTHESIS

This study is anchored on the following hypothesis:

H0: Inadequate Finance to mining sector has no significant effect on the development of the sector in Nigeria;

II. LITERATURE REVIEW

CONCEPTUAL REVIEW

FINANCE AS A CONCEPT

Finance, according to Otokiti and Awodun (2001) can simply be defined as money, fund, or resources. To him, finance is the oil that lubricates the wheel of progress of an organisation; it is the life of every organisation since every other aspects of an organisation are depending on finance to function.

To Olowe (1997), finance is simply the management of money and the management of the flows of money through an organisation whether private or governmental organisation as well as claims against money. Finance is very important to the management of every organisation because various functional parts of business firms which include marketing, purchasing, production, personnel, sales, etc requires the availability of money.

Akinmulegun and Dare (2008) see finance as business that involves as the pooling together of necessary financial resources which are required by individuals and business organizations in order to achieve desired objectives. It is the art of mobilizing all the required financial resources from various sources and using them in such a way that enables the

objectives of the firm to be achieved. To them, the bedrock of any business in the modern economy is finance.

SOURCES OF FINANCE

Otokiti and Awodun (2001) explains that there are three main sources of finance which can be explored by individuals and business organizations namely:

✓ Short-term source: These are the sources from which finance can be raised and repaid within duration of one year. These are usually cheap and flexible sources of finance which can be used to finance short-term working capital. Examples of credits that can be raised from this source includes borrowings from friends, trade credits, accruals, bank borrowing, factoring among others.

✓ Medium-term source: Borrowing from this source must be repaid within five years. Examples of medium-term credits are term loans, hire purchase agreement, lease agreement etc.

✓ Long-term source: This is a source of finance for raising credits which are repayable from 5 years and above. Long term credits include debentures, preference shares, ordinary shares, retained earnings, etc.

MINING AS A CONCEPT

Mining is the extraction of valuable minerals or other geological materials from the earth, usually from an orebody, lode , vein , seam , reef or placer deposit . These deposits form a mineralized package that is of economic interest to the miner. Ores recovered by mining include metals, coal, oil shale, gemstones, limestone , chalk, dimension stone, rock salt, potash, gravel , and clay . Mining is required to obtain any material that cannot be grown through agricultural processes, or created artificially in a laboratory or factory. Mining in a wider sense includes extraction of any non-renewable resource such as petroleum, natural gas, or even water (Wikipedia, 2018). According to Central Bank of Nigeria [CBN] (2016), four sub-activities make up the Mining & Quarrying sector: Crude Petroleum and Natural Gas, Coal Mining, Metal ore and Quarrying and other Minerals.

Albert (1947) perceives the term mining in its broadest term context as encompassing the extraction of any naturally occurring mineral substances such as solid, liquid, and gas from the earth or other heavenly bodies for utilitarian purposes. Mining of stones and metal has been a human activity since pre-historic times. Modern mining processes involve prospecting for ore bodies, analysis of the profit potential of a proposed mine, extraction of the desired materials, and final reclamation of the land after the mine is closed.

Nwaozor (2016) defines mining as the extraction of valuable minerals cum other geological materials from the earth crust, usually from lode, vein, ore-body, seam, reef, or placer, deposits. These deposits constitute a mineralized package that is of economic interest to the prospective miner. Ores gotten via mining activity are gemstones, limestone, coal, oil shale, metals, dimension stone, clay, gravel, potash, and rock salt, among others. Mining is required to obtain essential commodities that cannot be possibly grown via agricultural

processes, or created artificially in a factory or laboratory. The economic importance of mining cannot be overemphasized. In Ghana, for instance, the country's mining sector is a very vital segment of its economy, and has played a significant role in its socio-economic development since the colonial period. Historically, the Ghanaian mining sector's contribution to the country's gross foreign exchange, particularly gold has only been matched by its cocoa sector. In spite of the ongoing boom in the sector, Nigeria still lags behind. It is appalling to note that notwithstanding the unquantifiable solid minerals the country is blessed with, mining accounts for barely 0.3 per cent of the country's GDP due largely to the influence of its vast petroleum resources. The country's domestic mining industry is obviously underdeveloped, leading to importation of minerals such as, but not limited to, iron-ore and salt, that could be domestically produced (Nwaozor, 2016)

Nigeria has the capacity to generate at least N5 trillion yearly from the mining sector and export of its vast solid mineral deposits. However, solid minerals sector has been operating below capacity, with many mining operations manned by small scale artisanal miners, as opposed to the large scale actors. Mining remains one of the most promising sectors of the economy with the potential to generate over N5 trillion yearly for government, especially from exporting its solid mineral deposits. Banks with foresight and passion to improve the lots of the economy are targeting the huge funding potential in the mining sector and helping government realise its economy diversification plans. Also, solid minerals account for about nine per cent of South Africa's GDP, while mineral revenues are projected to account for 34.4 per cent of Botswana's total revenue (Nweze, 2016).

OVERVIEW OF MINERAL DEPOSITS IN NIGERIA

Mining is big business in Africa and a cornerstone of many national economies. It accounts for a quarter of GDP in the Democratic Republic of the Congo, and in Botswana the figure has been as high as 40%. Yet despite the huge potential for deposits of precious metals, base metals, coal and iron ore, the Nigerian mining sector contributed only 0.15% to GDP in 2015 (CBN Statistical Bulletin, 2016). Over the last 10 years, attempts to boost private investment in exploration and mining through regulatory changes have fallen flat, but the recent slowdown in the Nigerian economy has brought into sharp focus the need for greater economic diversification (Fayemi, 2017)

Improvement in the geological data over the years has indicated that Nigeria is blessed with numerous deposits of industrial, metallic and non-metallic minerals. There are about thirty-four minerals that have been identified in the country, of which only 13 are being actually mined, processed and marketed. They are coal (which has an export potential of 15 million tonnes per annum valued at US$1billion), kaolin, baryte, limestone, dolomite, feldspar, glass sand, ganstones (haphazard), gold (in small quantities), iron ore, lead-zinc, tin and its associated minerals and recently gypsum. The remaining twenty-one minerals, though in demand are untapped. The volumes of domestic trade deficit and foreign exchange losses resulting from this deficiency are colossal. Azobu (2015) explains that solid minerals sector had been

targeted by the previous administration to contribute 5% to GDP by 2015 and 10% to GDP by 2020. From the foregoing, is obvious that the potential of the Mining sector to significantly contribute to Nigeria's economy cannot be over-emphasized. An attestation to this fact is the steady increase in the contribution of the sector to the nation's GDP, which historically has been pinned down below 1%), but has recently been reported by the National Bureau of Statistics to stand at 15.39% as at Q2 2017. Also, international investor interest in the sector continues to grow by the day, and the Federal Government of Nigeria (FGN) has come to recognize the sector as a prime income generator away from oil (Ajayi, 2017).

CHALLENGES OF THE MINING SECTOR

Gbadeyanka (2017) posits that mining sector faces several challenges with geosciences data and information, Industry participants, Stakeholders, Institutions, Governance and other enablers of the sector. One of the major challenges experienced by miners in raising funds is the ability to establish a worthy collateral for the intending financiers, while insufficient funding has been identified as the reason for the inability to embark on detailed geo-science data gathering. In his own account, Fayemi (2015) clarifies that, the Nigerian mining industry is being faced by two major challenges, namely: external and internal.

EXTERNAL CHALLENGES

The global mining market is in depression as key sources of demand that supported prices over the past two decades have declined. There is continuous global decline in prices of mining products which has put mines and mining houses under tremendous pressure. This can be better understood in the sharp declines in the share prices of Glencore, BHP-Biliton, Anglo American and Rio Tinto for example. Naturally, as a result of falling metal and asset prices, many of the top mining houses are withdrawing from investment planning, shutting down mines and optimizing current operations because all mining now needs to be cost and process efficient.

INTERNAL CHALLENGES

The internal challenges are made up of different nature which does not correlate with a supply-demand balance issue. As mining sector is concerned in Nigeria, there are eight key internal challenges being faced as highlighted below:

- ✓ *INSUFFICIENT FUNDING:* Funding has been a challenge partially because the sector had not been a focus area for both government and financial institutions. Thus, a number of projects have drawn funding from offshore sources, while others have sought capital from a few Nigerian banks. We have commenced constructive engagement with the Central Bank of Nigeria (CBN) and with commercial lenders to help them create the teams to sharpen commercial options for Nigerian miners.
- ✓ *LIMITED INFRASTRUCTURE:* This is a key problem; for instance, the absence of appropriate infrastructure e.g.

water, railroads and port handling facilities for base and bulk minerals makes it difficult for Nigeria to export iron ore. There is therefore, need to improve energy, transport and market links to mines.
- ✓ *INSUFFICIENT GEOLOGICAL DATA:* While Nigeria has some geosciences data, heavy reliance is still placed on work done between thirty to fifty years ago to estimate reserve potential. There is thus, need to provide more detailed, investment grade data to support investors while mining licenses issued by the Cadastre Office should be able to serve as collateral for loans, provided they are supported by reliable information on the quality and grade of deposits.
- ✓ *LIMITED COOPERATIVE FEDERALISM:* There is lack of encouragement for the States in Nigeria to become involved in mining, and this is a key constraint i.e. royalties and taxes not directly accessible to states; and States have also not taken full advantage by setting up mining joint ventures, limiting their capacity to generate IGR.
- ✓ *LOW PRODUCTIVITY:* Nigeria's mining techniques and processes need to be upgraded in order to reduce mine site waste, and boost productivity of output. Ditto some of our older steel plants. Even in a labour intensive mining sector, it is important that miners have access to the most efficient supporting technology.

Other challenges are illegal Artisanal Mining and Community Challenges, weak Institutional Capacity, weak Ease of Doing Business and Perception Issues, among others.

PROSPECTS OF THE MINING AND QUARRYING SECTOR

Starting from a modest benchmark, the Nigerian mining industry could be on the brink of a major turnaround. Activity in the mining sector is picking up and the potential is huge, Andy Hunter, managing director of SGS Nigeria, told OBG. However, we need more government regulation to ensure healthy and stable growth. Further government commitment to the sector, new mineral discoveries and the resolution of disputes in the iron ore and steel industry bode well for future growth. However, renewed efforts will need to be sustained for many years if the country's potential as a major mineral producer is to be met.

- ✓ Exports and use in domestic industries for generation of foreign exchange and internal revenue.
- ✓ Emergence of new industrial and downstream products.
- ✓ Increased employment of Nigerians, particularly in the rural areas where the minerals are found. The multiplier benefits to the citizenry are enormous. In fact, the solid minerals sector can very easily be the largest employment sector of the economy, since deposits abound in virtually every State of the Federation.
- ✓ Technology transfer and development.
- ✓ Development of infrastructure, especially in the rural areas roads, hospitals, rail, schools and housing (Mining and Qarrying statistics, n.d)
- ✓ Revenue Generation, which can be achieved by blocking all forms of leakages in the revenue accruals with a view

to ensuring prompt and comprehensive collection of revenues.
- ✓ Industrialization, which can support Nigeria's industrialization, expansion of low cost coal generated power, earn foreign exchange and generate tax revenues for government at all levels.

III. THEORETICAL FRAMEWORK

JOSEPH SCHUMPETER'S THEORY ON ECONOMIC GROWTH AND DEVELOPMENT

In 1911, Schumpeter propounded economic growth and development theory which was anchored on the fact that the financial intermediation role of banks is at the centre of economic development (growth). This theory has been used by Piabuo (2015) when he examined the impact of financial sector development on economic growth between Cameroon and South Africa. Schumpeter articulately explained how financial transactions through banks take central stage in economic development. Thus, he preferred to use development instead of term economic growth. Schumpeter suggested that bankers, through their selection and funding of entrepreneurs, promote innovative activities and spur economic growth. According to Schumpeter the banker is an intermediary between those who has profitable business ideas to execute but lack the requisite investible funds and owners of surplus capital which is necessary to accomplish this aim. Thus, when a bank issues a loan, it authorizes the implementation of "the new profitable business ideas" for the overall benefit of the whole society (economic development). Therefore, banking activity is aimed at stimulating economic development. However, it implies the absence of centralized power that would exert exclusive control over social and economic processes. At the same time it should be considered that according to Schumpeter bank loans are of a great importance just at the moment of creating "the new combinations" (profitable business ideas); whereas in a steady state of the economy when firms have already acquired necessary means of production or are able to fill them up constantly due to the revenues from previous production, finance just plays an auxiliary role.

Schumpeter provides a provocative argument for the role of banks within the economy by arguing that economy has an endogenous conveyor which is innovation. Innovation is thus, generally defined as "the new combinations of existing stock of the factors of production". Those who realize and create these new combinations, and thus promote economic growth, are defined as entrepreneurs. Schumpeter regards credit creation by banks as the main source of finance, once the stationary economy of the circular flow is left behind and the Banks are the co-conductors of economic growth and development, as they move surplus capital from idle hands (surplus sector) in to the hands of the innovator/entrepreneur (deficit sector). They promote innovation by retrieving the means of production from old combinations and allocating it to new combinations. In summary, banks use their intermediary role to provide needed investible capital to the

entrepreneurs which helps to stimulate the economic growth and development.

EMPIRICAL REVIEW

Although there is paucity of empirical studies focusing on finance and mining sector as earlier pointed out, nevertheless, the following studies are insightful into the relationship between finance and the mining and quarrying sector in Nigeria. Piabuo (2015) examines the short-run and long-run impact of financial sector development on economic growth and also to verify the gap of financial development that separates Cameroon and an emergent country like South Africa. The vector error correction model was used, in Cameroon a long-run relationship between economic growth and financial development was noticed while for South Africa there is a short-run relationship between bank deposits and economic growth, there is also a long-run relationship between economic growth and financial development. The South African economy moves towards its long-run equilibrium faster after economic shocks thanks to its good financial developed economy.

Oruonye and Ahmed (2018) investigated the challenges of mining of solid mineral resources in Taraba State and the prospect of the sector. Data for the study were generated through secondary (desk) research, to identify existing literature on the mineral resource prospects of the state and past mining activities in the area. Primary data generated from field observations and interviews were also used. The findings of the study showed that large quantities of this mineral ore deposits have been mined out in the state resulting in large numbers of abandoned mine sites as a result of past mineral exploration exploitation in the form of test pits, lotos and open ponds.

Tawose (2012) studied the effect of bank loans and advances on industrial performance in Nigeria between 1975 and 2009. Co-integration and Error Correction technique was adopted for the analysis. The results showed that industrial performance co-integrated with all the identified explanatory variables. This suggests that the behavior of real Gross Domestic Product contributed by industrial sector in Nigeria is significantly explained by the commercial banks' loan and advances to industrial sector, aggregate saving, interest rate and inflation rate.

Ogunmuyiwa, Okuneye and Amaefule (2017) examined the impact of bank credit on growth of the manufacturing sector in Nigeria. Time series data from the return to democratic rule in 1999 to 2014 were fitted into the regression model using econometric techniques particularly the Augmented Dickey-Fuller (ADF) test and the Autoregressive Distributed Lag (ARDL) model. Empirical findings show that bank credit to the private sector has a positive impact on the manufacturing sector. Albeit, a significant impact was found between bank credit and manufacturing sector's growth, the policy implication of this finding is that bank credits drive manufacturing output in Nigeria.

Okon and Emmanuel (2014) investigated the impacts of commercial bank credit on Nigeria industrial subsectors between 1972 and 2012. Econometric Error Correction Model (ECM) was employed to estimate the output response of the

three subsectors namely: the manufacturing; mining and quarry; and real estate and construction subsectors to commercial bank credits, as well as the response of aggregate output of the entire industrial sector to subsector's output and their commercial bank credits. The results of estimation indicate the following: commercial bank credits impacted positively and significantly on the manufacturing sub-sector in Nigeria, commercial bank credits to mining and quarry is a positive and significant determinant of the current year Mining and Quarry output in Nigeria, previous year bank credits to real estate and construction is a positive determinant of the current year real estate and construction output, bank credits to manufacturing, mining and quarry as well as bank credits to real estate and construction correlated positively with aggregate industrial output with bank credits to real estate and construction having greater and a significant impact on industrial output. Interest rate was not an important determinant of industrial sector and industrial sub-sectors outputs, exchange rate is a negative and significant determinant of industrial sector's outputs in Nigeria.

In a subsequent research, Demetriades and Hussein (1996) investigate 16 less developed countries between 1960 and 1990 with the aid of time series technique. They uncover a long run relationship for indicators of financial development and per capita GDP in 13 countries. However, they find bi-directional causality in six countries and reverse causality in six countries while South Africa showed no evidence of causation between the variables.

Similar views are expressed by Odedokun (1998), Demetriades and Andrianova (2004), Shan and Jianhong (2006), recent researches on the finance and growth nexus report broken link. Demetriades and James (2011) in a study of eighteen Sub-Saharan African countries reports that the link between credit and growth is altogether absent while finance does not lead growth in the long run. Similar views are reported by Estrada et al. (2010) and Kumar (2011

IV. METHODOLOGY

SOURCES OF DATA

This study made use of data from secondary sources. Thus, annual time series data were obtained majorly from various editions of Statistical Bulletin of the Central Bank of Nigeria.

MODEL SPECIFICATION AND VARIABLE DEFINITIONS

Model of this study was developed after that of Okon and Emmanuel (2014) who specified that:

$$MINGDP = f(MINBC, INTR, EXR, U) \text{--------------(i)}$$

Where, MINGDP = Mining and Quarry Gross Domestic Products; MINBC = Bank Credits to Mining and Quarry sub-sector, INTR = Interest rate, EXR = Exchange rate.

Thus, this study adopted the above model and the adapted model was specified thus:

$$MQOUT = f(CBCMQ, MFCMQ, INTR) \text{…………..(ii)}$$

In econometric form, and introducing stochastic term, equation ii becomes:

$$MQOUT = \beta0 + \beta1 CBCMQ + \beta2 MFCMQ + \beta3 INTR + Ut\text{……….(iii)}$$

Taking the natural logarithm of equation iii, the adapted model becomes:

$$logMQOUT = \beta0 + \beta1 logCBCMQ + \beta2 logMFCMQ + \beta3 INTR + Ut\text{……….(iii)}$$

Where:

logMQOUT = Natural logarithm total Annual output of mining and quarrying sector as proxied by the real gross domestic product of the sector;

logCBCMQ = Natural logarithm of total credits granted by the commercial banks to the mining and quarrying sector;

logMFCMQ = Natural logarithm of total credits granted by the microfinance banks to the mining and quarrying sector;

INTR = Minimum lending rate in the economy;

A priori expectation: $\beta1, \beta2 > 0, \beta3 < 0$

METHOD OF DATA ANALYSIS

Data that were collected for this study were analysed using inferential statistics. Thus, we commenced data analysis by conducting stationary test on the data to determine the number of unit root in the data series. Estimation was done by employing Autoregressive Distributed Lags. Thereafter, co-integration test was conducted to determine both the shot-run and long-run dynamic relationships among the variable of interest. Then Error Correction Model (ECM) was estimated thereafter.

V. RESULTS AND DISCUSSION OF FINDINGS

STATIONARY TEST

Time series data are usually trended and assumed not to be stationary. We therefore, need to verify the underlying process that generates our time series variables so as to ascertain whether the variables are stationary or non-stationary. This is because if non-stationary variable is regressed on another non-stationary variable might lead to spurious regression, even though the result shows high R^2 value. In this case the results may suggest statistically significant relationships between the variables in the model, when in fact this is just evidence of contemporaneous correlations (Engle and Granger, 1987). A series is said to be stationary if it has a constant mean and constant finite variance over time. Consequently, this study employed Philips-Perron method of unit roots test and the result are displayed in table 1.0 below:

UNIT ROOT TEST AT LOGARITHMIC LEVELS

H0: b = 0; Ha: b > 0

Variables	Critical value @1%	Critical value @5%	Philips Perron test statistics	Order of Integration
MQOUT	-3.724070	-2.986225	1.089682	-
CBCMQ	-3.752946	-2.998064	-1.614983	-
MFCMQ	-3.737853	-2.991878	-2.067535	-
INTR	-3.724070	-2.986225	-3.891342*	I(0)

	Unit root test at first differences			
Variables	Critical value @1%	Critical value @5%	Philips Perron test statistics	Order of Integration
MQOUT	-3.737853	-2.871878	-2.998865*	I(1)
CBCMQ	-3.788030	-3.012363	-5.215665*	I(1)
MFCMQ	-3.752946	-2.998064	-5.997579*	I(1)
INTR	-	-	-	I(0)

Author's Computation 2018
*Notes:*Denotes significance at the 5% level and the rejection of the null hypothesis of non-stationarity.*
Table 1.0: Philips Perron Unit Root Test Results

From table 1.0 above, it can be observed that when the variables were defined at logarithm levels, only INTR was found to be stationary. However, when the variables were subjected to first differencing, the non-stationary components of the variables were removed and all other variables i.e MQOUT, CBCMQ, and MFCMQ were found to be stationary at I(1) and the null hypothesis of non-stationarity was rejected at 5% significance level. Thus, because of the different orders of integration of the variables, Autoregressive Distributed Lag (ARDL) becomes the appropriate model estimator.

AUTOREGRESSIVE DISTRIBUTED LAGS MODEL (SPECIFICATION AND ESTIMATION)

The ARDL model as used in this study was adopted from the work of Pesaran, Shin and Smith (2001). This model is beneficial as it can be applied on a time series data on the condition that the data series are integrated of the combined order I(1) and I(0); also it is very efficient in small or asymptotic sample (Ogunlokun, Akinfolarin & Adeleke, 2018). In addition, a dynamic short-run relationship can be estimated via error correction model (ECM), while long run equilibrium dynamic relationship is possible at the same time after co-integration test. Thus, the unrestricted error correction model (UECM) of ARDL model used to examine the long run and the short run relationships among the variables of interest are:

$\Delta logMQOUT=\beta_0+\beta_1 logCBCMQ_{t-1}+\beta_2 logMFCMQ_{t-1}+\beta_3 INTR_{t-1}+\Sigma\pi_i \Delta logMQOUT_{t-1} +\Sigma\theta_i\Delta logCBCMQ_{t-1}+\Sigma\gamma_i\Delta logMFCMQ_{t-1}+\Sigma\mu_i \Delta INTR_{t-1}+ Ut\ldots\ldots\ldots(iv)$

The variables are as earlier defined under model specifications. $\beta_1, \beta_2,$ and β_3 refer to the long run coefficients or multipliers while π_i, θ_i, γ_i, , μ_i, are the short run coefficients or multipliers.

Selected Model: ARDL(4, 4, 4, 4)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
DLMQOUT(-1)	0.160977	0.236903	0.679507	0.5669
DLMQOUT(-2)	-0.469198	0.240112	-1.954081	0.1899
DLMQOUT(-3)	0.420014	0.239932	1.750554	0.2221
DLMQOUT(-4)	0.379114	0.149943	2.528395	0.1272
DLCBCMQ	-0.002446	0.012448	-0.196515	0.8624
DLCBCMQ(-1)	0.003824	0.012717	0.300724	0.7920
DLCBCMQ(-2)	0.085097	0.012217	6.965368	0.0200
DLCBCMQ(-3)	-0.000985	0.017565	-0.056062	0.9604
DLCBCMQ(-4)	0.046061	0.015349	3.001019	0.0954
DLMFCMQ	2.44E-05	0.000116	0.210728	0.8526
DLMFCMQ(-1)	0.000186	0.000126	1.470469	0.2792
DLMFCMQ(-2)	-0.000306	0.000126	-2.426194	0.1361
DLMFCMQ(-3)	0.000173	9.81E-05	1.762843	0.2200
DLMFCMQ(-4)	-0.000208	9.35E-05	-2.226693	0.1559
INTR	-0.004757	0.005571	-0.853918	0.4831
INTR(-1)	-0.013062	0.006105	-2.139543	0.1658
INTR(-2)	0.021752	0.005516	3.943208	0.0587
INTR(-3)	-0.005803	0.003809	-1.523643	0.2671
INTR(-4)	0.016245	0.004395	3.696112	0.0660
C	-0.261535	0.177237	-1.475623	0.2780

R-squared	0.988493	Mean dependent var	0.073963
Adjusted R-squared	0.879179	S.D. dependent var	0.073508
S.E. of regression	0.025551	Akaike info criterion	-5.075988
Sum squared resid	0.001306	Schwarz criterion	-4.084131
Log likelihood	75.83586	Hannan-Quinn criter.	-4.842336
F-statistic	9.042644	Durbin-Watson stat	3.505450
Prob(F-statistic)	0.104120		

Author's Computation 2018
Table 2.0: ARDL Estimated Results

From the estimated ARDL model above, while the lag 1 and 2 values of commercial banks credit to mining and quarrying sector (CBCMQ) shows positive and insignificant relationship with the output of the mining sector, its current value and lag 4 shows negative and insignificant relationship. Also, while the current values, including lag 1 and 3 values of microfinance banks credits to mining sector (MFCMQ) shows positive and insignificant relationship output of the mining sector, its lag 2 and 4 values show negative and insignificant relationship. In case of interest rate on lending, its current value, including its lag 1 and 3 all show negative and insignificant relationships with MQOUT while its lag 2 and 4 values are positively related to MQOUT. Therefore, MFCMQ and INTR conform to a priori expectation in because it is expected that high interest rate will discourage borrowing by the investors in the mining sector and hence bring down the spate of growth in the sector. Similarly, MFCMQ is expected to be positively related to the growth of mining sector such that the more the credits that are granted to sector by the microfinance banks, the better the performance of the sector. On the contrary, the current value of CBCMQ contradicts a priori expectation of positive relationship while its lag 1, 2, and 4 values confirm a priori expectation. The intercept coefficient of the model which is -0.261535 represents the value of the endogenous variable (MQGOUT) in billion naira should there be no variation in explanatory variables. The coefficient of determination (R^2) of 0.98 indicates that about 98% of the variation in the dependent variable (MQOUT) can be explained by the independent variables while the remaining 2% is explained by the stochastic term in the model. The R^2 as adjusted for the degree of freedom (n-k) associated with the sums of squares entering into the specified model is 0.87 which is not close to R^2. This connotes that the estimated ARDL model is slightly affected by the removal or addition of variable to the model. F-statistics value of 9.042644 shows that the model performance is significant and sufficiently captures the effect of insufficient finance by commercial and microfinance banks on the development of mining and quarrying sector in Nigeria. The insufficiency of finance to

mining sector is corroborated further by the probability of F-stat value of 0.104120 which not significant statistically. The Durbin Watson Statistics which is 3.50 is higher than the benchmark of 2, and hence indicates the absence of autocorrelation among model variables.

TEST OF HYPOTHESIS

The decision rule for testing hypothesis is that Null Hypothesis (H0) should be rejected and Alternate Hypothesis (H1) accepted if P-value is less than 0.05 and vice versa.

H0: Inadequate Finance to mining sector has no significant effect on the development of the sector in Nigeria;

H1: Inadequate Finance to mining sector has significant effect on the development of the sector in Nigeria;

From table 2.0 above, P-value of the F-stat of 0.104120 is more than the critical value of 0.05; thus, we do not have enough reason to reject the H0 , hence, inadequate finance to mining sector has no significant effect on the development of the sector in Nigeria. Therefore, the economic significance of the foregoing is that the insignificant finance to the mining sector has been responsible for underdevelopment of the sector and by extension, responsible for insignificant contribution of the sector to the overall gross domestic product of the economy.

VI. RESIDUALS DIAGNOSTIC TEST

AUTOCORRELATION TEST

To test whether the residuals from the estimated model are free from autocorrelation or are serially uncorrelated, Breusch-Godfrey serial correlation test was conducted and the result are depicted in the table 3.0 below:

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.653900	Prob. F(2,10)	0.5409
Obs*R-squared	2.660057	Prob. Chi-Square(2)	0.2645

Author's Computation 2018
Table 3.0: Breusch-Godfrey Serial Correlation LM Test

The null hypothesis (H0) for this type of test is that the residuals are serially uncorrelated. From the table 3.0 above, the F-statistic p-value of 0.5409 is more than 0.01 and 0.05; it shows that we fail to reject the null hypothesis at both 1% and 5% significance levels. Hence, we conclude that the residuals are serially uncorrelated and the results are not biased.

HOMOSKEDASTICITY TEST

In order to test the efficiency of the estimator, the Breusch-Pagan-Godfrey homoskedasticity test was conducted on the residuals of the ARDL estimates. The results are depicted in the table 4.0 below:

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.193107	Prob. F(19,2)	0.5521
Obs*R-squared	20.21639	Prob. Chi-Square(19)	0.3817
Scaled explained	0.157481	Prob. Chi-Square(19)	1.0000
SS			

Table 4.0: Heteroskedasticity Test: Breusch-Pagan-Godfrey

Also, the null hypothesis is that the residuals are homoskedastic, and from the table 4.0 above, the F-statistic p-value of 0.5521 is greater than critical values of 0.01 and 0.05, it shows that we have no enough reason to reject this null hypothesis at both 1% and 5% significance levels. We therefore conclude that the residuals are homoskedastic and the estimation is efficient.

VII. COEFFICIENTS DIAGONOSTIC TESTS

ARDL Bounds Test
Date: 07/02/18   Time: 11:51
Sample: 1995 2016
Included observations: 22
Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	13.23638	3

Critical Value Bounds		
Significance	I(0) Bound	I(1) Bound
10%	2.72	3.77
5%	3.23	4.35
2.5%	3.69	4.89
1%	4.29	5.61

Author's Computation 2018
Table 5.0: Co-integration Bound Test

The F-statistic value of 13.23638 is evidently above the I(0) and I(1) critical value bound. This indicates that we have no enough reason to reject the null hypothesis that there is no existence of long-run equilibrating relationship among the variables of interest. The conclusion here is that the co-integrating relationship is either of usual kind or degenerate over time. Nevertheless, a look at the fit between the dependent variable and the equilibrating equation lends credence to the belief that the relationship is indeed valid and exist. Therefore, it makes sense to proceed to estimate the speed of adjustment equation.

ERROR CORRECTION MODEL (ECM)

The (ECM) has been shown to better capture the short-run dynamics of the relationship. In estimating an error correction model, one takes the residuals from the co-integrating equation and includes them as an error correction term (ECMt-1) with one period lag. Consequently, we estimate the short run dynamic parameters by estimating an error correction model (ECM) which measures the speed of adjustment associated with long run equilibrium relationship as follows:

$$\Delta logMQOUT = \beta_0 + \beta_1 logCBCMQ_{t-1} + \beta_2 logMFCMQ_{t-1} + \beta_3 INTR_{t-1} + \Sigma\pi_i \Delta logMQOUT_{t-1} + \Sigma\theta_i \Delta logCBCMQ_{t-1} + \Sigma\gamma_i \Delta logMFCMQ_{t-1} + \Sigma\mu_i \Delta INTR_{t-1} + \Psi ECM_{t-1} + U_t \ldots\ldots(v)$$

Where ΨECM_{t-1} is the coefficient that measure the speed of short term adjustment or convergence of $\Delta log MQOUT$ to the equilibrium in case there is deviation from the long run relationship; the ECM must be negative and statistically significant in order to conclude that it is in order.

ARDL Cointegrating And Long Run Form
Dependent Variable: DLMQOUT
Selected Model: ARDL(4, 4, 4, 4)
Date: 07/02/18   Time: 12:03
Sample: 1991 2016
Included observations: 22

Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(DLMQOUT(-1))	-0.329930	0.190413	-1.732705	0.2253
D(DLMQOUT(-2))	-0.799128	0.214526	-3.725091	0.0651
D(DLMQOUT(-3))	-0.379114	0.149943	-2.528395	0.1272
D(DLCBCMQ)	-0.002446	0.012448	-0.196515	0.8624
D(DLCBCMQ(-1))	-0.085097	0.012217	-6.965368	0.0200
D(DLCBCMQ(-2))	0.000985	0.017565	0.056062	0.9604
D(DLCBCMQ(-3))	-0.046061	0.015349	-3.001019	0.0954
D(DLMFCMQ)	0.000024	0.000116	0.210728	0.8526
D(DLMFCMQ(-1))	0.000306	0.000126	2.426194	0.1361
D(DLMFCMQ(-2))	-0.000173	0.000098	-1.762843	0.2200
D(DLMFCMQ(-3))	0.000208	0.000093	2.226693	0.1559
D(INTR)	-0.004757	0.005571	-0.853918	0.4831
D(INTR(-1))	-0.021752	0.005516	-3.943208	0.0587
D(INTR(-2))	0.005803	0.003809	1.523643	0.2671
D(INTR(-3))	-0.016245	0.004395	-3.696112	0.0660
ECM(-1)	-0.509093	0.141964	-3.586080	0.0697

Author's Computation 2018
Table 6.0: Estimated Short Run Coefficients with ARDL (ECM Form)

From the estimated short run coefficients in table 6.0 above, it can be observed that the short-run relationships among the variables of interest confirm the ones displayed on table 5.0. Thus, while CBCMQ shows negative and insignificant relationship with the output of the mining sector in its current value, MFCMQ shows positive and insignificant relationship in its current value. In addition, 1% increase in CBCMQ will culminate in just 0.2% decrease in the mining output in the short run and vice versa. Similarly, while MFCMQ is positively affecting the output of the sector by just 0.009%, INTR is negatively and insignificantly affecting mining output by 0.5%. The foregoing is also supporting the fact that finance attention currently being received by the mining and quarrying sector is insignificant to make the sector increase its productivity. ECM coefficient measures the short term deviation from the long run equilibrium relationship between the dependent and the independent variables. In this case, the coefficient of error correction model (ECM) is -0.51, though not statistically significant at 5% level with p-value of 0.0697 The negative value of ECM shows that there exists an adjustment speed from short run disequilibrium to long run equilibrium. In other words, it indicates that about 51% of deviations from the equilibrium level in the current year will be corrected in years following, and that when the growth of mining sector is at disequilibrium level due to experience of any shock by the explanatory variables, the speed of its adjustment to converge to equilibrium is 51%.

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLCBCMQ	0.258405	0.097511	2.650022	0.1178
DLMFCMQ	-0.000258	0.000145	-1.774944	0.2179
INTR	0.028238	0.018620	1.516562	0.2686
C	-0.513728	0.367780	-1.396834	0.2973

Author's Computation 2018
Table 7.0: Estimated Long Run Coefficients with ARDL (Co-integration Test)

Co-integration= DLMQOUT + 0.2584DLDCBCMQ − 0.0003DLMFCMQ + 0.0282INTR − 0.5137

Contrary to the short-run dynamic relationship among the variables of interest, in the long run, there is insignificant positive relationship between commercial banks credits to mining sector and the output of the sector; also, whereas there is positive relationship between microfinance banks credit and the output of the mining sector in the short-run, table 6.0 shows existence of negative relationship between microfinance banks credit and the mining sector output on the long run. In the same vein, on the long run, the interest rate on lending is expected to be positively related and hence, encourages borrowing by the mining and quarrying investors but in contradiction of a priori expectation. From the result in table 7.0, 1% increase in the commercial banks credits to the mining sector would lead to about 25% in the mining sector output in the long run, while 1% increase in the microfinance credit to the mining sector would negatively affect the output of the sector by 0.025% in the long run and vice versa. Interest rate on lending is positively related to the output of mining sector in the long run unlike the negative relationship under short-run dynamic estimates. By virtue of this result, none of the variables are significant to the specified model since their p-values are all more than the 0.05 critical values.

VIII.   CONCLUSION AND RECOMMENDATIONS

Now that diversification of the country's economy remains the only way to overcome the lingering recessionary era, the government ought to endeavour to take the bull by the horn towards ensuring that the mining industry is accorded deserved attention. For this dream to be holistically actualized, hands of fellowship must be duly and sincerely extended to the cognoscenti who can spur the industry to do more even when challenges are enormous. This study has investigated the effect of inadequate financing finance as the bane of mining and quarrying sector development in Nigeria between the period of 1991 through 2016. Finance is the live wire of every organizations and the oil in the wheel of progress of very developed organizations. Without finance, dreams and ideas, no matter how beautifully created they are, cannot see the light of the day without proper amount of finance in place. Consequently, it is expected that when financial institutions give priority to important sector like mining within an

economy and provide the right amount of finance at affordable cost, such sector is bound to be grow in leaps and bounds. However, going by the findings of this study, the reverse seem to be the case as the major financial institutions i. commercial and microfinance banks that are supposed to lend the mining sector have not lived up to expectation in this regards. This accounts for why mining sector is still nascent and underdeveloped in Nigeria. Thus, by virtue of the insignificance of the F-stat and its p-value, the insignificance of the coefficient of each of the parameters to the specified model as indicated by their individual p-values and the rejection of null hypotheses, it was concluded that insignificant finance to the mining sector has been responsible for the underdevelopment of the sector and by extension, responsible for insignificant contribution of the sector to the overall gross domestic product of the economy. Hence, insufficient finance has been the bane of mining and quarrying sector development in Nigeria.

Based on the findings of this study, the followings are recommended:

✓ Commercial and microfinance banks should be given special directive by the monetary authority to give priority to lending to mining sector as this sector holds the prospect to shut the door of grinding poverty ravaging the country.

✓ It is in this regard that Nigerian banks, just as Stanbic IBTC Bank has indicated, should demonstrate their capacity to finance major development initiatives in the mining and quarrying sector that have the potential to engender rapid economic transformation.

✓ Government should also be ready to subsidized the cost of lending to the mining sector preferably, by establishing mining credit guarantee scheme as it is being done in the counterpart sector like agriculture.

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