CAPITAL MARKET AND INDUSTRIAL SECTOR GROWTH IN NIGERIA (1981-2021)

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Abstract

This study examined the relationship between Nigeria's industrial sector growth and the capital market from 1981 to 2021. The World Development Indicator 2021 and the Central Bank of Nigeria's (CBN) Statistical Bulletin provided secondary data. Using the Augmented Dicey Fuller unit root technique, the developed model was put through a unit root test. The results of the Augmented Dickey Fuller unit root analysis showed that the variables' integration order is jumbled. This suggests that although some variables were stable after the initial difference, others remained fixed at levels. Because of this, the Auto-regressive Distributive Lag (ARDL) has to be used in the study. The Auto-regressive Distributive Lag (ARDL) bound test indicated that there was a long-term relationship between the expansion of Nigeria's industrial sector and the capital market. Additional findings demonstrated that deal value has a long- and short-term beneficial, statistically significant influence on the growth of the industrial sector. Similarly, both in the short and long terms, gross fixed capital creation was shown to have a favourable and considerable influence on the expansion of the industrial sector. Furthermore, during the current year's short run, there was a favourable relationship recorded between market capitalization and industrial sector growth. There is statistically substantial relationship between market capitalisation and industrial growth. Lastly, it is discovered that the industrial sector's growth over the preceding short-run period has a positive and substantial correlation with the all-share index. Therefore, throughout the course of this study, it was determined that capital market activities enhance the expansion of Nigeria's industrial sector. Among other things, it was recommended that, in order to help listed businesses in the capital market fulfil their short- and long-term obligations, the Security and Exchange Commission work with them to maintain or grow the number and value of deals in market transactions.

Keywords: Share of Industrial Sector to Gross Domestic Product, Market Capitalisation, All Share Index, Value of Deals, Gross Fixed Capital Formation.

Introduction

The industrial sector of a country is equated to a brain box of an economy particularly a growing economy like Nigeria. An efficient industrial sector leas to mechanization and innovation that would swiftly grow and develop a country's economy. This means that productive activities would improve, leading to increase output which will result to low or stable price, food security, employment generation, and improve standard of living. Thus, businesses that assist other businesses in manufacturing, transporting, or creating their goods comprise the industrial sector, which is a subset of the economy. The industrial sector help in eradicating unemployment and poverty. This is achieved through establishment of several factories which requires services of massive labour input to carry out productive activities. This particular situation resulted in a notable surge in production and efficiency, a subsequent decrease in prices, an increase in the availability of commodities, increased earnings, and a significant influx of individuals migrating from rural regions to urban centres.

Akinlo and Lawal (2015) assert that the industrial sector, encompassing manufacturing, solid minerals, crude petroleum, and natural gas sectors, plays a pivotal role in national development due to its manifold advantages, including employment creation, local and international goods production, and foreign revenue generation. The industrial sector assumes a pivotal part in a contemporary economy and encompasses several dynamic advantages that are essential for the advancement of economic growth. According to Solomon (2015), productive activities encompass several sectors such as manufacturing, mining, and oil exploration and production. These activities need the utilisation of human, financial, mechanical, and land resources with the objective of generating lucrative outcomes. Ultimately, the positive consequences of these activities contribute to the enhancement of corporations' returns and income, benefiting the government as well. Industries play a crucial role in the manufacturing of various materials, including raw, semi-finished, and completed items, which are then sold to end-users or customers. This process significantly contributes to the overall economic output of the nation.

The presence of industrial capabilities inside an economy is often regarded as a significant factor that has the ability to enhance economic growth. Undoubtedly, a notable differentiating aspect between developed and emerging economies lies in the accumulation of industrial knowledge and expertise. The benefits of a suitably developed industrial base for an economy lie in its incorporation of effective technology management strategies and supplementary resources, enabling the shift from a conventional and low-efficiency state to a more optimised and productive system of extensive production and delivery of commodities and services. This phenomenon elucidates the rationale behind the pursuit of economic growth by industrialised economies (Idyu, et al., 2014). According to Okoye et al. (2013), the formation of industries, regardless of their size, enables a nation to meet the majority of its population's needs by producing a wide range of commodities and services.

The significance of industrialisation as a fundamental driver of economic progress is evident in all types of economies, including capitalist, socialist, and mixed economies. This phenomenon occurs due to the establishment of many industries, encompassing both small-scale and large-scale enterprises, which enables a nation to meet the majority of its population's demands for products and services. Developing nations, such as Nigeria, are currently facing a pressing necessity to embark on industrialisation efforts in order to achieve economic self-sufficiency. The exclusive method for accomplishing this objective is through the establishment of small, medium, and large-scale industries. Industries in developing economies can achieve effective growth and development, provided that sufficient financial resources are available for their initiation and subsequent expansion. In order for industries to achieve growth and facilitate the process of industrialisation, it is imperative to have convenient access to long-term capital. It is imperative to acknowledge that the acquisition of long-term cash necessary for conducting productive endeavours in Nigeria is sourced from the capital market. The capital market refers to a structured marketplace where the trading of long-term liquidity occurs. According to Okoye and Nwisienyi (2013), the capital market may be defined as a structured system facilitating the exchange of financial assets and liabilities. These financial assets encompass a wide range of securities, spanning from ordinary stocks to derivatives.

According to these scholars, the basic purpose of the capital market is to facilitate the efficient allocation of funds from the economic surplus units to the deficit units for the purpose

of productive investments. Indeed, via the use of such mechanisms, corporate financial managers are granted access to a diverse array of sources of funding and instruments. The capital market in Nigeria plays a crucial role within the broader financial markets by facilitating tangible advancements in industrial financing. For an economy to ensure the smooth operation and growth of its industrial finance sector, it is imperative to provide a mechanism that facilitates the transfer of surplus financial resources to investors who demonstrate a demand for and willingness to invest more funds than their current revenues allow. Nevertheless, an analysis of the previous decade reveals that the capital market's impact on the industrial sector has exhibited significant fluctuations in terms of deal value.

Numerous scholarly investigations have assessed the influence of capital markets on the evolution of the industrial sector. Nevertheless, these research exhibit divergent viewpoints in some aspects. The evaluated research utilised several proxies to represent the capital market, such as the all share index, market capitalisation, value or volume of transactions. However, most studies neglected to account for the relative influence of gross fixed capital formation. These studies either neglected to consider or overlooked the influence of fixed capital assets held by enterprises, as well as the implications of shareholders' funds and long-term loans. Moreover, a significant number of these research have shown inconsistent results. For example, in their respective studies, Adekunle (2019), Ibi et al. (2015), and Emeh and Chigbu (2014) examined the influence of the capital market on the manufacturing sector. They found that market capitalisation, transaction volume, and the all-share index were positively and significantly associated with industrial sector growth. However, the value of shares exhibited a negative relationship with industrial sector growth. The current study differs from previous research by empirically examining the influence of the capital market on the expansion of the industrial sector in Nigeria. Additionally, this study expands the scope beyond what has been previously investigated.

The aim of this study is to conduct an impartial examination of the impact of the capital market on the expansion of the industrial sector in Nigeria within the time frame spanning from 1981 to 2021. The succeeding sections of this article are structured as follows: Section 1 serves as an introductory segment, whilst Section 2 presents a succinct summary of the extant body of literature pertaining to capital markets, industrial sectors, and the intricate relationship between capital markets and the evolution of industrial sectors. Section 3 of the study will primarily centre on the research methodologies employed, encompassing the elucidation of research variables. In contrast, section 4 will be dedicated to the presentation of the obtained results. Section 5 will culminate the study by providing a concise commentary on the policy implications and recommendations.

Literature Review

Conceptual Literature

Capital Market

The capital market refers to a financial market where the trading of long-term financial instruments, which provide liquidity, takes place. This entity provides financial assistance to many sectors and facilitates the medium and long-term borrowing requirements of governmental entities at the federal, state, and local levels. The capital market serves as a platform for the exchange of diverse financial instruments, including common stocks, shares,

debentures issued by firms, and government bonds and securities (Jhingan, 2012). This pertains to a market that facilitates long-term investment opportunities. In essence, the concept pertains to a marketplace wherein lenders seek to make long-term commitments and borrowers seek to obtain long-term finance. The platform serves as a marketplace for the exchange of long-term debt and equity liabilities. According to Al-Faki (2006), the capital market is a multifaceted system including of specialised financial institutions, methods, processes, and infrastructure. The major objective of this, is to enhance the linkage between capital suppliers and receivers, specifically for the goal of engaging in socio-economic development initiatives over an extended period of time. According to Nyong (1997), the capital market may be described as a multifaceted structure that possesses intrinsic processes for the purpose of mobilising, harnessing, and allocating long-term finances from key sectors of the economy, including households, corporations, and government, to other sectors within the economy. According to Dada (2003), the capital market may be characterised as an institutional framework that facilitates the provision of long-term capital to both governmental and corporate entities, with the aim of promoting industrial, socioeconomic, and infrastructural growth.

According to the definition provided by Abiola and Okodua (2008), the capital market can be described as a complex system consisting of specialised financial institutions, mechanisms, processes, and infrastructure. Its primary function is to facilitate the connection between individuals or entities that provide medium to long-term capital and those who require such capital for investment in socio-economic developmental projects. The term encompasses all the mechanisms and structures that support the process of purchasing and selling financial instruments. According to Okoye and Nwisienyi (2013), the capital market may be defined as a structured system that facilitates the exchange of financial assets and liabilities. These financial assets encompass a wide range of securities, spanning from ordinary stocks to derivatives. According to these scholars, the principal purpose of the capital market is to facilitate the efficient allocation of funds from the economic surplus units to the deficit units for the purpose of productive investments. Indeed, through the use of such a mechanism, financial managers inside corporations are granted access to a diverse array of funding sources and products.

The capital market consists of two separate divisions, specifically the primary market and the secondary market. The primary market, alternatively referred to as the new issues market, functions as a mechanism through which government and corporate bodies raise money by issuing securities. Subsequently, these securities are subscribed to either by the general public or a certain cohort of investors. According to Soyede (2005), the main market refers to a market that is particularly dedicated for the trading of freshly issued securities. This platform serves as a means for corporations or governments to secure cash for investment purposes, as well as for already publicly traded firms to generate additional capital for the purpose of expanding their operations. Both the Securities and Exchange Commission (SEC) and the Nigerian Stock Exchange (NSE) engage in primary market operations. In contrast, the secondary market serves as a platform for the exchange and transaction of pre-existing securities.

Pandey (2006) defines a continuous market as a sort of market in which the trading of existing securities occurs on a daily and ongoing basis. The term refers to the marketplace

where previously issued securities are bought and sold. The secondary market encompasses transactions and trading activities that occur on exchanges and over-the-counter marketplaces subsequent to the initial issue of securities in the main market. The capital market plays a crucial role within the financial markets of Nigeria, facilitating tangible advancements in industrial financing. For an economy to ensure the smooth operation and growth of its industrial finance sector, it is imperative to provide a mechanism that facilitates the transfer of surplus financial resources to investors who demonstrate a demand for more funds and exhibit a propensity to spend beyond their immediate income.

Industrial Sector

The industrial sector encompasses significant technology advancements inside an economy's productive structure. According to Egbulonu and Nwokoro (2016), industrial sector growth refers to "the thoughtful and unrelenting use and blend of suitable technology management practices and other resources to move an economy from the traditional low level of production to a more automated and efficient system of mass production of goods and services". It is crucial to acknowledge that the expansion of the industrial sector is a necessary condition for the transformation of an underdeveloped economy into a developed one. Industrialization is widely recognised as a significant driver that may propel the structural growth and diversity of an economy.

The industrial sector, which encompasses manufacturing, solid minerals, crude petroleum, and natural gas sectors, is widely seen as a crucial pillar for national development due to its many advantages. These include the formation of job opportunities, manufacture of commodities for both domestic and international consumption, and contribution to foreign cash streams. The industrial sector assumes a pivotal position in a contemporary economy and encompasses several dynamic advantages that are essential for fostering economic growth (Akinlo & Lawal, 2015). According to Solomon (2015), the utilisation of human, financial, mechanical, and land resources in productive endeavours such as manufacturing, mining, and oil exploration and production is intended to provide lucrative outcomes that eventually contribute to firms' returns and government income. Industries play a crucial role in the manufacturing of various materials, including raw, semi-finished, and completed items, which are then sold to end-users or customers. This process significantly contributes to the overall economic output of the nation.

Relationship between Capital Market and Industrial Sector

The Industrial sector is often regarded as an essential prerequisite for serving as an economic catalyst that stimulates the economic growth and development of a nation. There is a prevailing belief that the alleviation of poverty and underdevelopment can only be achieved via the process of industrial development. Similar to the assertion that industrialization is a necessary condition for economic progress, the presence of capital serves as a reliable assurance for successful industrialization, thereby highlighting the significance of the capital market in this context. The capital market serves as the primary means of acquiring money for industries in emerging economies. According to Okoye et al (2013), finance serves as the intermediary between the capital market and the expansion of the industrial sector, resulting in the industrial sector's significant dependence on the capital market for necessary finances. Hence, the significance of the capital market in relation to the industrial expansion of a country

becomes evident through the pivotal position it assumes in facilitating the aggregation of financial resources and their subsequent allocation to enterprises, the government, and people seeking finance for investment purposes. Hence, the imperative for a proficient capital market arises from the recognition that it facilitates the mobilisation and allocation of funds towards productive investments. In addition to this, the ease and cost-effectiveness of mobilising funds on the capital market have been identified as a motivating factor for firms to extend their operations and go into larger-scale enterprises.

The capital market might potentially exert an influence on economic activity by facilitating the generation of liquidity. The liquid equity market facilitates the mobilisation of savings for the purpose of successful investment that necessitates a long-term commitment of money. Historically, investors have frequently exhibited hesitancy in surrendering control over their savings for extended durations. According to Oloyede (2001), the presence of a liquid capital market is essential for the occurrence of an industrial revolution. The decreased willingness of savers to engage in major, long-term projects during the early stages of the industrial revolution might be attributed to this phenomenon. The stock market has a significant role in fostering economic growth, either directly or indirectly, as highlighted by Owolabi and Ajayi (2001).

Theoretical Literature

Efficient Market Theory

The Efficient Market Theory was formulated by Fama in 1965. The EMT is a scholarly concept that offers a theoretical framework for assessing the efficiency of the capital market. According to the idea, financial markets are deemed efficient since they include all available information, resulting in impartial values for traded assets. These prices are considered to be a reflection of the collective opinions held by all investors regarding future possibilities. According to Olawoye (2011), EMT posits that the market price of a security promptly and comprehensively incorporates all pertinent information. Previous studies on the efficient market theory have predominantly relied on the analysis of long-range dependency in equity returns. This observation indicates that the use of historical data has shown to be beneficial in enhancing the precision of prediction models. In this context, the financial market is seen as an ideal market characterised by unrestricted entrance and exit, a significant number of buyers and sellers, uniformity of goods and services, and comprehensive market information, including transparent pricing and other relevant conditions. In this particular scenario, the prices of products, namely stocks, are established by the interplay of demand and supply factors, hence rendering the market efficient.

Cobb-Douglas Production Theory

The formulation of the Cobb-Douglas production theory may be attributed to the collaborative efforts of Cobb and Douglas in the year 1928. The theory postulates that the production function is frequently employed to depict the correlation between outputs and inputs over a certain duration. The Cobb-Douglas model acknowledges a simple economic framework wherein the levels of labour and capital utilised define productive activities. The equation utilised to represent production assumed the subsequent format: The equation Y = P(L,K) denotes the correlation between aggregate outputs, which signify the monetary value of

all the products and services generated within a specific year, and the inputs of labour (L) and capital (K).

The variable "L" denotes the labour input, which is operationally defined as the total number of hours worked by individuals during a given year. The variable "K" denotes the capital input, which encompasses the monetary value of machinery, equipment, and buildings. The variables A and β denote aggregate factor output and labour and capital production elasticity, respectively. The values under consideration are predetermined and obtained from existing information and skills. The marginal productivities of components in accordance with the provided production function may be expressed as follows:

$$MPPk = \partial y/\partial k = AaK^{a-1}L^{\beta} \text{ and } MPPL = \partial y/\partial L = A\beta K^{aL\beta-1}.$$

Hence, the enhancement of factor input productivity is a key driver of output growth.

Review of Past Literature

Udofia et al. (2022) examined how the Nigerian capital market affected industrial growth from 1986 to 2018. This study used CBN statistics bulletin data and performed diagnostic, bounds, and error correction tests. The capital market index was based on market capitalization, whereas the industrial performance index was based on industrial GDP contribution. Analysis included the ADF stationarity test, Bounds test for long-run association, and ECM. The study found that the Nigerian capital market boosts industrial performance in the short and long term. The Bounds test yielded evidence supporting the presence of a 'levels connection'. According to the Error Correction Model (ECM), an annual rectification rate of 41.64% is observed for the short-run imbalance. The paper recommends improving financial systems and economic infrastructure to reduce system load.

Uruakpa (2019) examined how the capital market affects Nigeria's industrial sector. The 1985–2017 CBN Statistical Bulletin was used for the inquiry. OLS, ADF, Co-integration, and ECM were used to analyse the data. The research found a correlation between capital market indices such transaction value, market capitalization, and the All Share Index and industrial growth. This is true both short-term and long-term. This implies that the stock market has a considerable duty in facilitating the mobilisation of long-term capital, aligning with the a priori expectation about the pivotal function of the stock market as the central hub of capital market operations. Hence, it is suggested that the market in Nigeria should undergo change in order to serve as a catalyst for industrial growth.

Adekunle (2019) used dynamic Autoregressive Distributed Lag to evaluate the capital market's influence on manufacturing. This study examines the short- and long-term effects of the capital market on Nigerian industrial production. The Bound Test and Autoregressive Distributed Lag method are used using CBN Statistical Bulletin data. The analysis covers 1985–2017. The Bound Test showed a long-term association between manufacturing production, market capitalization, transaction volume, and the all share price index, supporting this relationship. The autoregressive distributed lag (ARDL) research shows that market capitalization boosts industrial production in the long and short run. Additionally, it was seen that an increase in the number of transactions had a favourable impact on the production of the manufacturing sector in the short term. However, in the long term, this effect became negative. On the other hand, the impact of the all share price index on manufacturing output was found to be negative and statistically insignificant, both in the short term and long term.

The findings of the Granger causality test revealed that there was no evidence to suggest that market capitalization and the overall share price index had a causal relationship with the production of the manufacturing sector. However, it was observed that the number of transactions did have a Granger-causal effect on the manufacturing sector output. The findings of this study suggest that capital investment has a positive impact on productivity in the manufacturing sector of Nigeria, but only in the short term and not in the long term.

Bina and Obah (2018) examined the effects of capital market expansion on the Nigerian economy from 2000 to 2013. This analysis used data from the Security Exchange Commission, Nigerian Stock Exchange Review Reports, and Central Bank of Nigeria Statistical Bulletin. SPSS version 16 assisted in ordinary least square regression data analysis. Market Capitalization (MCAP), Numbers of Deals, All-Share Index (ALSI), and Total Value of Transaction (TVT) have been used to measure capital market development, whereas GDP has measured economic growth.Economic development and independent variables are strongly correlated, according to the research. Except for the All Share Index, the Total Value of Transaction and Numbers of Deals did not significantly affect Nigeria's economic growth. In all, the model explains 90.4% of Nigeria's economic development. The analysis of the long-term association revealed that the variable of market capitalization had a statistically significant influence on the Gross Domestic Product (GDP). Similarly, the short-run error correction model continues to demonstrate that market capitalization has a favourable influence on the economy. Consequently, the research suggests the implementation of policies aimed at enhancing the scope and scale of the Nigerian capital market in order to facilitate its swift advancement, thereby fostering economic growth and development within the country.

Akpotor (2017) examines how the capital market affected Nigerian manufacturing enterprises' operational performance from 2007 to 2016. Secondary data from 10 NSE manufacturing companies in the NSE fact book was used in the study. Additionally, annual reports and accounting are important. Ex-post facto research was used. The statistical programme used in this work was E-view 7.0, and OLS estimation was used. The data show that manufacturing revenue (REV) increases with the expansion of ordinary shares (OS), preference shares (PS), bonds (BD), and long-term funds (LL). The findings of the study indicate that ordinary shares, preference shares, and long-term funds exhibit a positive influence on revenue generation, but bonds demonstrate a negative impact on revenue (REV).In contrast, the correlation analysis revealed a positive association between OS, PS, BD, and LL variables and Revenue (REV). The study found that Nigeria's industrial sector is heavily influenced by the capital market. Hence, it is recommended that manufacturing firms prioritise enhancing value-efficiency in their capital market performance at the Nigerian Stock Exchange as a means to foster growth within the industry.

A research by Ibi et al. (2015) examined the relationship between capital market expansion and industrial growth in Nigeria. They used 1980–2012 annual time series data. The co-integration test showed a long-term equilibrium relationship between variables. The Granger causality test shows a bidirectional relationship between industrial production, market capitalization, and transactions. Analysis shows a one-way causal link between industrial sector development and transaction value. The capital market in Nigeria positively and statistically significantly affects industrial production, according to short-term dynamics research. Market capitalization and deals show this impact. However, transaction values negatively impact

Nigerian industrial production during the studied timeframe. The study found a positive and statistically significant relationship between Nigerian industrial production and real GDP. The exchange rate and gross domestic investment negatively affect Nigerian industrial production statistically. Consequently, the study suggests that it is advisable for the government to enact suitable reform measures with the objective of enhancing operational efficiency within the Nigerian stock market. Additionally, it is imperative to decrease the expenses associated with capital raising by companies in the stock market, as the high costs and bureaucratic delays may restrict the utilisation of the capital market as a reliable means of acquiring cash for investment purposes.

Emeh and Chigbu (2014) examined how the capital market affects Nigerian economic growth. The time-series technique used in this study mainly depends on secondary data from 1985 to 2012. Regression analysis, multivariate co-integration, and error correction are used in this work. The results indicate that two variables have a positive correlation with economic growth, whereas two variables display a negative correlation that is statistically significant. This has the potential to foster discourse over the ramifications for policy modelling. The recommendation is that regulatory authorities with relevance to the matter should prioritise efforts to enhance market efficiency and transparency in order to bolster investor confidence. Hence, there is a requirement for a proficient and advantageous macroeconomic setting that can support economic expansion and guarantee the establishment of efficient systems for capital market-driven growth. Additionally, it is crucial for policy institutions to actively engage in conducting comprehensive assessments and implementing suitable policy advancements to promote economic growth led by the capital market.

Aiguh (2013) examined how the capital market affects Nigerian economic growth. The capital market was created to boost domestic savings and investment quality. Financial instruments from the stock market are essential for governments and other entities seeking long-term finance. This analysis used 1980–2009 CBN Statistical Bulletin data. Data was then analysed using conventional least square. The capital market positively and statistically significantly affects national economic growth. The investigation also revealed the market's limited significance in industrial development.

In this study, Echekoba et al. (2013) investigate the influence of the capital market on the economic growth of Nigeria during a period of democratic governance. Contrary to the prevailing notion that democracy fosters a conducive climate for investments, the Nigerian capital market appears to have fallen short in terms of its anticipated impact on economic growth. The study utilises time series data and use the multivariate regression approach for data analysis. GDP growth rate is positively correlated with market capitalization and all share indexes, while the total value of stock has a negative correlation, which is not statistically significant. The study thus suggests that it is imperative for the government to demonstrate a collective and genuine commitment towards the advancement of the capital market.

Kolapo and Adaramola (2012) examine how the Nigerian capital market affected economic growth from 1990 to 2010. This means stock market success spurs economic growth. GDP was used to quantify economic growth in this research. Market Capitalization, Total New Issues, Value of Transactions, and Total Listed Equities and Government Stocks were capital market indicators. Johansen co-integration and Granger causality tests show that the Nigerian capital market and economic development are co-integrated. This implies a strong link between

Nigeria's capital market and economic growth. GDP and the value of transactions (VLT) are bidirectionally causal, but market capitalization is unidirectionally causal to GDP. The F statistic is statistically significant at 5% using a two-tailed test. There is no evidence that GDP causes market capitalization in the other direction. It is also vital to highlight that GDP does not cause total new problems (TNI) or LEGS. This statement shows how the capital market boosts the economy. This study shows that capital market operations benefit the economy. Hence, it is advisable for the regulatory body to implement rules that promote more market participation by corporations and adopt a more proactive approach in monitoring activities to prevent unethical practises that compromise market integrity and diminish investor trust.

Methodology

The present study utilised time series data encompassing the time frame from 1981 to 2021. The primary source of data for this study was the Central Bank of Nigeria (CBN) Statistical Bulletins (2021), with a focus on secondary sources. This study used an ex-post facto research approach to investigate the influence of the capital market on the industrial sector in Nigeria.

Model Specification

This study is based on the Cobb-Douglas production theory and adopts the model developed by Uruakpa (2019) with minor adjustments. The empirical model used in this study is presented as follows:

IND = f(ASI, MCP, VTR)

Where;

IND = Industrial Sector Output, **ASI**= All Share Index, **MCP** = Market Capitalization, **VTR** = Value of transactions; *et* = error term

The model was modified by introducing gross fixed capital formation (GFCF) as a new variable because it is seen as an important capital market proxy. The model delineates the endogenous variable, namely the capital market, as a function of many exogenous factors, including market capitalisation, all share index, value of deals, and gross fixed capital creation. The model is defined in the following manner:

SI_GDP = f (MCAP, ASI, VOD, GFCF) 1

The mathematical model can be represented symbolically as;

SI_GDP = B0 + B1MCAP + B2ASI + B3VOD + B4GFCF 2

Equation (2) above is transformed into an econometric model by incorporating the disturbance term (ε) as follows;

SI_GDP= B0 + B1MCAP + B2ASI + B3VOD + B4GFCF + e 3

SI_GDP = B0 + B1MCAP + B2ASI + B3LVOD + B4GFCF + e 4

Where;

SI_GDP = Share of Industrial Sector to Gross Domestic Product, MCAP = Market Capitalisation, ASI = All Share Index, VOD = Value of Deals, GFCF = Gross Fixed Capital Formation, f = functional relationship

B0 = Intercept of relationship in the model/constant B1-B4 = Coefficients of each independent or explanatory variable e= Stochastic or Error term

Description of Variables in the Model

Share of Industrial Sector to GDP (**SI_GDP**)**:** This is the share or contributions of the industrial sector to gross domestic product (GDP). It will be measured in billon of Naira.

Market Capitalisation (MCAP): Market capitalization is a metric used to measure the overall value and magnitude of a market. The concept refers to the aggregate worth of all publicly traded stocks inside the market at any one moment. Market capitalisation is used in this paper to proxy capital market and is measured in billions of Naira.

All Share Index (ASI): This represents the aggregate quantity of deals executed inside the stock market. The all share index is used in this research discourse to proxy capital market and its unit of measurement is in billions of Naira.

Value of deals (VOD): This corresponds to the aggregate worth of shares traded on a daily basis inside the market at any given moment. A positive correlation exists between transaction rate and the value of a company's shares, leading to an increased ability to raise capital. It is also a measure of the independent variable "capital market" it is measured in billions of Naira

Gross Fixed Capital Formation (GFCF): This metric represents the total amount of investment made by a business in fixed capital assets, after accounting for any deductions or adjustments. The capital market is categorised into two major classifications depending on duration, namely long-term and short-term capital. The firm's long-term capital is dedicated to the acquisition of fixed assets. The financial structure comprises the shareholders' equity and long-term loans (Orjih, 2001). The gross fixed capital formation is measured in billions of Naira.

Method of Data Analyses

Unit Root Test

The researcher used the Augmented Dickey Fuller (ADF) unit root test to assess variable integration. This ensured the right technique was chosen, preventing false regression.

The ARDL Methodology

The autoregressive distributive lag model (ARDL) by Pesaran, Shin, and Smith (2001) was used to examine variable correlation. To test for a cointegration relationship, the model uses unconstrained error correction as outlined below:

$$\Delta SI\_GDP_t = \beta_0 + \Delta SI\_GDP_{t-1} + \Sigma\beta_{1t}\Delta MCAP_{t-1} + \Sigma\beta_{2t}\Delta ASI_{t-1} + \Sigma\beta_{3t}\Delta VOD_{t-1} + \Sigma\beta_{4t}\Delta GFCF_{t-1} + \Delta SI\_GDP_{t-1} + \Sigma \Phi_{1t}\Delta MCAP_{t-1} + \Sigma \Phi_{2t}\Delta ASI_{t-1} + \Sigma \Phi_{3t}\Delta VOD_{t-1} + \Sigma \Phi_{4t}\Delta GFCF_{t-1} + Ut \quad 5$$

The implication in this context is that if the calculated F-statistic exceeds the critical value at a significance level of 5%, it may be concluded that cointegration exists. In the event that the calculated F-statistic falls below the crucial value at a significance level of 5%, it may be concluded that there is an absence of cointegration. Nevertheless, if the estimated F-statistics falls between the range of the upper and lower critical values, the inference is considered unconvincing. Once a cointegration connection is established, the long-run model may be estimated according to the provided specifications.

$$\Delta SI\_GDP_{t-1} + \Sigma\Phi_{1t}\Delta MCAP_{t-1} + \Sigma\Phi_{2t}\Delta ASI_{t-1} + \Sigma\Phi_{3t}\Delta VOD_{t-1} + \Sigma\Phi_{4t}\Delta GFCF_{t-1} + U_t \quad 6$$

In a similar manner, the short-run model of the error correction specification estimates the short-run dynamic behaviour of its variables as;

$$\Delta SI\_GDP_t=\beta_0+\Delta SI\_GDP_{t-1}+\Sigma\beta_{1t}\Delta MCAP_{t-1}+\Sigma\beta_{2t}\Delta ASI_{t-1}+\Sigma\beta_{3t}\Delta VOD_{t-1}+\Sigma\beta_{4t}\Delta GFCF_{t-1}+ ECT_{t-1}+U_t \quad 7$$

Where the ECT in the above equation is specified as;

$$ECT_t =\Delta SI\_GDP_t -\beta_0- \Delta SI\_GDP_{t-1} - \Sigma\beta_{1t}\Delta MCAP_{t-1} - \Sigma\beta_{2t}\Delta ASI_{t-1} - \Sigma\beta_{3t}\Delta VOD_{t-1}- \Sigma\beta_{4t}\Delta GFCF_{t-1}- \quad 8$$

The study concluded by evaluating the model by the implementation of tests for serial correlation, the Ramsey reset test, and heteroskedasticity.

Empirical Data Analysis

In the field of time series analysis, it is customary to assess the order of integration for each series as a means of mitigating the issue of spurious regression. Hence, an investigation is carried out to examine the stationary property of each variable through the utilisation of Augmented Dickey Fuller test methodologies. In order to determine stationarity, the Augmented Dickey Fuller (ADF) test statistics must surpass the Mackinnon Critical Value at a significance level of 5%, considering just the absolute value. If this requirement is not satisfied, we reject H1 and accept Ho, that the data is non-stationary.

Table 1: Unit Root Test Using Augmented Dickey Fuller (ADF)

Variables	Levels		First Difference		
	ADF. Statistics	5% Critical Value	ADF. Statistics	5% Critical Value	Order of Integration
SI_GDP	6.116766	-2.936942			1(0)
GFCF	9.582105	-2.936942			1(0)
MCAP	-2.856727	-2.936942	-4.925797	-2.938987	1(1)
ASI	-1.253691	-2.936942	-6.787988	-2.941145	1(1)
VOD	-2.165877	-2.936942	-6.366215	-2.945842	1(1)

Source: Extracts from E-view 10. * Level of significance at 5%

Table 1 shows the results of Augmented Dickey Fuller (ADF) Tests on the research variables to determine if they were stationary or non-stationary. The findings of the stationarity test indicate that SI_GDP and GFCF exhibit stationarity after being differenced once (1), whereas MCAP, ASI, and VOD demonstrate stationarity at level 1(0). The variables demonstrate a combination of integrated orders or levels of stationarity, as determined by assessments of their stationarity. Data analysis used Autoregressive Distributive Lag (ARDL), which can handle stationary at level I(0) and first difference I(1) variables. Thus, the best analytical method is the ARDL test, which analyses the dependent-independent variable connection using short- and long-term trends.

Table 2: ARDL Bound Test

Test Statistics	Value	K
F-statistics	5.851678	4

Significance	I (0)	1(1)
10%	2.45	3.52
5%	2.86	4.01
2.5%	3.25	4.49
1%	3.74	5.06

Source: Authors computation from E-view 10 Output

The findings of the bound test are displayed in Table 2, where the F-statistics were compared to the critical bound values. The F-statistic has a value of 5.851678. The results indicate that, with a significance level of 0.05, the F-statistic exceeds both the lower and upper critical values of 2.86 and 4.01, respectively. It may be inferred that there exists a certain level of co-integration between the expansion of the capital market and the industrial sector in Nigeria. Consequently, the anticipated outcomes of the Auto-Regressive Distributive Lag (ARDL) model in both the long-run and short-run are as follows.

Table 3: ARDL Long-run Result

Variable	Coefficient	Std. Error	t-statistics	Prob
MCAP	-1.681558	0.447738	-3.755674	0.0012
ASI	-0.382520	0.080319	-4.762503	0.0001
VOD	1.756652	4.060662	4.326024	0.0003
GFCF	3.477926	0.592061	5.874270	0.0000
EC = SI_GDP - (-1.6816*MCAP -0.3825*ASI + 17.5665*VOD + 3.4779*GFCF)				

Source: Authors computation from E-view 10 Output

Table 3 of the Autoregressive Distributive Lag (ARDL) long-run result suggest a negative relationship between market capitalisation (MCAP) and share of industrial sector to gross domestic product (SI_GDP). On average, a 5 percent point increase in MCAP is associated with a decrease in annual SI_GDP of 1.68 unit yearly. The p-value equally indicate that there is a statistical significant relationship between MCAP and SI_GDP. Investigation on the coefficient of all share index (ASI) advocates a negative relationship with the value of real gross domestic product (SI_GDP). The result denotes that a 5 percent rise in ASI is related to a decline in annual SI_GDP of 0.38% decrease per year. The p-value shows that there is statistical significant relationship between ASI and SI_GDP. Furthermore, the value of value of deal (VOD) suggest a positive relationship with share of industrial sector to real gross domestic product (SI_GDP). On average, a 5 percent point increase in VOD is related to an increase in annual SI_GDP of 1.75 unit point per yearly. The p-value equally indicate that there is a statistical significant relationship between VOD and SI_GDP.

Finally, the value of Gross fixed capital formation (GFCF) reported a positive relationship with the share of industrial sector to gross domestic product (SI_GDP). On average, a 5 percent point increase in GFCF is connected with an increase in annual SI_GDP of 3.48 unit per yearly. The p-value equally shows that there is a statistical significant relationship between GFCF and SI_GDP.

Table 4: ARDL Short-run Result

Variables	Coefficient	Std. Error	t-Statistics	Prob
D(MCAP)	1.007912	0.157922	6.382350	0.0000
D(MCAP(-1)	-0.427970	0.279360	-1.531964	0.1412
D(MCAP(-2)	-0.194810	0.177023	-1.100482	0.2842
D(ASI)	-0.244623	0.029011	-8.432188	0.0000
D(ASI(-1)	0.294916	0.037668	7.829290	0.0000
D(ASI(-2)	0.020497	0.050220	0.408145	0.6875
D(VOD)	2.290260	0.570667	4.013301	0.0007
D(VOD(-1)	-1.600120	1.118202	-1.430976	0.1679

D(VOD(-2)	-1.243067	0.495484	*-2.508795*	0.0208
D(GFCF)	1.036312	0.066374	15.61328	0.0000
D(GFCF(-1)	-2.004582	0.201268	-9.959749	0.0000
D(GFCF(-2)	-1.304805	0.406881	-3.206846	0.0044
ECM(-1)	-0.503184	0.084920	-5.925375	0.0000
Adj R^2 =0.972068, F-statistics = 100.0479 (0.000000), DW =1.995466				

Source: Authors computation from E-view 10 Output

Based on the findings derived from the Auto-regressive Distributive Lag (ARDL) model shown in Table 4, it is evident that the error correction term coefficient exhibits statistical significance and a negative relationship. Put differently, the negative sign serves to substantiate its importance. It may be inferred that the error correction mechanism (ECM) will be efficacious in rectifying any deviations from the long-term equilibrium. The ECM coefficient of -0.503184 suggests that the rate at which the system adjusts towards long-term equilibrium is 50%. This implies that any divergence from equilibrium in previous periods will be rectified by 50% in the current period. This implies that the current value of SI_GDP is sensitive to fluctuations in MCAP, ASI, and VOD.

The coefficient of Market capitalisation (MCAP) in the ARDL short-run model is estimated to be +1.007912. This suggests a favourable link between MCAP and SI_GDP this year. This result matches the apriori algorithm. The findings show that a one-unit increase in market capitalization increases SI_GDP by one unit. In the previous year, the all share index (ASI) coefficient was +0.294916. This means the Aggregate Social Index (ASI) and Social Inclusion Gross Domestic Product are positively correlated. In the immediate term, a marginal rise in the Aggregate Supply Index (ASI) will result in a corresponding increase of 0.29% in the Gross Domestic Product (GDP) attributable to Supply-side Influences (SI_GDP).

The coefficient of value of Deals (VOD) demonstrates a positive and statistically significant influence of the industrial sector on the gross domestic product, with a value of +2.290260 in the most recent period. In the present time frame, there exists a notable positive correlation of +1.036312 between the proportion of the industrial sector in the gross domestic product and the value of gross fixed capital formation (GFCF).

Additional data on the adjusted R2 coefficient have substantiated the extent of the association, since it accounts for 97% of the variance in the dependent variable. This suggests that there is really a genuine relationship between the variables. The entire model's probability value of 0.000000 shows its great relevance. The Durbin-Watson value of 1.995466 suggests no autocorrelation in the dataset. All studies showed a strong association between the capital market and Nigerian economic growth.

Diagnostic Test

Table 5: Ramsey Reset Test, Serial Correlation LM Test and Homoscedasticity Test Results

	F-Statistic	**Prob.Value**
Ramsey Reset Test	0.071329	0.7923
Breusch-Godfrey Serial Correlation LM Test	0.199774	0.8207
Breusch-Pagan-Godfrey Heteroskedasticity iiTest	1.095191	0.4187

Source: *Author's Computation using E-view 10*

According to Table 5, the diagnostic test showed that the Ramsey reset test linearity test provided an f-statistic of 0.071329 and a p-value of 0.7923. The model's p-value surpasses 0.05, indicating proper specification. Thus, our study disproved the null hypothesis.

The Breusch-Godfrey Serial Correlation LM test detects serial correlation in regression models. The serial or autocorrelation test yields an f-statistic of 0.199774 and a Chi-Square probability of 0.8207. A probability value of 82 percent (0.8207) surpasses the threshold value of 5 percent (0.05), indicating that the model does not exhibit serial correlation.

The Breusch-Pagan-Godfrey test shows no heteroscedasticity with an f-statistic of 1.095191 and a Chi-Square probability of 0.4187. The probability Chi-square value over 5% (P > 0.05) suggests the model lacks heteroskedasticity. Hence, residuals exhibit homoscedasticity as they possess a consistent variance, a desirable characteristic in regression analysis.

Discussion of Results

The value of Market capitalisation indicates that the impact on industrial sector is positive. The implication of this is that, the share value of listed company is attractive to investors as well as the public within the study period. Also, the attractiveness of the market capitalisation can help create a diversified portfolio. The positive relationship between Market capitalisation and industrial sector conforms to apriori expectation and is statistically significant in the current year period of the short-run. This position was corroborated by the works of Udofia et al (2022); Uruakpa (2019); Adekunle (2019) and Ibi et al. (2015) discovered that market capitalization positively and significantly affects industrial sector performance.

The performance of the all share index had a favourable impact on the industrial sector throughout the preceding year's short-term timeframe. The correlation between the all share index and the industrial sector is consistent with economic theory and has statistical significance. The efficient market hypothesis states that financial markets are efficient because asset prices represent investors' aggregate opinions on future possibilities and include all relevant information. Hence, it may be anticipated that the capital market in Nigeria will exert influence on the performance of the industrial sector, primarily through the facilitation of cash mobilisation from surplus sectors to deficit sectors, such as the industrial sector, for the purpose of investment. This finding agrees with previous study by Uruakpa (2019).

Industrial sector benefits long-term and short-term from deal value. The considerable beneficial impact matches expectations. This means that stakeholders in the capital market massively traded on shares of quoted companies which significantly increased the number and value of deals. The findings is in line with the works of Uruakpa (2019) and Adekunle (2019) but disagree with the findings of Bina and Obah (2018). Finally, the coefficient of gross fixed capital creation was positively correlated with industrial sector in the long and short term. Gross fixed capital creation and industrial sector are positively correlated, as expected and statistically significant.

Conclusion and Recommendations

Conclusion

This research looked at the impact of the capital market during the years 1981–2021, specifically on the growth of Nigeria's industrial sector. Market capitalization, the all share index, transaction value, and gross fixed capital production are just a few of the explanatory

variables that the study uses as stand-ins for the capital market. This study's explanatory variable is the industrial sector's share of GDP, which acts as a stand-in for the expansion of the industrial sector. Based on the findings, it can be said that both the short- and long-term growth of the industrial sector is positively and statistically significantly influenced by the value of deals and gross fixed capital creation. Furthermore, it was discovered that, both in the present and past short-term periods, market capitalization and the all-share index also have a positive and statistically significant link with the expansion of the industrial sector. Thus, it can be concluded that throughout the research period under consideration, the growth of Nigeria's industrial sector is facilitated by the activity in the capital market.

Recommendations

The following recommendations were made in light of the findings:

i. The security and exchange commission in collaboration with quoted companies in the capital market should maintain or increase the volume as well as value of deals in the market to enable them meet up their short and long term obligation.
ii. The security and exchange commission should make policies that would increase the tenure of loan facilities to be longer. This would encourage investors to increase their capital base which will lead to massive investment that will assist the economy in terms of job creation, needed savings, increase shareholders wealth and living standard of the economy.
iii. Also, investors should take advantage of the viability of the capital market in terms of subscribing to new and existing shares of companies that are very efficient and reporting stead profit. This will not only increase listed companies capital but will provide liquidity to the deficit sector of the economy.

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APPENDICES

Years	SI_GDP	MCAP	ASI	VOD	GFCF
1981	54.67	5.00	0	0.30	124.52
1982	51.88	5.00	0	0.22	128.10
1983	54.16	5.70	0	0.40	120.26
1984	50.33	5.50	0	0.26	97.78
1985	62.86	6.60	127.30	0.32	87.14
1986	65.05	6.80	163.80	0.50	108.87
1987	80.47	8.20	190.90	0.38	122.46
1988	102.94	10.00	233.60	0.85	138.10
1989	146.83	12.80	325.30	0.61	217.75
1990	175.15	16.30	513.80	0.23	262.77
1991	218.12	23.10	783.00	0.24	285.59
1992	341.66	31.20	1107.60	0.49	396.61
1993	417.06	47.50	1543.80	0.80	559.15
1994	553.96	66.30	2205.00	0.99	744.09
1995	1132.84	180.40		1.84	1153.47

			5092.20		
1996	1530.05	285.80	6992.10	6.98	1494.75
1997	1557.54	281.90	6440.50	10.33	1697.77
1998	1379.20	262.60	5672.70	13.57	1948.65
1999	1609.82	300.00	5266.40	14.07	2098.54
2000	2388.83	472.30	8111.00	28.15	2404.82
2001	2328.41	662.50	10963.10	57.68	2473.47
2002	2650.03	764.90	12137.70	59.41	3078.78
2003	3525.14	1359.30	20128.94	120.40	3846.23
2004	5145.43	2112.50	23844.50	225.82	4723.72
2005	6520.74	2900.06	24085.80	262.94	5772.64
2006	7822.11	5120.90	33189.30	470.25	7948.12
2007	8441.76	13181.69	57990.20	1076.02	6997.62
2008	9874.38	9562.97	31450.78	1679.14	7535.27
2009	9229.81	7030.84	20827.17	685.72	9177.08
2010	13826.43	9918.21	24770.52	799.91	9183.06
2011	17853.11	10275.34	20730.63	638.93	9897.20
2012	19587.72	14800.94	28078.81	808.99	10281.95
2013	20853.85	19077.42	41329.19	2350.88	11478.08
2014	22213.01	16875.10	34657.15	1338.60	13593.78
2015	19188.58	17003.39	28624.25	978.05	14112.17
2016	18641.17	16185.73	26874.62	577.82	15104.18
2017	25639.90	21128.90	38243.19	1078.49	16908.13
2018	33218.33	21904.04	31430.50	1203.37	24550.24
2019	39879.69	25890.22	26842.07	931.48	35863.98
2020	43530.78	38589.58	40270.72	1086.18	41253.55
2021	55300.97	42054.50	42716.44	953.87	58293.95

Source: Central Bank of Nigeria (CBN) statistical Bulletin, 2021.

APPENDIX

UNIT ROOT TEST

LSI_GDP 1A

Null Hypothesis: SI_GDP has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		6.116766	1.0000
Test critical values:	1% level	-3.605593	
	5% level	-2.936942	
	10% level	-2.606857	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(SI_GDP)
Method: Least Squares
Date: 05/26/23 Time: 14:19
Sample (adjusted): 1982 2021
Included observations: 40 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SI_GDP(-1)	0.165188	0.027006	6.116766	0.0000
C	-30.96529	386.8930	-0.080036	0.9366

R-squared	0.496120	Mean dependent var	1381.157
Adjusted R-squared	0.482860	S.D. dependent var	2730.490
S.E. of regression	1963.562	Akaike info criterion	18.05161
Sum squared resid	1.47E+08	Schwarz criterion	18.13606
Log likelihood	-359.0323	Hannan-Quinn criter.	18.08215
F-statistic	37.41482	Durbin-Watson stat	1.475654
Prob(F-statistic)	0.000000		

LMCAP 2A

Null Hypothesis: MCAP has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		2.856727	1.0000
Test critical values:	1% level	-3.605593	
	5% level	-2.936942	
	10% level	-2.606857	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(MCAP)
Method: Least Squares
Date: 05/26/23 Time: 14:21
Sample (adjusted): 1982 2021
Included observations: 40 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MCAP(-1)	0.127324	0.044570	2.856727	0.0069
C	235.1653	501.5679	0.468860	0.6418

R-squared	0.176792	Mean dependent var	1051.238
Adjusted R-squared	0.155129	S.D. dependent var	2836.705
S.E. of regression	2607.411	Akaike info criterion	18.61881
Sum squared resid	2.58E+08	Schwarz criterion	18.70325
Log likelihood	-370.3762	Hannan-Quinn criter.	18.64934

F-statistic	8.160887	Durbin-Watson stat	2.187338
Prob(F-statistic)	0.006904		

MCAP 2B

Null Hypothesis: D(MCAP) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.925797	0.0003
Test critical values:	1% level	-3.610453	
	5% level	-2.938987	
	10% level	-2.607932	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(MCAP,2)
Method: Least Squares
Date: 05/26/23 Time: 14:22
Sample (adjusted): 1983 2021
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(MCAP(-1))	-0.799890	0.162388	-4.925797	0.0000
C	880.2136	483.7005	1.819749	0.0769

R-squared	0.396051	Mean dependent var	88.84410
Adjusted R-squared	0.379728	S.D. dependent var	3617.719
S.E. of regression	2849.219	Akaike info criterion	18.79740
Sum squared resid	3.00E+08	Schwarz criterion	18.88271
Log likelihood	-364.5493	Hannan-Quinn criter.	18.82801
F-statistic	24.26348	Durbin-Watson stat	1.982063
Prob(F-statistic)	0.000018		

ASI 3A

Null Hypothesis: ASI has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.253691	0.6414
Test critical values:	1% level	-3.605593	
	5% level	-2.936942	
	10% level	-2.606857	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(ASI)
Method: Least Squares
Date: 05/26/23 Time: 14:28
Sample (adjusted): 1982 2021
Included observations: 40 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ASI(-1)	-0.098804	0.078810	-1.253691	0.2176
C	2602.427	1719.234	1.513713	0.1384

R-squared	0.039719	Mean dependent var	1067.911
Adjusted R-squared	0.014448	S.D. dependent var	7691.453
S.E. of regression	7635.687	Akaike info criterion	20.76776
Sum squared resid	2.22E+09	Schwarz criterion	20.85220
Log likelihood	-413.3552	Hannan-Quinn criter.	20.79829
F-statistic	1.571741	Durbin-Watson stat	2.095445
Prob(F-statistic)	0.217613		

ASI 3B

Null Hypothesis: D(ASI) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.787988	0.0000
Test critical values:	1% level	-3.615588	
	5% level	-2.941145	
	10% level	-2.609066	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(ASI,2)
Method: Least Squares
Date: 05/26/23 Time: 14:29
Sample (adjusted): 1984 2021
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(ASI(-1))	-1.594647	0.234922	-6.787988	0.0000
D(ASI(-1),2)	0.431266	0.159474	2.704312	0.0105
C	1601.894	1207.995	1.326077	0.1934

R-squared	0.632705	Mean dependent var	64.36105
Adjusted R-squared	0.611717	S.D. dependent var	11769.52
S.E. of regression	7333.866	Akaike info criterion	20.71405
Sum squared resid	1.88E+09	Schwarz criterion	20.84333
Log likelihood	-390.5669	Hannan-Quinn criter.	20.76005

F-statistic	30.14567	Durbin-Watson stat	1.968324
Prob(F-statistic)	0.000000		

VOD 4A

Null Hypothesis: VOD has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.165877	0.2214
Test critical values:	1% level	-3.605593	
	5% level	-2.936942	
	10% level	-2.606857	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(VOD)
Method: Least Squares
Date: 05/26/23 Time: 14:30
Sample (adjusted): 1982 2021
Included observations: 40 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
VOD(-1)	-0.223553	0.103216	-2.165877	0.0367
C	116.1197	72.58520	1.599771	0.1179

R-squared	0.109883	Mean dependent var	23.83925
Adjusted R-squared	0.086459	S.D. dependent var	388.8508
S.E. of regression	371.6610	Akaike info criterion	14.72255
Sum squared resid	5249012.	Schwarz criterion	14.80699
Log likelihood	-292.4510	Hannan-Quinn criter.	14.75308
F-statistic	4.691022	Durbin-Watson stat	2.182116
Prob(F-statistic)	0.036662		

VOD 4B

Null Hypothesis: D(VOD) has a unit root
Exogenous: Constant
Lag Length: 3 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.366215	0.0000
Test critical values:	1% level	-3.626784	
	5% level	-2.945842	
	10% level	-2.611531	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(VOD,2)
Method: Least Squares
Date: 05/26/23 Time: 14:32
Sample (adjusted): 1986 2021
Included observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(VOD(-1))	-2.931845	0.460532	-6.366215	0.0000
D(VOD(-1),2)	1.429374	0.365805	3.907478	0.0005
D(VOD(-2),2)	0.941687	0.266429	3.534479	0.0013
D(VOD(-3),2)	0.458651	0.161896	2.832992	0.0080
C	84.13740	59.61437	1.411361	0.1681

R-squared	0.738646	Mean dependent var	-3.676944
Adjusted R-squared	0.704923	S.D. dependent var	640.6766
S.E. of regression	348.0220	Akaike info criterion	14.67065
Sum squared resid	3754698.	Schwarz criterion	14.89059
Log likelihood	-259.0718	Hannan-Quinn criter.	14.74742
F-statistic	21.90325	Durbin-Watson stat	1.888857
Prob(F-statistic)	0.000000		

GFCF 5A

Null Hypothesis: D(VOD) has a unit root
Exogenous: Constant
Lag Length: 3 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.366215	0.0000
Test critical values:	1% level	-3.626784	
	5% level	-2.945842	
	10% level	-2.611531	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(VOD,2)
Method: Least Squares
Date: 05/26/23 Time: 14:32
Sample (adjusted): 1986 2021
Included observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(VOD(-1))	-2.931845	0.460532	-6.366215	0.0000
D(VOD(-1),2)	1.429374	0.365805	3.907478	0.0005
D(VOD(-2),2)	0.941687	0.266429	3.534479	0.0013
D(VOD(-3),2)	0.458651	0.161896	2.832992	0.0080
C	84.13740	59.61437	1.411361	0.1681

R-squared	0.738646	Mean dependent var	-3.676944
Adjusted R-squared	0.704923	S.D. dependent var	640.6766

S.E. of regression	348.0220	Akaike info criterion	14.67065
Sum squared resid	3754698.	Schwarz criterion	14.89059
Log likelihood	-259.0718	Hannan-Quinn criter.	14.74742
F-statistic	21.90325	Durbin-Watson stat	1.888857
Prob(F-statistic)	0.000000		

ARDL Bound Test/Long-Run

ARDL Long Run Form and Bounds Test
Dependent Variable: D(SI_GDP)
Selected Model: ARDL(1, 3, 3, 3, 3)
Case 3: Unrestricted Constant and No Trend
Date: 05/26/23 Time: 14:38
Sample: 1981 2021
Included observations: 38

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-105.6959	157.5214	-0.670994	0.5099
SI_GDP(-1)*	-0.503184	0.164678	-3.055557	0.0062
MCAP(-1)	-0.846133	0.246963	-3.426158	0.0027
ASI(-1)	-0.192478	0.072735	-2.646286	0.0155
VOD(-1)	8.839190	3.345457	2.642147	0.0156
GFCF(-1)	1.750036	0.448706	3.900185	0.0009
D(MCAP)	1.007912	0.216867	4.647595	0.0002
D(MCAP(-1))	-0.427970	0.416106	-1.028512	0.3160
D(MCAP(-2))	-0.194810	0.268063	-0.726733	0.4758
D(ASI)	-0.244623	0.040972	-5.970454	0.0000
D(ASI(-1))	0.294916	0.068740	4.290295	0.0004
D(ASI(-2))	0.020497	0.088797	0.230830	0.8198
D(VOD)	2.290260	0.974248	2.350799	0.0291
D(VOD(-1))	-1.600120	1.923469	-0.831893	0.4153
D(VOD(-2))	-1.243067	0.838476	-1.482531	0.1538
D(GFCF)	1.036312	0.156012	6.642501	0.0000
D(GFCF(-1))	-2.004582	0.346580	-5.783897	0.0000
D(GFCF(-2))	-1.304806	0.620400	-2.103168	0.0483

* p-value incompatible with t-Bounds distribution.

Levels Equation
Case 3: Unrestricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MCAP	-1.681558	0.447738	-3.755674	0.0012
ASI	-0.382520	0.080319	-4.762503	0.0001
VOD	1.756652	4.060662	4.326024	0.0003
GFCF	3.477926	0.592061	5.874270	0.0000

EC = SI_GDP - (-1.6816*MCAP -0.3825*ASI + 17.5665*VOD + 3.4779*GFCF)

F-Bounds Test Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	5.851678	10%	2.45	3.52
K	4	5%	2.86	4.01
		2.5%	3.25	4.49
		1%	3.74	5.06
			Finite Sample: n=40	
Actual Sample Size	38			
		10%	2.66	3.838
		5%	3.202	4.544
		1%	4.428	6.25
			Finite Sample: n=35	
		10%	2.696	3.898
		5%	3.276	4.63
		1%	4.59	6.368

t-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
t-statistic	-3.055557	10%	-2.57	-3.66
		5%	-2.86	-3.99
		2.5%	-3.13	-4.26
		1%	-3.43	-4.6

ARDL Short-run

ARDL Error Correction Regression
Dependent Variable: D(SI_GDP)
Selected Model: ARDL(1, 3, 3, 3, 3)
Case 3: Unrestricted Constant and No Trend
Date: 05/26/23 Time: 14:40
Sample: 1981 2021
Included observations: 38

ECM Regression
Case 3: Unrestricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-105.6959	131.9615	-0.800961	0.4326
D(MCAP)	1.007912	0.157922	6.382350	0.0000
D(MCAP(-1))	-0.427970	0.279360	-1.531964	0.1412
D(MCAP(-2))	-0.194810	0.177023	-1.100482	0.2842
D(ASI)	-0.244623	0.029011	-8.432188	0.0000
D(ASI(-1))	0.294916	0.037668	7.829290	0.0000
D(ASI(-2))	0.020497	0.050220	0.408145	0.6875
D(VOD)	2.290260	0.570667	4.013301	0.0007
D(VOD(-1))	-1.600120	1.118202	-1.430976	0.1679

D(VOD(-2))	-1.243067	0.495484	-2.508795	0.0208
D(GFCF)	1.036312	0.066374	15.61328	0.0000
D(GFCF(-1))	-2.004582	0.201268	-9.959749	0.0000
D(GFCF(-2))	-1.304806	0.406881	-3.206846	0.0044
CointEq(-1)*	-0.503184	0.084920	-5.925375	0.0000

R-squared	0.981882	Mean dependent var	1453.863
Adjusted R-squared	0.972068	S.D. dependent var	2783.882
S.E. of regression	465.2706	Akaike info criterion	15.40043
Sum squared resid	5195441.	Schwarz criterion	16.00375
Log likelihood	-278.6081	Hannan-Quinn criter.	15.61508
F-statistic	100.0479	Durbin-Watson stat	1.995466
Prob(F-statistic)	0.000000		

* p-value incompatible with t-Bounds distribution.

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	5.851678	10%	2.45	3.52
K	4	5%	2.86	4.01
		2.5%	3.25	4.49
		1%	3.74	5.06

t-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
t-statistic	-5.925375	10%	-2.57	-3.66
		5%	-2.86	-3.99
		2.5%	-3.13	-4.26
		1%	-3.43	-4.6

Diagnostic Test

Ramsey Reset Test

Ramsey RESET Test
Equation: UNTITLED
Specification: SI_GDP SI_GDP(-1) MCAP MCAP(-1) MCAP(-2) MCAP(-3) ASI ASI(-1) ASI(-2) ASI(-3) VOD VOD(-1) VOD(-2) VOD(-3) GFCF GFCF(-1) GFCF(-2) GFCF(-3) C
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	0.267075	19	0.7923
F-statistic	0.071329	(1, 19)	0.7923

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	19431.59	1	19431.59
Restricted SSR	5195441.	20	259772.0
Unrestricted SSR	5176009.	19	272421.5

Unrestricted Test Equation:
Dependent Variable: SI_GDP
Method: ARDL
Date: 05/26/23 Time: 14:41
Sample: 1984 2021
Included observations: 38
Dependent lags: 1 (Fixed)
Dynamic regressors (3 lags, fixed):
Fixed regressors: C

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
SI_GDP(-1)	0.462598	0.211789	2.184235	0.0417
MCAP	1.084800	0.363597	2.983524	0.0076
MCAP(-1)	-2.320729	0.587285	-3.951620	0.0009
MCAP(-2)	0.173825	0.573919	0.302874	0.7653
MCAP(-3)	0.199479	0.275068	0.725198	0.4772
ASI	-0.259077	0.068477	-3.783404	0.0013
ASI(-1)	0.344820	0.074307	4.640482	0.0002
ASI(-2)	-0.281921	0.079937	-3.526786	0.0023
ASI(-3)	-0.030511	0.098361	-0.310198	0.7598
VOD	2.343859	1.017670	2.303161	0.0327
VOD(-1)	5.251064	1.835283	2.861174	0.0100
VOD(-2)	0.609907	1.703668	0.357996	0.7243
VOD(-3)	1.236354	0.859016	1.439268	0.1663
GFCF	1.165830	0.510591	2.283298	0.0341
GFCF(-1)	-1.364048	0.560120	-2.435277	0.0249
GFCF(-2)	0.727189	0.733461	0.991449	0.3339
GFCF(-3)	1.376545	0.689775	1.995643	0.0605
C	-119.7308	169.6549	-0.705731	0.4889
FITTED^2	-1.79E-06	6.69E-06	-0.267075	0.7923

R-squared	0.999273	Mean dependent var	10449.58
Adjusted R-squared	0.998584	S.D. dependent var	13870.62
S.E. of regression	521.9402	Akaike info criterion	15.65984
Sum squared resid	5176009.	Schwarz criterion	16.47863
Log likelihood	-278.5369	Hannan-Quinn criter.	15.95116
F-statistic	1450.652	Durbin-Watson stat	1.931829
Prob(F-statistic)	0.000000		

*Note: p-values and any subsequent tests do not account for model selection.

Serial Correlation

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.199774	Prob. F(2,18)	0.8207
Obs*R-squared	0.825173	Prob. Chi-Square(2)	0.6619

Test Equation:
Dependent Variable: RESID
Method: ARDL

Date: 05/26/23 Time: 14:43
Sample: 1984 2021
Included observations: 38
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SI_GDP(-1)	0.061966	0.247389	0.250480	0.8051
MCAP	0.099326	0.306165	0.324420	0.7494
MCAP(-1)	-0.204989	0.738946	-0.277408	0.7846
MCAP(-2)	0.192948	0.735876	0.262201	0.7961
MCAP(-3)	-0.019591	0.287021	-0.068257	0.9463
ASI	-0.012145	0.048095	-0.252527	0.8035
ASI(-1)	0.030488	0.100367	0.303764	0.7648
ASI(-2)	-0.016003	0.087081	-0.183767	0.8563
ASI(-3)	0.017843	0.108777	0.164035	0.8715
VOD	-0.054565	1.063314	-0.051316	0.9596
VOD(-1)	0.068762	1.475278	0.046609	0.9633
VOD(-2)	-0.466134	1.940949	-0.240158	0.8129
VOD(-3)	-0.044349	0.926208	-0.047882	0.9623
GFCF	0.064859	0.214472	0.302414	0.7658
GFCF(-1)	-0.272506	0.833885	-0.326791	0.7476
GFCF(-2)	0.325564	1.097005	0.296776	0.7700
GFCF(-3)	-0.333843	1.055047	-0.316424	0.7553
C	36.71225	180.0458	0.203905	0.8407
RESID(-1)	-0.103184	0.399404	-0.258345	0.7991
RESID(-2)	-0.193679	0.306453	-0.632001	0.5353

R-squared	0.021715	Mean dependent var	-3.46E-12
Adjusted R-squared	-1.010919	S.D. dependent var	374.7230
S.E. of regression	531.3830	Akaike info criterion	15.69426
Sum squared resid	5082621.	Schwarz criterion	16.55615
Log likelihood	-278.1909	Hannan-Quinn criter.	16.00091
F-statistic	0.021029	Durbin-Watson stat	2.034108
Prob(F-statistic)	1.000000		

Heteroskedasticity

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.095191	Prob. F(17,20)	0.4187
Obs*R-squared	18.32018	Prob. Chi-Square(17)	0.3689
Scaled explained SS	10.20097	Prob. Chi-Square(17)	0.8950

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 05/26/23 Time: 14:44
Sample: 1984 2021
Included observations: 38

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-31690.46	84043.13	-0.377074	0.7101
SI_GDP(-1)	-170.4767	87.86155	-1.940288	0.0666

MCAP	-170.0217	115.7062	-1.469425	0.1573
MCAP(-1)	169.2801	296.5092	0.570910	0.5744
MCAP(-2)	-486.8522	275.6999	-1.765877	0.0927
MCAP(-3)	173.9148	143.0208	1.216010	0.2381
ASI	24.15545	21.86015	1.104999	0.2823
ASI(-1)	-43.92594	38.46621	-1.141936	0.2670
ASI(-2)	40.34982	38.99128	1.034842	0.3131
ASI(-3)	-93.34264	47.37632	-1.970238	0.0628
VOD	576.0863	519.7948	1.108296	0.2809
VOD(-1)	587.1634	752.7456	0.780029	0.4445
VOD(-2)	1340.723	737.9371	1.816853	0.0843
VOD(-3)	358.2375	447.3559	0.800788	0.4327
GFCF	-67.04282	83.23796	-0.805436	0.4300
GFCF(-1)	525.7590	254.5110	2.065761	0.0521
GFCF(-2)	-551.7745	378.3735	-1.458280	0.1603
GFCF(-3)	758.1393	331.0048	2.290418	0.0330

R-squared	0.482110	Mean dependent var	136722.1
Adjusted R-squared	0.041904	S.D. dependent var	277814.0
S.E. of regression	271931.0	Akaike info criterion	28.17000
Sum squared resid	1.48E+12	Schwarz criterion	28.94570
Log likelihood	-517.2300	Hannan-Quinn criter.	28.44599
F-statistic	1.095191	Durbin-Watson stat	2.038630
Prob(F-statistic)	0.418712		

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