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Abstract: This study evaluates the responsiveness of capital market development to the manufacturing sector's performance in Nigeria from 1985 to 2020. Market capitalisation, the value of transactions, and turnover ratio were used. The manufacturing value-added measures manufacturing sector performance. The vector error correction model technique was employed. The result revealed a long-run relationship between capital market development and the manufacturing sector's performance. Market capitalisation, the value of transactions, and turnover ratio positively and significantly affect the manufacturing sector's performance. This implies the indicators influenced and respond to the direction of the manufacturing sector's performance. The government should encourage savings mobilisation and investments in the capital market by implementing policies that promote capital market financing. The government should apply policies that motivate manufacturing industries to obtain funds from the stock market to boost performance. The governments should promote stock market development such that the ratio of companies'

turnover should boost the manufacturing sector's performance by facilitating the extensive documentation and bottlenecks in the stock market listing and issue procedures. The Security and Exchange Commission should implement regulations that improve market capitalisation, the value of transactions, and turnover ratio to promote manufacturing sector performance.

Keywords: capital market development; performance; manufacturing sector; vector error correction model; VECM; Nigeria.

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1 Introduction

Before the discovery of oil in 1956 at Oloibiri which is in the present day in Bayelsa State, agriculture was the mainstay of the Nigerian economy. Thereafter, processing and manufacturing companies began to spring up for serious business with a bright mode. For instance, the tanning, leather, and footwear companies in Kano and Kaduna, Ewu Flour Mills, Kaduna Textiles Limited, Asaba Textiles Mills Company, and many other manufacturing companies were established with an abundance of raw materials and human resources (Banjoko et al., 2012). However, some of these major manufacturing industries that were viable in the 1970s and 1980s collapsed, and some are gasping for support financially and otherwise. Some are in moribund conditions as the companies can no longer break even or make a profit (Adenikinju and Chete, 2002; Banjoko et al., 2012). Some of the reasons adduced for this misfortune are limited long-term funding, high cost of credit, poor infrastructures, policy inconsistency, and an increase in production cost as a result of high tariffs, among others. As of today, nobody can deny the fact that some of these challenges still constitute a hindrance to the growth and development of the manufacturing sector in Nigeria.

Globally, industrialisation is a key factor for economic growth and development in any nation whether a developed or emerging economy. The manufacturing sector, on the other hand, is seen as a subset of the industrial sector of an economy (Kwode and Buzugbe, 2015). The manufacturing sector, therefore, propels the wheel for robust, sustainable development as well as diversifying and transforming an economy. In a developed economy, the manufacturing sector generates a substantial percentage of employment, thereby creating massive wealth for the general well-being of a nation. The manufacturing sector stimulates the economic growth and development of a country (Ovat, 2014). Although the manufacturing sector in the emerging countries had diminished in the last two decades, the sector remains a springboard for economic growth and development with positive spillover effects to be harnessed (Tybout, 2000; UNIDO, 2016).

Adenikinju and Chete (2002) put forward that the Nigerian manufacturing sector witnessed satisfactory growth from 1970 to 1980 and thereafter, the industry deteriorated severely. The manufacturing sector in Nigeria experienced challenges, resulting in unimpressive performance. Kwode and Buzugbe (2015) noted that the Nigerian manufacturing sector has been performing below expectation, leading to a decline in productivity. Similarly, Banjoko et al. (2012) observed that since Nigerian independence

the performance of the manufacturing sector has not been impressive and exhibited staggering growth.

Studies on the stock markets' evolution and economic sectors' performance are quite old. Yet the studies are still inconclusive and debatable (Kesuh et al., 2022; Yartey and Adjasi, 2007). Some initial studies on the association between the Stock market and economic sectors' performance were conducted by McKinnon (1973) and Schumpter (1911). Schumpter (1911) stated that stock markets provide finance to businesses to acquire new technologies that promote economic growth and performance. Theoretically, stock markets are considered growth accelerators, which stimulate the economic sectors' performance through domestic savings mobilisation (Singh, 1997; Uguanyi et al., 2022). Manufacturing industries borrow from the stock markets to finance their investments and production projects which increase the country's economic growth through the gross domestic product contribution. Also, as the demand for financial services in the economy increase, manufacturing sector expansion spurs the stock market's development (Ho and Njindan, 2017). Ngong et al. (2022) postulated that stock market development responds negatively to agricultural performance and growth. Many studies have been done to establish the correlation between manufacturing sector performance and stock market development with conflicting results. From different academic perspectives, studies on the responsiveness of stock markets to manufacturing sector performance are not yet conclusive (Levine and Zervos, 1996a, 1996b; Stiglitz, 1985; Tachiwou, 2010; Vishny, 2010; Vacu, 2013). The stock market's contribution to boosting the manufacturing sector's performance and economic growth is overlooked, whereas the banking institutions are hailed as the new intermediation engine of economic sectors' performance and growth. This could be validated since studies on the responsiveness of stock markets manufacturing sector's performance particularly in an emerging nation like Nigeria remained inconsistent in analysis, results, and conclusions (Kesuh et al., 2022; Ngong et al., 2022; Vacu, 2013). The differences could prevail because most developing nations' stock markets are still in infancy with small sizes. Some macroeconomic conditions in the emerging countries could equally explain the non-consistent outcomes.

Nonetheless, with a boom in oil prices in the 1970s yet the country made the grievous mistake of abandoning other sectors like micro, small and medium manufacturing (Rankin et al., 2002). Of course, that was the period that the country earned so much from the crude oil exports that could have guaranteed development in the manufacturing sector of the economy. But sadly, due to a lack of economic blueprint, the sector was highly ignored as the government embarked on frivolities and wild elephant projects, basking in the euphoria of an oil boom that later gave way to despair (Dagogo, 2014). Today, the fluctuations and volatility in the global oil prices have again plunged the country into recession since 2016 and in the third quarter of 2020. Although the contraction witnessed in 2020 also reflected the effects of the COVID-19 pandemic (NBS, 2020; CBN, 2021).

According to neoclassical economists, growth can be achieved by increasing optimally the quantity of the factors of production which are land, labour, capital, and entrepreneurship. So, in a world of two factors, labour and capital, it is always presumed that the low-income countries which are emerging have abundant labour with scarce capital from medium to long-term funds. This scarce capital arises as a result of a deficit in domestic savings in emerging countries. This in turn places constraints on capital formation, hence growth and development retardation in the manufacturing sector and other key sectors of the economies. Where labour is readily available, production increases may still be limited and stagnant due to the non-availability of opportunities

like the capital market for industries to borrow funds needed for long-term investments. This is typically true for Nigeria which is rich and well-endowed with abundant raw materials and human resources except for capital. This is evident in the Nigerian government's borrowing spree from foreign nations.

The manufacturing industries in Nigeria after independence are established with private capital under private foreign initiatives. Ordinarily, this scenario is not too healthy for an economy because of the in-built risk involved like vulnerability to shocks (Dada, 2003). The owners of funds exploit the companies. There is the wilful withdrawal of interest and unload investments which could result in an upsurge collapse of the companies. Besides, there is a limit to the number of funds that can be raised from such sources. To pave the way for a robust, dynamic, and aggressive industrial revolution which guarantees persistent and stable growth and development, the Lagos stock exchange was established on 15th September 1960 which later metamorphosed into the Nigerian capital market in 1977. One of the objectives of establishing the Nigerian capital market was to provide opportunities for industries to borrow funds needed for long-term investments (Al-Faki, 2006). Therefore, the role of the capital market in the mobilisation and allocation of funds to the various sectors of the economy is considered paramount to the direction and pace of economic growth and development.

Thus, Nigerian population growth without a corresponding capital market development and manufacturing sector growth is a concern. The problem of scarce long-term financial resources that are required to finance and maintain a smooth inflow of robust investment in the manufacturing sector had resulted in the under performance of the sector and created absolute negative effects on the economy thereby placing the country on a wrong pedestal. The abysmal performance of both the Nigerian capital market and manufacturing sector had paved the way for low productivity, increased importation of consumer goods, lean contribution to total economic output, non-diversification of export earnings, and meagre contribution to job creation; thereby giving rise to poor social/economic well-being of the citizenry. This is evident in the daily growing statistics of the unemployment rate and the prevailing widespread poverty that is threatening the security situation in the country.

Given the manufacturing sector's challenging backdrop, few people are convinced that the manufacturing sector has made significant progress. The inability of the sector to achieve sustainable domestic production, reduce poverty, deliver unemployment and improve the general well-being of the citizenry and the nation at large has become worrisome. Given the inconsistencies and disputable nature of existing research findings, further studies are necessary for elucidation. Thus, this study examines the responsiveness of capital market development to manufacturing sector performance in Nigeria. Specifically to:

1 examine the responsiveness of market capitalisation to manufacturing sector performance in Nigeria

2 evaluate the responsiveness of value of transactions to manufacturing sector performance in Nigeria

3 ascertain the responsiveness of turnover ratio to manufacturing sector performance in Nigeria.

This study would be vital to the government and market stakeholders for proper decision-making and policy formulation.

2 Literature review

The capital market is a market where medium to long-term funds is sourced for or raised to finance major investment projects with a long-term gestation period for economic development purposes. The capital market is a network of specialised institutions that brings together in numerous avenues the suppliers and users of funds (Ogbulu, 2009). Al-Faki (2006) viewed the capital market as an organised financial institution, a series of mechanisms, processes, and infrastructure that aid the coming together of issuers and investors of medium to long-term funds for investment in socio-economic developmental projects of a country. Essentially, the capital market was established to provide funds for the promotion of industrial growth and economic development by way of mobilising long-term finances and capital formation (Ogege and Ezike, 2012).

The capital market is a platform for buying and selling long-term security instruments which allows the issuers and investors to trade within a range of market infrastructure (IBRD, 2016). According to Osaze (2000), the capital market which is of the essence for the long-term growth capital formation is a key driver to the growth and development of an economy. The capital formation here refers to the process of expanding investment by producing goods and services to grow the real sector of the economy such as manufacturing (CBN, 2017). An active capital market is capable of reducing poverty and channelling capital to key sectors of the economy to achieve desirable growth and development (IBRD, 2016). It is a market for mobilising domestic resources like savings as well as foreign capital for the sole purpose of achieving productive long-term investment in an economy (WEF, 2016).

Before the discovery of oil in 1956 at Oloibiri in the present-day Bayelsa State, the Nigerian economy was said to be an agrarian one. Thereafter, manufacturing industries sprang up in major cities of the country with a bright mode and with an abundance of raw materials and human capital. Before the oil windfall in the 1970s, manufacturing contributed about ten percent to the country's economic total output and increased to 13% in 1981 (Ku et al., 2010). But, with the increase in oil revenues to the government account over time, the contribution of the manufacturing sector as a share of the total economic output began to deflate astronomically.

Hence, some analysts and commentators mainly in the political circle opine that the Nigerian manufacturing sector experienced growth in the last two decades. On the contrary, another group of analysts especially researchers noted that the manufacturing sector growth rate is on a constant decline and with a tiny contribution to the total economic output (Adenikinju and Chete, 2002; Ku et al., 2010; Alli, 2010; Vassily, 2011; Banjoko et al., 2012; Chete et al., 2013; Kwode and Buzugbe, 2015; Adekoya, 2019; Emefiele, 2021).

2.1 Theoretical review

The impact of capital market development on manufacturing sector performance is studied within the framework of the financial-led growth hypothesis and the endogenous theory. The financial-led growth hypothesis or supply-leading hypothesis posits that

financial markets are created mainly with the hope of providing financial services to the real sector to boost productivity in the economy (Schumpter, 1911; Onwumere et al., 2012; Adeyeye et al., 2015; Karimo and Ogbonna, 2017; Offum and Ihuoma, 2018). A well-developed financial market stimulates growth through savings and investment. Ovat (2012) noted that a vibrant financial intermediation mechanism paves the way for channelling scarce resources from the surplus units to deficit units to boost investments and thus stimulating growth in the manufacturing sector and development in the economy at large. Conversely, the supply-leading hypothesis says that financial markets develop as a result of the increase in the demand for financial services from the thriving real sector (Onwumere et al., 2012; Adeyeye et al., 2015; Karimo and Ogbonna, 2017; Offum and Ihuoma, 2018).

Solow (1956) and Swan (1956) independently developed the neoclassical growth model. Which is now otherwise referred to as the Solow-Swan growth model (Dimand and Spencer, 2008). This is a model of long-run growth where the factors of production determine the output. This is all about the accumulation of capital and its uses to achieve the desired economic growth (Spencer and Dimand, 2010; Banton, 2019). The model when first developed captured two driving forces (that is, capital and labour) but was later extended by Solow in 1957 to include technology as the third driving force of productivity (Banton, 2019). In the long-run, aggregate output can be enhanced by technological improvement. The neo-classical theorist maintained that progress in technological advancement could push the production function upward, resulting in the overall growth of an economy. This assertion is contrary to the views of the Harrod-Domard model of economic growth theory that presupposed that growth is only equated with savings and investment (Agarwal, 2017).

Kaldor (1996) revealed that manufacturing is the engine of growth of any nation that wants to attain or promote economic growth and development. The manufacturing sector can attract labour from other key sectors of an economy in which diminishing returns exist. In the long-run, productivity increases since the average product of labour will exceed the marginal products. Thus, the spillover effects will automatically spread to other key sectors such as the financial sector (capital market) of the economy (Szirmai, 2009; Herman, 2011; Veugelers, 2013; Westkamper, 2014). Consequently, the improvements in the financial sector and other key sectors will have a long-run impact on capital accumulation and mobilisation of savings into productive investments which will lead to capital market development that will impact positively on the overall economic growth and development of an economy (Bencivenga and Smith, 1991; Levine and Zervos, 1996a, 1996b; Caporale et al., 2004).

2.2 Empirical literature

Abdu and Anam (2018) evaluated the Nigerian industrial sector and economic growth in the face of sustainable development goals from 1981 to 2016 using multiple regression techniques on time series data. The result showed that industrial output had a significant impact on the nation's economic growth during the period of study. The study failed to use stock market parameters and the analysis ended in 2016 employing multiple regressions which are limited robustness. Adeleye (2018) examined the factors that affect long-term capital formation in the Nigerian capital market on economic growth from 1990 to 2014 using the ordinary least squares technique. The findings showed that the

stock market had a significant but weak impact on economic growth. This study period was limited to 2014 and applied the ordinary least squares technique which is vulnerable to outliers. Owui (2019) equally examined the impact of the capital market on the Nigerian industrial sector using the ordinary least squares multiple regressions. The study revealed a significant impact of the capital market on the industrial sector. The study used the ordinary least squares technique which is vulnerable to outliers with only one measure of the capital market. Ngong et al. (2022) examine the link between stock market development and agricultural growth in emerging African economies from 1990–2020 using fully modified ordinary least square and dynamic ordinary least square methods. The findings disclose that market capitalisation negatively affects agricultural growth while stock value traded positively affect agricultural growth. The findings unveil bidirectional causality between labour and agricultural growth with unidirectional causality flows from agricultural growth to market capitalisation and stock value traded. This study focused on the agricultural sector's growth and performance using the fully modified and dynamic ordinary least square methods.

Aminu et al. (2019) investigated the interplay between financial development and manufacturing output in Nigeria from 1984 to 2016 by using the autoregressive distributed lag model. The findings showed that financial development contributed positively to manufacturing output in the long run. This study focused on both market and banking sector developments. Ayodeji and Ajala (2019) studied the effects of capital market performance on sectoral output growth in Nigeria from 1984 to 2018 using the auto-regressive distributed lag method. The study revealed a positive long-run effect of the capital market on industrial output growth. The research studied several economic sectors' outputs together. Kesuh et al. (2022) investigated the causal relationship between stock market development and economic growth in Sub-Saharan Africa from 1990–2020 applying the autoregressive distributed lag model, co-integration, and Granger causality tests. The results revealed that stock market capitalisation positively and significantly affects economic growth in the long run and negatively insignificant effect in the short run. Stock market liquidity captured by the total value of shares traded and turnover ratio negatively and significantly affects economic growth. An inconclusive causality exists between stock market development and economic growth. This study provided debatable findings.

Adekule (2020) evaluated the short-run and long-run effects of the capital market on manufacturing output in Nigeria using the bound test and auto-regressive distributed lag technique from 1985 to 2017. The study showed that the capital market promoted manufacturing sector productivity in the short run and not in the long run. Toby and Dibiah (2021) investigated capital market development and economic growth in Nigeria from 1981 to 2017 adopting the vector autoregressive (VAR) technique. The findings show that the capital market impacts economic growth. Udo et al. (2021) examined the effects of capital market development on the Nigerian economic growth from 1983 to 2016 using the auto-regressive distributed lag method. The study revealed that all share indexes and several listed securities positively and significantly related to economic growth in the short and long runs.

The literature illustrates studies conducted using varied methodologies within different time frames and geographical locations. The studies provide conflicting findings on the responsiveness of the stock market to manufacturing sectors' performance. Some studies unveil results that positively affect manufacturing sectors' performance (Adekule, 2020; Ayodeji and Ajala, 2019). Some studies show negative effects of the stock market

on manufacturing sectors' performance (Kesuh et al., 2022; Ngong et al., 2022). Others reveal inconclusive causal links (Kesuh et al., 2022). Hence, this study examines the responsiveness of capital market development to the manufacturing sector's performance in Nigeria.

3 Methodology

This study applies the *ex-post facto* research design to study the developmental trend of the variables of interest over time. The variables include manufacturing value-added, market capitalisation, the value of transactions, and turnover ratio sourced from the Central Bank of Nigeria Statistical Bulletin, Securities and Exchange Commission Bulletin, and the World Bank Group data from 1985 to 2020. The study employs the vector error correction model (VECM) due to its simple long and short-term equation interpretations of results. Theoretically, VECM is a representation of the co-integrated VAR model which is Granger's representation theorem. Thus, a co-integrated VAR has VECM representation and vice versa which are used to determine the co-integrating relationships. When the number of co-integrating links is fixed certain VAR coefficients in the model are restricted. The resulting VAR from VECM representation has more efficient coefficient estimates. A VECM is a restricted VAR designed for the use of non-stationary co-integrated series. The VECM specification restricts the long-run behaviour of the endogenous variables to converge to their co-integrating relationships and allows a wide range of short-run dynamics. The co-integration term is the error correction term (ECT) since the deviation from long-run equilibrium is gradually corrected in the series with partial short-run adjustments.

This research work is anchored on the endogenous growth model proposed by Solow (1956). The model states that growth and performance occur due to internal factors like capital, labour, and technology. The general form of the neoclassical growth theory is expressed as:

$$Y = AF(K, L) \tag{3.1}$$

where Y = output; K = share of capital; L = labour and A = determinant level of technology

Given the relationship between labour and capital, equation (3.1) can be re-written as:

$$Y = F(K, AL) \tag{3.2}$$

where the variables are the same as earlier defined, thus, the equation above specifies:

Output (Y) as a linear function of capital (K), labour (L), and an index of technology (A). Extending this model, the capital market indicators such as market capitalisation ($MCAP$), the value of transactions (VTR), and turnover ratio (TOR) are incorporated. The structural form of the VECM technique used is modified based on Ibi et al. (2015) is given as:

$$Z_t = f(MVA, MCAP, VTR \text{ and } TOR) \tag{3.3}$$

where MVA is manufacturing value added (dependent variable) and is the proxy for manufacturing sector performance, $MCAP$ is market capitalisation, VTR is the value of

transactions and *TOR* is turnover ratio are independent variables. The implicit form of the model is given as:

$$\Delta Z_t = \alpha_{io} + \sum_{i=j}^{k} A_i \Delta Z_{t-1} + \sum \delta ECT(-1) + \varepsilon_{it} \tag{3.4}$$

where Z_t is the vector of exogenous and endogenous variables, Δ is the difference operator, t is the current period, $t-1$ is one period lag, $t-i$ is the j^{th} period lag and k is the maximum number of lags. α_{io} is the coefficient of autonomous variables, A_i is the coefficient of the exogenous and endogenous variables, δ is the coefficient of the ECT and ε_{it} is the vector of innovations. Each variable in equations (3.3) and (3.4) can assume the position of the dependent variable under systemic modelling which the VECM typically permits. Thus, the systematic version of model (3.4) is re-specified explicitly to test the hypothesis as applicable:

$$\begin{aligned}\Delta MVA_t = \alpha_{1,0} &+ \sum_{i=1}^{k} A_{1,1} \Delta MVA_{t-i} + \sum_{i=1}^{k} A_{1,2} \Delta MCAP_{t-i} + \sum_{i=1}^{k} A_{1,3} \Delta VTR_{t-i} \\ &+ \sum_{i=1}^{k} A_{1,4} \Delta TOR_{t-i} + \sum \delta_1 ECT(-1) + \varepsilon_{1,1}\end{aligned} \tag{3.4a}$$

For objective one, the relevant model is

$$\begin{aligned}\Delta MCAP_t = \alpha_{1,0} &+ \sum_{i=1}^{k} A_{1,1} \Delta MCAP_{t-i} + \sum_{i=1}^{k} A_{1,2} \Delta MVA_{t-i} + \sum_{i=1}^{k} A_{1,3} \Delta VTR_{t-i} \\ &+ \sum_{i=1}^{k} A_{1,4} \Delta TOR_{t-i} + \sum \delta_1 ECT(-1) + \varepsilon_{1,1}\end{aligned} \tag{3.4b}$$

For objective two, the relevant model is

$$\begin{aligned}\Delta VTR_t = \alpha_{1,0} &+ \sum_{i=1}^{k} A_{1,1} \Delta VTR_{t-i} + \sum_{i=1}^{k} A_{1,2} \Delta MVA_{t-i} + \sum_{i=1}^{k} A_{1,3} \Delta MCAP_{t-i} \\ &+ \sum_{i=1}^{k} A_{1,4} \Delta TOR_{t-i} + \sum \delta_1 ECT(-1) + \varepsilon_{1,1}\end{aligned} \tag{3.4c}$$

For objective three, the relevant model is

$$\begin{aligned}\Delta TOR_t = \alpha_{1,0} &+ \sum_{i=1}^{k} A_{1,1} \Delta TOR_{t-i} + \sum_{i=1}^{k} A_{1,2} \Delta MVA_{t-i} + \sum_{i=1}^{k} A_{1,3} \Delta MCAP_{t-i} \\ &+ \sum_{i=1}^{k} A_{1,4} \Delta VTR_{t-i} + \sum \delta_1 ECT(-1) + \varepsilon_{1,1}\end{aligned} \tag{3.4d}$$

When variables contain one or more co-integrating vectors, an appropriate estimation method is the VECM. The VECM adjusts the short-run variables' changes and equilibrium deviations. The lag lengths criteria propose lag two for VECM estimation. The ECT (ECT_{t-1}) is a critical parameter in the VECM dynamic model estimation. The

ECT measures the adjustment speed of endogenous variables to the equilibrium level. For the effect of a joint variable using VECM all the variables are considered exogenous (ΔX) and endogenous (ΔY) to get the long and short-run relationship. The short-term impacts are captured using individual differentiated terms' coefficients. This captures the effects and the VECM coefficient provides information if or not the past values of variables influence the current values. The ECT's size and coefficient statistical significance measures each variable's tendency to return to equilibrium. When the coefficient is significant implies that previous equilibrium errors determine the current values captured in the long run.

4 Discussion of results

The descriptive statistics of the variables in Table 2 shows the mean and moment conditions of each variable. The manufacturing value-added mean value ranges from 7.17 minimum to 21.05 maximum values. This implies the average manufacturing value-added in the total gross domestic product was 7.90%. The average ratio of MCAP is 8.79% with a standard deviation of 6.0. The figures of MCAP indicate that the capital market has little penetration into the manufacturing sector. The average turnover ratio was 7.2%, which indicates that stocks get traded in the market at a rate of 7.2% on average. The figures suggest that liquidity in the stock market is low. The standard deviation shows that stock value traded deviates furthest from the meanwhile manufacturing value-added deviates least from the mean. The skewness reveals that all the variables are positively skewed. The exogenous variables show leptokurtic characteristics since the variables' means are all greater than three. MCAP, TOR, and VTR are not normally distributed while MVA is normally distributed based on the Jacque-Bera probability values.

Table 3 shows the augmented Dickey-Fuller and Philip Perron test results for unit root. The unit root test is essential to determine the estimation technique. Econometrics models are not supposed to be applied by default. The unit root tests should be applied to establish a suitable analytical method. The results illustrate that all the variables are first difference stationary. This is a precondition for Engle and Granger residual co-integration test. The variables' integration in different order one, $I(1)$ signals a long-term relationship within the variables.

Table 1 Summary of variables

Variable	*Definition and used by*	*Measurement*
Manufacturing value added (% of GDP) – MVA	Manufacturing value added is the manufacturing sector's net output (Szirmai and Verspagen, 2015)	Log of MVA
Market capitalisation (MCAP)	It is the total value of all equities securities traded on a stock market (Owui, 2019)	Log of MCAP
Value of transactions (VTR)	It is the total amount or value of a company's stock (Offum and Ihuoma, 2018)	Log of VTR
Turnover ratio (TOR)	It is the ease and speed at which securities are bought and sold (Ezirim et al., 2009)	Log of TOR

Source: Author's compilation 2021

Table 2 Descriptive statistics

Variable	*Mean*	*Max.*	*Min.*	*Std. dev.*	*Skewness*	*Kurtosis*	*Jacque Bera*	*Prob.*
MVA	7.90	21.05	7.17	1.35	0.02	1.40	3.61	0.16
MCAP	8.79	38.62	6.59	6.00	1.51	6.80	33.45	0.00
TOR	7.20	29.40	0.60	6.45	1.49	5.95	24.83	0.00
VTR	64.42	23.58	1.40	105.95	1.52	4.48	16.19	0.00

Source: Author's computation

Table 3 Unit root test

Variables	*Augmented Dicker fuller (ADF)*				*Integration order*	*Philip Peron (PP)*			
	T-stat	*At 1%*	*At 5%*	*At 10%*		*T-stat*	*At 1%*	*At 5%*	*At 10%*
MVA	–6.651***	–4.394	–3.612	–3.243	*I*(1)	–2.139**	–2.660	–1.955	–1.609
MCAP	–5.139***	–3.699	–2.976	–2.627	*I*(1)	–5.326***	–3.699	–2.976	–2.627
TOR	–3.745***	–3.699	–2.976	–2.627	*I*(1)	–3.712***	–3.699	–2.976	–2.627
VTR	–3.636**	–4.374	–3.603	–3.238	*I*(1)	–0.456**	–3.689	–2.971	–2.625

Notes: *** and ** denotes 1% and 5% significant level respectively.

Source: Author's conception

From Table 4, the co-integration check between exogenous variables and endogenous variables is performed using the Johansen and Juselius co-integration tests. When variables are co-integrated, a linear, stable, and long-run affiliation exists within the series so that the disequilibrium errors should fluctuate near a zero mean. The co-integration test has four hypothesised co-integrating equations which are based on the trace and max-eigen statistical values. The findings indicate that three co-integrated equations in the trace test and two co-integrated equations in the max-eigen test since the equations are significant at the 5% level. The findings reveal co-integration among the variables hence the null hypothesis of no co-integration is not accepted.

Table 4 Johasen and Juselius cointegration test

Unrestricted cointegration rank (trace test)			
Hypothesised no. of CE(s)	*Trace statistic*	*0.05 critical value*	*Prob.***
None*	186.02	125.62	0.00
At most 1*	124.03	95.75	0.00
At most 2*	77.10	69.82	0.01
At most 3	6.84	15.49	0.60
Unrestricted cointegration rank test (eigenvalue test)			
Hypothesised no. of CE(s)	*Max-eigen statistic*	*0.05 critical value*	*Prob.***
None*	61.99	46.23	0.00
At most 1*	46.93	40.08	0.01
At most 2	31.20	33.88	0.10
At most 3	4.74	14.26	0.77

Source: Author's computation

Table 5 Vector error correction model

Long run results				
Variable	*Coefficient*	*Std. error*	*t-statistic*	*Prob.*
MCAP	0.576487	0.157449	3.661420	0.0016
VTR	0.181550	0.392778	9.84371	0.01844
TOR	0.092408	0.483154	5.26940	0.01754
R-squared	0.781232	F-statistic		1.495167
Log likelihood	4.764241	Akaike AIC		–0.702235
Schwarz SC	1.435103			
Short run results				
Variable	*ΔLMVA*	*ΔLMCAP*	*ΔLTOR*	*ΔLVTR*
$ECM_{t-1}(\alpha)$	–0.05	–1.20	–0.48	–0.79
$\Delta LMVA_{t-1}$	0.43	–0.76	0.99	–1.50
$\Delta LMVA_{t-2}$	–0.24	0.68	–1.11	3.09
$\Delta LMCAP_{t-1}$	–0.37	–0.66	1.19	0.26
$\Delta LMCAP_{t-2}$	0.11	0.88	–1.54	2.87
$\Delta LTOR_{t-1}$	0.00	–0.08	–0.51	–0.25
$\Delta LTOR_{t-2}$	–0.01	–0.01	–0.40	–0.07
$\Delta LVTR_{t-1}$	–0.01	–0.38	0.08	–0.67
$\Delta LVTR_{t-12}$	–0.09	–0.12	0.18	0.28
Constant	0.04	0.26	0.10	0.05
R-squared	0.63	0.58	0.48	0.78
F-statistic	1.82	1.50	1.00	3.81

Source: Author's computation

From Table 5, the findings indicate that market capitalisation significantly and positively affects manufacturing value-added by 0.576. This implies that a percentage increase in market capitalisation produces a 57.6% increase in the manufacturing value-added. The findings suggest that market size responds positively to manufacturing sector performance and growth in Nigeria. Value of transactions significantly and positively impacts manufacturing value-added by 0.182. This means that a percentage increase in the value of transactions produces an 18.2% increase in manufacturing value-added. This implies that the value of transactions responds positively to the manufacturing value-added. This outcome unveils that an increase in companies' stock value would promote manufacturing sector performance. The turnover ratio has a significantly positive effect on manufacturing value-added by 0.092. A percentage increase in turnover ratio gives a 9.2% rise in manufacturing value-added. This unveils that the turnover ratio responds favourably to the manufacturing value-added. Thus, the companies' stocks enjoy market liquidity that enhances the manufacturing sector's performance. Overall, the stock market responds positively to the manufacturing sector's performance in Nigeria. The findings align with the results of Owui (2019) and Udo et al. (2021) but disagree with the findings of Ngong et al. (2022). The R-squared shows that 78.1% variations in the manufacturing value-added were explained by market capitalisation, the value of transactions, and the turnover ratio in the Nigerian stock market. Hence, there is a

goodness of fit for the estimated model. The high value of the F-statistic justifies that the variables are statistically significant in this study.

5 Conclusions and policy recommendations

This study examines the responsiveness of stock market development to the manufacturing sector's performance in Nigeria from 1985 to 2020 using annual data from World Bank development indicators and the Central Bank of Nigeria Statistical Bulletin. The manufacturing value-added is the proxies for manufacturing sector's performance as the endogenous variable. The exogenous variables included stock market capitalisation, turnover ratio, and value of transactions that measured stock market development. The study is analysed using the VECM. The findings reveal that the stock market capitalisation, turnover ratio, and value of transactions impact positively on the manufacturing sector's performance. This implies that the stock market development responds favourably to the manufacturing sector's performance. The government should encourage savings mobilisation and investments in the capital market by implementing policies that promote capital market financing. The government should apply policies that motivate manufacturing industries to obtain funds from the stock market to boost performance. The governments should promote stock market development such that the ratio of companies' turnover should boost the manufacturing sector's performance by facilitating the extensive documentation and bottlenecks in the stock market listing and issue procedures. The governments and the Security and Exchange Commission ought to apply attractive policies for investors and encourage companies' listing in the stock market. The Security and Exchange Commission should implement regulations that improve market capitalisation, the value of transactions, and turnover ratio to promote manufacturing sector performance. Thus, policies that increase investors' confidence through stock market development initiatives and institutions should be utilised.

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