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Stock Markets and Industrial Development of Europe: Lessons for Nigeria

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Abstract

This study examined the controversy on the direction of causality/impact between stock markets and industrial sector development of Europe with a view to unearthing some lessons for Nigeria's quest for developing her industrial sector for rapid economic growth. The study employed cross sectional stock exchanges' monthly data of eleven countries in Europe spanning the period January 2015 to November 2022. The variables for the study comprise Industrial output which served as proxy for industrial development (the dependent variable) and the explainable variables which include Market Capitalization, Stock market Index and Volume of Transactions as indices of stock market performance. The econometric estimation tools employed for the Panel data relationship include the pooled regression analytic model with fixed and random effects as well as the Kao Residual Co-integration, the Likelihood Ratio, the Hausman specification and Residual cross section dependence tests. The empirical results of the study demonstrate that the relationship between market capitalization, stock market index and industrial output within the scope this study were mixed with both negative and positive effects whereas in all, there was no significant relationship between volume of transactions and industrial output. It was also found that the Likelihood ratio and Hausman tests support the fixed effect that unobserved/omitted variables are important explanatory variables for each country's industrial development. This means that industrial development of the respective countries studied in Europe depend not only on stock market performance of the countries but also on other discretionary policies adopted by these countries. In addition, the Residual cross section dependence test found a cross-sectional dependence or correlation among the selected countries in the Euro zone. The import of these findings for Nigeria is that current efforts being undertaken by policy makers and the regulatory authorities should be intensified to boost activities in the stock market in Nigeria as this will impact positively on industrial development and the economy at large. We therefore recommend comprehensive policy thrust that incorporates not just capital market reforms but also monetary, fiscal, incomes, industrial, trade and foreign exchange policies all working in tandem to achieve a sustainable growth of the stock market.

Keywords: Industrial Output, Market Capitalization, Stock Market index, Pooled Regression, Europe

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1. 1 Introduction

Stock markets are organised institutional arrangements where buyers and sellers of securities meet under competitive atmosphere to trade with each other and where prices are established in response to the forces of supply and demand for securities issued by different economic units in the economy. The market therefore provides the avenue for issuing new securities and the exchange of existing securities and is therefore rightly positioned to serve as an important segment of the financial system in any nation that desires the advancement of industrial finance (Udofia et al, 2022).Whether capitalist, socialist or a mixed economy, industrialization remains the backbone for economic advancement of a nation, hence a platform for financing such process must be of paramount importance. An efficient stock market has the capacity to allocate funds adequately, timely and at the least cost to expand investment and output (Ogbulu, 2016; Barro, 1990; Schwert, 1990; Fama, 1990). The transmission mechanism of the capital market makes it possible to facilitate the flow of savings into investment outlets (Gurley & Shaw, 1997, Onoh, 2002). This is done through the intermediating role of the market between the surplus units and the deficit units, resulting in the accumulation of capital that leads to increased investment and economic growth (Chou, 2007). However, Fama (1990) and Schwert (1990) maintained that stock market returns signpost information concerning corporate expectation of cash flows in the future and discount rates, thus providing an effective signal to gauge industrial production as well as investors' expectations.

Despite the clear role played by deposit money banks (DMBs) in the economy, the capital market complementarily offers wide range of platforms for raising long term debt capital through issue of debt securities. Onoh (2002) posited that capital markets provide long term loans to industries, commerce, and governments. These kinds of instruments traded in the capital market are seen to be more flexible to both investors and issuers

of securities. Besides, the capital market serves as an agency of DMBs intermediation because it does not only bring investors and issuers together on an alternative platform, but assists the exchange of debt capital, a veritable function that is primarily the domain of DMBs and other financial institutions.

Nevertheless, deposit money banks and other financial institutions on one hand and the capital market on the other continue to exist together and perform their respective roles since it is impossible for each of the institutions to completely substitute each other in the provision of the needs of the economy. For that, the capital market being considered as possessing wide range of roles beyond the traditional is also seen as a catalyst for capital creation given that a well developed and vibrant capital market is the backbone of a healthy and efficient economy. Again, the capital market as an institution that operates on market mechanism does have its time of turbulence in response to market forces. This is evident in the various reported cases of crises on the stock markets around the world, especially during the great depression of 1930s (Onoh, 2007) and the global economic meltdown of 2007/2008.

The capital market is normally divided into equity, debt, and derivatives segments (Ezirim, 2005; Bhalla, 2009; Ogbulu, 2019). The debt segment deals with the issue of long-term debt securities by various corporate bodies as well as the federal and state governments. The equity segment on its own comprises equity issues and stock trading, whereas the derivatives segment consists of derivatives (futures and options) of various companies and stock indices (Ogbulu, 2016). The essence of this division or segment in the capital market is to facilitate regulations and effective supervision as well as to provide investors with distinct platforms for trading in each of these types of securities. Any well-functioning equity market provides liquidity, facilitates risk diversification, information acquisition about firms, corporate control, and savings mobilization (Chou, 2007). Therefore, whenever the efficiency or quality of service is altered, the functioning of the stock markets could as well affect the pace of industrial development.

1.2 Statement of problem

The place of stock markets in industrial sector can never be overemphasized. A deepened, broad, and resilient stock market serves as a fulcrum that supports industrialization and economic development of any nation. It reduces liquidity and productivity shocks to investors thereby enhancing the production capacity of the economy (Levine, 1991; Bensivenga et al, 1996; Liu & Hsu, 2006). A good number of studies have been conducted on the impact of stock markets on industrial development both in the developed and developing countries. Some of these studies found positive impact of stock market on industrial sector development. For example (Levine, 2003; Atje and Jovanovic, 1993; Levine and Zervos, 2003). On the other hand, several studies have also reported negative relationships between capital market activities and industrial development. Such studies as Harris (1997), Watson (1998) and Watson (1998), argued that though stock market activities are positively related to industrial development, the presence of stock market fluctuations could be hazardous to industrial development of a nation.

It is also observed that in many developing nations, the role of the stock market is not significantly noticeable because of the abysmal performance of the industrial sector. Such under performance is seen in the manufacturing sub sector and is due mainly to capacity underutilization, dilapidation of basic infrastructure, vicious circle of poverty, high rates of production cost and inflation, unfriendly investment environment and other economic factors. Ibi, Joshua, Eja, and Olatunbosun (2015) are of the view that due to the underdeveloped and shallow nature of the capital markets in developing countries like Nigeria, it has become a controversy on whether capital markets in developing countries have any positive impact on industrial sector development. Though there is no end to the arguments, there is still trepidation about the adverse effect of the volatile behaviour associated with the stock markets that would produce a negative rather than positive impact on industrial development.

Given the raging debate and the profound interrelationships and similarities between and among national economies in today's world, there is the need therefore to review the role of stock markets in industrial development in developed countries. Hence the need for this study to investigate the relationship between stock markets and industrial development in Europe as a testable model from which we can draw inferences for a developing country like Nigeria.

2. Literature Review

2.1 Overview of the Stock market and its significance in the development

In terms of providing a clear definition, there seems to be an agreement among authors that a stock market is a place where securities are bought and sold and this market is divided into primary and secondary markets (Razzaq et al., 2022; Adesanya et al., 2020). Shah, Isah, and Zulkernine, (2018) define the stock market or stock exchange as an organized and regulated financial market where securities (bonds, notes, and shares) are bought and sold at prices governed by the forces of supply and demand. Stock markets have been identified as locations for engaging in economic transactions of buying and selling stocks or shares which are the ownership claims on businesses, representing an aggregation of buyers and sellers of stock and need not be a physical location or a discrete entity (Akpunonu et al., 2018). There are many perspectives across various bodies of literature on what the stock market is but there seems to be a consensus that the stock market, also known by different names as share markets and equity markets (Akpunonu et al., 2018), is the very hub of the capital market, and the pivot around which every activity of the capital market revolves (Musa et al., 2020). Without this facility and the chance, which is thus available to investors to liquidate their investments or adjust their portfolio whenever they desire to do so, it is doubtful if there would be any motivation to invest in securities. In its nature, the capital market is a complex of institutions and mechanisms through which intermediate and long-term funds are pooled and made available to businesses and the government (Ubesie et al., 2020; Abina & Maria, 2019).

Some bodies of literature have expanded that definition to mean markets where securities such as debentures, stocks or bonds issued or proposed to be issued, shares, commodities, futures contracts, options, and other derivatives are traded on the floor by authorized or registered dealers or brokers on behalf of their clients (Shujau et al., 2022; Omodero & Alege, 2021). It differs from the over-the-counter market for securities in that trading on the floor of the Exchange is limited to members, that is, to those who have purchased a seat on the Exchange. In addition, the Securities in which trading occur are limited to those which have been admitted to listing on the Exchange.

Stock Exchanges provide a market for the trading of securities to individuals and organizations seeking to invest their savings or excess funds through the purchase of securities (Clap, 2019). Concerning their significance, stock exchanges are established to facilitate, regulate, and control the business of buying and selling securities (Devi et al., 2020). It constitutes, maintains, or provides a marketplace for bringing together, purchasers and sellers of securities or for otherwise performing for Securities the functions commonly performed by an Exchange (Devkota et al., 2021; Rao et al., 2020). It is a market that facilitates capital mobilization and allocation, allowing both governments and companies to raise funds through the market on long and most prudent terms through the offer of shares and bonds (Acha & Akpan, 2019)

Other authors have also looked at the stock market to be significant in the economy in that it provides an avenue for the movement of long-term capital funds from those with savings to invest in those areas of industries, commerce, and government where funds are absent for expansion and other developmental purposes (Adesanya et al., 2020; John, 2019; Udeh & Igwebuike, 2019). It is equipped with an efficient delivery mechanism for the mobilization and allocation, management, and distribution of long-term funds (Shahbaz, Ahmed, and Ali 2008). More so, it drives the efficient allocation of acquirable capital funds to the diverse uses in the economy. The stock market can also be a mechanism that can measure and detect the symptoms of an impending economic boom or decline long before the predicted prosperity or decline occurs (Gormsen & Koijen, 2020).

Summarising its importance, Akpunonu et al. (2018) stressed that the stock market plays a very substantive role in economic growth and development. This, according to the authors, is because the success or failure of any economy is hinged on the viability of the financial system which invariably and undoubtedly incorporates the structure of the capital market. (The stock market plays a crucial role in global economies and corporate finance where the financial market generates finance for the economic growth of the country (Zahid, Ather & Anam 2011).) Globally, stock markets have become a source of long-term investment for individuals, groups, and governments at all levels (Akpunonu & Nwankwo 2014). Therefore, they facilitate the flow of funds from the area of surplus to the area of needs, as well as the channelling of funds from those who desire them to those who need them for economic endeavours (Donald, 2020).

It must be noted that the performance of stock markets varies from one country to another (He et al., 2020). Thus, the impact of stock markets on the country's economy can be different from how other countries' stock markets affect their economies. This is because the impact of stock markets on the economy depends on various factors like the organization of stock exchanges, its relationship with other components of the financial system, the

system of governance in the country, etc (Al-Thaqeb et al., 2022; Nguyen & Nguyen, 2020). These factors may be distinct and unique for each country and therefore produce different results in different economies. Developed countries and developing countries around the world have developed their stock markets with some of the most active stock markets existing in countries like the US, the UK, Japan, India, China, Canada, Germany, France, South Korea, and the Netherlands (Bhutto et al., 2022).

There have been a lot of views on the characteristics of the stock markets. Evidence in the literature also shows that in stock markets are dynamic in nature. This is a result of changing fundamentals of companies, changes in the domestic and international macroeconomy, and changes in market sentiment (Selvamuthu et al., 2019). The stock market, like any other market, has buyers and sellers and there are goods (shares of companies) that are exchanged for a price. However, the goods are not demanded for their own sake but are a means to increase wealth to enhance future consumption. There is an inherent greed factor in this market, and overall, it makes it very difficult to predict market movements (Min, 2020). Four sets of players have been identified in the stock market, namely, investors who have a medium to long-run perspective, day traders, arbitrageurs, and speculators (Wong et a., 2022; Slobodianyk & Abuselidze,2021).

2.1.1 The Stock market in Europe

Some of the most active stock markets exist in countries like the US, the UK, Japan, India, China, Canada, Germany, France, Czech, Hungary, South Korea, Sigapore and the Netherlands. Europe, alongside America, held the centre stage during the 19th Century as the principal centres of stock trading with the London Stock Exchange being the main stock market for Europe and the New York Stock Exchange for America (Rehman et al., 2022; Aslam et al., 2020). These two Stock Exchanges continue to have strong markets today even though most of the stock exchanges that were established during the 19th century disappeared almost immediately while only a few thrived (Akala 2019). For instance, Wright and Hamre (2021) stressed that the UK has the largest market with €3 trillion in listed companies (21% of the European total), followed by France with €2.6tn or 18%. There is a mid-tier of sizeable markets in Germany, Switzerland, and the Netherlands, but then a long tail of small exchanges with 18 of the 33 exchanges having a combined market cap of less than €100bn as at the end of the year 2021. Europe has very strong and viable stock markets, even though investor confidence has fallen to lows not seen since the very beginning of the coronavirus pandemic, high inflation, rising interest rates, and an escalation of the war in Ukraine (Ernawati et al., 2022; Zakeri et al., 2022). All these have led to the fall of European equity markets in 2022.

The major European stock indices include the Financial Times Stock Exchange 100 Index (FTSE 100) considered a benchmark index that is used to gauge the performance of the UK economy as it represents 81% of the UK's market value on the London Stock Exchange. Next is the Euro Stoxx?? 50 which represents a popular market index of the largest blue-chip companies from 18 countries in the Euro zone, representing the leading European businesses covering almost 50% of European stock market capitalisation. Euro Stoxx 50 comprises stocks from the United Kingdom, Switzerland, Sweden, Norway, Finland, Spain, Portugal, Luxembourg, Netherlands, Italy, Germany, France, Denmark, Austria, Belgium, Czech Republic, Ireland, and Greece. There is also the Cotation Assistee en Continu, commonly known as the CAC 40, which is a benchmark index of the French stock market performance, representing the 40 businesses with the highest market capitalisation on the Euronext Paris Stock Exchange. The CAC 40 has been identified in stock market literature as one of the largest European stock markets and one of the most important national indices of the Euronext Pan-European Stock Exchange group (Chowdhury et al., 2022; La Torre et al., 2020).

In Germany, there is the Deutscher Akrien Index or better known as DAX 30, which tracks the performance of the 30 biggest companies traded on the Frankfurt Stock Exchange (FSE). The DAX 30 constituent businesses represent almost 75% of the total market capitalization of the FSE and are seen as a gauge of the health of the German economy. The German economy has held a leading position in the European Union and is estimated as the fifth-largest economy globally. That is why so many traders choose the DAX 30 to invest in the European stock market.

It is also important to discuss the Switzerland 20, also known as the Swiss SMI 20 or the Swiss Market Index, which has been verified as the most highly valued blue-chip market index in Switzerland. The SMI tracks the performance of the 20 biggest and most traded large and mid-cap stocks listed on the SIX Swiss Exchange. It is considered a benchmark of the Swiss stock market and accounts for 90% of the market capitalization and trading volume of Liechtenstein's and Switzerland's equities on the SIX stock exchange. There is also the NASDAQ Nordic which is made up of the Baltic and Scandinavian stock exchanges including Demark, Sweden, Finland, Iceland, Estonia, Latvia and Lithuania with activities in Norway and the Faroe Islands (Wang et al., 2021; La Torre et al., 2020).

2.1.2 The Nigerian Stock Market

The progenitor of what is today known as the Nigerian Exchange Group (NGX), formerly Nigerian Stock Exchange was the Lagos Stock Exchange, which was founded on September 15, 1960, but began official operations on the 25th of August 1961 with 19 Securities listed for Trading (Nwosu et al., 2021). The operations were initially conducted inside the Central Bank building in Lagos Island with four firms as market dealers, namely Inlaks, John Holt, C.T Browning, and Investment Company of Nigeria (ICON). In December 1977, the Lagos Stock Exchange was rechristened the Nigerian Stock Exchange with branches established in some of the major commercial cities of the country. The branches currently sum up to 13 across the country. The NSE is regulated by the Securities and Exchange Commission which is involved in the surveillance of the Exchange to forestall breaches of market rules as well as detect and prevent unfair manipulations in trading practices (Abina & Maria, 2019).

The Nigerian Stock Exchange plays a very crucial and central role in the entire capital mobilization process in Nigeria. Adesanya et al., (2020) referred to the Nigerian Stock Exchange as the centre point of the Nigeria Capital market, which provides a framework for the mobilization of private and public savings and the availability of such funds for productive purposes. The Nigerian Stock Exchange also assists various competitive alternatives in allocating the capital resources of the country. Market capitalisation, which is the most widely used indicator in assessing the size of a Stock Exchange Market in an economy, closed at N25890.21 billion at the end of December 2019 (Update). The NSE All-Share Index, which was introduced in 1984 with a base of 100, closed at 26,842.07 at the end of December 2019 (CBN, 2019). The NSE-All Share index increased 5649 points or 13.22% since the beginning of 2022, according to trading on a contract for difference (CFD) that tracks this benchmark index from Nigeria. Presently the All-Share Index is in the excess of 48,000.

However, the Nigerian Stock Exchange Market has been faced with many challenges such as paucity of securities in the market, low trading activities, lack of awareness and patronage by the investing public, bureaucratic delays in closing transactions as well as lack of depth and breadth in the market (Ogbulu, 2019). The global financial meltdown in 2008 and the decline in oil prices also resulted in decline in the value of shares in the stock exchange for some period of time (Ibrahim & Isiaka, 2020). Despite these challenges, there is hope in the horizon considering the initiatives put in place by market regulators to scale up activities. There is now a more effective and efficient regulatory approach with the deployment of information and communications technology (ICT) by SEC and NSE to digitize market activities and services. ((Market monitoring, enforcement of rules, and ease of exchange of information between the regulators and other stakeholders in the ecosystem need to be up scaled.

Akpunonu et al. (2018) explained that the Nigerian Stock market plays a very crucial role in the mobilization and allocation of funds from savers to productive investment that will spur economic development and improve the standard of living in the Nigerian economy. They facilitate the efficient allocation of resources to the appropriate users. It also enhances higher productivity and better realization of the macro-economic goals of the country such as price stability, higher level of savings, greater export opportunities, more employment opportunities, and a higher standard of living for the populace.

2.1.3 Industrial Development in Europe

Industrial development in Europe began with the industrial revolution which marked the transition to new manufacturing processes in Great Britain and Continental Europe – and the United States which happened from around 1760 to about 1820 – 1840 (Philbeck & Davis, 2018). The shift involved going from hand production methods to machines, new chemical manufacturing, iron production process and the rise of mechanized factory system. Output and average income greatly increased coupled with an unprecedented rise in population growth rate. The development of trade and the rise of business were among the major causes of the Industrial Revolution. The Industrial Revolution influenced in some way almost every aspect of daily life. (Steams, 2020). Rapid industrial development began in Britain to happen again after 1870 arising from a new group of innovations in what has been known as the Second Industrial Revolution which involved mass production, steel-making processes, assembly line, electrical grid systems, the large-scale manufacture of machine tools and the use of increasingly advanced machinery in steam-powered factories (Philbeck & Davis, 2018).

There is evidence in the literature that factors that facilitated industrial development in Europe and America included high levels of agricultural productivity to provide excess manpower and food; a pool of managerial and entrepreneurial skills; availability of ports, rivers, canals and roads to cheaply move raw materials and outputs; natural resources such as coal, iron and waterfalls; political stability and a legal system that supported business; as well as adequate finance to invest (Sokhanvar, 2019). Specifically, in Britain, the new factors for industrial

development included the eagerness of British entrepreneurs to export industrial expertise and the willingness to import ((the process.)) ((Britain met the criteria and industrialized starting in the 18th century, and then it exported the process to western Europe (especially Belgium, France, and the German states) in the early 19th century.)) The United States copied the British model in the early 19th century and Japan copied the Western European models in the late 19th century (Hill, 2018; Vishnevsky & Chekina, 2018)

2.2. Theoretical Framework

There are theories that attempt to explain the relationship between stock market and economic growth including industrial development (Atje & Jovanovic, 1993; Demirguc-Kunt & Maksimovic, 1996; Levine & Zervos, 1998). The veracity is not in doubt because stock market plays a prominent role in the economic and at different transition processes ranging from privatization to financial institution consolidation etc. The stock market is a veritable avenue or mechanism for wooing foreign portfolio investments. Again, the stock market makes information available for improvement of efficiency in financial intermediation.

Two theories readily stand out namely - the neo-classical growth and the endogenous growth theories. For instance, Solow (1956) and Swan (1956) neoclassical theory assert that long run aggregate output can increase through technological advancement. The theorists are of the opinion that improvement in technology can push the production function upward, thus leading to overall growth in the economy. Ndako (2010) opines that the mainstream neo-classical growth theory asserts that increase in savings rate induces a temporary increase in aggregate output in the short run, whereas in the long run, output adjusts to a new level whereby savings accumulation affects aggregate output, not the inherent growth rate. This implies that the savings rate and financial development has no significant effect on the long run aggregate output.

Therefore, the emergence of endogenous growth model due to the heavy attack on the neo-classical growth model, appreciated the role of financial development towards the process of economic growth. The endogenous theory opined that growth rate of aggregate output is determined within the model through savings and investment. Within the endogenous growth model, financial market impact economic growth in the long run by mobilizing savings into productive investment that lead to the output growth rate (Bencivenga & Smith, 1991; Levine & Zervos, 1996; Caporale et al, 2004). In support, Olweny and Kimani, (2011) held that an efficient and functional financial market ignites an increase in aggregate output. The Cobb-Douglas (C-D), an unrestricted neo-classical growth model is employed in measuring the impact of capital market on economic growth. The good thing about the C-D kind of growth model is that it accommodates some modifications on the related variables measuring increase in returns or performance, such as industrial development associated with economic growth (Sinai & Stockes, 1972; Ndebbio, 1991).

2.3 Empirical Literature

Studies on the relationship between stock market and industrial sector development abound with varying focus of interest in terms of coverage, period, choice of variables and methodology employed. For instance, Udofia et al (2022) employed Error Correction Mechanism to examine the role of capital markets in industrial development in Nigeria. The study made use of time series data obtained from the Central Bank of Nigeria Statistical bulletin. The variables of the study are market capitalization, an index for capital market whereas the contribution of industrial sector to GDP was a proxy of industrial performance. The results of the study revealed that Nigeria capital market exert positive and significant impact on the industrial sector performance within the scope of the study.

Using cross country regressions model, Levine and Zervos (1998) examined the relationship between stock market returns and industrial growth. The study found that equity market liquidity is positively and significantly related to future rate of economic growth, capital accumulation and productivity growth.

Chiang and Chen (2017) investigated stock market activities and industrial production of 20 international markets. The study made use of the maximum likelihood method and granger test. It was revealed that the increase in stock returns has positive effect on industrial growth and productive growth, whereas stock market risk negatively and significantly affects production growth for advanced markets.

Ibi et al, (2015) examined the relationship between the capital market and industrial sector development in Nigeria. The authors used time series data spanning the period 1980 to 2012 and error correction mechanism was employed to estimate the relationship. The results found that market capitalization and number of deals exert positive and significant impact on industrial output in Nigeria, whereas value of transaction has a negative and significant influence on industrial output within the scope of the study.

Victor et al (2013) investigated how the capital market impact industrial development in Nigeria using descriptive approach and found that the capital market is positively related to industrial sector development in Nigeria. **Review more.

3. Materials and Methods

3.1 Data and Technique

The data for this study comprise a combination of cross country and time series data on Industrial output chosen as proxy for industrial development the dependent variable, whereas the explanatory variables are Market Capitalization, Share Price Index and Volume of Transactions as indices of stock market performances. The data were obtained from eleven stock exchanges selected from the continent of Europe from January 2015 to November 2022. The tools of analysis employed include Kao Residual Co-integration Test, Panel data relationship estimation tools (pool regression, fixed and random effects), the Likelihood Ratio Test and the Hausman specification test.

3.1.1 The Likelihood ratio test (fixed effects vs pooled regression)

The likelihood ratio $(LR)(LR)$ test is used to compare the pooled regression model with the fixed effects model. The null hypothesis favours the pooled model i.e., Unobserved sectional differences are not significant. The likelihood ratio $(F)(F)$ statistic can be computed as:

$$F\,(N-1, NT-N-K) = \frac{(R^2{}_{UR}}{}$$

Where $R^2{}_{UR}R^2{}_{UR}$ is the R^2R^2 from the LSDV model, $R^2{}_RR^2{}_R$ is the R^2R^2 from the pooled model. A rejection of the null hypothesis means that the pooled model is not valid.

3.1.2 Hausman specification test (fixed effects versus random effects model)

The Hausman (1978) specification test compares the random effect model with the fixed test model. The null hypothesis favours the random effects model, that is.,z_iz_i are uncorrelated with the explanatory variables. The test statistic is given as

$$H = (\hat{\beta}_{--} - \hat{\beta}_{--})' [Var(\hat{\beta}_{--}) - Var(\hat{\beta}$$

Where: $\hat{\beta}_{FE}\ \hat{\beta}_{FE}$ is the slope coefficient for fixed effects model, $\hat{\beta}_{RE}\hat{\beta}_{RE}$ is the slope coefficient for random effects model. The test statistic HH follows a chi-square distribution with degree of freedom equals the number explanatory variables. A rejection of the null hypothesis validates the fixed effects model against the random effects model.

3.2 Model Specification

The functional and explicit models for pooled regression, fixed and random effects are specified as shown below.

3.2.1 The pooled regression model approach

INDOUPT = f (MKTCAP, SHAREPI, TVOL)

$$INDOUPT_{it} = \alpha_0 + \alpha_1 MKTCAP_{it} + \alpha_2 SHAREPI_{it} + \alpha_3 TVOL_{it} + \varepsilon_{it1} \quad (1)$$

3.2.2 The fixed effects approach

INDOUPT = f (MKTCAP, SHAREPI, TVOL)

$INDOUPT_{it} = (\alpha + Z_i) + \alpha_1 MKTCAP_{it} + \alpha_2 SHAREPI_{it} + \alpha_3 TVOL_{it} + \varepsilon_{it2}$ (2)

$\alpha_i + \alpha_1 MKTCAP_{it} + \alpha_2 SHAREPI_{it} + \alpha_3 TVOL_i + \varepsilon_{it3}$ (3)

3.2.3 Random effect

INDOUPT = f (MKTCAP, SHAREPI, TVOL)

$INDOUPT\ it = \alpha_0 + \alpha_1 MKTCAP_{it} + \alpha_2 SHAREPI_{it} + \alpha_3 TVOL_i + \varepsilon_{it3} + \mu_{it4}$ (4)

Where, α = Intercept, INDOUPT= Industrial Output, MKTCAP = Market Capitalization, SHAREPI = Share Price Index, TVOL = Transaction Volume, $\varepsilon_{it,}$ μ_{it} = error terms.

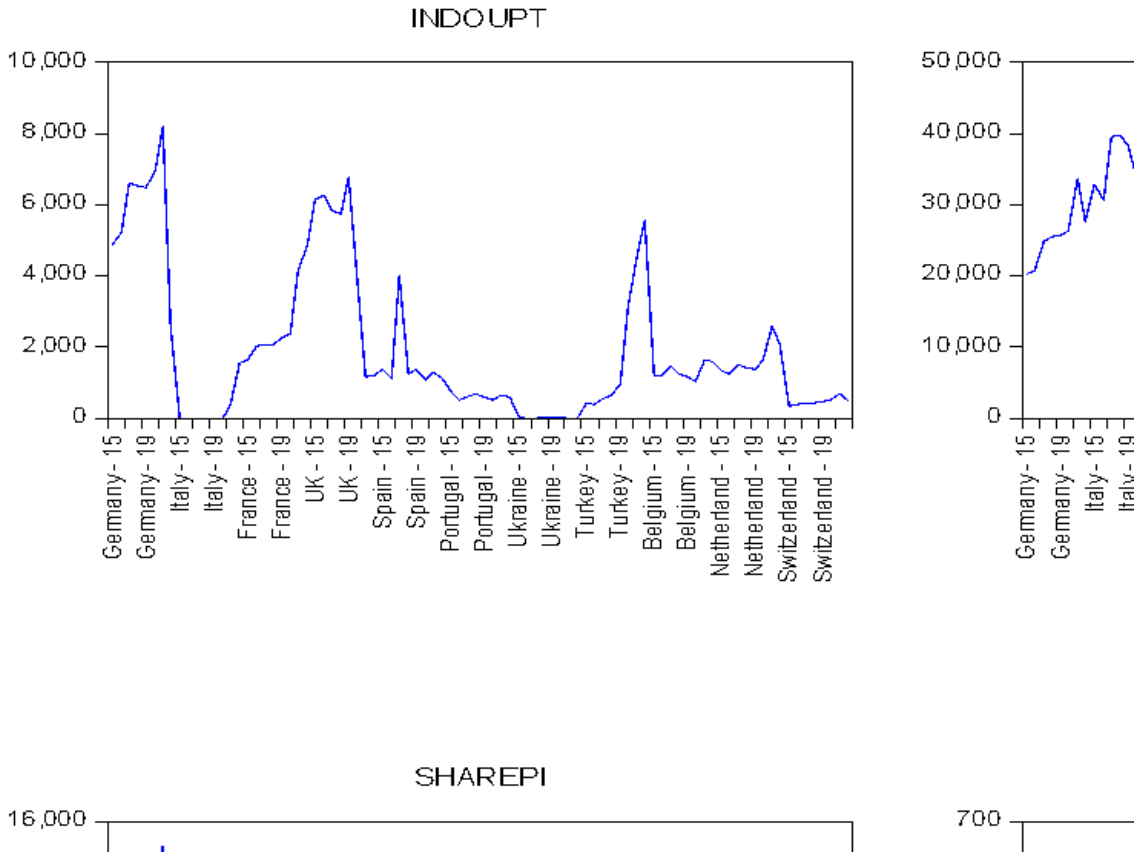
3.3 A Priori Expectation

$\alpha\alpha_1, \alpha\alpha_2, \alpha\alpha_3 > 0, < 0$, ?? are coefficients of MKTCAP, SHAREPI and TVOL. It is expected that Market Capitalization, Share Price Index, and Transaction Volume will either positively or negatively influence the Industrial Output.

4. Empirical Results

4.1 Trend Analysis

The results of trend analysis revealed that among the selected countries in this study, Germany, Italy, and United Kingdom are more developed industrially than other countries in the Euro zone. The industrial output growth rate in United Kingdom and Germany are seen to be consistent from 2015 to 2019. This is followed by Belgium with visible evidence in 2015 but retarded in 2019. Significant growth was seen in Spain in 2019, while Ukraine is seen to be the lowest in industrial development. Judging from market capitalization and share price index, the stock markets of Germany, United Kingdom, Italy, Switzerland, Spain, and Portugal were respectively seen to be more developed in terms of depth and breath. The volume of transaction was seen to be more in Belgium, Switzerland, and Netherland. However, all the variables used in the respective countries trended upwards and downwards with periods of peak and trough as well exhibited undulating movements suggesting the expected non-stationarity of the variables.



4.2 Panel Data Estimation Results

Table1below is a summary of test to know if co-integration relationship exists between stock market variables and industrial output. The result shows that the Kao Statistics is highly significant at 5% significance level, indicating the existence of co-integration relationship among the variables.

Table 1. Kao residual-based co-integration.

Kao test statistic	P-value
-6.174480	0.0010

Having established that relationship exists between stock market variables and industrial output, the study proceeded to estimate the variables with pool regression, fixed and random effects.

The results of the estimation on Table 2 revealed that the probability values of industrial output (INDOUPT) for both pool regression, fixed and random effects are highly significant at 5% significance level suggesting that Industrial output is autoregressive. This is statistical evidence showing that industrial output in the past can predict future events in industrial development in Europe. The results of pool regression, fixed and random effects revealed both negative and positive relationships between market capitalization, share price index and industrial output within the scope this study, whereas in all, transaction volume significantly relate to industrial output. The constant coefficients are insignificant at 5% level of significance, indicating stock market variables not selected in this study do not have significant influence on industrial development in Europe within the scope

of this study. This shows that market capitalization, share price index and volume of transaction are the most important among variables of stock market that affect the industrial development.

The values of the adjusted R-square; 0.923, 0.971 and 0.923 respectively suggest that the stock market variables jointly explained 92.3%, 97.1% and 92.3% respectively of the observed variations in industrial development proxied by industrial output. The probability values of F-statistics from both pool regression, fixed and random effects are highly significant, indicating overall significance of the models. Finally, the Durbin-Watson values from pool regression, fixed and random effects respectively indicate absence of autocorrelation.

Table 2. Panel regression results

Variables	Pool Regression	Fixed Effects	Random Effects
Constant	0.205086(0.6317)	-4.189840(0.0057)	0.205086(0.6317)
INDOUPT (-1)	0.949623 (0.0000)	0.576957 (0.0000)	0.949623 (0.0000)
MKTCAP	0.225475 (0.0185)	-0.455083 (0.0489)	0.225475 (0.0185)
SHAREPI	-0.230531 (0.0766)	1.346083 (0.0000)	-0.230531 (0.0766)
TVOL	0.044191 (0.2005)	0.041493 (0.1098)	0.044191 (0.2005)
Adjusted R-Square	0.923368	0.971172	0.923368
F-Statistic	229.9369 (0.000000)	183.8837 (0.000000)	229.9369(0.000000)
Durbin-Watson	1.675769	1.698065	1.675769

**Probability values are inside bracket*

Next is to examine if unobserved variables have significant influence on the industrial development in each country. Therefore, in table 3 below, both the likelihood ratio and Hausman tests rejected the null hypothesis that unobserved variables have no significant relationship with observed variables, which would have favoured both pool regression and random assertions. Therefore, the two tests back fixed effect that unobserved variables are important explanatory variable for each country's industrial development.

Table 3. Model specification test

Specification test	Statistics
Likelihood Ratio Test	7.453581(0.0000)
Hausman Test	27.195405(0.0000)

**Probability values are inside bracket*

Since, unobserved variables are important explanatory variable for each country's industrial development, the researchers reported the unobserved effects of the various stock exchanges of the on the respective countries in Europe in Table 4.

Table 4. The unobserved Countries' cross fixed effects.

	Country	Effect
1	Germany	-0.175184
2	Italy	0.351636
3	France	0.181203
4	UK	-0.192164
5	Spain	-0.683158
6	Portugal	-0.864100
7	Ukraine	-0.090937
8	Turkey	1.235163
9	Belgium	-0.147241
10	Netherland	1.924148
11	Switzerland	-1.539364

The last is to check if the selected stock markets are interacted with each other in the Euro zone using the Residual cross section dependence test as shown on table 5. The probability values of the various tests are significant at 5% ((and 10%)) level significance. This is sufficient evidence to reject the null hypothesis that no cross-section dependence (correlation) among the selected countries, hence there is cross-section dependence or correlation among the selected countries in the Euro zone.

Table 5. Cross-Section Dependence Test

Test	Statistic	d.f.	Prob.
Breusch-Pagan LM	82.08359	55	0.0104
Pesaran scaled LM	2.582319		0.0098
Bias-corrected scaled LM	1.665652		0.0958
Pesaran CD	2.155873		0.0311

5. Conclusion and Recommendations

This study stock market and industrial development of Europe employed 11 cross sectional stock exchanges with associated monthly reports from January 2015 to November2022. It was found that both negative and positive relationship exist between market capitalization, share index and industrial output within the scope this study, whereas in all, transaction volume significantly relates to industrial output. These results corroborate the findings of Levine, 2003; Atje and Jovanovic, 1993; Levine and Zervos, 2003, the positive impacts exist between stock market and industrial development and that of Harris, 1997 and Watson, 1998, though stock market performance are positively related to industrial development, the presence of stock market fluctuations could have negative effect on industrial development of a nation.

In Nigeria, this result is in line with Victor et al (2013) and Ibi et al, (2015) that market capitalization and number of deals exert positive and significant impact on industrial output in Nigeria, whereas value of transaction has a negative and significant influence on industrial output. The study is also in consonance with the theoretical framework of Solow (1956) and Swan (1956) neoclassical theory which holds that a long run aggregate output can increase through technological advancement. These theorists are of the opinion that improvement in technology can push the production function upward, thus leading to overall growth in the economy. It was also found that unobserved variables are important explanatory variables for each country's

industrial development. This means the influence of stock market on industrial development of respective countries studied in Europe depend on their respective discretionary policies adopted.

The lesson for Nigeria arising from the findings of this study suggest that the current efforts being undertaken by policy makers and the regulatory authorities should be intensified to boost activities in the stock market in Nigeria as this will impact positively on industrial development and the economy at large. In addition, our findings support a comprehensive policy thrust that incorporates not just capital market reforms but also monetary, fiscal, incomes, industrial, trade and foreign exchange policies all working in tandem to achieve a sustainable growth of the stock market.

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