Stock Market Development and Agricultural Performance in Nigeria

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Being a M.Sc. Post-Field Presentation to the Department of Economics, Faculty of Management and Social Sciences, Lead City University, Ibadan, Oyo State, Nigeria

In Partial Fulfillment of the Requirements for the Award of Master of Science Degree (M.Sc.) in Economics

2023

Certification

This is to certify that this thesis titled "Stock Market Development and Agricultural Performance in Nigeria" was carried out by Adewale Kazeem OSHONIYI with Matriculation number of LCU/PG/002626 in the Department of Economics, Faculty of Management and Social Sciences, Lead City University, Ibadan, under my supervision and that this work has not been previously submitted.

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Dedication

This research is dedicated to almighty ALLAH, who in his infinite mercy spared my life up to this present moment and for his grace, care, love and opportunity given to me to be able to achieve my aim during the writing of this thesis.

Acknowledgements

I wish to appreciate the Management of Lead City University for the opportunity afforded me to pursue my Postgraduate Studies with the laudable university. My profound gratitude goes to the school library and the school of Post-graduate Studies for the necessary corrections and guidance.

There was never lack of wants throughout as GOD almighty strengthened me during difficult times, my sincere appreciation goes to my Supervisor, who doubles as HOD, Dr Olusola. O. Ogunjimi whose contributions and constructive criticism pushed me this far. My profound gratitude goes to our Dean, Faculty of Management and Social Sciences, Professor Omolara Campbell. My warm appreciation goes to my lecturers; Dr. Olorunfemi. Y. Alimi, Dr. Adesina Oluwatosin.O., Dr. Esther Aderinto R., Dr. Ogunro Tolu.O., Dr. Oyaromade R., Mr. Emiola T., Mrs. Oduyoye-Ejumedia A., and Miss. F. V. Oniyide, of the Department of Economics for the support and individual contribution to ensure the work comes out unique. Also, I appreciate the Administrative staff and fellow postgraduate students in the Department of Economics and Developmental studies.

I would also like to thank my friends and parents for their support and encouragement as I worked on this thesis. Thank you all for your support and encouragement. GOD bless you real good. Even though the above-mentioned institutions and persons have assisted in the process of this research work, I alone stand responsible for my errors, if any, found in this work.

Abstract

Despite the growing body of research exploring the relationship between stock market development and agricultural performance, a noticeable gap persists in the literature regarding the distinction of specific stock market measures on various dimensions of agriculture, such as outputs, employment, and exports. This study investigates the effects of stock market measures (stock market capitalization, total stock transaction value, and all share index) on agricultural performance in Nigeria over the period 1985-2022. Using the ARDL bound testing approach, stock market capitalization and all share index positively influence short-run agricultural output growth. However, total stock transaction value has a negative and significant impact on agricultural output growth in the short run. The long run impact of stock market development on agricultural output growth is not significant at 5% level. In addition, total stock transaction negatively and significantly impacted on employment in agricultural sector at 5%. In the long run, the study discovered that all share index adversely and significantly impact agricultural employment at the conventional level. It implies that stock market development negatively impact agricultural employment both in the short and long run. Furthermore, it discovered that stock market development have no significant impact on agricultural export in the short run. However, the stock market development mainly through total stock transaction value positively and significantly impact agricultural exports in the long run. There is a need to consider measures to strike a harmonious balance between financial market development and the support of key economic drivers, fostering a comprehensive and sustainable economic landscape. Government should carefully

consider the trade-offs between promoting financial market development and sustaining employment in vital sectors like agriculture, ensuring a balanced economic approach.
Keywords: Money market, bank sector, stock market,
Word Count: 274.

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Chapter One

Introduction

1.0 Introduction

1.1 Background to the Study

The notion of a potential connection between financial markets and real economic activities is not a novel concept; nonetheless, the understanding of this relationship has evolved over time. Prior to the Great Depression, the primary role of money or capital was to facilitate the exchange of credit to support economic growth and development. The initial investigation of the link between financial markets and real economic activity was conducted by two prominent scholars[1]. The authors posited that a distinguishing factor between developed and emerging nations lies in the level of advancement of their respective financial systems, which tends to be more sophisticated in the former. A study posited that financial markets possess the potential to augment an individual or entity's financial capabilities and enhance the efficacy of commercial transactions[2]. Investors can obtain the requisite financing for their initiatives through the presence of robust financial markets. Research has shown evidence that financial markets play a significant role in fostering economic development by facilitating the accumulation of physical capital[3].

Numerous scholarly investigations have been conducted to examine the link between financial development and economic growth in developing nations[4]. The primary focus of the bulk of studies has been on the development of the banking sector as a means to assess financial development. There is a scarcity of research that specifically examines the interrelationship between the development of the stock market and the expansion of

other economic sectors. Moreover, there is ongoing debate over the link between stock market development and growth.

The analysis of empirical data indicates that the relationship between stock market development and expansion exhibits variations across different locations and time periods. The capital market comprises a network of organizations that facilitate the issuance and trading of long term financial assets and instruments, such as shares, stocks, debentures, mortgages, and others[4]. The capital market serves as a mechanism to facilitate the allocation and utilization of domestic savings for the purpose of enhancing investment productivity. The stock market is a financial market that facilitates the exchange of long-term money through lending and borrowing activities[5].

The stock market serves as a convergence point for individuals seeking to lend or borrow capital. The primary function of a stock market is to facilitate the allocation of funds from sectors with surplus capital to sectors experiencing deficits, hence promoting economic progress. Capital markets serve as a crucial financial intermediary within every economy. The value exchange occurs through the issuance of long-term cash securities, wherein borrowers and governments issue financial instruments to lenders. The various types of securities encompass shares, bonds, debentures, and stocks. Shares are commonly referred to as equity instruments, whereas other types of securities are classified as debt instruments[5]. The stock market facilitates the exchange of long-term debt or equity securities[6]. The increasing complexity of African financial systems underscores the significant role played by stock markets. The stock markets facilitate economic expansion through several mechanisms, including the generation of liquidity, the mobilization of savings for both private and public sectors, the diversification of risk,

and the transmission of high-quality information[7]. The provision of these services contributes to the enhancement of growth. In developing economies, the expansion of stock markets exhibits consistent growth throughout time.

One academic proposed that in emerging nations, the capital markets play a crucial role in mobilizing domestic savings and effectively allocating funds[8]. Stock markets play a pivotal role in fostering economic progress in underdeveloped nations by facilitating the attraction and redirection of investments. The utilization of capital market finance, which offers long-term investment resources, emerges as the most favourable approach for financing agriculture due to its ability to expedite development, hence fostering economic growth[9].

The financial industry plays a crucial role in an economy by facilitating the management of money supply, credit creation, and supporting fiscal policies, which in turn contributes to employment generation in rising countries. Therefore, the sector constitutes a fundamental component of economic advancement. The significance of the stock market in fostering economic growth and development undergoes notable transformations over the course of time. The classical theory posits that economic development is a process of expansion characterized by the deliberate redistribution of productive resources from a primary sector that exhibits low levels of productivity, technology, and output to a more advanced industrial sector that demonstrates higher levels of productivity and returns[8]. Limited access to money is a significant impediment to the process of modernization in growing economies in Africa, such as Nigeria. Therefore, it is imperative to develop financial frameworks that are tailored to the unique characteristics of the informal sector and align with the requirements of rural financial markets[10].

The stock market plays a crucial role in the economy by providing corporations with access to both short-term and long-term cash, while also offering investment options to primary and secondary investors. The profits derived from stock investments exhibit variability in response to fluctuations in share prices, which are contingent upon a multitude of factors. The elements under consideration encompass agricultural sector productivity such as its output growth, employment generation and export promotion.

An enhancement in the stock market performance may suggest an amelioration in the macroeconomic indicators of nations[11]. Conversely, it could also be a result of economic expansion of the agricultural sector. According to economic theory, it is postulated that a more robust correlation should exist between activity and stock prices, as the price of a stock is determined by the discounted present value of a company's future cash flows.

This study thus centers its attention on examining the influence of stock market development on productivity in Nigeria. The objective is to ascertain whether such development leads to enhanced production growth, increased exports, and greater employment opportunities within the sector. The stock market serves as a platform for the trading of long-term financial instruments. This differs from the money market, which is a financial market where the trading of short-term assets takes place. Given the limited scope of previous research, which primarily examined the relationship between stock market development and output growth while neglecting its impact on exports and employment generation, and the inconclusive findings that emerged from these studies, the primary aim of this investigation is to assess the connection between stock market development and productivity in Nigeria. Specifically, this study will focus on the effects

of stock market development on output growth, exports, and employment generation within the sector.

1.2 Statement of the Problem

The agricultural sector in Nigeria is of paramount importance to the country's economy, serving as a critical source of livelihoods, food security, and export potential. However, this sector has been plagued by persistent challenges that hinder its full potential. The problem is rooted in the sector's struggle with stagnant output growth, inadequate employment generation, and underwhelming export promotion efforts. The issue of output growth in Nigeria's agricultural sector is a pressing concern. Despite the vast arable land and favourable climatic conditions, productivity remains suboptimal.

According to the World Bank, Nigeria's productivity growth has been sluggish, averaging 1.3% annually over the past decade, significantly below the desired rate[12]. This underperformance is particularly alarming given the sector's contribution to GDP and its pivotal role in providing livelihoods for millions of Nigerians. This problem is further exacerbated by the limited adoption of modern techniques and technology, leading to low crop yields and inadequate value addition. These issues collectively hinder the sector's ability to meet domestic food demand, reduce imports, and participate effectively in global markets.

Also, the agricultural sector in Nigeria faces a challenge in terms of employment generation. Despite being the largest employer in the country, it has not been able to create sufficient jobs to absorb the growing labour force. The United Nations Development Programme (UNDP) reports that while agriculture contributes to about

23% of Nigeria's GDP, it employs over 70% of the workforce, indicating a substantial labour surplus in the sector[13]. This situation underscores the need for policies and strategies to enhance labour productivity, support entrepreneurship, and stimulate agribusinesses to generate more employment opportunities. Addressing this issue is vital for improving living standards, reducing poverty, and achieving broader economic diversification.

The agricultural sector in Nigeria has fallen short of its export promotion potential. The country has abundant produce that holds export potential, including cocoa, cashew, sesame, and more. However, Nigeria's exports have been underperforming compared to other African nations like Cote d'Ivoire and Ghana. According to the Nigerian Export Promotion Council (NEPC), the country's share in global exports remains relatively low, with significant room for growth[14]. Barriers to export growth include inadequate infrastructure, poor post-harvest handling, and compliance challenges that hinder the country's ability to meet international standards and tap into global markets effectively.

Over the years, the Nigerian stock market has experienced significant growth in terms of its scale and level of liquidity. Prior to 2008, the stock market exhibited a comparable performance to that of numerous developed stock markets worldwide, as evidenced by the attainment of record highs by market indicators. For example, the market capitalization experienced a significant increase in 2007, reaching N13,295 billion, compared to its value of N16.36 billion in 199015. In a similar vein, the market turnover experienced a significant increase to over N2,100 billion in 2007, compared to its initial value of N0.31 billion in 1990[16]. The All-Share Index has reached its peak, indicating the culmination of a period of significant growth in the stock market. In 2007, the index

reached its highest recorded value of 57,990.2 points, a significant increase from its lowest value of 513.8 points in 1990[17]. Nevertheless, the remarkable period of stock market expansion ultimately concluded due to a multitude of unethical behavior exhibited by those involved in the market. Currently, the All-Share Index is recorded at 25,339.39 points, with an approximate market capitalization of N10,160 billion[16].

The Nigerian capital market, despite its relative youth, has emerged as one of the rapidly expanding financial markets among emerging economies in recent times. According to a scholarly perspective, the market exhibited considerable promise; nonetheless, investigations have uncovered the presence of numerous unethical and detrimental practices that ultimately led to its downfall in 2008[18]. Regrettably, the Nigerian Stock Exchange exhibited a deficiency in integrity, which had a detrimental effect on the market. Consequently, substantial divestment occurred, leading to a persistent decline in employment opportunities and a significant decrease in tax revenues. The study conducted by the researcher unveiled that prior to the global economic downturn, certain investors expressed concerns regarding elevated valuations, instances of insider trading, illicit sales of stocks by brokers, fraudulent selling of nonexistent shares to investors, misappropriation of returns on investors' stock by stockbrokers, and the practice of pump and dump. It is crucial to acknowledge that, irrespective of the global economic downturn in 2008, the excessively inflated Nigerian equities were a result of extensive exploitation and manipulation inside the market, characterized by an unprecedented scale, and were inevitably on the verge of a complete collapse[19].

1.3 Research Questions

Some of the pertinent research questions this research study intends to answer are:

i. How has the stock market development affected the agricultural output growth of Nigeria?
ii. To what extent does stock market development influence agricultural exports in Nigeria?
iii. What is the effect of stock market development on agricultural employment rate in Nigeria?

1.4 Objectives of the Study

The aim of the study is to investigate the links between stock market development and productivity in Nigeria. The specific objectives of the study are to:

i. Determine the effect of stock market development on agricultural output growth in Nigeria;
ii. Examine the influence of stock market development on agricultural exports in Nigeria; and
iii. Investigate the effect of stock market development on agricultural employment rate in Nigeria.

1.5 Hypotheses

The following research hypotheses formulated for the study are:

H_{01}: There is no significant relationship between stock market development and agricultural output growth in Nigeria.

H_{02}: Stock market development has no significant influence on agricultural exports in Nigeria.

H_{03}: There is no significant relationship between stock market development and agricultural employment rate in Nigeria.

1.6 Scope of the Study

The study examines the link between stock market development and productivity in Nigeria throughout the period spanning from 1985 to 2022. The selection of this specific time frame is justified by the accessibility of relevant data and the occurrence of policy modifications in recent years. This study encompasses the period from the initiation of the Structural Adjustment Programme (SAP) to the era of the Economic Recovery Growth Plan. The evaluation of the impact of financial market policy on economic performance, specifically in terms of stock market development, is conducted during two distinct eras. This evaluation focuses on several aspects such as output growth, employment, and stable prices. Nigeria is located in the western region of the African continent. The maritime boundary of the country is defined by the Gulf of Guinea to the south, while its land boundary is shared with Cameroon and Chad to the east, Niger to the north, and Benin to the west.

Nigeria encompasses a total land area of 923,768 square kilometres, positioning it as the 32nd largest country globally in terms of territorial expanse. The country's latitudinal extent ranges from 40°N to 140°N, while its longitudinal extent spans from 20°E to 150°E. The country exhibits a range of climatic conditions, spanning from equatorial in the southern regions to arid in the northern areas, and tropical in the central parts. It is

worth noting that the estimated population of the country exceeds 200 million individuals[20]. The time series data pertaining to the dependent and independent variables spanning the years 1985 to 2021 were obtained from various sources, such as the Central Bank of Nigeria statistical bulletin, the World Bank database (specifically the World Development Indicators), as well as additional sources including librarian resources and publications from the Federal Office of Statistics.

1.7 Significance of the Study

The study's relevance is rooted in the examination of the effects of stock market development on productivity, with the aim of fostering the advancement of the Nigerian agricultural sector in terms of production growth, employment creation, and export enhancement. The performance and development of the stock market contribute to an increase in the proportion of savings that are allocated towards investments.

Furthermore, the development of stock markets serves as a catalyst for increasing the savings rate, thereby fostering a climate conducive to investment. Moreover, the development of the stock market has been found to enhance the efficiency of capital allocation. The utilization is limited to the conversion of savings into investments through the stock market, as well as activities within an economy. The stock market effectively facilitates the conversion of savings into productive investments across several economic sectors[21].

The role of finance-led growth in reducing poverty and driving economic transformation has been significant in numerous Asian and Latin American nations. However, it is important to note that this hypothesis did not yield the same outcomes in Africa, particularly in the case of Nigeria. The stock market sector in Africa continues to exhibit a relative underperformance when compared to global counterparts. The constraint engenders suspicion within the international community regarding the pertinence of the sector in terms of its potential for output growth, employment generation, and export advancement. The primary factors contributing to the low output growth, high unemployment, and low exports can be attributed to the inadequate investment in the physical and human capital of the agricultural sector[22]. Conducting research on this matter is thus crucial to provide valuable insights for policy makers in making informed decisions regarding the allocation of resources in the pursuit of stock market growth and development. This research aims to facilitate the attainment of accelerated output growth, employment generation, and increased sector exports.

Additionally, this study aims to address a research gap that has been frequently overlooked in previous studies. Its findings will assist the central authority in making informed decisions regarding the continuation of current financial management and implementation practices, or the need to reassess them in order to establish a robust and stable environment that promotes growth in the agricultural sector, enhances employment opportunities, and boosts exports. The considerable lack of clarity in literature about the impact of stock market development on Nigerian productivity, specifically in terms of output growth, employment, and exports, poses a significant worry for both academic researchers and policy makers. This study aims to identify the primary challenges

associated with the management of financial market policies and their impact on productivity.

This study's findings will make a valuable contribution to the current body of literature by examining the impact of stock market policies on productivity, specifically in terms of output growth, employment, and exports.

This study elucidates the influence of stock market development indices on the growth of output, employment, and exports within the sector of Nigeria. The research holds significant relevance for the central governing body in its pursuit of the macroeconomic goals within the respective nation of operation. Furthermore, this phenomenon holds significant advantages for policymakers as it facilitates the effective implementation of financial sector policies, hence fostering sustained economic growth within Nigeria. This study also investigates the challenges impeding the efficient administration of financial market policy and proposes potential remedies for these challenges. Additionally, it offers policy guidance to policymakers regarding strategies to enhance the vibrancy of the Nigerian financial economy through the management of stock market policies, specifically focusing on market capitalization, all share index, and the total value of stock traded. This guidance sheds light on the necessary policies and practical measures that policymakers should undertake to enhance the implementation of financial policies, particularly during a time when the industry is confronted with diverse challenges. This study provides valuable insights and acts as a valuable reference for future scholars in their pursuit of knowledge.

1.8 Limitation to the Study

This study investigates the impact of stock market development on the Nigerian agricultural sector between the periods of 1985 and 2020. The choice of this study period is based on the availability of data from national and international institutions. The secondary source of data employed in this study is not within the control of the researcher.

It therefore becomes difficult for the user to read accurately how financial market policy affects the key economic performance indices in the country. The study is limited to stock market policies formulation and implementation on one hand and output growth, employment and exports on the other and how has the sector's policies faired so far in the growth and development of Nigerian agricultural sector.

1.9 Operational Definitions of Terms

Financial Institution: It is a company engaged in the business of dealing with financial and monetary transactions such as deposits, loans, investment, and currency exchange.

Financial Market Development: It aims at enhancing the capacity of the financial system to pool domestic savings and foreign capital in funding investment and consumption, and at enabling efficient risk-sharing.

Stock Market Development: This involves raising long term capital through buying and selling of existing stocks traded on a stock exchange for businesses in a country.

Productivity: This involves the assessment of quantifying the output, employment generation, and export production achieved with a specific number of inputs.

Agricultural Output Growth: It pertains to the growth of agricultural outputs for a specific period.

Agricultural Employment: This refers to the total number of individuals engaged in activities, including subsistence farmers, who primarily produce items for personal consumption rather than for commercial purposes.

Agricultural Exports: This is the monetary values of agricultural crops that is being export to other countries over a period.

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Chapter Two

Literature Review

2.0 Literature Review

The chapter presents the literature review and theoretical framework relating to stock market development and economic performance. It is divided into five sub-sections. The first section presents conceptual review on stock market development and economic performance. In section 2.2, it presents the relevant theories relating to the links between stock market development and economic performance. The third section reviews past studies relating to how stock market development influence the indicators of economic performance like output growth, inflation and unemployment. Section four presents the gaps in literature while the last section provides the theoretical framework relating to the relationship between stock market development and economic performance.

2.1 Conceptual Review

2.1.1 Stock Market Development

A stock market, equity market, or share market is the aggregation of buyers and sellers of stocks, which represent ownership claims on businesses; these may include securities listed on a public stock exchange, as well as stock that is only traded privately, such as shares of private companies which are sold to investors through equity crowd funding platforms. Stock markets support resource allocation and spur growth through different channels. By reducing transaction costs and liquidity costs, stock markets can positively affect the average productivity of capital[1,2]. By pooling resources on larger projects which

would otherwise have difficulty accessing finance, stock markets can mobilize savings and spur the rate of investment[3].

Through the promotion of the acquisition of information about firms, stock markets may promote and improve resource allocation and the average productivity of capital. In addition, by exerting a continuous and strict control over the management of firms, stock markets positively affect firms' investment decisions and the average return on investments[3]. Improving risk diversification through internationally-integrated stock markets and increasing the array of possible investments, stock markets can augment the rate of saving and the rate of investment[4].

The duration of investment projects in conjunction with the expected rate of return and the relevant risk is a very important variable for investors. Investors, who strictly prefer shorter-term assets, might find investments with particularly long maturities unattractive. Moreover, disrupting an investment project before it has reached maturity can be very costly in terms of missed profit and lower rates of return. Following this line of arguments, a notable scholar builds a theoretical model which shows that by reducing these liquidation costs, and increasing the average productivity of capital and the rate of savings, stock markets can foster capital accumulation and growth[2].

In fact, by their nature, equity markets make it possible to transfer the ownership of investment projects that are already running before their final realization and without disrupting physical production. This feature of stock markets has two effects: (a) it attracts more resources into long term investments from investors who would not have committed their finances for long periods of time; (b) it reduces the loss of resources which would have occurred with disruption of physical production. Both these effects

will spur growth. The first does this by increasing the savings rate, the second by reducing actual resources lost by the premature liquidation of investments[3].

2.1.2 Agricultural Productivity

Agricultural performance can be defined as the achievements of agricultural sector which includes outputs, land, fertility, technology, labour productivity and exports. It measures the overall achievement of a country's agricultural industry, and also indicates the deviation from the preferred level of performance. performance has to do with everything that has to do with the general accomplishment of agricultural sector.

Agricultural Output Growth

Agricultural output growth is the persistent increase in the production of foods, feeds, fiber and other goods through the systematic growing and harvesting of plants and animals. It is the constant improvement in the making use of land to raise plants and animals[8]. Nigeria's wide range of climate variations allows it to produce a variety of food and cash crops. The staple food crops include cassava, yams, corn, cocoyam, cowpeas, beans, sweet potatoes, millet, plantains, bananas, rice sorghum and a variety of fruits and vegetables. The leading cash crops are cocoa, citrus, cotton, groundnut, palm oil, plan kernel, benniseed and rubber. They were also Nigeria's major exports in the 1960s and early 1970s until petroleum took over the economy. Chief among the export destinations for Nigerian exports are Britain, the United States, Canada, France and Germany[9].

The oil glut of the early 1980s reduced substantially, inflows of foreign exchange and consequently, participation of government in investment activities. Most of the companies erected at the wake of the oil boom witnessed low capacity utilization and in

extreme cases out-right closure[10]. This led to a drastic rise in food import bills and the price of imported goods.

To redress this situation, the government embarked on integrated programmes aimed at increasing production and productivity. A Nigerian scholar[11] explained that agriculture is a source of food and raw materials for industrial sector, it creates more employment opportunities, it reduces poverty and improve income distribution, it speeds up industrialization and easing the pressure on balance of payment.

According to an international institution[12], underdeveloped countries can hope to move from the condition of stagnation to one of self-sustained growth if the sector is developed so that, surplus labour force is absorbed by new industries. A proffessiona[13] also viewed agriculture as a means of reducing dependence on certain importations, curtailing food price increases, earning foreign exchange, absorbing many new entrances to labour market and increasing farmer's income. For many other developing countries, agriculture remains the gate way to several desired ends which includes poverty reduction, rural transformation, employment generation, food security and improved national health profile of the citizenry[14]. Before the discovery of oil in Nigeria, agriculture accounted for over 60% of its Gross Domestic Product (GDP) as well as being a major source of foreign exchange earnings. It provided food and employment for the teeming population and raw materials for the growing industries.

A notable writer[15] stated that from the standpoint of occupational distribution and contribution to the GDP, agriculture was the leading sector in the 1960s. Also, the Nigerian economy, like that of Brazil, could reasonably be described as an economy during the first decade after independence. This is because agriculture served as the

engine of growth of the overall economy of the two countries. During that period, Nigeria was the world's second largest producer of cocoa, the largest exporter of palm kernel and the largest producer and exporter of palm oil.

It was also a leading exporter of other major commodities such as cotton, groundnut, rubber, as well as hides and skins. 36also affirmed the positive contribution of agriculture to the Nigerian economy before the discovery of oil. Despite the reliance of Nigerian peasant farmers on traditional tools and indigenous farming methods, these farmers produced 70% of Nigeria's exports and 95% of its food needs[16]. The sector however suffered neglect during the hey-days of the oil boom in the 1970s. Also, he[17] further stated that sector accounted for less than 5% of Nigeria's GDP in 2004. Ever since then, Nigeria has been facing serious poverty challenges and the insufficiency of basic food needs. It is further revealed by NEEDS Policy Paper, 2004 that two-thirds of Nigerians live below the poverty line of US$1 per day, most of them in the rural areas[18]. The root of this crisis lies in the neglect of agriculture and the increased dependency on monoculture economy based on oil.

Employment in Agricultural Sector

Agricultural employment is defined as the total number of working age persons who were engaged in the activity to produce goods or provide services for pay or profit, whether at work during the reference period or not at work due to temporary absence from a job, or to working-time arrangement. The agricultural sector consists of activities in agriculture, hunting, forestry and fishing. Until 2000, agriculture was the mainstay of employment around the world. Since then, the services sector has assumed this mantle and the gap between the two has widened. Although employment growth in agriculture has slowed

the number of workers in this sector reached over one billion, representing 1 in 3 of all workers[19]. The agricultural sector has some special characteristics that make it more difficult, compared to other sectors, to know precisely how many people it employs.

Firstly, in many countries agriculture is still dominated by family farms, where family members provide labour input at different times of the year. Secondly, many farmers and farm workers pursue agriculture as a part-time activity and have other more or less important sources of income. Thirdly, agriculture is characterized by seasonal labour peaks, where large numbers of workers may be hired for relatively short periods[20].

Furthermore, with 1.3 billion people employed in the sector, agriculture is the second greatest source of employment worldwide after services and it accounts 28% of global employment[21]. As countries develop, the share of the population working in agriculture is declining[22]. While more than 2/3 of the population in poor countries work in agriculture, less than 5% of the population does in rich countries[23]. Productivity gains makes it possible to reduce the land needed to feed a given number of

people. It is predominantly the huge productivity increase that makes this reduction in labor possible.

Agriculture Export

Agricultural export refers to the crop locally grown in a country but sold to a buyer in another country. An export crop simply means a crop that is currently grown in a country like Nigeria but has export potentials[24]. exports are goods and services produced domestically but purchased by foreigners. This form of exports is one of the oldest forms

of economic transfer and occurs on a large scale between nations. In the case of Nigeria, the breakdown of her top exports and top destination countries[25] are presented below:

Sesamum seeds: Sesamum seeds, the tiny, oil-rich seeds, have been Nigeria's agricultural export biggest earner for some years.

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During the period under review, Nigeria made the sum of N112.8 billion from the export of the products and this accounted for 38.9% of the top 10 products. Top destinations for the product include Japan, China, Turkey, India, and Vietnam.

Cocoa Beans: Cocoa (Fermented, superior quality raw cocoa) exports are Nigeria's second largest export. During the period under review, cocoa export was estimated to be N109.6 billion, accounting for 37.8% of the top exports. The top destinations for the product are Germany, Netherlands, Spain, Indonesia, Belgium, Malaysia, and Estonia.

Cashew nuts (In shell and shelled): Cashew nuts are Nigeria's 3rd biggest export product. In one year (March 2019 – March 2020), Nigeria generated a total sum of N38.2 billion from cashew nuts export. The top destinations are Vietnam, India, USA, Russia and the Netherlands.

Frozen shrimps and prawns: Ranking 4th on the list, Frozen shrimps and prawns accounted for 3.4% of the biggest export in Nigeria, estimated to be N9.85 billion in the last one year. According to the breakdown, Netherlands, Belgium, France, Vietnam, and the USA are top destinations for the export of the products.

Natural cocoa butter: Natural cocoa butter ranks as Nigeria's 5th biggest export product within the period. Nigeria generated the sum of N7.69 billion as revenue

proceeds from the export of cocoa butter. Germany and Estonia are top destinations for the product.

Sesame oil and its fractions: Sesame oil, an edible vegetable oil derived from sesame seeds, ranks 6th on the list with an estimated export value of N3.1 billion.

Other products on the top list include Cotton, Agro-food items, Other cut flowers & flower buds of kind suitable ornamental purposes and Ginger. During the period, a total sum of N2.53 billion was generated from Cotton export, Agro-food items (N1.97 billion), Cut flowers and flower buds (N1.96 billion) and Ginger (N1.43 billion).

Figure 2.1 presents the trend analysis of the top ten exports in Nigeria from 2019 to 2020.

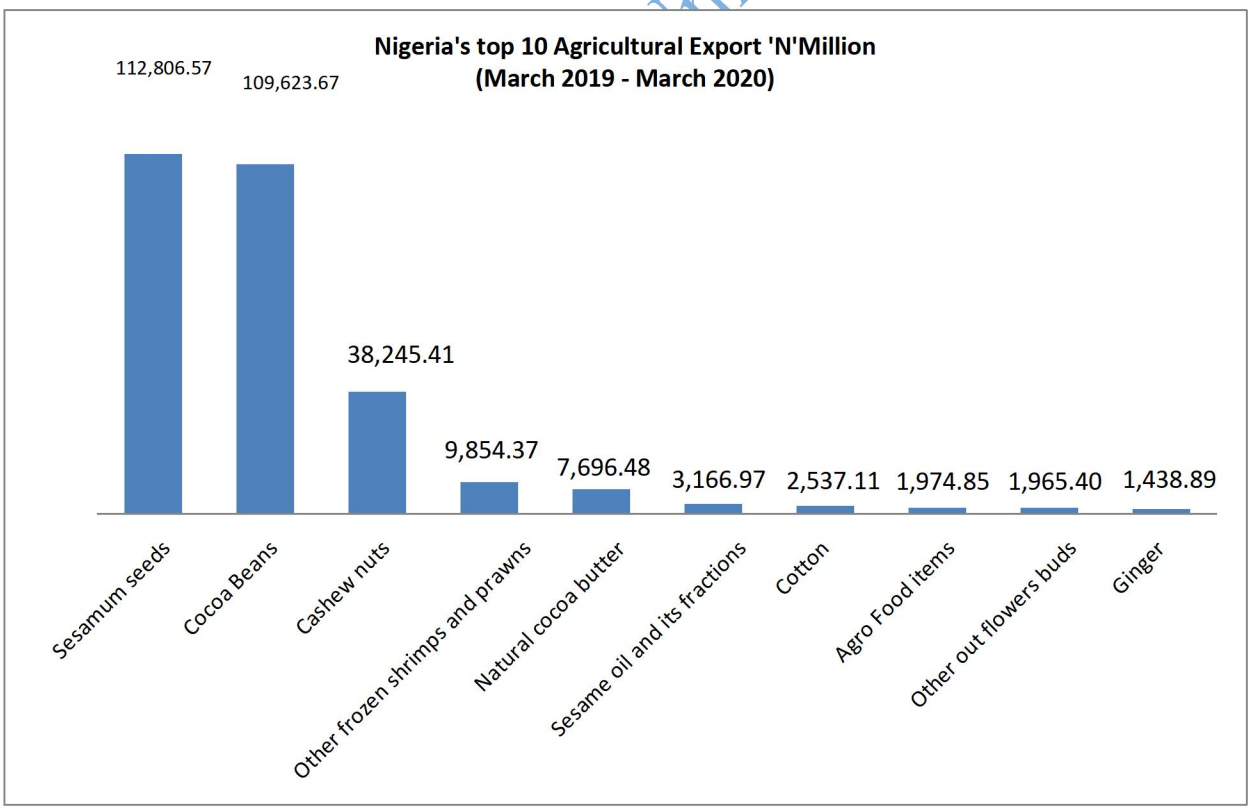

Figure 2.1: Nigeria's top 10 Exports from 2019 to 2020

Source: National Bureau of Statistics (2020)

1.2 Theoretical Review

2.2.1 Theoretical Links between Stock Market and Output Growth

Traditionally, economic theory had put much emphasis on macroeconomic factors in explaining economic growth as well as financial system development which comprise banking sector, money market and stock market development. They included factors such as economic stability, income growth, institutional development and financial markets, among the factors, financial markets development has in recent decades received considerable attention in explaining economic growth6. Much of the attention emanates from the function that these markets play in the economy. These functions are transfer of resources over time, across borders and between economic entities; resource mobilization and pooling of savings; and allocation of capital efficiently and competitively[7].Finance and economic theorists have envisaged both positive and negative links between financial development and economic growth. Certain researchers have found a positive link between them[8,9,10]. Similarly, other have evidences for a positive link for some indicators11. Although, a positive effect between them is predominant, surprisingly, others have witnessed arguments and evidences for a negative effect between stock market development and economic growth7. The debate on how financial development causes economic growth is ever growing11. The empirical literature provides in many cases bi-directional causalities between financial development and economic development, both in developing and developed countries[6]. Other related evidences show that this effect is only in the long-run[6,12,13].

However, notable results have tended to differ substantially across economies due to different institutional features and size of markets. These have led to two general lines of

theoretical arguments that are proposed in the literature as regards to the causality in the finance growth nexus as follows:

2.2.1.1 The Demand-Side Causality

The "demand-following" hypothesis contends that financial development follows economic development[12]. Stated differently, economic growth causes financial development, implying that growth in demand for financial services is an outcome of economic development. This hypothesis is expected to work in countries with high economic development, where the growing financial services demand leads to the country to introduce new financial institutions, markets and products[14]. Some studies support this hypothesis both theoretically and empirically[15].

Economic growth implies an increase in services and goods produced by an economy over time. The theoretical position on the causality of economic growth on financial development (particularly stock markets development) remains less developed compared to the causality of financial system on economic growth[16]. When economic growth increases, the financial system is enabled to sustain sufficient activities making it cost-effective. Economists contend that fixed costs are assumed in the process of formation of financial intermediaries in early development of the financial system[7]. These fixed costs decline as the economy develops, allowing more financial inclusion in the financial system. This among other issues implies the presence of threshold effects in the development of financial markets.

In support of this line of argument, empirical evidences for positive short-term causality flowing from economic growth to stock market development are well established in previous works[17].

They evidenced a demand leading hypothesis, implying the antecedence and causation of economic growth over stock market development.

With a special focus on Africa, a study contends that over a decade preceding 2013 not less than six sub-Saharan economies were among the top ten fastest growing economies around the world[18]. The study further shows that based on IMF data projections which indicated that between 2011 and 2015, seven out of the top ten world fastest growing economies would come from sub-Sahara Africa. The projection has not changed much, in each of these cases Tanzania is also listed as among the top ten world growing economies. To what extent the growth effect can be felt in the development of its stock market remains a quest for research. This study will among other issues tests for this effect.

2.2.1.2 The supply-side causality

The "supply-leading" hypothesis supports the idea that economic development follows financial development[17]. Stated differently, financial development causes economic development; thus, there is a proactive causality from financial development to economic development. Several studies support this hypothesis both theoretically and empirically[7,19]. Theoretically, a financial system, especially its stock market that is well developed promotes savings and allocate productive capitals to investments efficiently which in turn promote economic growth[19]. Specifically, a study argues for stock markets

over banking system in that the former offers numerous financial services than the latter, which are akin to fostering investment and economic growth[20].

For instance, stock market development indicators, for instance market capitalization improves capital mobilization and risk diversification more efficiently, while stock market traded value and turnover ratio, which are liquidity measures lower transaction costs which enable efficient functions of markets[7]. The extant literature identifies many channeling mechanisms for the flow of effects from stock market development to economic growth. They include: supply of ex ante information on investments, corporate governance implementation, risk amelioration and investment diversification and resource mobilization and pooling effects[11,19,21]. Each of these mechanisms may impact savings and/or investments and consequently economic growth[11].

Further, stock markets have specific important effects which cause economic growth; they lower transaction costs and reduce trade risk, improve financial intermediation efficiency and provide exit options for investors[17]. More empirical evidences indicate that stock market development spurs economic growth[19,21]. Particularly, a study found evidence for a supply-leading hypothesis, where stock market development spurred economic growth[14]. Another study found a positive link between stock market development and economic growth, but the contribution was smaller[22].

2.2.2 Growth Theories

2.2.2.1 The Neo-classical growth theory

The Neo-classical growth theory which is jointly attributed to Solow and Swan describes how a steady rate (equilibrium) of economic growth is attained through the application of the requisite quantities of labour, capital and technology[23,24]. This theory succeeded

capital fundamentalism which was the dominant construct for explaining economic growth in the 1950s and 1960s,

capital fundamentalism suggests that rapid capital accumulation is key to increasing the rate of economic growth[25]. The neoclassical growth theory, according to Solow and Swan, is based on three premises, the first being that capital accumulation and how it is applied are important determinants for economic growth. Further, it is also based on the premise that the interplay between the capital and labour determine the level of an economy's output. The third premise is that technology enhances labour productivity in a way that it increases economic output. The Solow-Swan model is based on a Cobb-Douglas type production function in which output at time t denoted by Yt is a function capital at time t as denoted by Kt, labour at time t denoted by Lt and technological advancement at time t denoted by At. Solow drew up his model based on the assumptions of constant and diminishing returns to scale, perfect competition and information and the absence of externalities.

The Solow-Swan model is therefore thus:

$$Y_t = f(k_t, A_tL_t) \qquad (2.1)$$

According to the model, technological advancement results in greater productivity per unit labour which in turn increases output. Given that labour is limited by the number of workers in an economy as well as the number of jobs available, economic output based on increase in labour alone is therefore limited. The model, however, considers the economic benefits related to technological advancement as infinite thereby resulting exponentially high economic growth; thus the model considers technological

advancement as exogenous with economic output growing in tandem labour whilst holding output per capital constant (in the absence of technological advancement).

A study argued that the in some cases the neoclassical growth model was consistent with empirical evidence, it notes research that concludes that differences in measured inputs explaining less than half of the large cross-country differences in GDP per capita, consistent with the model[26]. The study also notes how, empirically, a strong positive correlation exists between savings rates and growth across countries; this finding is contrary to the neoclassical growth theory which suggests there would be no correlation, provided countries are in the steady state. The notion that only growth in productivity can lead to long-run economic growth that is suggested by the neoclassical growth theory is also challenged by two scholars who go on and propose a set of six stylized facts which they state is an attempt to address the neoclassical growth theory's narrow focus on physical capital alone[27]. The analysis of the long-run economic effects of the development of the JSE cannot therefore be undertaken in the context of the neoclassical growth theory. The existence of empirical evidence that points towards the positive correlation between of savings rate and economic growth effectively renders the theory unsuitable as considers savings growth as exogenous. Ultimately the failure of the neoclassical growth theory to explain how savings and investment rates or how policies and regulations that influence savings and investment rates can affect the steady-state growth rate led to the conclusion on its unsuitability as a theoretical basis for the study.

2.2.2.2 The Endogenous growth theory

The endogenous growth theory (also known as the new growth theory) is essentially an extension of the neoclassical growth theory and a return of sorts to capital fundamentalism[28]. The endogenous growth theory whose early proponents

propose a model in which economic growth is affected not only by government policies which have the potential of raising a country's growth rate through the promotion of more intense competition which in turn stimulate product and process innovation but also by investment in research and development and human capital[29,30,31]. The endogenous growth model therefore proposes that technological advancement is endogenous and vital to economic growth.

The endogenous growth theory also posits that technological advancement can be explained through factors such as increased savings, investment and population growth which factors are in turn are affected by government policies which influence the rate of long-run growth by impacting accumulation of capital (physical and human capital), creation and diffusion of new knowledge through software development and other information technology provided services[32].

This endogenous theory can, therefore, be used to explain the financial development and economic growth nexus given how savings and investment within this theory catalyze economic growth. According to Howitt first version of the endogenous growth model is the AK model which is expressed as follows:

$$Y_t = Ak_t \qquad (2.2)$$

The AK model which was earlier expressed by Frankel is also based on a Cobb Douglas type production function in which output at time t denoted by Y_t is a function of the level

of technological advancement, which is positive constant denoted by A and the physical and human capital at time t denoted by Kt[28,33]. The model suggests that aggregate output function can exhibit constant and sometimes increasing marginal product of capital due to the some of the capital accumulated capital accruing to firms being in the form of intellectual capital. Intellectual capital, according to Frankel, results in technological advancement which in turn offsets the tendency for marginal product of capital to diminish[28].

As shown by Howitt, the AK model demonstrates how long-run economic growth rate depends on an economy's savings rate[33]. According to the AK model, if an economy saves a fixed portion of output, s, and given a fixed rate of depreciation, δ , the rate of aggregate net investment is as follows:

$$\frac{dk}{dt} = sY_t - \delta k_t \qquad (2.3)$$

When considered in conjunction with equation (2.2) the growth rate, g, is presented as:

$$g \equiv \frac{1}{Y}\frac{dY}{dt} = \frac{1}{K}\frac{dK}{dt} = sA\text{-}\delta \qquad (2.4)$$

According to equation (2.4), an increase in the savings rate, s, results in a permanent increase in the growth rate, g. Based on the analysis of the AK model of endogenous growth a positive correlation between stock market development and economic growth should exist. The study is therefore couched in the endogenous growth theory, this is also in spite of the absence of any indication in the theory of the direction of the relationship between these two variables[32].

1.3 Review of Empirical Studies

A study looks into how the growth of agriculture in Africa's emerging countries is influenced by the expansion of the stock market (as measured by market capitalization and stock value traded) within the period 1990- 2020[28]. The three types of estimation tests used in the study are fully modified ordinary least squares (FMOLS), dynamic ordinary least squares (DOLS), and Pairwise Dumitrescu Hurlin panel causality tests. The results of the FMOLS and DOLS show that market capitalization has a negative impact on growth, whereas stock value traded has a favourable impact on growth. The causality results show that there is unidirectional causal flow from value added to market capitalization and stock value exchanged, and bi-directional causality between labour and value added.

A research study investigates the relationship between stock market development and economic growth in South Africa with a view from the Johannesburg Stock Exchange market[28]. The study measured stock market development by market capitalization, market value of stock traded and turnover, while economic growth is proxy by gross domestic product. The estimator used is the Autoregressive Distributed Lag Bounds method using an annual date sets spanning from 1975 to 2013. A long run relationship was found among growth, stock market capitalization and stock market traded value. The long run estimation results showed that stock market development positively impacted on economic growth mainly from stock market capitalization and market traded value. The study found a decreasing return to scale from the indicators to output growth. The economic implication raised was that a likely path used to raise funds in the Johansen Stock Exchange to overseas companies or to unproductive industries of the economy.

Findings indicate that a uni-causal link from stock market development to economic growth.

Some group of authors examine both the short and long run causal link between stock market development and economic growth in SSA over the period, 1990-2020[34]. The study used panel estimators - autoregressive distributed lag model and the Granger causality from 1990 to 2020. The empirical results showed that stock market capitalization positively impacted on output growth in the long run but negative in the short run.

As for stock market liquidity measured by total value of shares traded and turnover ratio, their adverse effect on economic growth is significant at 5% level. The causality test result is inconclusive as they were unable to found if stock market development causes economic growth or economic growth causes stock market development in Africa.

Some group of scholars examine the role of stock market development (measured by market capitalization and stock value traded) in growth in emerging economies of Africa within the periods 1990-2020[35]. Using fully modified OLS and dynamic OLS, the result reveals that market capitalization influences growth negatively while stock value traded affects growth positively. The causality test results show a bi-causal link between labour and value added and a one-way causality flow from growth to market capitalization and stock value traded.

A study re-investigates the links between stock market development and economic growth in Malaysia during the periods, 1981-2016[36]. It also estimates the moderating role of foreign capital inflows and exchange rate in the nexus between stock market development and economic growth. The ARDL bound test confirmed a cointegration

between stock market development and economic growth. As for the short run and long run estimates, it found that Malaysia's output growth is promoted by stock market development. Concerning the moderating factors, foreign capital acts as a magnifying moderator while exchange rate operates as a deteriorating moderator. The Granger causality test result found a unidirectional link from stock market development to economic growth which is consistent with the ARDL estimator.

A scholar contributed to the extant literature by reinvestigating the role of stock markets in the Tanzanian economy using a quarterly data set spanning from 2001 to 2019[7]. The researcher employed both the autoregressive distribute lag (ARDL) bound estimator and Granger causality test. Findings confirm that the Tanzania economy responds negatively to stock market liquidity both in the short and long run. However, stock market size and depth directly enhance output growth, which was presumed to be from the stock market's primary issues. The causality result shows mostly a one-way directional causation from stock market development to economic growth but inequitable causation from output growth to stock market development using stock market liquidity as a measure of stock market development.

While investigating the nexus of stock market development and economic growth from 1981 to 2011, it found that all-share index, number of deals and market capitalization had direct and significant impact the Nigerian economic growth using the error correction model techniques[37]. As well, the study discovered a unidirectional causal relation ran from capital market to economic growth while a feedback was reported from market capitalization to economic growth. Also, a study evaluating the stock market-economic growth nexus in Nigeria from 1985 to 2015, found that her output growth is

heterogeneously affected by the country's stock market indices using growth OLS estimator[38]. Thus, the capital market enhanced the country's output growth significantly. While investigating the role played by stock market development in Indian economy (mainly manufacturing sector, electricity, gas and water sector, and service sector, all share of GDP) from 2003:Q4 to 2014:Q4 using ARDL approach, the study found a long and short runs association between sector-specific stock indices and sector-specific GDP[39].

Also, a one-way causal relationship exists from sector-specific stock prices to their respective sector's GDP.

A study evaluates the effects of capital market performance (measured by number of listed equities, number of deals, market capitalization, all-share index, value of deals, value of transactions and stock market turnover) on the Nigerian economic growth within the periods, 1984-2016[40]. It uses three estimators i.e. OLS, ARDL, and vector autoregressive (VAR). The results revealed that output growth is positively influenced by market capitalization, number of listed equities and value of transactions but adversely affected by stock market turnover, all-share index, number of deals and value of deals. However, another study found a long run significant link between market capitalization ratio and output but an insignificant nexus among all-share index and output in Nigeria from 1980 to 2012[41].

A research study used ARDL approach to investigate the links between stock market development and economic growth in Nigeria over the periods, 1985-2018[42]. The findings confirmed a long run connection between stock market and economic growth. However, the study revealed a statistically insignificant positive link among stock market

indices and output growth. In the case of Kenya, a study found trade volume and market capitalization impacting positively on Kenya's output growth from 2000:Q1 to 2011:Q4[43]. Likewise, a study discovered a statistical significant impact of all-share index, market value and market capitalization on output growth in Nigeria within the period 2000-2010 using the OLS estimator[44]. Equally, a study used co-integration and Granger causality tests and argued that Nigerian economic growth is positively influenced by market capitalization and value of transactions from 1971 to 2013[45].

A study made a comparative analysis of stock market performance and economic growth between Nigeria and South Africa using an annual datasets from 1986 to 2015[46]. The ARDL estimator found a co-integration between stock market and output growth in Nigeria but not in South Africa. The study found a direct link between stock value traded ratio and short- and long-run output growth in Nigeria and South Africa, although not statistically significant at 5% level. It further showed that South Africa's market capitalization significantly impacted the country's economic growth, although not in Nigeria.

A study investigates how stock market performance influences the South and East Asian growth within the period 1996-2015[47]. Using pooled OLS estimator, it was discovered that stock market development significantly impacted on output growth of South Asia but insignificant on the economic growth of East Asian. Using ARDL bound estimator, a study argued that the impact of stock market development on South Africa economy is strong in the short run but minimal in the long run[48]. Another study using ECM approach found that market capitalization and number of deals significantly and positively impacted on industrial output, whereas value of transactions reportedly impacted on

industrial output negatively in Nigeria within 1980-2012[49]. Its causality test result showed a bi-causal link from industrial output to market capitalization and number of deals, whereas a one-way causality moved from stock transaction values to industrial output. A study further confirmed a one-way directional causality from total amount of stock traded and stock market capitalization (all as a share of GDP) to industrial performance in Nigeria within 1985-2015[50]. Two researchers used regressive analysis to investigate role of stock market efficiency (proxy by all share index) to manufacturing performance in Nigeria over the periods, 1985-2017[51].

The results showed that all-share index adversely and significantly influenced the performance of manufacturing sector. A study found the ARDL estimation result revealing that all share index directly and significantly impacted the manufacturing sector output but the direct impact of market capitalization on the sector's growth was insignificant statistically at 5% level in Nigeria using a yearly data ranging within 1981-2017[52].

While employing ARDL approach in capital market sector's output growth nexus from 1984 to 2018, a research discovered that long run sector is positively driven by market capitalization, all-share index, total value of stock transactions and number of listed equities[53]. As for industrial sector, market capitalization and number of deals have positive impact in the long run. Only market capitalization directly affects construction and trade sectors significantly at 5% level. However, the positive effects of all share index, total amount of stock transaction and number of deals on trade sector are statistically insignificant in long run. A quarterly data series analysis on the nexus

between stock market and firms' growth in South Africa from 2001 to 2015 showed that found a significant positive relationship in the long run using the VECM estimator[54].

2.4 Summary of Gaps in Literature Reviewed

Although the financial sector's potentials as a critical engine in agricultural output growth are really compelling, literature reveals divergent results on the relationship between stock market development and productivity. There is no clear direction of causality between stock market development and productivity. However, these studies have only focused on output growth while lesser attention have been placed on other indices of productivity like agricultural output, exports and employment. Also, the earlier studies conducted used different methodologies. The studies provide non-consensus findings on the bond between stock market development and agricultural output growth.

Some findings indicate positive link between stock market development and productivity, while others show a negative association[40,44,47,51]. Additionally, limited country specific studies have been conducted on the relationship between stock market development and productivity as regards the Nigerian economy. The conducted studies give inconclusive findings which motivate further research. Thus, this study examines the causation between stock market development and productivity in Nigeria, the most populous black nation in the world.

2.5 Theoretical Framework

The theoretical foundation of this study hinges on the endogenous growth theory as it proposes that financial sector can boost output growth rates if they can bring goods and services to private sectors in which there would otherwise be sub-optimal investment.

Under the neoclassical model, financial sector such as stock market development may affect the incentive to invest in human and physical capital, but in the long-run these affect only the equilibrium factor ratios, not the growth rate, although in general there will be transitional growth effects. Meanwhile, the endogenous growth model predicts that financial sector will influence the long-run growth rate. Furthermore, the production function is written in a Cobb-Douglas form, with constant returns to scale in capital and labour for simplicity. The function is presented as shown below before other variables are integrated:

$$Y_t = Ak_t^{\alpha} L_t^{\beta} k \qquad (2.5)$$

Where: Y denotes agricultural productivity, A is the constant term, K denotes fixed capital and L represents labour supply. α and β are the respective coefficients of capital and labour with values ranging between 0 and 1, implies $0 < \alpha,\beta < 1$. *t* is time period and μ is error term.

This theoretical framework elucidates that stock market development proxies like market capitalization, all-share index, and value of transactions apply a considerable effect on growth. The variables measure the capital market efficiency, funds mobilization, liquidity and wealth creation capacity as vectors[53]. As this study examines the causation between stock market development and economic performance, it integrates stock market variables in equation (2.6) gives equation (2.5) as follows:

$$Y = AK_t^{\propto} L_t^{\beta} SM_t^{1-\propto-\beta} e_t^{u_t} \qquad (2.6)$$

The variables remained as earlier defined and the term *SMD* is used to denote stock market development. Taking the natural logarithm of the above equation, it becomes:

$$\ln Y_t = \ln A + \alpha \ln K_t + \beta \ln L_t + (1 - \alpha - \beta) \ln SM_t + \mu_t \qquad (2.7)$$

Note that $1 - \alpha - \beta = \emptyset$ and $\ln e = 0$. The above equation represents the theoretical model of this study.

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Chapter Three

Methodology

3.0 Methodology

The methodology of this study is presented in a way to explain the empirical modeling and estimation approaches used to estimate the parameters. The discussion under this chapter is divided into five different sections. Thus, the empirical modeling is specified in line with the specific objectives of the study. For the second section, the theoretical expectation is presented to explain the a'priori presumptions between the variables in the model specifications. The third part provides the estimation techniques used to estimate the coefficients while the last part of the study provides data sources and measurements.

1.1 Model Specification

3.1.1 Empirical Model of the Relationship between Stock Market Development and Agricultural Output Growth

Following the theoretical framework of the endogenous growth theory developed in the last section of the previous chapter and the models of previous studies, the adapted model relating to the links between stock market development and agricultural output growth including the relevant control variables (i.e. investment, financial sector development, trade openness, inflation and interest rate spread) is stated in a functional form as[1,2,3,4]:

$$agog_t = f(smd_t,\ inv_t, topen_t) \tag{3.1}$$

In mathematical form, it becomes:

$$agog_t = \varphi_0 + Bsmd_t + \varphi_1 inv_t + \varphi_2 fsd_t + \varphi_3 topen_t + e_t \tag{3.2}$$

Where: $agog$ denotes agricultural output growth; smd is a vector of stock market development indices like market capitalization to GDP ($mcap$), stock traded value to GDP ($sttrd$) and all share index (asi); inv represents capital investment measured by gross fixed capital formation to GDP; fsd is financial sector development proxy by domestic credit to private sector by banks to GDP; $topen$ is trade openness; $\varphi_0, B, \varphi_{1-3}$ are parameters; t denotes time; and e is error term.

3.1.2 Empirical Model of the Nexus between Stock Market Development and Agricultural Exports

For this sub-section, the study adapts and modifies the model of previous studies to investigate the impact of stock market development on agricultural exports in Nigeria5,6. The model specifies agricultural exports rate ($agex$) as a function of stock market development indices such as market capitalization to GDP ($mcap$), stock traded value to GDP ($sttrd$) and all share index (asi); including other controlling variables like capital investment (inv), financial sector development proxy by domestic credit to private sector by banks to GDP (fsd), trade openness ($topen$), inflation rate (inf), interest rate spread (int). Consequently, the model is stated functionally as:

$$agex_t = f(smd_t,\ inv_t, fsd_t\ topen_t) \quad (3.3)$$

In mathematical form, it becomes:

$$agex_t = \gamma_0 + \Phi smd_t + y_1 inv_t + y_2 fsd_t + y_3 topen_t + v_t \quad (3.4)$$

Where: $agex$ is agricultural exports; smd is a vector of stock market development indices like market capitalization to GDP $(mcap)$, stock traded value to GDP $(sttrd)$ and all share index (asi); inv represents capital investment measured by gross fixed capital formation to GDP; fsd is financial sector development proxy by domestic credit to private sector by banks to GDP; $topen$ is trade openness; y_0, Φ, y_{1-3} are parameters; t denotes time; and v is error term.

3.1.3 Empirical Model of the Nexus between Stock Market Development and Agricultural Employment

To investigate the impact of stock market development on agricultural employment, the study modeled agricultural employment rate as a function of stock market development indices such as market capitalization to GDP, stock traded value to GDP and all share index; including the relevant control variables i.e. capital investment, financial sector development, trade openness, interest rate spread, and inflation rate. The baseline model for the time series analysis is specified below as:

$$agemp_t = f(smd_t,\ inv_t, fsd_t\ topen_t) \qquad (3.5)$$

To estimate the parameters, the function is transformed into the generalized equation below as:

$$agemp_t = \theta_0 + \Theta smd_t + \theta_1 inv_t + \theta_2 fsd_t + \theta_3 topen_t + v_t \qquad (3.6)$$

Where: $agemp$ denotes agricultural employment; smd is a vector of stock market development indices like market capitalization to GDP $(mcap)$, stock traded value to GDP $(sttrd)$ and all share index (asi); inv represents capital investment

measured by gross fixed capital formation to GDP; fsd is financial sector development proxy by domestic credit to private sector by banks to GDP; $topen$ is trade openness $\theta_0, \Theta, \theta_{1-3}$ are parameters; t denotes time; and v is disturbance term.

3.2 Theoretical Expectation

For agricultural output growth model, the study expects a direct relationship between stock market development and output growth. It means that the development of the stock market in terms of market capitalization, the value of shares traded and its all share index have high tendency of enhancing the overall agricultural activities which in turn improve its output growth in a country. Similarly, capital investment, employment, financial sector development and trade openness have positive level of association with the agricultural output growth. In contrary, inflation rate and interest rate are expected to have an indirect impact on the agricultural output growth.

Concerning agricultural employment generation model, the study presumes that an increase in stock market development has a positive impact on agricultural employment in the country. It implies that there is high tendency of employment generation in the sector with improved stock market. Likewise, capital investment is expected to enhance the level of agricultural employment. If there is an inflow of domestic credit to private sector by banks through an improved financial sector, it is expected to increase domestic investment as there is high tendency of increasing agricultural employment in an economy. Also, trade openness is expected to have a direct relationship with agricultural employment level. This is because as the trade between countries improves, employment generation through agricultural output growth is expected.

However, high inflation and interest rate spread are expected to cause a drag to agricultural employment.

Meanwhile for agricultural exports model, stock market development is expected to enhance the agricultural exports. Similarly, an increase in capital is expected to have a positive relationship with agricultural exports of a country. More so, financial sector development is expected to have a direct relationship with the country's agricultural exports. As domestic credit to private sector increases, there is high chance of more funds at low interest rate for agricultural businesses to thrive its exports in the country. If there is high inflation and interest rates in an economy, it is expected to lessen agricultural exports. Also, trade openness is expected to have n direct relationship with agricultural exports.

1.2 Estimation Techniques

The specification and estimation of the models requires that we test the time series properties of the data in order to determine whether the variables contain integrated components, hence, this study adopt time series estimation techniques. Before estimating the parameters, the study examines the stationarity (presence of a unit root) of the variables using the Augmented Dickey Fuller (ADF) test. Afterwards, the study tests for the cointegration of the variables depending on the results of the stationarity of the variables. In addition, the appropriate estimator was also employed to evaluate the coefficients of the empirical models.

3.3.1 Unit root test

This study used the unit root test to test for the stationarity of the times series data collected for the research to avoid the danger of bias that stationarity of data may pose to the study if they are not checked. The unit root test was employed because in the literature most time series variables are non-stationary and using non-stationary variables in the model might lead to a spurious regression. In order to ascertain whether time series data were stationary or non-stationary and to determine the number of times (the level) at which the variables must be differenced before becoming stationary, unit root tests were conducted. The Dickey – Fuller regression is estimated as follows for unit root.

$$\Delta Y_t = \lambda Y_{t-1} + V_t \qquad (3.8)$$

If λ equals 0, Y_t is non-stationary, as a result Y_t and X_t are not co-integrated. In order words, if λ is significantly different from 0 Y_t and X_t are found integrated individually. Given the inherent weakness of the unit root to distinguish between null and the alternative hypotheses, it is desirable that the Augmented Dickey Fuller (ADF) test be applied. To be co-integrated; both Y_t and X_t must have the same order of integration[8,9]. The ADF regression is specified as follows:

$$\Delta Y_t = \propto + \beta t + \delta Y_{t-1} + Y_i \sum_{t-1}^{m} \Delta Y_{t-1} + \varepsilon_t \qquad (3.9)$$

Δ is the first difference operator, t is the new random error term, M is the optimum number of lags needed to obtain "white noise". The null hypothesis of non-stationarity is rejected if the estimated ADF statistic is found to be larger in absolute term or more negative than its critical values at 1 or 5 percent level of significance.

3.3.2 Co-integration test

The purpose of the co-integration test is to determine whether a group of non-stationary time series is co-integrated to reduce bias. The concept of co-integration creates the link between integrated processes and the concept of steady state equilibrium10.Thus, in this study, autoregressive distributed lag (ARDL) tests for co-integration analysis was employed to investigate the long-term relationship between the variables of interest.

3.3.3 ARDL Estimation Test

In this study, the autoregressive distributed lag (ARDL) was used to estimate the shortrun and long-run estimates of the existing relationship between stock marketdevelopment and economic performance. Three advantages for using this method are stated as11: (a) small sample data (b) variables with mixed stationarity level either I(0) or I(1) and (c) both long- and short-run estimates can be derived simultaneously. The lag length is selected using the Akaike information criteria (AIC). The calculated Fstatistic value is used to make the decision about the cointegration. The significance of our calculated value is compared with the two tabulated values (upper bound and lower bound) computed by a scholar12. The decision criteria support cointegration if the calculated value is greater than the upper bound value; no cointegration if the value is lesser than the lower bound value; and inconclusive if the value lies between the two bounds values.

3.4 Sources of Data

This study examines the effect of stock market development on productivity in Nigeria for the period 1985 to 2021. The study uses secondary type of time series data for the variables, agricultural output growth, agricultural exports, agricultural

employment, market capitalization, stock traded value, all share index, capital investment, financial sector development, trade openness, inflation rate, , and interest rate that were obtained from the Statistical Bulletin and Annual Report of the Central Bank of Nigeria (CBN) 2022 and World Bank Development Indicators 2022. Table 3.1 presents the source and measurement of the variables.

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Table 3.1: Definition and source of data and variable measurements

Variables Description Measurement Data source

agog output growth is the total outcomes of produces in a country.

Domestic currency of agricultural output (natual log)

CBN statistical bulletin (2022)

Ag emp employment as a percentage of total employment.

Total employment in agricultural as % of total employment

World Development Indicator (2022)

agex raw materials exports as percentage of merchandise exports.

It is measured as raw material exports as % of merchandise exports World Development Indicators (2022)

smd Stock market development involves performance indices of the stock market like market capitalization, stock traded and all share index.

Percentage of GDP

Central Bank o Nigeria Statistical Bulletin (2021)

inv Capital investment involves all private

expenses on fixed capital goods to GDP.

It is measured as total gross

fixed capital formation as %

of GDP

World DevelopmenIndicators (2022)

fsd Financial sector development includes the domestic credit to private sector by banks

in an economy.

It is measured as percentage of GDP

World Development

Indicators (2022)

topen Trade openness captures the total trade as a

percentage of gross domestic product.

It is measured as total trade

as a percentage of GDP

World Development

Indicators (2022)

Source: Author's compilation (2023).

Endnotes

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Chapter Four

Results of Findings

4.0 Results of Findings

In this chapter, the study presets the details of data presentation, estimation and the results of the empirical investigation of the links between stock market development and performance in Nigeria. Also, it addresses the long-run and short-run relationship between stock market development and performance in Nigeria. This is divided into descriptive analysis which shows the measure of central tendency which include the mean, median as well measures of variation, it also takes into consideration the trend analysis which shows the trend of the time series data used from 1985-2022 and econometric analysis which focuses on test for unit root, cointegration test using the autoregressive distributed lagged model.

4.1 Data Presentation

The data used for analyzing the relationship between stock market development and performance in Nigeria is presented in the Appendix.

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Table 4.1 Descriptive Statistics

Signs Variable description Mean Std Dev. Min. Max. Kurtosis Skewness Jarque-Bera Prob.

agex

raw materials exports (% of

merchandise exports)

0.891 1.516 0.006 7.268 11.435 3.346 218.40 0.000

agog

Agriculture, forestry, and fishing, value added

(% of GDP)

23.758 3.784 18.020 36.965 3.646 1.517 27.971 0.000

agemp

Employment in agriculture (% of total

employment) (modeled ILO estimate)

45.201 6.590 35.205 55.240 -1.464 -0.247 3.606 0.165

mcap Stock market capitalization to GDP 12.450 8.657 3.085 38.014 0.229 0.784 3.595 0.166

sttrd Total stock transaction value to GDP 0.828 0.912 0.041 4.203 4.995 2.089 53.51 0.000

asi All share index 18821.7 16461.4 127.3 57990.2 -0.738 0.500 2.470 0.291

fsd Domestic credit to private sector to GDP 12.143 5.663 5.806 22.755 -1.611 0.475 5.176 0.075

topen Trade (% of GDP) 33.417 11.246 9.136 53.278 -0.453 -0.316 1.063 0.588

inv Gross fixed capital formation (% of GDP) 31.156 12.802 14.169 54.948 -1.170 0.246 2.541 0.281

Source: Author's computation (2023).

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4.2 Presentation of Results

4.2.1 Summary Statistics

The summary of the preliminary analysis showing the mean, standard deviation, skewness and peakedness of the variables employed for analyzing the relationship between government expenditure and performance in Nigeria is presented in Table 4.1.

From Table 4.1, the mean value of 0.891% suggests that, on average, raw materials constitute a significant portion of merchandise exports in Nigeria. It suggests that the country relies heavily on the export of raw products. The economic implication is that changes in global demand for these commodities or disruptions in the sector can have a substantial impact on export earnings. The mean value of 23.758 for agriculture, forestry, and fishing shows that they collectively contribute around 24% to Nigeria's GDP on average. It means that policies supporting the growth and modernization of these sectors can have a meaningful impact on overall economic performance, rural development, and food security. The mean employment in agriculture at 45.201 indicates that, on average, nearly half of the total employment in Nigeria is in the sector. This shows that changes in the sector, such as improvements in productivity or shifts in labour demand, can have widespread effects on employment and livelihoods.

In addition the mean value of 12.45% implies that, on average, the stock market capitalization represents about 12% of Nigeria's GDP. The economic implication is that, while the stock market is an important component of the financial system, it may not play as dominant a role in the overall economy as other sectors. The mean value of

0.828% suggests that, on average, the total stock transaction value constitutes less than 56

1% of Nigeria's GDP. Stock market may not be the primary driver of economic activity. However, changes in stock market transactions can still influence investor confidence and capital flow. The mean All Share Index of 18,821.7 indicates the average level of performance of the Nigerian stock market. The stock market has experienced significant variability over the years, reflecting changes in market conditions, investor sentiment, and economic factors.

As for the control variables, the mean value of 12.14% suggests that, on average, domestic credit to the private sector constitutes around 12% of Nigeria's GDP. The economic implication is that policies aimed at enhancing credit availability and promoting a conducive business environment can support private sector growth and investment. The mean trade percentage of 33.42% indicates that trade activities contribute, on average, around 33% to the Nigeria's GDP. Thus, international trade is a crucial driver of economic growth and diversification. The mean value of 31.16% suggests that, on average, gross fixed capital formation constitutes around 31% of Nigeria's GDP. Investments in fixed capital, such as infrastructure and machinery, are vital for economic development.

Moreover, the skewness which measures the assymetry of the distribution of the series around its mean always has a normal distribution at zero. A positive skewness implies that the distribution has a long right tail and a negative skewness implies that the distribution has a long left tail. The outcomes from Table 4.2 showed that all the variables are positively skewed except for employment and trade openness

(which is negatively skewed) thereby implying long right tails. Also, Kurtosis measures the peakedness or flatness of the distribution of the series. If the kurtosis is above three, the distribution is peaked or leptokurtic relative to the normal and if the kurtosis is less than three, the distribution is flat or platykurtic relative to normal. The result from the

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table indicated that only the values of exports, outputs and total stock traded value exceed three which implies peakedness or leptokurtic. As for the other variables, their values fell below three therefore implying flat or platykurtic.

4.2.2 Correlation Analysis

The correlation analyses of the variables are presented in Table 4.2. The coefficients show that the level of association between the variables used to explain the existing relationship between stock market performance and performance in Nigeria.

From Table 4.2, the results show that government stock market development correlated positively with exports but relates negatively with employment rate in the sector. As for agricultural output to GDP ratio, it relates positively with total stock transaction value and all share index but negatively correlates with stock market capitalization. Their correlation coefficients are moderates As for the controlling variables, their correlation relationships also differ among the three measures of performance. Meanwhile, the correlation coefficients of these controlling variables are equally reported. Consequently, these results are just preliminary analysis subject to confirmation using the appropriate estimation method to reveal the parameter signs and magnitudes of the variables.

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Table 4.2: Correlation Matrix

agex agog agemp mcap sttrd asi fsd topen inv

agex 1

agog -0.137 1

agemp -0.182 0.104 1

mcap 0.213 -0.040 -0.730 1

sttrd 0.218 0.066 -0.458 0.739 1

asi 0.116 0.007 -0.773 0.768 0.667 1

fsd 0.233 -0.222 -0.681 0.729 0.485 0.707 1

topen 0.313 0.449 0.043 0.026 0.203 -0.011 -0.161 1

inv -0.335 -0.113 0.814 -0.755 -0.657 -0.764 -0.730 -0.267 1

Source: Author's computation (2023).

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4.2.3 Trend Analysis

This sub-section of the study accesses the trend of stock market development variables and performance indices in Nigeria for the period of 38 years i.e. 1985-2022. This enables to determine the trend and pattern of raw materials exports, the contribution of agricultural to GDP, the percentage of employment in the sector, stock market capitalization, total stock transaction value, all share index, capital, domestic credit to private sector and trade openness. The time series of these principal variable (stock market development) and controlling variables are plotted against dependent variables (output, employment and exports in the sector) which are shown in Figures 4.1, 4.2, 4.3, and 4.4.

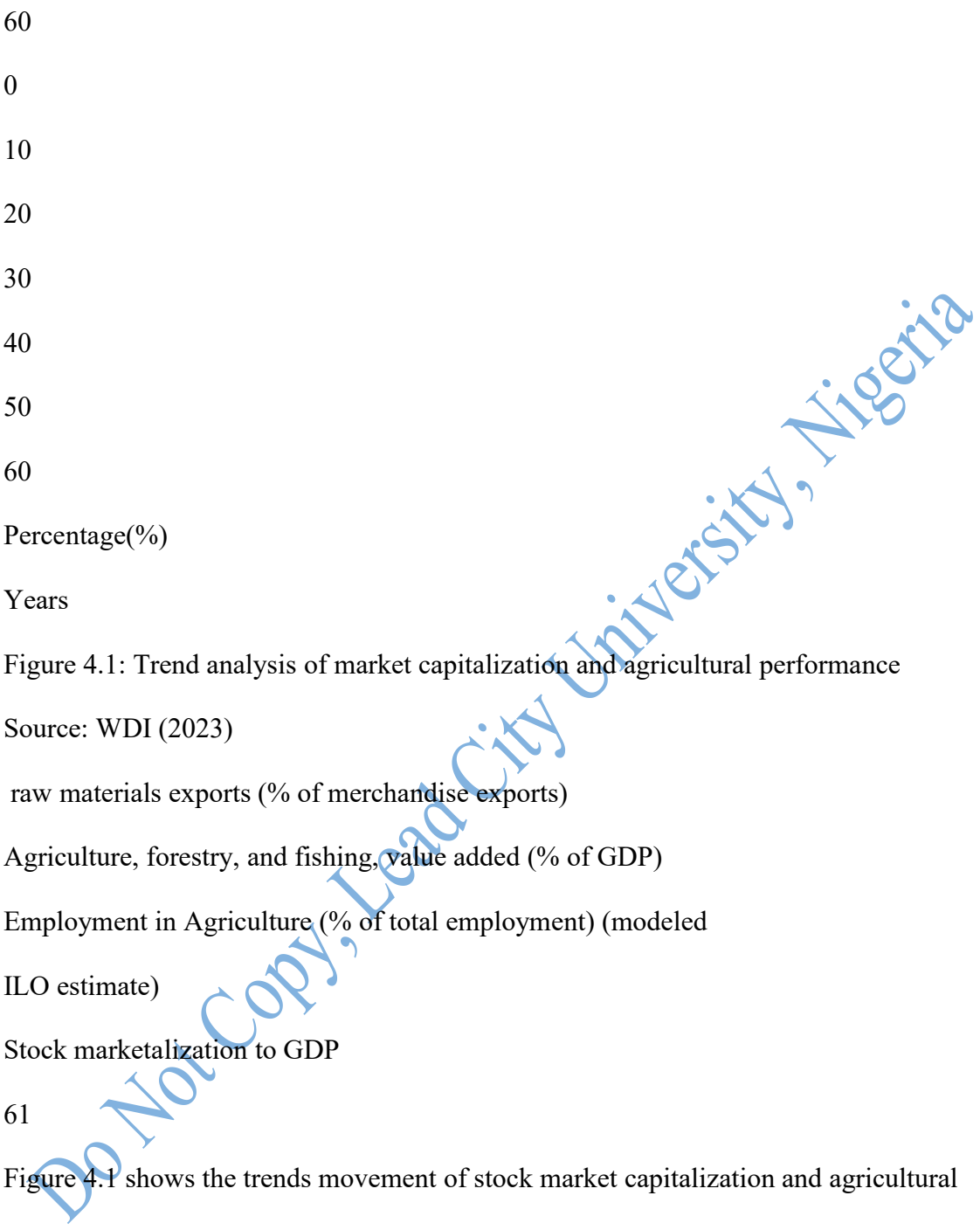

Figure 4.1: Trend analysis of market capitalization and agricultural performance

Source: WDI (2023)

Figure 4.1 shows the trends movement of stock market capitalization and agricultural performance indices such as output, employment and exports. The trend shows fluctuations in the percentage of raw materials exports relative to merchandise exports over the years. There is a noticeable increase from 1985 to 1996, with a significant peak in 1996 (1.622144%). This could indicate a period of intensified

exports during that time. Subsequently, there is a general decrease in the percentage, with occasional spikes, suggesting potential shifts in the country's focus on raw materials for exports. More so, the contribution of agriculture, forestry, and fishing to GDP follows a gradual decline from 1985 to 2022. The trend suggests a relative reduction in the significance of the sector in contributing to the overall GDP of the country over the years. While there are fluctuations, the general trend points towards a diversification of the economy away from heavy dependence on agriculture.

In addition, the percentage of employment in agriculture shows a gradual decrease over the years, reflecting a shift in employment patterns in Figure 4.1. In 1985, over 55% of the total employment was in agriculture, but by 2022, this percentage has decreased to around 35%. This decline in the share of employment in agriculture indicates a potential movement of the labour force from the sector to other industries, possibly due to urbanization and economic diversification. Also, the ratio of stock market capitalization to GDP fluctuates over the years, indicating changes in the relative size of the stock market compared to the overall economic output. Notable peaks in 2007, 2008, and 2022 (38.01%, 23.93%, and 25.30% of GDP, respectively) suggest periods of heightened stock market activity and valuation relative to the economy. The trends might reflect the influence of economic events, investor sentiment, and policy changes on the stock market's contribution to the overall economic landscape.

Employment, Agricultural output

Agricultural exports, Total stock transaction

Years

Figure 4.2: Trend analysis of stock traded value and agricultural performance

Source: WDI (2023)

raw materials exports (% of

merchandise exports)

Total stock transaction value to GDP

Agriculture, forestry, and fishing, value added

(% of GDP)

Employment in agriculture (% of total

employment) (modeled ILO estimate)

63

The trend movement of total stock transaction value to GDP and agricultural performance is depicted in Figure 4.2. The ratio of total stock transaction value to GDP shows significant variability, particularly with a sharp increase in 2003, reaching 10.03% of GDP. This surge in 2003 could be associated with increased stock market trading activity, potentially driven by economic reforms, policy changes, or other factors that boosted investor confidence and participation. The subsequent years see fluctuations, suggesting changing levels of market liquidity and investor engagement. Furthermore, Figure 4.3 depicts the series of all share index against agricultural performance in a graphical form. The all share index reflects the performance of the overall stock market. Notable peaks in 2008, 2014, and 2022 (31,450.78, 34,657.15, and 51,251.06, respectively) indicate periods of significant market valuation. The peak in 2008 might be associated with the global financial crisis, while peaks in 2014 and 2022 could be influenced by specific economic events, policy changes, or shifts in investor

sentiment. The all share index values show a general increasing trend over the years, suggesting overall growth and development in the Nigerian stock market.

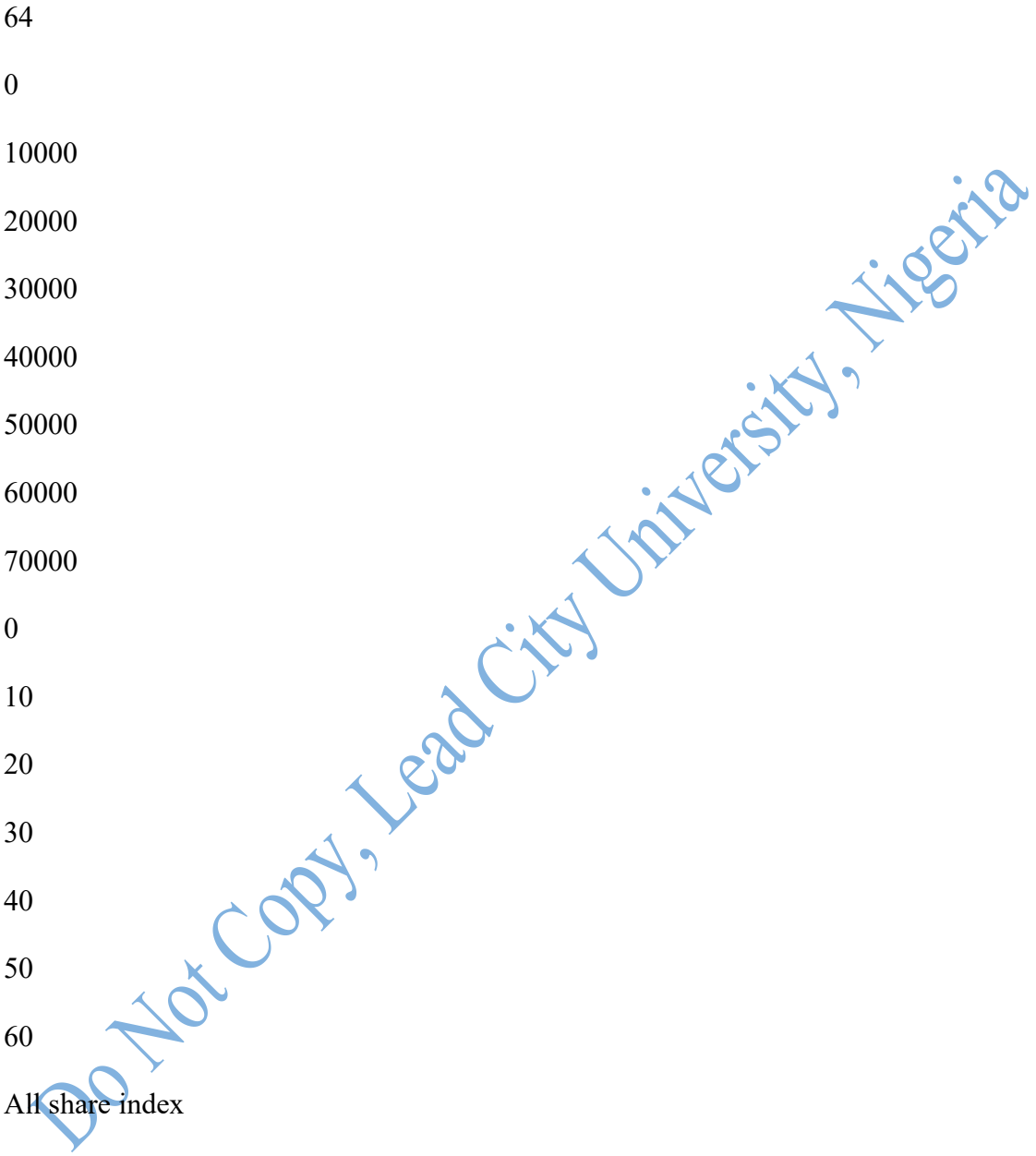

Figure 4.3: Trend analysis of all share index and agricultural performance

Source: WDI (2023)

raw materials exports (% of merchandise exports)

Agriculture, forestry, and fishing, value added (% of GDP)

Employment in agriculture (% of total employment) (modeled ILO estimate)

All share index

65

Figure 4.4 presents the trend movement of trade, investment, domestic credit, and agricultural performance in Nigeria. The series shows fluctuations in the ratio of domestic credit to the private sector relative to GDP. Notable peaks occur in 2009 (22.75%), 2010 (18.96%), and 2017 (19.55%), indicating periods of increased domestic credit availability to the private sector. The general trend suggests variations in the country's credit policies and financial conditions, with an emphasis on stimulating private sector activities during certain periods. Further, the percentage of trade relative to GDP displays fluctuations over the years, indicating changes in the country's trade activities. Notable peaks are observed in 1997 (51.46%), 2000 (48.99%), and 2001 (49.68%), suggesting periods of heightened trade activities and possibly increased global economic integration. The overall trend indicates the importance of trade in Nigeria's economic landscape, with occasional fluctuations likely influenced by global economic conditions and trade policies. The ratio of gross fixed capital formation to GDP reveals changes in the country's investment in physical assets. A consistent decline in this ratio is observed over the years, indicating a relative decrease in the proportion of GDP dedicated to fixed capital formation. The decline might suggest challenges or shifts in the country's investment landscape, possibly influenced by economic

conditions, policy changes, or shifts in investment preferences.

66

0

10

20

30

40

50

60

Percentage (%)

Years

Figure 4.4: Trend analysis of trade, capital, credit, and agricultural performance

Source: WDI (2023), CBN Bulletin (2023)

raw materials exports (% of merchandise exports)

Agriculture, forestry, and fishing, value added (% of GDP)

Employment in agriculture (% of total employment) (modeled ILO estimate)

Domestic credit to private sector to GDP

Trade (% of GDP)

Gross fixed capital formation (% of GDP)

67

The increase in exports until 1996 indicates a period of emphasis on exporting raw materials, but the subsequent decline may indicate changes in trade patterns or a shift towards value-added products. The diminishing contribution of

agriculture to GDP and the decreasing share of employment in agriculture suggest a broader economic transformation, with the country possibly diversifying its economy away from heavy reliance on agriculture. The figures indicates dynamic trends in Nigeria's stock market, reflecting the influence of various economic factors, global events, and policy changes. Periods of high market capitalization, transaction value, and All Share Index coincide with economic events and policy changes that impact investor behaviour and market dynamics. Also, peaks in domestic credit to the private sector correspond to periods of economic stimulation, while fluctuations in trade percentages highlight the country's responsiveness to global economic conditions. The consistent decline in gross fixed capital formation as a percentage of GDP warrants further investigation into factors influencing investment decisions and potential implications for long-term economic growth.

4.3 Pre-Estimation Tests (Unit Root Test)

This section presents the unit root test results as it examines the stationarity level of the variables. It is used to check for the presence of a unit root i.e. if the variables are not stationary at levels. This test is carried out using the Augmented Dickey Fuller (ADF) and Phillip-Perron (PP) tests. This is the first test carried out before the co-integration analysis and is known as the pre estimation test. The ADF and PP are carried out using the E-views software package and the results from the test are presented in Table 4.3.

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Table 4.3: ADF and PP Test Results [Trend and Intercept]

Variables

Augmented Dickey Fuller Test Phillip-Perron Test

Remarks

Stat at level Stat at first diff. Stat at level Stat at first diff.

AGEX -2.280(2) [-3.544] -3.789**(2)[-3.548] -2.323(6)[-3.536] -4.5620***(1)[-3.540] I(1)

AGOG -3.345*(1)[-3.540] -6.855***(1)[-3.544] -2.544(3)[-3.537] -5.288***(3)[-3.540] I(1)

AGEMP -2.181(2)[-3.544] -5.034***(0)[-3.540] -1.615(4)[-3.537] -5.183***(3)[-3.540] I(1)

MCAP -3.445*(0)[-3.536] -6.736***(0)[-3.540] -3.499*(1)[-3.537] -7.134***(3)[-3.540] I(1)

STTRD -2.579(0)[-3.537] -6.445***(0)[-3.540] -2.586(2)[-3.537] -6.793***(3)[-3.540] I(1)

ASI -3.632**(0)[-3.537] - -3.788**(3)[-3.537] - I(0)

FSD -3.159*(1)[-3.540] -5.532***(1)[-3.544] -2.340(3)[-3.537] -4.595***(3)[-3.540] I(1)

TOPEN -2.923(0)[-3.537] -7.833***(0)[-3.540] -2.674(5)[-3.537] -8.741***(3)[-3.540] I(1)

INV -0.213(0)[-3.537] -6.689***(0)[-3.540] 0.071(2)[-3.537] -8.819***(3)[-3.540] I(1)

Note: ***, ** and * signify significance level at 1%, 5% and 10% respectively.

Sources: Author's computation (2023).

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Furthermore, the a priori expectation when using the ADF and PP tests is that a variable is stationary when the value of the ADF and PP test statistics are greater than the critical value at 5%. From the test result reported in Table 4.3, all share index was found not to

accept the null hypothesis “they have unit root test” at 5% level. This implies that the series (i.e. all share index) are stationary at levels. Thus, its series is integrated at order zero i.e. I(0). However, the series of exports, outputs, employment, market capitalization, total stock transaction value, domestic credit to private sector by banks, trade openness and investment are not stationary at levels but they are integrated at order one i.e., I(1). Therefore, they were found not to reject the null hypothesis “no stationary” at level but after several iterations based on the number of lag length and differencing, the series were found to reject the null hypothesis at first difference. This indicates that the first-difference of these series were stationary.

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4.4 Presentation of Results

4.4.1 Empirical Results of the Impact of Stock Market Development on Output Growth

Cointegration Test Result

The study tests the long-run relationship between the stock market development, output growth and other controlling variables using the autoregrssive distributed lag (ARDL) bound cointegration tests in the stated hypotheses before estimating both the short-run and long-run parameters. For the first model showing the relationship between stock market development, output growth and other controlling variables, the ARDL bound test is employed because it is suitable for variables at different order of integration. The F-statistics estimate for testing the existence of long-run relationship between stock market development,

output growth and other controlling variables in Nigeria is presented in Table 4.4.

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Table 4.4: Existence of Long-Run cointegration between stock market development and output growth

Test Statistic	Value	K
F-statistics (agog| mcap, sttrd, asi, fsd, topen, inv)	5.0245	6
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	1.99	2.94
5%	2.27	3.28
2.5%	2.55	3.61
1%	2.88	3.99

Source: Author's computation (2023).

72

From the table, the estimated F-statistics of the normalized equation (Farb = 5.0245) is greater than the lower and upper critical bound at 1% significance level. This implies that the null hypothesis of no long-run relationship is rejected at 1% significance level. The implication of the above estimation is that stock market development (stock market capitalization, stock traded transaction, and all share index), control variables (investment, domestic credit too private sector by banks, and trade openness) and output growth, all have equilibrium condition that keep them together in the long-run. Thus, there exists a long-run relationship between stock market development and output growth in Nigeria.

Results of Short-run and Long-run Estimates

The discussion in here answers the first null hypothesis that stock market development has no significant effect on the output growth in Nigeria. It examines both the short-run and long-run relationship estimates of stock market development and other controlling variables in Nigeria using the estimated ARDL approach described extensively in the previous chapter. The estimated ARDL model is a composite of shortrun and long-run estimates of the interrelationship among considered series in this study. The clear evidence of our empirical estimates from stock market development variables (stock market capitalization, stock traded transaction, and all share index), capital, domestic credit to private sectors by banks and trade openness are presented in Table 4.5.

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Table 4.5: Results of estimated ARDL model of output growth

Dependent Variable: output growth (AGOG)

Selected Model: ARDL(3, 3, 1, 1, 3, 3, 1)

Sample: 1985 2022 Included observations: 35

Short-Run Estimates

Variable Coefficient Std. Error t-Statistic Prob.

D(AGOG(-1)) 0.313744 0.077581 4.044072 0.0014

D(AGOG(-2)) -0.217774 0.091775 -2.372912 0.0338

D(MCAP) -0.130903 0.071191 -1.838759 0.0889

D(MCAP(-1)) 0.007799 0.074944 0.104062 0.9187

D(MCAP(-2)) 0.265582 0.075139 3.534544 0.0037

D(STTRD) -3.709542 0.719625 -5.154824 0.0002

DLOG(ASI) 4.942549 1.000130 4.941906 0.0003

D(FSD) -0.860259 0.150046 -5.733282 0.0001

D(FSD(-1)) 0.597599 0.158007 3.782101 0.0023

D(FSD(-2)) 1.066355 0.178885 5.961109 0.0000

D(TOPEN) -0.165528 0.031335 -5.282585 0.0001

D(TOPEN(-1)) 0.196734 0.026665 7.377973 0.0000

D(TOPEN(-2)) 0.221669 0.030078 7.369846 0.0000

D(INV) -0.233837 0.074665 -3.131805 0.0079

ECT(-1) -0.607730 0.077282 -7.863829 0.0000

Long-run Estimates

MCAP 1.228497 0.649111 1.892585 0.0809

STTRD -9.937992 5.119859 -1.941068 0.0742

LOG(ASI) -0.641178 2.053984 -0.312163 0.7599

FSD -2.074655 0.683959 -3.033302 0.0096

TOPEN -0.051870 0.117739 -0.440545 0.6668

INV -0.726849 0.372261 -1.952525 0.0727

C 69.98579 30.79899 2.272340 0.0407

R-squared 0.9130 F-stat 10.130 (0.000)

Adj. R-squared 0.8522 D-Watson 2.0590

Source: Author's computation (2023).

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The short-run estimation results show the error correction mechanism which measures the speed or degree of adjustment. It is the rate of adjustment at which the dependent variable changes due to changes in the independent variables. The short run analysis shows the dynamic pattern in the model and to ensure that dynamics of the model have not been constrained by inappropriate lag length specification. The ARDL test automatically choose the lag length on all variables as the model was set at three to ensure sufficient degree of the freedom based on automatic selection of Akaike Information Criterion. The short-run estimates of the relationship between stock market development and agricultural output growth is presented in Table 4.5. The coefficient of the ECT is found to be negative and statistically significant at the conventional level. The ECT value (-0.6077) implied that the model corrects its short-run disequilibrium by 60.77% speed of adjustment in order to return to the long run equilibrium.

The coefficients of the short-run lags one and two of change in output growth has positive and negative significant impact on the current changes in output growth at 5% respectively. On average, this implies that the sector is gradually improving its output growth to other key sector like service. The short-run parameter estimates of all share index was found to be positive and statistically significant at 5% indicating that all share index influence changes in the output growth of the sector. Likewise, stick market capitalization has positive impact on agricultural output growth in the short run. However, total stock transaction value negatively influence short-run agricultural output growth. The result of domestic credit to private sector by banks and trade openness at lag one and two positively impact output growth but their current levels are negative and significant at 5%

level. As for investment, the current value negatively affects output growth at 5% significance level.

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The long-run estimates from Table 4.5 indicated that total stock transaction value and all share index have negative impact on the output growth in Nigeria. The result shows that the two indicators were not in tandem with the theoretical expectations and only stock transaction was statistically significant at 5%. However, stock market capitalization positively and significantly influences agricultural output growth at 10% level. Meanwhile, financial sector development, trade openness and investment have indirect effects on agricultural output growth, which all do not conform to a'priori expectations. Financial sector development was significant at 5% level while investment was significant at 10% level. A 1% increase in financial sector development and investment reduce output growth by 2.07% and 0.73% correspondingly.

The coefficient of determination (Adjusted-R2) is high (85.22%) indicating that about 85.22% of the total variations in output growth was explained by the variables in the model. It simply indicated that the variation of changes in output growth was explained by 85.22% variations in stock market development and other controlling variables. The overall test using the F-statistic (10.130) is statistically significant at 5% level of significance showing that model is well specified and statistically significant. The Durbin Watson statistic (2.0590) shows that there is absence of serial autocorrelation in the model.

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Diagnostic Test

The estimated ARDL model is tested for heteroscedasticity, serial correlation, functional form misspecification, parameter stability and normality. The results from these tests are shown in Table 4.6.

The estimated ARDL model revealed that the model passed the serial correlation, normality test, and heteroskedasticity test. It means that the error terms are normally distributed with same variances and they are not serially correlated. Also, the Ramsey RESET test was satisfactory for the ARDL model indicating that the model is well distributed.

Additionally, the ARDL model passed the Ramsey RESET test, showing that the model is evenly specified. Additionally, the cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ), respectively, as shown in Figures 4.5a and 4.5b are steady.

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Table 4.6: Diagnostic Tests of Selected ARDL Model

Results

Serial Correlation: 0.7273 [0.5051] Normality Test: 0.9082 [0.6350]

Functional Form: 2.1221 [0.1322] Heteroskedasticity Test: 1.3381 [0.29878]

Source: Author's computation (2023).

-12

-8

-4

0

4

8

12

10 11 12 13 14 15 16 17 18 19 20 21 22

CUSUM 5% Significance

Figure 4.5a: Cumulative sum

-0.4

0.0

0.4

0.8

1.2

1.6

10 11 12 13 14 15 16 17 18 19 20 21 22

CUSUM of Squares 5% Significance

Figure 4.5b: Cumulative sum of squares

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4.4.2 Empirical Results of the Effect of Stock Market Development on Employment

Cointegration Results

In this section, the long-run relationship between the stock market development, employment, and other controlling variables are tested using the autoregrssive distributed lag (ARDL) bound cointegration tests prior to the estimation of both the short-run and long-run parameters. For the first model showing the relationship between stock market development, capital, domestic credit to private sector by banks, trade openness and employment, the ARDL bound test is

employed because it is suitable for variables at different order of integration. The Fstatistics

estimate for testing the existence of long-run relationship between stock

market development, employment and other controlling variables in Nigeria

is presented in Table 4.7.

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Table 4.7: Existence of long-run cointegration between stock market development and employment

Test Statistic	Value	K
F-statistics (agemp| mcap, sttrd, asi, fsd, topen, inv)	4.7645	6
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	1.99	2.94
5%	2.27	3.28
2.5%	2.55	3.61
1%	2.88	3.99

Source: Author's computation (2023).

80

Table 4.7 showed that the estimated F-statistics of the normalized equation (Farb= 4.765) is greater than the lower and upper critical bound at 1% significance level. This implies that the null hypothesis of no long-run relationship is rejected at 1% significance level. The implication of the above estimation is that stock market development (stock market capitalization, stock traded transaction, and all share index), control variables (such as

capital, domestic credit to private sector by banks and trade openness) and employment, all have equilibrium condition that keep them together in the long-run. Thus, there exists a long-run relationship between stock market development and employment in Nigeria.

Results of Short-run and Long-run Estimates

In this sub-section, this discussion answers the first null hypothesis that stock market development has no significant effect on the employment in Nigeria. This examines both the short-run and long-run estimates of stock market development and other controlling variables in Nigeria using the estimated ARDL approach described extensively in the previous chapter. The estimated ARDL model is a composite of shortrun

and long-run estimates of the interrelationship among considered series in this study. The clear evidence of our empirical estimates from stock market development (stock market capitalization, stock traded transaction, and all share index), capital, financial sector development and trade openness are presented in Table 4.8.

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Table 4.8: Results of estimated ARDL model of employment

Dependent Variable: employment (AGEMP)

Selected Model: ARDL(4, 0, 2, 0, 2, 0, 2)

Sample: 1985 2022 Included observations: 34

Short-Run Estimates

Variable Coefficient Std. Error t-Statistic Prob.

D(AGEMP(-1)) -0.129985 0.113299 -1.147279 0.2672

D(AGEMP(-2)) 0.544683 0.105812 5.147637 0.0001

D(AGEMP(-3)) 0.463106 0.121273 3.818704 0.0014

D(STTRD) -0.332116 0.093345 -3.557928 0.0024

D(STTRD(-1)) -0.320362 0.107397 -2.982974 0.0084

D(FSD) -0.089476 0.036849 -2.428175 0.0266

D(FSD(-1)) 0.133960 0.034761 3.853787 0.0013

D(INV) -0.080890 0.020289 -3.986798 0.0010

D(INV(-1)) -0.096253 0.021472 -4.482643 0.0003

ECT(-1) -0.355031 0.048398 -7.335574 0.0000

Long-run Estimates

MCAP 0.064665 0.085440 0.756844 0.4595

STTRD 0.178845 0.881224 0.202951 0.8416

LOG(ASI) -1.915039 0.545711 -3.509256 0.0027

FSD -0.696490 0.113147 -6.155622 0.0000

TOPEN 0.039323 0.034130 1.152142 0.2652

INV 0.024530 0.081885 0.299571 0.7681

C 67.80926 7.929817 8.551175 0.0000

R-squared 0.7240 F-stat 503.84 (0.000)

Adj. R-squared 0.6205 D-Watson 1.8545

Source: Author's computation (2023).

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The short-run estimation results show the error correction mechanism which measures the speed or degree of adjustment. It is the rate of adjustment at which the dependent

variable changes due to changes in the independent variables. The short run analysis shows the dynamic pattern in the model and to ensure that dynamics of the model have not been constrained by inappropriate lag length specification. The ARDL test automatically choose the lag length on all variables as the model was set at three to ensure sufficient degree of the freedom based on automatic selection of Akaike Information Criterion. The short-run estimates of the relationship between stock market development and employment is presented in Table 4.8. The coefficient of the ECT is found to be negative and statistically significant at the conventional level. The ECT value (-0.3550) implied that the model corrects its short-run disequilibrium by 35.3% speed of adjustment in order to return to the long run equilibrium.

The coefficient of the short-run lag one of change in employment at lags to and three have positive and significant impact on the current changes in employment growth at 5%. This means that the employment rate of people presently in the sector depends on those that are previously in the services. The shortrun parameter estimate of current and lag one of total stock transaction value was found to be negative, indicating that it influences changes in the employment rate in the sector negatively. Thus, the coefficients are statistically significant at 5%.

Capital investment has an indirect effect on employment and its impacts are significant statistically. As for financial sector development, their current values exact positive impact on employment while the lag one values reported negative impacts.

The long-run estimates in Table 4.8 indicated that all share have negative impact on employment in the agricultural sector. This did not corroborate the a'priori expectation

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but statistically insignificant at 5%. In magnitude terms, a 1% changes in all share index will lead to a decrease of 1.92% changes in agricultural sector employment. However, the positive impacts of stock market capitalization and total stock transaction on agricultural employment are not significant statistically at 5% level. Also, trade openness and investment have positive and insignificant impact on employment in the long-run. On the contrary, financial sector development negatively impacted on the employment level of the Nigerian agricultural sector for the periods understudy. Also, on magnitude basis, 1% increase in financial sector development will cause a decline in the agricultural sector employment by 0.70%.

The coefficient of determination (Adjusted-R2) is high (72.4%) indicating that about 72.4% of the total variations in employment was explained by the variables in the model. It simply indicated that the variation of changes in employment was explained by 72.4% variations in stock market development and other controlling variables. The overall test using the F-statistic (503.84) is statistically significant at 5% level of significance showing that model is well specified and statistically significant. The Durbin Watson statistic (1.8545) shows that there is absence of serial autocorrelation in the model.

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Diagnostic Test

The estimated ARDL model is tested for heteroscedasticity, serial correlation, functional form misspecification, parameter stability and normality. The results from these tests are shown in Table 4.9.

The estimated ARDL model revealed that the model passed the serial correlation, normality test, and heteroskedasticity test. It means that the error terms are normally distributed with same variables and they are not serially correlated. Also, the Ramsey RESET test was satisfactory for the ARDL model indicating that the model is well distributed.

In addition, the ARDL model passed the Ramsey RESET test, showing that the model is evenly specified. Additionally, the cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ), respectively, as shown in Figures 4.6a and 4.6b are steady.

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Table 4.9: Diagnostic Tests of Selected ARDL Model

Results

Serial Correlation: 0.9466 [0.4101] Normality Test: 0.3555 [0.8372]

Functional Form: 1.2826 [0.2179] Heteroskedasticity Test: 2.2760 [0.0511]

Source: Author's computation (2023).

-12

-8

-4

0

4

8

12

2006 2008 2010 2012 2014 2016 2018 2020 2022

CUSUM 5% Significance

Figure 4.6a: Cumulative sum

-0.4

0.0

0.4

0.8

1.2

1.6

2006 2008 2010 2012 2014 2016 2018 2020 2022

CUSUM of Squares 5% Significance

Figure 4.6b: Cumulative sum of squares

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4.4.3 Empirical Results of the Effects of Stock Market Development on Exports

Cointegration Test Result

Concerning this section, the study examines the long-run relationship between the stock market development, exports and other controlling variables using the autoregrssive distributed lag (ARDL) bound cointegration tests before the estimation of both the short-run and long-run parameters. For the first model showing the relationship between stock market development, exports and other controlling variables, the ARDL bound test is employed because it is suitable for variables at different order of integration. The F-statistics estimate for testing the existence of long-run relationship between stock market development, exports and other controlling variables in Nigeria is presented in Table 4.10.

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Table 4.10: Existence of longr-run cointegration between stock market development and exports

Test Statistic	Value	K
F-statistics (agex| mcap, sttrd, asi, fsd topen, inv)	7.7132	6
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	1.99	2.94
5%	2.27	3.28
2.5%	2.55	3.61
1%	2.88	3.99

Source: Author's computation (2023).

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From the table, the estimated F-statistics of the normalized equation (Farb = 7.7132) is greater than the lower and upper critical bound at 5% significance level. This implies that the null hypothesis of no long-run relationship is rejected at 5% significance level. The implication of the above estimation is that stock market development (stock market capitalization, stock traded transaction, and all share index) control variables (such as capital, domestic credit to private sector by banks and trade openness) and exports, all have equilibrium condition that keep them together in the long-run. Thus, there exists a long-run relationship between stock market development and exports in Nigeria.

Results of Short-run and Long-run Estimates

The discussion in here answers the first null hypothesis that stock market development has no significant effect on the exports in Nigeria. It examines both the short-run and long-run relationship estimates of stock market development and other controlling variables in Nigeria using the estimated ARDL approach described extensively in the previous chapter. The estimated ARDL model is a composite of shortrun and long-run estimates of the interrelationship among considered series in this study. The clear evidence of our empirical estimates from stock market development (stock market capitalization, stock traded transaction, and all share index), financial sector development, investment and trade openness are presented in Table 4.11.

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Table 4.11: Results of estimated ARDL model of exports

Dependent Variable: exports(AGEX)

Selected Model: ARDL(3, 0, 1, 0, 2, 1, 2)

Sample: 1985 2022 Included observations: 35

Short-Run Estimates

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(AGEX(-1))	0.556238	0.080344	6.923199	0.0000
D(AGEX(-2))	-0.318569	0.082675	-3.853252	0.0011
D(STTRD)	0.176181	0.163939	1.074673	0.2960
D(FSD)	-0.251465	0.046611	-5.394920	0.0000
D(FSD(-1))	-0.370550	0.049336	-7.510810	0.0000
D(TOPEN)	-0.031745	0.011688	-2.716190	0.0137

D(INV) 0.035916 0.028649 1.253647 0.2252

D(INV(-1)) -0.164557 0.030434 -5.407045 0.0000

ECT(-1) -0.555800 0.060485 -9.189060 0.0000

Long-run Estimates

MCAP 0.061833 0.074087 0.834596 0.4143

STTRD 2.007033 0.867513 2.313548 0.0320

LOG(ASI) 0.000824 0.471038 0.001750 0.9986

FSD 0.294399 0.113748 2.588174 0.0180

TOPEN 0.095732 0.039466 2.425641 0.0254

INV 0.188542 0.100815 1.870173 0.0769

C -14.04499 8.561025 -1.640573 0.1173

R-squared 0.8661 F-stat 14.426 (0.0000)

Adj. R-squared 0.8249 D-Watson 2.1238

Source: Author's computation (2023).

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The short-run estimation results show the error correction mechanism which measures the speed or degree of adjustment. It is the rate of adjustment at which the dependent variable changes due to changes in the independent variables. The short run analysis shows the dynamic pattern in the model and to ensure that dynamics of the model have not been constrained by inappropriate lag length specification. The ARDL test automatically choose the lag length on all variables as the model was set at three to ensure sufficient degree of the freedom based on automatic selection of Akaike Information Criterion. The short-run estimates of the relationship between stock market

development and exports are presented in Table 4.11. The coefficient of the ECT is found to be negative and statistically significant at the conventional level. The ECT value (-0.5558) implied that the model corrects its short-run disequilibrium by 55.58% speed of adjustment in order to return to the long run equilibrium.

The coefficients of the short-run lags one and two of change in exports have significant positive and negative impact on the current changes in exports at 5%. The short-run parameter estimates of current total stock transaction value was found to be positive and statistically significant at 5% indicating that it influences changes in exports. For current and first lag of financial sector development, the parameters are all negative and significant implying that financial sector development influences the sector's exports negatively. The result of trade openness in the short-run is similar to parameters of financial sector development. As for investment, the current value positively affects exports although not significant but the coefficient of its first lag is both negative and significant at 5%.

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The long-run estimates from Table 4.11 indicated that stock market development measures have positive impact on the exports in Nigeria. The result shows that all indicators were in tandem with the theoretical expectations but only the coefficient of total stock transaction is significant at 5%. Also, on magnitude basis, 1% increase in stock market capitalization, total stock transaction value and all share index will cause exports to increase by 0.062%, 2.01% and 0.0008% respectively.

Also, financial sector development, trade openness and investment have direct and significant effects on exports at 5% level. A 1% increase in financial sector

development, trade openness and investment increase exports by 0.29%, 0.096%, and 0.19% correspondingly.

The coefficient of determination (Adjusted-R2) is high (82.49%) indicating that about 82.49% of the total variations in exports was explained by the variables in the model. It simply indicated that the variation of changes in exports was explained by 82.49% variations in stock market development and other controlling variables. The overall test using the F-statistic (14.426) is statistically significant at 5% level of significance showing that model is well specified and statistically significant. The Durbin Watson statistic (2.1238) shows that there is absence of serial autocorrelation in the model.

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Diagnostic Test

The estimated ARDL model is tested for heteroscedasticity, serial correlation, functional form misspecification, parameter stability and normality. The results from these tests are shown in Table 4.12.

The estimated ARDL model revealed that the model passed the serial correlation, normality test, and heteroskedasticity test. It means that the error terms are normally distributed with same variables and they are not serially correlated. Also, the Ramsey RESET test was satisfactory for the ARDL model indicating that the model is well distributed.

Additionally, the ARDL model passed the Ramsey RESET test, showing that the model is evenly specified. Additionally, the cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ), respectively, as shown in Figures 4.7a and 4.7b are steady.

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Table 4.12: Diagnostic Tests of Selected ARDL Model

Results

Serial Correlation: 0.1771 [0.8392] Normality Test: 1.7559 [0.4156]

Functional Form: 2.3993 [0.1203] Heteroskedasticity Test: 2.0677 [0.0682]

Source: Author's computation (2023).

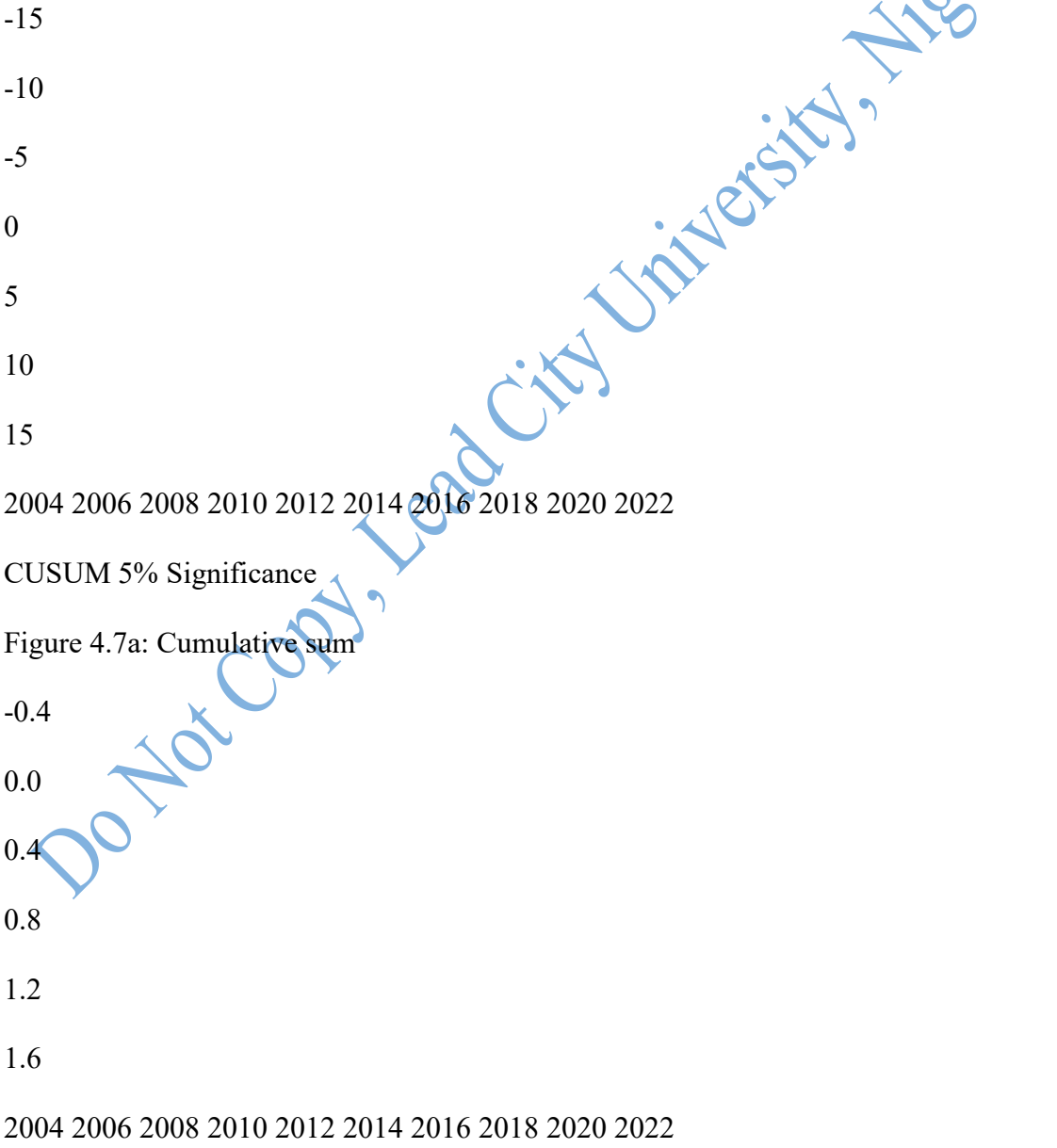

Figure 4.7a: Cumulative sum

CUSUM of Squares 5% Significance

Figure 4.7b: Cumulative sum of squares

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4.5 Discussion of Findings

This research study investigates the impact of stock market development on performance (measured by outputs, employment and exports) in Nigeria. As for the first objective, the findings showed that there is a long run relationship between stock market development and output growth in Nigeria. Stock market capitalization and all share index positively influence short-run agricultural output growth. This findings may likely result from improved access to capital for enterprises, leading to increased investments, modernization, and efficiency within the sector. Also, the positive short-term impact may also be subject to market dynamics and investor sentiment, emphasizing the need for a stable and supportive financial environment for sustained benefits. However, the negative and significant impact of total stock transaction value on short-run agricultural output growth suggests a potential drawback. High levels of stock market trading may divert capital and attention away from the sector, negatively affecting its short-term performance. This inverse relationship highlights the importance of a balanced economic approach, ensuring that excessive financial market activities do not hinder the growth of vital sectors like agriculture.

The long run impact of stock market development on agricultural output growth is not significant at 5% level. The lack of significant long-run impacts of stock market development on agricultural output growth at the 5% level implies that, over an extended

period, the broader effects of stock market activities do not distinctly shape the trajectory of agricultural productivity. This result suggests that while short-term fluctuations in the stock market may influence immediate output, the longterm growth and resilience of the sector are influenced by a more diverse set of factors, such as policies, technology adoption, and global market

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trends. It corroborates the results of previous studies1,2,3 that government spending on the farm sector positively impacts agricultural sectors performance in the shot-run1,2,3. It however went contrary with the studies that found government expenditure positively influencing the sector's long-run growth4,5.

Concerning the second objective, the findings showed that there is a long run relationship between stock market development and employment in Nigeria. The study found that total stock transaction negatively and significantly impacted on employment in agricultural sector at 5%. This finding implies that as stock market transactions increase, there is a detrimental effect on employment within the agricultural sector. Such a relationship may arise from a potential diversion of resources or investments away from labour-intensive activities toward more capital intensive financial activities, leading to a reduction in employment opportunities in the sector. In the long run, the study discovered that all share index adversely and significantly impact agricultural employment at the conventional level. This further underscores the potentially enduring consequences of stock market development on the labour market within the agricultural sector. This suggests that over an extended period, as the overall stock market performance, as represented by the all-share index,

experiences adverse movements, it may contribute to a sustained negative effect on employment in agriculture. It implies that stock market development negatively impact agricultural employment both in the short and long run. This is not in tandem with the studies that found that labour force participation, employment, and unemployment rate increases significantly following a rise in stock market development under a mixture of specifications and identification structures6,7,8,9,10.

Findings from the third objective show that a long run relationship exists between stock market development and agricultural exports in Nigeria. It discovered that stock market

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development have no significant impact on agricultural export in the short run. This implies that short-term fluctuations in the stock market may not be the primary drivers of changes in agricultural exports. Other factors such as global market conditions, trade policies, and productivity might play a more immediate role. However, the stock market development mainly through total stock transaction value positively and significantly impact agricultural exports in the long run. This suggests that as the stock market matures and experiences long-term positive trends, it can contribute positively to agricultural exports. A plausible explanation for this relationship is that a thriving stock market may attract investments and capital flows that benefit the agricultural sector over time.

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Chapter Five

Summary, Conclusion and Recommendation

5.0 Summary, Conclusion and Recommendation

5.1 Summary

In this study, the existing relationship between stock market development and performance in Nigeria is investigated in order to understand how stock market development affects the output growth, employment and exports in the sector. Understudying this research study became necessary because it makes enquiries on the findings of past studies which can best be described as inconclusive. The study is

conducted for developing countries in sub-Saharan countries such as Nigeria. The datasets employed were obtained from the Central Bank of Nigeria (2022) and World Development Indicators (2023) which spans from 1985 to 2022. The ARDL estimator was used to evaluate the parameters were based on the characteristics of the datasets. For the first objective, a long-run relationship was found between stock market development and output growth. The short-run parameter estimates of all share index was found to be positive and statistically significant at 5% indicating that all share index influence changes in the output growth of the sector. Likewise, stick market capitalization has positive impact on agricultural output growth in the short run. However, total stock transaction value negatively influence short-run agricultural output growth. In the long run, total stock transaction value and all share index have negative impact on the output growth in Nigeria. The result shows that the two indicators were not in tandem with the theoretical expectations and only stock transaction was statistically significant at 5%. However, stock market capitalization positively and significantly influences agricultural output growth at 10% level.

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Regarding the second objective, the results show that there exists a long-run relationship between stock market development and employment in Nigeria. The shortrun parameter estimate of current and lag one of total stock transaction value was found to be negative, indicating that it influences changes in the employment rate in the sector negatively. In the long run, all share have negative impact on employment in the agricultural sector. This did not corroborate the a'priori expectation but statistically insignificant at 5%. However, the positive impacts of stock market

capitalization and total stock transaction on agricultural employment are not significant statistically at 5% level.

Concerning the third objective, the study found that a long run relationship between stock market development and agricultural exports in Nigeria. The short-run parameter estimates of current total stock transaction value was found to be positive and statistically significant at 5% indicating that it influences changes in exports. In the long run, stock market development measures have positive impact on the exports in Nigeria. The result shows that all indicators were in tandem with the theoretical expectations but only the coefficient of total stock transaction is significant at 5%.

5.2 Conclusion

This study investigates the impact of stock market development on performance (measured by the output growth, employment and exports in sector) over the periods of 1985 to 2022 using the ARDL bound testing approach. In the empirical model, findings showed that stock market capitalization and all share index positively influence short-run agricultural output growth. However, total stock transaction value has a negative and significant impact on agricultural output growth in

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the short run. The long run impact of stock market development on agricultural output growth is not significant at 5% level. The study found that total stock transaction negatively and significantly impacted on employment in agricultural sector at 5%. In the long run, the study discovered that all share index adversely and significantly impact agricultural employment at the conventional level. It implies that stock market development negatively impact agricultural employment both in the short and long run. Furthermore, it discovered that stock market development have no significant impact on agricultural export in the short run. However, the stock market development mainly through total stock transaction value positively and significantly impact agricultural exports in the long run. Based on the F-statistics results, the study concludes that stock market development has significant impact on performance in Nigeria.

5.3 Recommendations

Following the reported findings discussed in the subsequent parts of the chapter in this research study, the following policy recommendations are discussed below:

a) There is a need to consider measures to strike a harmonious balance between financial market development and the support of key economic drivers, fostering a comprehensive and sustainable economic landscape.

b) Government should carefully consider the trade-offs between promoting financial market development and sustaining employment in vital sectors like agriculture, ensuring a balanced economic approach.

c) Addressing the negative influence of stock market development on agriculture

employment requires targeted policies that promote inclusive economic growth, emphasizing the need for measures to mitigate any unintended consequences of financial market development on employment in critical sectors.

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d) There is a need to consider a comprehensive approach that includes both financial market development and targeted strategies for promoting agricultural exports to enhance the overall economic landscape.

e) The Nigerian Exchange Group administrators and market participants should recognize the importance of long-term stock market stability and growth in fostering a conducive environment for agricultural exports to flourish.

5.4 Contribution to Knowledge

This study contributes to the existing body of knowledge in the following ways:

a) Unlike previous research, which often treated stock market development as a singular construct, this study decomposed it into three distinct components: stock market capitalization, stock traded transactions, and the all-share index. Simultaneously, agricultural performance was disentangled into three crucial dimensions: agricultural outputs, agricultural employment, and agricultural exports. This decomposition provides a nuanced and granular understanding of the diverse channels through which stock market development may influence various aspects of the agricultural sector.

b) The findings of this study contribute novel insights to the literature by revealing

that the impact of stock market development on agricultural performance is not uniform across different components. Specifically, while the all-share index and stock market capitalization positively influence short-run agricultural output growth, the total stock transaction value has a negative and significant impact on short-run agricultural output growth. Moreover, the study sheds light on the dynamics over an extended period, demonstrating that the long-run effects of

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stock market development, particularly through total stock transaction value, play a positive and significant role in shaping agricultural exports.

c) Additionally, the study advances our understanding of the linkages between stock market development and employment in the agricultural sector. The results indicate that stock market transactions negatively impact employment in agricultural, emphasizing the need for policymakers to carefully navigate the potential trade-offs between financial market development and employment creation in critical sectors.

5.5. Suggestions for Further Studies

The findings of this study open avenues for further research in several key areas to deepen our understanding of the intricate relationship between stock market development and agricultural performance. These are some suggestions for areas of future studies:

a) Investigate the effects of specific stock market policies, regulations, or interventions on agricultural performance. This could include an analysis of the

influence of policy changes in stock market operations on agricultural outputs, employment, and exports.

b) Explore the role of investor behaviour and sentiment in influencing the relationship between stock market development and agricultural performance. Understanding how investor decisions impact investments and, subsequently, performance can provide insights for policy interventions.

c) Conduct a more granular examination of the temporal dynamics of stock market development and its impact on agriculture. This could involve assessing how

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short-term fluctuations in stock market variables interact with performance over different time horizons.

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Year
raw materials exports (% of merchandise exports)
Agriculture,

forestry, and
fishing, value
added (% of GDP)
agriculture (% of
total employment)
(modeled ILO
estimate)
Stock
marketalization
to GDP
Total stock
transaction
value to
GDP
All share
index
agex agog agemp mcap sttrd asi
1985 0.044902 18.22764 55.23972 3.513804 0.168556 127.3
1986 0.409406 18.02043 54.38191 3.432209 0.251308 163.8
1987 0.519733 20.55211 53.29792 3.351313 0.156286 190.9
1988 0.682446 23.37165 52.51537 3.168414 0.26941 233.6
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1997 0.079305 27.41665 50.79797 6.379692 0.23379 6440.5
1998 0.099477 27.90837 50.43721 5.464963 0.282428 5672.7
1999 0.133504 26.02849 50.0396 5.472102 0.256678 5266.4
2000 0.005946 21.35724 49.2726 6.687196 0.398614 8111
2001 0.006176 24.47535 48.565 8.045425 0.700514 10963.1
2002 0.281333 36.96508 47.92553 6.650466 0.516515 12137.7
2003 0.009263 33.82706 46.8777 10.02657 0.888123 20128.94
2004 0.602009 27.23045 45.55516 11.65578 1.245968 23844.5
2005 0.683602 26.08928 44.87226 12.54249 1.137173 24085.8
Year of merchandise
exports)
fishing, value
added (% of GDP)
(modeled ILO
estimate)
to GDP
value to

GDP
index
agex agog agemp mcap sttrd asi
2006 0.361642 24.73499 44.1769 16.85883 1.54815 33189.3
2007 0.76228 24.66258 43.50106 38.01393 3.103075 57990.2
2008 0.928697 25.27975 42.85565 23.93482 4.20267 31450.78
2009 1.137224 26.74885 42.16732 16.17718 1.577759 20827.17
2010 1.631811 23.8937 41.3431 17.88052 1.442077 24770.52
2011 6.129512 22.23471 40.58178 16.12746 1.002813 20730.63
2012 7.268343 21.85996 39.46394 20.38708 1.114323 28078.81
2013 3.205081 20.75862 38.27072 23.54947 2.901959 41329.19
2014 0.434799 19.99025 37.52303 18.72162 1.485074 34657.15
2015 0.309646 20.63189 37.0064 17.86488 1.027601 28642.25
2016 0.16018 20.98311 36.67591 15.77935 0.56331 26874.62
2017 0.232204 20.84657 36.29753 18.38906 0.938641 38243.19
2018 0.133974 21.20377 35.91854 16.96844 0.932218 31430.5
2019 0.114395 21.9063 35.51901 17.77696 0.639584 26842.07
2020 0.155382 24.14331 35.75922 25.01718 0.70416 40270.72
2021 0.264813 23.35706 35.20511 23.88436 0.54174 42716.44
2022 0.264813 23.69187 35.20511 25.29532 0.577435 51251.06
Source: CBN Bulletin (2022), WDI (2023)
112
Unit root test
Null Hypothesis: AGEX has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 2 (Fixed)
t-Sta tistic Pro b.*
Augmented D ickey-Fuller test sta tistic -2.28 0071 0.43 32
Test critical values: 1% level -4.243644
5% level -3.544284
10% level -3.204699
*MacKinnon (1996) one-sided p- values.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(AGEX)
Method: Least Squares
Date: 11/18/23 Time: 11:54
Sample (adjusted): 1988 2022
Included observations: 35 after adjustments
Varia ble Coe fficient Std . Error t-S tatistic P rob.
AGEX (-1) -0.3 41780 0.1 49899 -2.2 80071 0 .0299
D(AGEX(-1)) 0.476007 0.157937 3.013915 0.0052
D(AGEX(-2)) -0.235847 0.180210 -1.308734 0.2006
C 0.258975 0.389651 0.664633 0.5114
@TREND("1985") 0.003011 0.017808 0.169057 0.8669
R-squared 0.3 74207 Mean dependent var -0.00 7283
Adjusted R-squared 0.290768 S.D. dependent var 1.219510

S.E. of regression 1.027022 Akaike info criterion 3.022767
Sum squared resid 31.64321 Schwarz criterion 3.244959
Log likelihood -47.89842 Hannan-Quinn criter. 3.099468
F-statistic 4.484790 Durbin-Watson stat 1.896611
Prob(F-statistic) 0.005846
113
Null Hypothesis: D(AGEX) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 2 (Fixed)
t-Sta tistic Pro b.*
Augmented D ickey-Fuller test sta tistic -3.78 9419 0.02 95
Test critical values: 1% level -4.252879
5% level -3.548490
10% level -3.207094
*MacKinnon (1996) one-sided p- values.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(AGEX,2)
Method: Least Squares
Date: 11/18/23 Time: 11:56
Sample (adjusted): 1989 2022
Included observations: 34 after adjustments
Varia ble Coe fficient Std . Error t-S tatistic P rob.
D(AGE X(-1)) -1.0 93843 0.2 88657 -3.7 89419 0 .0007
D(AGEX(-1),2) 0.458025 0.203116 2.254996 0.0319
D(AGEX(-2),2) -0.014958 0.185647 -0.080574 0.9363
C 0.111346 0.451461 0.246635 0.8069
@TREND("1985") -0.006071 0.019891 -0.305235 0.7624
R-squared 0.5 14201 Mean dependent var -0.00 4786
Adjusted R-squared 0.447194 S.D. dependent var 1.520914
S.E. of regression 1.130814 Akaike info criterion 3.218805
Sum squared resid 37.08347 Schwarz criterion 3.443270
Log likelihood -49.71969 Hannan-Quinn criter. 3.295354
F-statistic 7.673860 Durbin-Watson stat 1.993586
Prob(F-statistic) 0.000240
114
Null Hypothesis: AGEX has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 6 (Newey-West automatic) using Bartlett kernel
Adj. t -Stat Pro b.*
Phillips-Perro n test statistic -2.32 3429 0.41 16
Test critical values: 1% level -4.226815
5% level -3.536601
10% level -3.200320
*MacKinnon (1996) one-sided p- values.
Residual vari ance (no correction) 1.162 468
HAC corrected variance (Bartlett kernel) 1.031048

Phillips-Perron Test Equation
Dependent Variable: D(AGEX)
Method: Least Squares
Date: 11/18/23 Time: 11:57
Sample (adjusted): 1986 2022
Included observations: 37 after adjustments
Varia ble Coe fficient Std . Error t-S tatistic P rob.
AGEX (-1) -0.3 02577 0.1 24156 -2.4 37075 0 .0202
C 0.265155 0.381371 0.695267 0.4916
@TREND("1985") 0.000823 0.017586 0.046785 0.9630
R-squared 0.1 51827 Mean dependent var 0.00 5944
Adjusted R-squared 0.101934 S.D. dependent var 1.186856
S.E. of regression 1.124740 Akaike info criterion 3.150585
Sum squared resid 43.01133 Schwarz criterion 3.281200
Log likelihood -55.28582 Hannan-Quinn criter. 3.196633
F-statistic 3.043074 Durbin-Watson stat 1.345888
Prob(F-statistic) 0.060847
115
Null Hypothesis: D(AGEX) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 1 (Used-specified) using Bartlett kernel
Adj. t -Stat Pro b.*
Phillips-Perro n test statistic -4.56 2055 0.00 44
Test critical values: 1% level -4.234972
5% level -3.540328
10% level -3.202445
*MacKinnon (1996) one-sided p- values.
Residual vari ance (no correction) 1.318 609
HAC corrected variance (Bartlett kernel) 1.468644
Phillips-Perron Test Equation
Dependent Variable: D(AGEX,2)
Method: Least Squares
Date: 11/18/23 Time: 12:00
Sample (adjusted): 1987 2022
Included observations: 36 after adjustments
Varia ble Coe fficient Std . Error t-S tatistic P rob.
D(AGE X(-1)) -0.7 56654 0.1 68757 -4.4 83691 0 .0001
C 0.067635 0.425862 0.158819 0.8748
@TREND("1985") -0.003751 0.019280 -0.194533 0.8470
R-squared 0.3 78661 Mean dependent var -0.01 0125
Adjusted R-squared 0.341004 S.D. dependent var 1.477444
S.E. of regression 1.199368 Akaike info criterion 3.281121
Sum squared resid 47.46993 Schwarz criterion 3.413081
Log likelihood -56.06018 Hannan-Quinn criter. 3.327179
F-statistic 10.05555 Durbin-Watson stat 1.772362
Prob(F-statistic) 0.000389

116
Null Hypothesis: AGOG has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=9)
t-Sta tistic Pro b.*
Augmented D ickey-Fuller test sta tistic -3.34 4799 0.07 53
Test critical values: 1% level -4.234972
5% level -3.540328
10% level -3.202445
*MacKinnon (1996) one-sided p- values.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(AGOG)
Method: Least Squares
Date: 11/18/23 Time: 12:01
Sample (adjusted): 1987 2022
Included observations: 36 after adjustments
Varia ble Coe fficient Std . Error t-S tatistic P rob.
AGOG (-1) -0.4 20187 0.1 25624 -3.3 44799 0 .0021
D(AGOG(-1)) 0.280340 0.161568 1.735113 0.0923
C 10.69405 3.142747 3.402771 0.0018
@TREND("1985") -0.027104 0.042358 -0.639881 0.5268
R-squared 0.2 73272 Mean dependent var 0.15 7540
Adjusted R-squared 0.205141 S.D. dependent var 2.946122
S.E. of regression 2.626611 Akaike info criterion 4.873705
Sum squared resid 220.7708 Schwarz criterion 5.049652
Log likelihood -83.72670 Hannan-Quinn criter. 4.935115
F-statistic 4.010987 Durbin-Watson stat 1.767130
Prob(F-statistic) 0.015685
117
Null Hypothesis: AGOG has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 3 (Used-specified) using Bartlett kernel
Adj. t -Stat Pro b.*
Phillips-Perro n test statistic -2.54 3621 0.30 68
Test critical values: 1% level -4.226815
5% level -3.536601
10% level -3.200320
*MacKinnon (1996) one-sided p- values.
Residual vari ance (no correction) 6.726 299
HAC corrected variance (Bartlett kernel) 5.556016
Phillips-Perron Test Equation
Dependent Variable: D(AGOG)
Method: Least Squares
Date: 11/18/23 Time: 12:02
Sample (adjusted): 1986 2022
Included observations: 37 after adjustments

Varia ble Coe fficient Std . Error t-S tatistic P rob.
AGOG (-1) -0.3 14553 0.1 17605 -2.6 74648 0 .0114
C 8.033343 2.914281 2.756544 0.0093
@TREND("1985") -0.021690 0.041679 -0.520406 0.6062
R-squared 0.1 81114 Mean dependent var 0.14 7682
Adjusted R-squared 0.132944 S.D. dependent var 2.905534
S.E. of regression 2.705512 Akaike info criterion 4.906064
Sum squared resid 248.8731 Schwarz criterion 5.036679
Log likelihood -87.76219 Hannan-Quinn criter. 4.952112
F-statistic 3.759915 Durbin-Watson stat 1.625121
Prob(F-statistic) 0.033481
118
Null Hypothesis: D(AGOG) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 3 (Used-specified) using Bartlett kernel
Adj. t -Stat Pro b.*
Phillips-Perro n test statistic -5.28 7526 0.00 06
Test critical values: 1% level -4.234972
5% level -3.540328
10% level -3.202445
*MacKinnon (1996) one-sided p- values.
Residual vari ance (no correction) 8.276 544
HAC corrected variance (Bartlett kernel) 4.232087
Phillips-Perron Test Equation
Dependent Variable: D(AGOG,2)
Method: Least Squares
Date: 11/18/23 Time: 12:03
Sample (adjusted): 1987 2022
Included observations: 36 after adjustments
Varia ble Coe fficient Std . Error t-S tatistic P rob.
D(AGO G(-1)) -0.9 07891 0.1 73259 -5.2 40086 0 .0000
C 0.660247 1.071897 0.615961 0.5421
@TREND("1985") -0.026453 0.048456 -0.545911 0.5888
R-squared 0.4 54174 Mean dependent var 0.01 5056
Adjusted R-squared 0.421093 S.D. dependent var 3.949248
S.E. of regression 3.004822 Akaike info criterion 5.117969
Sum squared resid 297.9556 Schwarz criterion 5.249929
Log likelihood -89.12345 Hannan-Quinn criter. 5.164027
F-statistic 13.72939 Durbin-Watson stat 1.875321
Prob(F-statistic) 0.000046
119
Null Hypothesis: AGEMP has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 2 (Automatic - based on SIC, maxlag=9)
t-Sta tistic Pro b.*
Augmented D ickey-Fuller test sta tistic -2.18 0743 0.48 50

Test critical values: 1% level -4.243644
5% level -3.544284
10% level -3.204699
*MacKinnon (1996) one-sided p- values.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(AGEMP)
Method: Least Squares
Date: 11/18/23 Time: 12:22
Sample (adjusted): 1988 2022
Included observations: 35 after adjustments
Varia ble Coe fficient Std . Error t-S tatistic P rob.
AGEM P(-1) -0.1 48315 0.0 68011 -2.1 80743 0 .0372
D(AGEMP(-1)) 0.118217 0.163750 0.721933 0.4759
D(AGEMP(-2)) 0.381396 0.164959 2.312070 0.0278
C 8.242069 3.900792 2.112922 0.0430
@TREND("1985") -0.090852 0.041085 -2.211321 0.0348
R-squared 0.2 28566 Mean dependent var -0.51 6937
Adjusted R-squared 0.125709 S.D. dependent var 0.535142
S.E. of regression 0.500377 Akaike info criterion 1.584652
Sum squared resid 7.511300 Schwarz criterion 1.806844
Log likelihood -22.73141 Hannan-Quinn criter. 1.661353
F-statistic 2.222160 Durbin-Watson stat 2.281033
Prob(F-statistic) 0.090310
120
Null Hypothesis: D(AGEMP) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)
t-Sta tistic Pro b.*
Augmented D ickey-Fuller test sta tistic -5.03 3787 0.00 13
Test critical values: 1% level -4.234972
5% level -3.540328
10% level -3.202445
*MacKinnon (1996) one-sided p- values.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(AGEMP,2)
Method: Least Squares
Date: 11/18/23 Time: 12:22
Sample (adjusted): 1987 2022
Included observations: 36 after adjustments
Varia ble Coe fficient Std . Error t-S tatistic P rob.
D(AGEM P(-1)) -0.8 79423 0.1 74704 -5.0 33787 0 .0000
C -0.445851 0.213645 -2.086875 0.0447
@TREND("1985") -0.001012 0.008797 -0.115039 0.9091
R-squared 0.4 34485 Mean dependent var 0.02 3828
Adjusted R-squared 0.400211 S.D. dependent var 0.707231
S.E. of regression 0.547722 Akaike info criterion 1.713558

Sum squared resid 9.899982 Schwarz criterion 1.845518
Log likelihood -27.84404 Hannan-Quinn criter. 1.759615
F-statistic 12.67695 Durbin-Watson stat 2.048750
Prob(F-statistic) 0.000082
121
Null Hypothesis: AGEMP has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 4 (Newey-West automatic) using Bartlett kernel
Adj. t -Stat Pro b.*
Phillips-Perro n test statistic -1.61 4734 0.76 77
Test critical values: 1% level -4.226815
5% level -3.536601
10% level -3.200320
*MacKinnon (1996) one-sided p- values.
Residual vari ance (no correction) 0.263 098
HAC corrected variance (Bartlett kernel) 0.467459
Phillips-Perron Test Equation
Dependent Variable: D(AGEMP)
Method: Least Squares
Date: 11/18/23 Time: 12:25
Sample (adjusted): 1986 2022
Included observations: 37 after adjustments
Varia ble Coe fficient Std . Error t-S tatistic P rob.
AGEM P(-1) -0.0 82824 0.0 68587 -1.2 07567 0 .2355
C 4.141493 3.885196 1.065968 0.2939
@TREND("1985") -0.048257 0.040958 -1.178193 0.2469
R-squared 0.0 41140 Mean dependent var -0.54 1476
Adjusted R-squared -0.015264 S.D. dependent var 0.531044
S.E. of regression 0.535082 Akaike info criterion 1.664810
Sum squared resid 9.734617 Schwarz criterion 1.795425
Log likelihood -27.79898 Hannan-Quinn criter. 1.710858
F-statistic 0.729381 Durbin-Watson stat 1.660522
Prob(F-statistic) 0.489600
122
Null Hypothesis: D(AGEMP) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel
Adj. t -Stat Pro b.*
Phillips-Perro n test statistic -5.18 2641 0.00 09
Test critical values: 1% level -4.234972
5% level -3.540328
10% level -3.202445
*MacKinnon (1996) one-sided p- values.
Residual vari ance (no correction) 0.274 999
HAC corrected variance (Bartlett kernel) 0.346854
Phillips-Perron Test Equation

Dependent Variable: D(AGEMP,2)
Method: Least Squares
Date: 11/18/23 Time: 12:26
Sample (adjusted): 1987 2022
Included observations: 36 after adjustments
Varia ble Coe fficient Std . Error t-S tatistic P rob.
D(AGEM P(-1)) -0.8 79423 0.1 74704 -5.0 33787 0 .0000
C -0.445851 0.213645 -2.086875 0.0447
@TREND("1985") -0.001012 0.008797 -0.115039 0.9091
R-squared 0.4 34485 Mean dependent var 0.02 3828
Adjusted R-squared 0.400211 S.D. dependent var 0.707231
S.E. of regression 0.547722 Akaike info criterion 1.713558
Sum squared resid 9.899982 Schwarz criterion 1.845518
Log likelihood -27.84404 Hannan-Quinn criter. 1.759615
F-statistic 12.67695 Durbin-Watson stat 2.048750
Prob(F-statistic) 0.000082
123
Null Hypothesis: MCAP has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)
t-Sta tistic Pro b.*
Augmented D ickey-Fuller test sta tistic -3.44 4637 0.06 08
Test critical values: 1% level -4.226815
5% level -3.536601
10% level -3.200320
*MacKinnon (1996) one-sided p- values.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(MCAP)
Method: Least Squares
Date: 11/18/23 Time: 12:36
Sample (adjusted): 1986 2022
Included observations: 37 after adjustments
Varia ble Coe fficient Std . Error t-S tatistic P rob.
MCAP (-1) -0.5 11797 0.1 48578 -3.4 44637 0 .0015
C 0.188242 1.458245 0.129088 0.8980
@TREND("1985") 0.347083 0.116725 2.973524 0.0054
R-squared 0.2 59821 Mean dependent var 0.58 8689
Adjusted R-squared 0.216281 S.D. dependent var 4.908168
S.E. of regression 4.345099 Akaike info criterion 5.853579
Sum squared resid 641.9162 Schwarz criterion 5.984194
Log likelihood -105.2912 Hannan-Quinn criter. 5.899627
F-statistic 5.967403 Durbin-Watson stat 1.878550
Prob(F-statistic) 0.006008
124
Null Hypothesis: MCAP has a unit root
Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on SIC, maxlag=9)
t-Sta tistic Pro b.*
Augmented D ickey-Fuller test sta tistic -3.44 4637 0.06 08
Test critical values: 1% level -4.226815
5% level -3.536601
10% level -3.200320
*MacKinnon (1996) one-sided p- values.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(MCAP)
Method: Least Squares
Date: 11/18/23 Time: 12:36
Sample (adjusted): 1986 2022
Included observations: 37 after adjustments
Varia ble Coe fficient Std . Error t-S tatistic P rob.
MCAP (-1) -0.5 11797 0.1 48578 -3.4 44637 0 .0015
C 0.188242 1.458245 0.129088 0.8980
@TREND("1985") 0.347083 0.116725 2.973524 0.0054
R-squared 0.2 59821 Mean dependent var 0.58 8689
Adjusted R-squared 0.216281 S.D. dependent var 4.908168
S.E. of regression 4.345099 Akaike info criterion 5.853579
Sum squared resid 641.9162 Schwarz criterion 5.984194
Log likelihood -105.2912 Hannan-Quinn criter. 5.899627
F-statistic 5.967403 Durbin-Watson stat 1.878550
Prob(F-statistic) 0.006008
125
Null Hypothesis: D(MCAP) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)
t-Sta tistic Pro b.*
Augmented D ickey-Fuller test sta tistic -6.73 5568 0.00 00
Test critical values: 1% level -4.234972
5% level -3.540328
10% level -3.202445
*MacKinnon (1996) one-sided p- values.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(MCAP,2)
Method: Least Squares
Date: 11/18/23 Time: 12:37
Sample (adjusted): 1987 2022
Included observations: 36 after adjustments
Varia ble Coe fficient Std . Error t-S tatistic P rob.
D(MCA P(-1)) -1.1 57902 0.1 71909 -6.7 35568 0 .0000
C 0.339265 1.793505 0.189163 0.8511
@TREND("1985") 0.018328 0.081189 0.225741 0.8228
R-squared 0.5 78910 Mean dependent var 0.04 1460
Adjusted R-squared 0.553389 S.D. dependent var 7.568405

S.E. of regression 5.057887 Akaike info criterion 6.159430
Sum squared resid 844.2133 Schwarz criterion 6.291390
Log likelihood -107.8697 Hannan-Quinn criter. 6.205487
F-statistic 22.68398 Durbin-Watson stat 2.095301
Prob(F-statistic) 0.000001
126
Null Hypothesis: MCAP has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 1 (Newey-West automatic) using Bartlett kernel
Adj. t -Stat Pro b.*
Phillips-Perro n test statistic -3.49 8694 0.05 42
Test critical values: 1% level -4.226815
5% level -3.536601
10% level -3.200320
*MacKinnon (1996) one-sided p- values.
Residual vari ance (no correction) 17.34 909
HAC corrected variance (Bartlett kernel) 18.37881
Phillips-Perron Test Equation
Dependent Variable: D(MCAP)
Method: Least Squares
Date: 11/18/23 Time: 12:38
Sample (adjusted): 1986 2022
Included observations: 37 after adjustments
Varia ble Coe fficient Std . Error t-S tatistic P rob.
MCAP (-1) -0.5 11797 0.1 48578 -3.4 44637 0 .0015
C 0.188242 1.458245 0.129088 0.8980
@TREND("1985") 0.347083 0.116725 2.973524 0.0054
R-squared 0.2 59821 Mean dependent var 0.58 8689
Adjusted R-squared 0.216281 S.D. dependent var 4.908168
S.E. of regression 4.345099 Akaike info criterion 5.853579
Sum squared resid 641.9162 Schwarz criterion 5.984194
Log likelihood -105.2912 Hannan-Quinn criter. 5.899627
F-statistic 5.967403 Durbin-Watson stat 1.878550
Prob(F-statistic) 0.006008
127
Null Hypothesis: D(MCAP) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 3 (Used-specified) using Bartlett kernel
Adj. t -Stat Pro b.*
Phillips-Perro n test statistic -7.13 3609 0.00 00
Test critical values: 1% level -4.234972
5% level -3.540328
10% level -3.202445
*MacKinnon (1996) one-sided p- values.
Residual vari ance (no correction) 23.45 037
HAC corrected variance (Bartlett kernel) 14.43152

Phillips-Perron Test Equation
Dependent Variable: D(MCAP,2)
Method: Least Squares
Date: 11/18/23 Time: 12:40
Sample (adjusted): 1987 2022
Included observations: 36 after adjustments
Varia ble Coe fficient Std . Error t-S tatistic P rob.
D(MCA P(-1)) -1.1 57902 0.1 71909 -6.7 35568 0 .0000
C 0.339265 1.793505 0.189163 0.8511
@TREND("1985") 0.018328 0.081189 0.225741 0.8228
R-squared 0.5 78910 Mean dependent var 0.04 1460
Adjusted R-squared 0.553389 S.D. dependent var 7.568405
S.E. of regression 5.057887 Akaike info criterion 6.159430
Sum squared resid 844.2133 Schwarz criterion 6.291390
Log likelihood -107.8697 Hannan-Quinn criter. 6.205487
F-statistic 22.68398 Durbin-Watson stat 2.095301
Prob(F-statistic) 0.000001
128
Null Hypothesis: STTRD has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)
t-Sta tistic Pro b.*
Augmented D ickey-Fuller test sta tistic -2.57 9305 0.29 13
Test critical values: 1% level -4.226815
5% level -3.536601
10% level -3.200320
*MacKinnon (1996) one-sided p- values.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(STTRD)
Method: Least Squares
Date: 11/18/23 Time: 12:41
Sample (adjusted): 1986 2022
Included observations: 37 after adjustments
Varia ble Coe fficient Std . Error t-S tatistic P rob.
STTR D(-1) -0.3 47232 0.1 34622 -2.5 79305 0 .0144
C 0.103358 0.218465 0.473109 0.6392
@TREND("1985") 0.010389 0.011487 0.904405 0.3721
R-squared 0.1 67071 Mean dependent var 0.01 1051
Adjusted R-squared 0.118075 S.D. dependent var 0.692991
S.E. of regression 0.650794 Akaike info criterion 2.056358
Sum squared resid 14.40012 Schwarz criterion 2.186973
Log likelihood -35.04262 Hannan-Quinn criter. 2.102406
F-statistic 3.409901 Durbin-Watson stat 1.884449
Prob(F-statistic) 0.044703
129
Null Hypothesis: D(STTRD) has a unit root

Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)
t-Sta tistic Pro b.*
Augmented D ickey-Fuller test sta tistic -6.44 4696 0.00 00
Test critical values: 1% level -4.234972
5% level -3.540328
10% level -3.202445
*MacKinnon (1996) one-sided p- values.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(STTRD,2)
Method: Least Squares
Date: 11/18/23 Time: 12:53
Sample (adjusted): 1987 2022
Included observations: 36 after adjustments
Varia ble Coe fficient Std . Error t-S tatistic P rob.
D(STTR D(-1)) -1.1 14813 0.1 72981 -6.4 44696 0 .0000
C 0.100501 0.254935 0.394220 0.6960
@TREND("1985") -0.004628 0.011539 -0.401092 0.6909
R-squared 0.5 57259 Mean dependent var -0.00 1307
Adjusted R-squared 0.530426 S.D. dependent var 1.047129
S.E. of regression 0.717550 Akaike info criterion 2.253707
Sum squared resid 16.99098 Schwarz criterion 2.385667
Log likelihood -37.56673 Hannan-Quinn criter. 2.299765
F-statistic 20.76784 Durbin-Watson stat 2.056012
Prob(F-statistic) 0.000001
130
Null Hypothesis: STTRD has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel
Adj. t -Stat Pro b.*
Phillips-Perro n test statistic -2.585 500 0.28 87
Test critical values: 1% level -4.226815
5% level -3.536601
10% level -3.200320
*MacKinnon (1996) one-sided p- values.
Residual vari ance (no correction) 0.389 192
HAC corrected variance (Bartlett kernel) 0.391391
Phillips-Perron Test Equation
Dependent Variable: D(STTRD)
Method: Least Squares
Date: 11/18/23 Time: 12:57
Sample (adjusted): 1986 2022
Included observations: 37 after adjustments
Varia ble Coe fficient Std . Error t-S tatistic P rob.
STTR D(-1) -0.3 47232 0.1 34622 -2.5 79305 0 .0144
C 0.103358 0.218465 0.473109 0.6392

@TREND("1985") 0.010389 0.011487 0.904405 0.3721
R-squared 0.1 67071 Mean dependent var 0.01 1051
Adjusted R-squared 0.118075 S.D. dependent var 0.692991
S.E. of regression 0.650794 Akaike info criterion 2.056358
Sum squared resid 14.40012 Schwarz criterion 2.186973
Log likelihood -35.04262 Hannan-Quinn criter. 2.102406
F-statistic 3.409901 Durbin-Watson stat 1.884449
Prob(F-statistic) 0.044703
131
Null Hypothesis: D(STTRD) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 3 (Used-specified) using Bartlett kernel
Adj. t -Stat Pro b.*
Phillips-Perro n test statistic -6.79 2522 0.00 00
Test critical values: 1% level -4.234972
5% level -3.540328
10% level -3.202445
*MacKinnon (1996) one-sided p- values.
Residual vari ance (no correction) 0.471 972
HAC corrected variance (Bartlett kernel) 0.280111
Phillips-Perron Test Equation
Dependent Variable: D(STTRD,2)
Method: Least Squares
Date: 11/18/23 Time: 12:58
Sample (adjusted): 1987 2022
Included observations: 36 after adjustments
Varia ble Coe fficient Std . Error t-S tatistic P rob.
D(STTR D(-1)) -1.1 14813 0.1 72981 -6.4 44696 0 .0000
C 0.100501 0.254935 0.394220 0.6960
@TREND("1985") -0.004628 0.011539 -0.401092 0.6909
R-squared 0.5 57259 Mean dependent var -0.00 1307
Adjusted R-squared 0.530426 S.D. dependent var 1.047129
S.E. of regression 0.717550 Akaike info criterion 2.253707
Sum squared resid 16.99098 Schwarz criterion 2.385667
Log likelihood -37.56673 Hannan-Quinn criter. 2.299765
F-statistic 20.76784 Durbin-Watson stat 2.056012
Prob(F-statistic) 0.000001
132
Null Hypothesis: ASI has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)
t-Sta tistic Pro b.*
Augmented D ickey-Fuller test sta tistic -3.63 1468 0.04 26
Test critical values: 1% level -4.226815
5% level -3.536601
10% level -3.200320

*MacKinnon (1996) one-sided p- values.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(ASI)
Method: Least Squares
Date: 11/18/23 Time: 12:59
Sample (adjusted): 1986 2022
Included observations: 37 after adjustments
Varia ble Coe fficient Std . Error t-S tatistic P rob.
ASI (-1) -0.5 24416 0.1 52825 -3.4 31468 0 .0016
C -2995.621 2573.734 -1.163920 0.2526
@TREND("1985") 725.6889 222.5662 3.260553 0.0025
R-squared 0.2 62329 Mean dependent var 138 1.723
Adjusted R-squared 0.218936 S.D. dependent var 8087.761
S.E. of regression 7147.786 Akaike info criterion 20.66460
Sum squared resid 1.74E+09 Schwarz criterion 20.79521
Log likelihood -379.2951 Hannan-Quinn criter. 20.71065
F-statistic 6.045497 Durbin-Watson stat 1.793060
Prob(F-statistic) 0.005671
133
Null Hypothesis: D(ASI) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=9)
t-Sta tistic Pro b.*
Augmented D ickey-Fuller test sta tistic -6.03 4933 0.00 01
Test critical values: 1% level -4.243644
5% level -3.544284
10% level -3.204699
*MacKinnon (1996) one-sided p- values.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(ASI,2)
Method: Least Squares
Date: 11/18/23 Time: 13:01
Sample (adjusted): 1988 2022
Included observations: 35 after adjustments
Varia ble Coe fficient Std . Error t-S tatistic P rob.
D(AS I(-1)) -1.5 22299 0.2 52248 -6.0 34933 0 .0000
D(ASI(-1),2) 0.366504 0.168889 2.170093 0.0378
C 574.7219 3018.879 0.190376 0.8503
@TREND("1985") 74.69586 134.7913 0.554159 0.5834
R-squared 0.6 11596 Mean dependent var 243 .0720
Adjusted R-squared 0.574008 S.D. dependent var 12320.03
S.E. of regression 8041.044 Akaike info criterion 20.92972
Sum squared resid 2.00E+09 Schwarz criterion 21.10747
Log likelihood -362.2700 Hannan-Quinn criter. 20.99108
F-statistic 16.27126 Durbin-Watson stat 1.935113
Prob(F-statistic) 0.000002

134
Null Hypothesis: ASI has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 3 (Used-specified) using Bartlett kernel
Adj. t -Stat Pro b.*
Phillips-Perro n test statistic -3.78 7961 0.04 85
Test critical values: 1% level -4.226815
5% level -3.536601
10% level -3.200320
*MacKinnon (1996) one-sided p- values.
Residual vari ance (no correction) 4694 8342
HAC corrected variance (Bartlett kernel) 44900368
Phillips-Perron Test Equation
Dependent Variable: D(ASI)
Method: Least Squares
Date: 11/18/23 Time: 13:05
Sample (adjusted): 1986 2022
Included observations: 37 after adjustments
Varia ble Coe fficient Std . Error t-S tatistic P rob.
ASI (-1) -0.5 24416 0.1 52825 -3.4 31468 0 .0016
C -2995.621 2573.734 -1.163920 0.2526
@TREND("1985") 725.6889 222.5662 3.260553 0.0025
R-squared 0.2 62329 Mean dependent var 138 1.723
Adjusted R-squared 0.218936 S.D. dependent var 8087.761
S.E. of regression 7147.786 Akaike info criterion 20.66460
Sum squared resid 1.74E+09 Schwarz criterion 20.79521
Log likelihood -379.2951 Hannan-Quinn criter. 20.71065
F-statistic 6.045497 Durbin-Watson stat 1.793060
Prob(F-statistic) 0.005671
135
Null Hypothesis: D(ASI) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 3 (Used-specified) using Bartlett kernel
Adj. t -Stat Pro b.*
Phillips-Perro n test statistic -6.65 2746 0.00 00
Test critical values: 1% level -4.234972
5% level -3.540328
10% level -3.202445
*MacKinnon (1996) one-sided p- values.
Residual vari ance (no correction) 6414 1078
HAC corrected variance (Bartlett kernel) 39735873
Phillips-Perron Test Equation
Dependent Variable: D(ASI,2)
Method: Least Squares
Date: 11/18/23 Time: 13:07
Sample (adjusted): 1987 2022

Included observations: 36 after adjustments
Varia ble Coe fficient Std . Error t-S tatistic P rob.
D(AS I(-1)) -1.1 13385 0.1 74497 -6.3 80526 0 .0000
C 295.0695 2966.662 0.099462 0.9214
@TREND("1985") 64.52099 134.3288 0.480322 0.6342
R-squared 0.5 52564 Mean dependent var 236 .0589
Adjusted R-squared 0.525447 S.D. dependent var 12142.83
S.E. of regression 8364.932 Akaike info criterion 20.98114
Sum squared resid 2.31E+09 Schwarz criterion 21.11310
Log likelihood -374.6605 Hannan-Quinn criter. 21.02720
F-statistic 20.37679 Durbin-Watson stat 2.065338
Prob(F-statistic) 0.000002
136
Null Hypothesis: FSD has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=9)
t-Sta tistic Pro b.*
Augmented D ickey-Fuller test sta tistic -3.15 8999 0.10 87
Test critical values: 1% level -4.234972
5% level -3.540328
10% level -3.202445
*MacKinnon (1996) one-sided p- values.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(FSD)
Method: Least Squares
Date: 11/18/23 Time: 13:08
Sample (adjusted): 1987 2022
Included observations: 36 after adjustments
Varia ble Coe fficient Std . Error t-S tatistic P rob.
FSD (-1) -0.3 67456 0.1 16320 -3.1 58999 0 .0034
D(FSD(-1)) 0.368178 0.161312 2.282396 0.0293
C 1.311877 0.823256 1.593523 0.1209
@TREND("1985") 0.170870 0.060598 2.819718 0.0082
R-squared 0.2 67803 Mean dependent var 0.32 0907
Adjusted R-squared 0.199159 S.D. dependent var 2.277900
S.E. of regression 2.038486 Akaike info criterion 4.366731
Sum squared resid 132.9736 Schwarz criterion 4.542678
Log likelihood -74.60116 Hannan-Quinn criter. 4.428141
F-statistic 3.901354 Durbin-Watson stat 1.833770
Prob(F-statistic) 0.017538
137
Null Hypothesis: D(FSD) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=9)
t-Sta tistic Pro b.*
Augmented D ickey-Fuller test sta tistic -5.53 1811 0.00 04

Test critical values: 1% level -4.243644
5% level -3.544284
10% level -3.204699
*MacKinnon (1996) one-sided p- values.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(FSD,2)
Method: Least Squares
Date: 11/18/23 Time: 13:35
Sample (adjusted): 1988 2022
Included observations: 35 after adjustments
Varia ble Coe fficient Std . Error t-S tatistic P rob.
D(FSD (-1)) -1.1 46553 0.2 07265 -5.5 31811 0 .0000
D(FSD(-1),2) 0.415909 0.163111 2.549847 0.0159
C 0.018155 0.807798 0.022475 0.9822
@TREND("1985") 0.017112 0.036115 0.473809 0.6390
R-squared 0.5 09350 Mean dependent var -0.00 9323
Adjusted R-squared 0.461868 S.D. dependent var 2.935532
S.E. of regression 2.153432 Akaike info criterion 4.479213
Sum squared resid 143.7554 Schwarz criterion 4.656967
Log likelihood -74.38623 Hannan-Quinn criter. 4.540574
F-statistic 10.72718 Durbin-Watson stat 2.100122
Prob(F-statistic) 0.000054
138
Null Hypothesis: FSD has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 3 (Used-specified) using Bartlett kernel
Adj. t -Stat Pro b.*
Phillips-Perro n test statistic -2.34 0056 0.40 32
Test critical values: 1% level -4.226815
5% level -3.536601
10% level -3.200320
*MacKinnon (1996) one-sided p- values.
Residual vari ance (no correction) 4.229 831
HAC corrected variance (Bartlett kernel) 4.287337
Phillips-Perron Test Equation
Dependent Variable: D(FSD)
Method: Least Squares
Date: 11/18/23 Time: 13:37
Sample (adjusted): 1986 2022
Included observations: 37 after adjustments
Varia ble Coe fficient Std . Error t-S tatistic P rob.
FSD (-1) -0.2 64292 0.1 13501 -2.3 28544 0 .0260
C 1.170528 0.838928 1.395267 0.1720
@TREND("1985") 0.122120 0.058871 2.074342 0.0457
R-squared 0.1 39038 Mean dependent var 0.33 2163
Adjusted R-squared 0.088393 S.D. dependent var 2.247083

S.E. of regression 2.145472 Akaike info criterion 4.442201
Sum squared resid 156.5038 Schwarz criterion 4.572816
Log likelihood -79.18072 Hannan-Quinn criter. 4.488249
F-statistic 2.745347 Durbin-Watson stat 1.458790
Prob(F-statistic) 0.078475
139
Null Hypothesis: D(FSD) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 3 (Used-specified) using Bartlett kernel
Adj. t -Stat Pro b.*
Phillips-Perro n test statistic -4.59 4906 0.00 40
Test critical values: 1% level -4.234972
5% level -3.540328
10% level -3.202445
*MacKinnon (1996) one-sided p- values.
Residual vari ance (no correction) 4.845 604
HAC corrected variance (Bartlett kernel) 3.037998
Phillips-Perron Test Equation
Dependent Variable: D(FSD,2)
Method: Least Squares
Date: 11/18/23 Time: 13:38
Sample (adjusted): 1987 2022
Included observations: 36 after adjustments
Varia ble Coe fficient Std . Error t-S tatistic P rob.
D(FSD (-1)) -0.8 08283 0.1 70683 -4.7 35580 0 .0000
C 0.068292 0.815491 0.083743 0.9338
@TREND("1985") 0.009761 0.036913 0.264419 0.7931
R-squared 0.4 04688 Mean dependent var -0.00 3974
Adjusted R-squared 0.368609 S.D. dependent var 2.893470
S.E. of regression 2.299155 Akaike info criterion 4.582616
Sum squared resid 174.4417 Schwarz criterion 4.714575
Log likelihood -79.48708 Hannan-Quinn criter. 4.628673
F-statistic 11.21657 Durbin-Watson stat 1.842535
Prob(F-statistic) 0.000192
140
Null Hypothesis: TOPEN has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)
t-Sta tistic Pro b.*
Augmented D ickey-Fuller test sta tistic -2.92 2781 0.16 73
Test critical values: 1% level -4.226815
5% level -3.536601
10% level -3.200320
*MacKinnon (1996) one-sided p- values.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TOPEN)

Method: Least Squares
Date: 11/18/23 Time: 13:41
Sample (adjusted): 1986 2022
Included observations: 37 after adjustments
Varia ble Coe fficient Std . Error t-S tatistic P rob.
TOPE N(-1) -0.3 54203 0.1 21187 -2.9 22781 0 .0061
C 14.40826 4.699345 3.066015 0.0042
@TREND("1985") -0.112565 0.125989 -0.893457 0.3779
R-squared 0.2 27732 Mean dependent var 0.32 9312
Adjusted R-squared 0.182305 S.D. dependent var 8.995255
S.E. of regression 8.134094 Akaike info criterion 7.107611
Sum squared resid 2249.558 Schwarz criterion 7.238226
Log likelihood -128.4908 Hannan-Quinn criter. 7.153658
F-statistic 5.013095 Durbin-Watson stat 2.251892
Prob(F-statistic) 0.012361
141
Null Hypothesis: D(TOPEN) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)
t-Sta tistic Pro b.*
Augmented D ickey-Fuller test sta tistic -7.83 2784 0.00 00
Test critical values: 1% level -4.234972
5% level -3.540328
10% level -3.202445
*MacKinnon (1996) one-sided p- values.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TOPEN,2)
Method: Least Squares
Date: 11/18/23 Time: 13:42
Sample (adjusted): 1987 2022
Included observations: 36 after adjustments
Varia ble Coe fficient Std . Error t-S tatistic P rob.
D(TOPE N(-1)) -1.2 97923 0.1 65704 -7.8 32784 0 .0000
C 4.804140 3.167431 1.516731 0.1389
@TREND("1985") -0.222049 0.143481 -1.547586 0.1313
R-squared 0.6 50263 Mean dependent var 0.03 4893
Adjusted R-squared 0.629067 S.D. dependent var 14.41795
S.E. of regression 8.781143 Akaike info criterion 7.262746
Sum squared resid 2544.580 Schwarz criterion 7.394706
Log likelihood -127.7294 Hannan-Quinn criter. 7.308803
F-statistic 30.67835 Durbin-Watson stat 2.099475
Prob(F-statistic) 0.000000
142
Null Hypothesis: TOPEN has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 5 (Newey-West automatic) using Bartlett kernel

Adj. t -Stat Pro b.*
Phillips-Perro n test statistic -2.67 3614 0.25 27
Test critical values: 1% level -4.226815
5% level -3.536601
10% level -3.200320
*MacKinnon (1996) one-sided p- values.
Residual vari ance (no correction) 60.79 888
HAC corrected variance (Bartlett kernel) 37.57392
Phillips-Perron Test Equation
Dependent Variable: D(TOPEN)
Method: Least Squares
Date: 11/18/23 Time: 13:43
Sample (adjusted): 1986 2022
Included observations: 37 after adjustments
Varia ble Coe fficient Std . Error t-S tatistic P rob.
TOPE N(-1) -0.3 54203 0.1 21187 -2.9 22781 0 .0061
C 14.40826 4.699345 3.066015 0.0042
@TREND("1985") -0.112565 0.125989 -0.893457 0.3779
R-squared 0.2 27732 Mean dependent var 0.32 9312
Adjusted R-squared 0.182305 S.D. dependent var 8.995255
S.E. of regression 8.134094 Akaike info criterion 7.107611
Sum squared resid 2249.558 Schwarz criterion 7.238226
Log likelihood -128.4908 Hannan-Quinn criter. 7.153658
F-statistic 5.013095 Durbin-Watson stat 2.251892
Prob(F-statistic) 0.012361
143
Null Hypothesis: D(TOPEN) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 3 (Used-specified) using Bartlett kernel
Adj. t -Stat Pro b.*
Phillips-Perro n test statistic -8.74 0681 0.00 00
Test critical values: 1% level -4.234972
5% level -3.540328
10% level -3.202445
*MacKinnon (1996) one-sided p- values.
Residual vari ance (no correction) 70.68 277
HAC corrected variance (Bartlett kernel) 40.42842
Phillips-Perron Test Equation
Dependent Variable: D(TOPEN,2)
Method: Least Squares
Date: 11/18/23 Time: 13:44
Sample (adjusted): 1987 2022
Included observations: 36 after adjustments
Varia ble Coe fficient Std . Error t-S tatistic P rob.
D(TOPE N(-1)) -1.2 97923 0.1 65704 -7.8 32784 0 .0000
C 4.804140 3.167431 1.516731 0.1389

@TREND("1985") -0.222049 0.143481 -1.547586 0.1313
R-squared 0.6 50263 Mean dependent var 0.03 4893
Adjusted R-squared 0.629067 S.D. dependent var 14.41795
S.E. of regression 8.781143 Akaike info criterion 7.262746
Sum squared resid 2544.580 Schwarz criterion 7.394706
Log likelihood -127.7294 Hannan-Quinn criter. 7.308803
F-statistic 30.67835 Durbin-Watson stat 2.099475
Prob(F-statistic) 0.000000
144
Null Hypothesis: INV has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)
t-Sta tistic Pro b.*
Augmented D ickey-Fuller test sta tistic -0.21 2788 0.99 03
Test critical values: 1% level -4.226815
5% level -3.536601
10% level -3.200320
*MacKinnon (1996) one-sided p- values.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INV)
Method: Least Squares
Date: 11/18/23 Time: 13:45
Sample (adjusted): 1986 2022
Included observations: 37 after adjustments
Varia ble Coe fficient Std . Error t-S tatistic P rob.
INV (-1) -0.0 21378 0.1 00465 -0.2 12788 0 .8328
C -0.739286 5.282424 -0.139952 0.8895
@TREND("1985") 0.055003 0.120421 0.456759 0.6507
R-squared 0.0 50720 Mean dependent var -0.35 9138
Adjusted R-squared -0.005120 S.D. dependent var 3.769163
S.E. of regression 3.778799 Akaike info criterion 5.574294
Sum squared resid 485.4969 Schwarz criterion 5.704909
Log likelihood -100.1244 Hannan-Quinn criter. 5.620342
F-statistic 0.908314 Durbin-Watson stat 1.764039
Prob(F-statistic) 0.412764
145
Null Hypothesis: D(INV) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)
t-Sta tistic Pro b.*
Augmented D ickey-Fuller test sta tistic -6.68 8571 0.00 00
Test critical values: 1% level -4.234972
5% level -3.540328
10% level -3.202445
*MacKinnon (1996) one-sided p- values.
Augmented Dickey-Fuller Test Equation

Dependent Variable: D(INV,2)
Method: Least Squares
Date: 11/18/23 Time: 13:52
Sample (adjusted): 1987 2022
Included observations: 36 after adjustments
Varia ble Coe fficient Std . Error t-S tatistic P rob.
D(INV (-1)) -1.0 13628 0.1 51546 -6.6 88571 0 .0000
C -3.100617 1.220276 -2.540915 0.0159
@TREND("1985") 0.127636 0.054978 2.321573 0.0266
R-squared 0.5 79172 Mean dependent var -0.23 7578
Adjusted R-squared 0.553667 S.D. dependent var 4.995325
S.E. of regression 3.337283 Akaike info criterion 5.327846
Sum squared resid 367.5361 Schwarz criterion 5.459806
Log likelihood -92.90124 Hannan-Quinn criter. 5.373904
F-statistic 22.70843 Durbin-Watson stat 1.871908
Prob(F-statistic) 0.000001
146
Null Hypothesis: INV has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel
Adj. t -Stat Pro b.*
Phillips-Perro n test statistic 0.070 999 0.99 58
Test critical values: 1% level -4.226815
5% level -3.536601
10% level -3.200320
*MacKinnon (1996) one-sided p- values.
Residual vari ance (no correction) 13.12 154
HAC corrected variance (Bartlett kernel) 11.07403
Phillips-Perron Test Equation
Dependent Variable: D(INV)
Method: Least Squares
Date: 11/18/23 Time: 13:52
Sample (adjusted): 1986 2022
Included observations: 37 after adjustments
Varia ble Coe fficient Std . Error t-S tatistic P rob.
INV (-1) -0.0 21378 0.1 00465 -0.2 12788 0 .8328
C -0.739286 5.282424 -0.139952 0.8895
@TREND("1985") 0.055003 0.120421 0.456759 0.6507
R-squared 0.0 50720 Mean dependent var -0.35 9138
Adjusted R-squared -0.005120 S.D. dependent var 3.769163
S.E. of regression 3.778799 Akaike info criterion 5.574294
Sum squared resid 485.4969 Schwarz criterion 5.704909
Log likelihood -100.1244 Hannan-Quinn criter. 5.620342
F-statistic 0.908314 Durbin-Watson stat 1.764039
Prob(F-statistic) 0.412764
147

Null Hypothesis: D(INV) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel
Adj. t -Stat Pro b.*
Phillips-Perro n test statistic -6.81 8599 0.00 00
Test critical values: 1% level -4.234972
5% level -3.540328
10% level -3.202445
*MacKinnon (1996) one-sided p- values.
Residual vari ance (no correction) 10.20 934
HAC corrected variance (Bartlett kernel) 8.776434
Phillips-Perron Test Equation
Dependent Variable: D(INV,2)
Method: Least Squares
Date: 11/18/23 Time: 13:51
Sample (adjusted): 1987 2022
Included observations: 36 after adjustments
Varia ble Coe fficient Std . Error t-S tatistic P rob.
D(INV (-1)) -1.0 13628 0.1 51546 -6.6 88571 0 .0000
C -3.100617 1.220276 -2.540915 0.0159
@TREND("1985") 0.127636 0.054978 2.321573 0.0266
R-squared 0.5 79172 Mean dependent var -0.23 7578
Adjusted R-squared 0.553667 S.D. dependent var 4.995325
S.E. of regression 3.337283 Akaike info criterion 5.327846
Sum squared resid 367.5361 Schwarz criterion 5.459806
Log likelihood -92.90124 Hannan-Quinn criter. 5.373904
F-statistic 22.70843 Durbin-Watson stat 1.871908
Prob(F-statistic) 0.000001
148
Objective I
Dependent Variable: AGOG
Method: ARDL
Date: 11/18/23 Time: 14:00
Sample (adjusted): 1988 2022
Included observations: 35 after adjustments
Maximum dependent lags: 3 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (3 lags, automatic): MCAP STTRD LOG(ASI) FSD TOPEN INV
Fixed regressors: C
Number of models evalulated: 12288
Selected Model: ARDL(3, 3, 1, 1, 3, 3, 1)
Varia ble Coe fficient Std . Error t-S tatistic P rob.*
AGOG (-1) 0.7 06014 0.1 70712 4.1 35701 0 .0012
AGOG(-2) -0.531517 0.164762 -3.225966 0.0066
AGOG(-3) 0.217774 0.167285 1.301811 0.2156

MCAP -0.130903 0.145450 -0.899986 0.3845
MCAP(-1) 0.885296 0.250722 3.530992 0.0037
MCAP(-2) 0.257784 0.197933 1.302379 0.2154
MCAP(-3) -0.265582 0.139991 -1.897140 0.0802
STTRD -3.709542 1.347684 -2.752531 0.0165
STTRD(-1) -2.330069 1.420419 -1.640410 0.1249
LOG(ASI) 4.942549 2.098715 2.355036 0.0349
LOG(ASI(-1)) -5.332211 2.184471 -2.440962 0.0297
FSD -0.860259 0.321191 -2.678337 0.0190
FSD(-1) 0.197028 0.289239 0.681195 0.5077
FSD(-2) 0.468757 0.304071 1.541602 0.1472
FSD(-3) -1.066355 0.270466 -3.942664 0.0017
TOPEN -0.165528 0.047727 -3.468216 0.0042
TOPEN(-1) 0.330739 0.055865 5.920317 0.0001
TOPEN(-2) 0.024934 0.048499 0.514124 0.6158
TOPEN(-3) -0.221669 0.047376 -4.678931 0.0004
INV -0.233837 0.110896 -2.108615 0.0549
INV(-1) -0.207891 0.154166 -1.348489 0.2005
C 42.53243 16.61461 2.559942 0.0237
R-squared 0.9 42410 Mean dependent var 24.1 7103
Adjusted R-squared 0.849379 S.D. dependent var 3.638071
S.E. of regression 1.411932 Akaike info criterion 3.794539
Sum squared resid 25.91617 Schwarz criterion 4.772186
Log likelihood -44.40443 Hannan-Quinn criter. 4.132023
F-statistic 10.13011 Durbin-Watson stat 2.058969
Prob(F-statistic) 0.000053
*Note: p-valu es and any subsequ ent tests do n ot account for m odel selection.
149
ARDL Long Run Form and Bounds Test
Dependent Variable: D(AGOG)
Selected Model: ARDL(3, 3, 1, 1, 3, 3, 1)
Case 2: Restricted Constant and No Trend
Date: 11/18/23 Time: 14:00
Sample: 1985 2022
Included observations: 35
Conditional E rror Correction Regression
Varia ble Coe fficient Std . Error t-S tatistic P rob.
C 42. 53243 16 .61461 2.5 59942 0 .0237
AGOG(-1)* -0.607730 0.229887 -2.643599 0.0203
MCAP(-1) 0.746594 0.403757 1.849117 0.0873
STTRD(-1) -6.039612 2.181886 -2.768069 0.0160
LOG(ASI(-1)) -0.389663 1.213579 -0.321086 0.7532
FSD(-1) -1.260829 0.487491 -2.586365 0.0226
TOPEN(-1) -0.031523 0.069510 -0.453497 0.6577
INV(-1) -0.441728 0.166601 -2.651413 0.0200

D(AGOG(-1)) 0.313744 0.145663 2.153898 0.0506
D(AGOG(-2)) -0.217774 0.167285 -1.301811 0.2156
D(MCAP) -0.130903 0.145450 -0.899986 0.3845
D(MCAP(-1)) 0.007799 0.241245 0.032328 0.9747
D(MCAP(-2)) 0.265582 0.139991 1.897140 0.0802
D(STTRD) -3.709542 1.347684 -2.752531 0.0165
DLOG(ASI) 4.942549 2.098715 2.355036 0.0349
D(FSD) -0.860259 0.321191 -2.678337 0.0190
D(FSD(-1)) 0.597599 0.255202 2.341671 0.0358
D(FSD(-2)) 1.066355 0.270466 3.942664 0.0017
D(TOPEN) -0.165528 0.047727 -3.468216 0.0042
D(TOPEN(-1)) 0.196734 0.053102 3.704860 0.0026
D(TOPEN(-2)) 0.221669 0.047376 4.678931 0.0004
D(INV) -0.233837 0.110896 -2.108615 0.0549
* p-value inco mpatible with t-Boun ds distribution.
L evels Equation
Case 2: Restricted Constant and No Trend
Varia ble Coe fficient Std . Error t-S tatistic P rob.
MC AP 1.2 28497 0.6 49111 1.8 92585 0 .0809
STTRD -9.937992 5.119859 -1.941068 0.0742
LOG(ASI) -0.641178 2.053984 -0.312163 0.7599
FSD -2.074655 0.683959 -3.033302 0.0096
TOPEN -0.051870 0.117739 -0.440545 0.6668
INV -0.726849 0.372261 -1.952525 0.0727
C 69.98579 30.79899 2.272340 0.0407
EC = AGOG - (1.2285*MCAP -9.93 80*STTRD -0 .6412*LOG(AS I) -2.0747
*FSD -0.0519*TOPEN -0.7268*INV + 69.9858)
F-Bounds Test Null Hypothesis: No levels relationship
Test Statistic Val ue Signif. I(0) I(1)
Asymptotic:
n=1000
150
F-statistic 5.024484 10% 1.99 2.94
k 6 5% 2.27 3.28
2.5% 2.55 3.61
1% 2.88 3.99
Actual Sample Size 35
Finite Sample:
n=35
10% 2.254 3.388
5% 2.685 3.96
1% 3.713 5.326
151
ARDL Error Correction Regression
Dependent Variable: D(AGOG)
Selected Model: ARDL(3, 3, 1, 1, 3, 3, 1)

Case 2: Restricted Constant and No Trend
Date: 11/18/23 Time: 14:01
Sample: 1985 2022
Included observations: 35
E CM Regressio n
Case 2: Restricted Constant and No Trend
Varia ble Coe fficient Std . Error t-S tatistic P rob.
D(AGO G(-1)) 0.3 13744 0.0 77581 4.0 44072 0 .0014
D(AGOG(-2)) -0.217774 0.091775 -2.372912 0.0338
D(MCAP) -0.130903 0.071191 -1.838759 0.0889
D(MCAP(-1)) 0.007799 0.074944 0.104062 0.9187
D(MCAP(-2)) 0.265582 0.075139 3.534544 0.0037
D(STTRD) -3.709542 0.719625 -5.154824 0.0002
DLOG(ASI) 4.942549 1.000130 4.941906 0.0003
D(FSD) -0.860259 0.150046 -5.733282 0.0001
D(FSD(-1)) 0.597599 0.158007 3.782101 0.0023
D(FSD(-2)) 1.066355 0.178885 5.961109 0.0000
D(TOPEN) -0.165528 0.031335 -5.282585 0.0001
D(TOPEN(-1)) 0.196734 0.026665 7.377973 0.0000
D(TOPEN(-2)) 0.221669 0.030078 7.369846 0.0000
D(INV) -0.233837 0.074665 -3.131805 0.0079
CointEq(-1)* -0.607730 0.077282 -7.863829 0.0000
R-squared 0.9 13030 Mean dependent var 0.08 9708
Adjusted R-squared 0.852151 S.D. dependent var 2.960473
S.E. of regression 1.138336 Akaike info criterion 3.394539
Sum squared resid 25.91617 Schwarz criterion 4.061117
Log likelihood -44.40443 Hannan-Quinn criter. 3.624641
Durbin-Watson stat 2.058969
* p-value incom patible with t-Bound s distribution.
F-Bounds Test Null Hypothesis: No levels relationship
Test Statistic Val ue Signif. I(0) I(1)
F-statistic 5.024 484 10% 1.99 2.94
k 6 5% 2.27 3.28
2.5% 2.55 3.61
1% 2.88 3.99
152
0
2
4
6
8
10
12
-2.5 -2.0 -1.5 -1.0 -0.5 0.0 0.5 1.0 1.5 2.0 2.5
Series: Residuals
Sample 1988 2022

Observations 35
Mean -1.76e-14
Median -0.034767
Maximum 2.095603
Minimum -2.102731
Std. Dev. 0.873064
Skewness -0.115040
Kurtosis 3.754869
Jarque-Bera 0.908198
Probability 0.635020
Breusch-Godfrey Serial Correlation LM Test:
F-statistic 0.7 27330 Prob. F(2,11) 0 .5051
Obs*R-squared 4.087873 Prob. Chi-Square(2) 0.1295
Heteroskedasticity Test: Breusch-Pagan-Godfrey
F-statistic 1.3 38092 Prob. F(21,13) 0 .2987
Obs*R-squared 23.92942 Prob. Chi-Square(21) 0.2965
Scaled explained SS 4.547303 Prob. Chi-Square(21) 0.9999
Ramsey RESET Test
Equation: UNTITLED
Specification: AGOG AGOG(-1) AGOG(-2) AGOG(-3) MCAP MCAP(-1) MCAP(-2) MCAP(-3) STTRD STTRD(-1) LOG(ASI) LOG(ASI(-1)) FSD FSD(-1) FSD(-2) FSD(-3) TOPEN TOPEN(-1) TOPEN(-2) TOPEN(-3) INV INV(-1) C
Omitted Variables: Squares of fitted values
Val ue d f Proba bility
t-statistic 2.122078 12 0.1322
F-statistic 4.866462 (1, 12) 0.1322
F-test summa ry:
Sum of Sq. df
Mean
Squares
Test SSR 8.509588 1 8.509588
Restricted SSR 25.91617 13 1.993551
Unrestricted SSR 17.40658 12 1.450548
153
-12
-8
-4
0
4
8
12
10 11 12 13 14 15 16 17 18 19 20 21 22
CUSUM 5% Significance
-0.4
0.0

0.4
0.8
1.2
1.6
10 11 12 13 14 15 16 17 18 19 20 21 22
CUSUM of Squares 5% Significance
154
Hypothesis II
Dependent Variable: AGEMP
Method: ARDL
Date: 11/18/23 Time: 14:05
Sample (adjusted): 1989 2022
Included observations: 34 after adjustments
Maximum dependent lags: 4 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (2 lags, automatic): MCAP STTRD LOG(ASI) FSD TOPEN INV
Fixed regressors: C
Number of models evalulated: 2916
Selected Model: ARDL(4, 0, 2, 0, 2, 0, 2)
Varia ble Coe fficient Std . Error t-S tatistic P rob.*
AGEM P(-1) 0.5 14984 0.1 65615 3.1 09524 0 .0064
AGEMP(-2) 0.674669 0.223866 3.013712 0.0078
AGEMP(-3) -0.081577 0.241341 -0.338017 0.7395
AGEMP(-4) -0.463106 0.183768 -2.520061 0.0220
MCAP 0.022958 0.028736 0.798928 0.4354
STTRD -0.332116 0.211591 -1.569613 0.1349
STTRD(-1) 0.075249 0.168467 0.446669 0.6608
STTRD(-2) 0.320362 0.177483 1.805032 0.0888
LOG(ASI) -0.679898 0.269196 -2.525664 0.0218
FSD -0.089476 0.065059 -1.375296 0.1869
FSD(-1) -0.023839 0.063490 -0.375477 0.7119
FSD(-2) -0.133960 0.061582 -2.175306 0.0440
TOPEN 0.013961 0.013456 1.037486 0.3140
INV -0.080890 0.030937 -2.614696 0.0181
INV(-1) -0.006655 0.036603 -0.181812 0.8579
INV(-2) 0.096253 0.030892 3.115843 0.0063
C 24.07436 7.425888 3.241951 0.0048
R-squared 0.9 97896 Mean dependent var 44.1 8255
Adjusted R-squared 0.995915 S.D. dependent var 6.197289
S.E. of regression 0.396093 Akaike info criterion 1.292517
Sum squared resid 2.667123 Schwarz criterion 2.055697
Log likelihood -4.972790 Hannan-Quinn criter. 1.552783
F-statistic 503.8351 Durbin-Watson stat 1.854541
Prob(F-statistic) 0.000000
*Note: p-valu es and any subsequ ent tests do n ot account for m odel

selection.
155
ARDL Long Run Form and Bounds Test
Dependent Variable: D(AGEMP)
Selected Model: ARDL(4, 0, 2, 0, 2, 0, 2)
Case 2: Restricted Constant and No Trend
Date: 11/18/23 Time: 14:05
Sample: 1985 2022
Included observations: 34
Conditional E rror Correction Regression
Varia ble Coe fficient Std . Error t-S tatistic P rob.
C 24. 07436 7.4 25888 3.2 41951 0 .0048
AGEMP(-1)* -0.355031 0.092917 -3.820948 0.0014
MCAP** 0.022958 0.028736 0.798928 0.4354
STTRD(-1) 0.063496 0.320119 0.198350 0.8451
LOG(ASI)** -0.679898 0.269196 -2.525664 0.0218
FSD(-1) -0.247275 0.085790 -2.882318 0.0103
TOPEN** 0.013961 0.013456 1.037486 0.3140
INV(-1) 0.008709 0.028424 0.306399 0.7630
D(AGEMP(-1)) -0.129985 0.166155 -0.782315 0.4448
D(AGEMP(-2)) 0.544683 0.213805 2.547568 0.0208
D(AGEMP(-3)) 0.463106 0.183768 2.520061 0.0220
D(STTRD) -0.332116 0.211591 -1.569613 0.1349
D(STTRD(-1)) -0.320362 0.177483 -1.805032 0.0888
D(FSD) -0.089476 0.065059 -1.375296 0.1869
D(FSD(-1)) 0.133960 0.061582 2.175306 0.0440
D(INV) -0.080890 0.030937 -2.614696 0.0181
D(INV(-1)) -0.096253 0.030892 -3.115843 0.0063
* p-value inco mpatible with t-Boun ds distribution.
** Variable interpreted as Z = Z(-1) + D(Z).
L evels Equation
Case 2: Restricted Constant and No Trend
Varia ble Coe fficient Std . Error t-S tatistic P rob.
MC AP 0.0 64665 0.0 85440 0.7 56844 0 .4595
STTRD 0.178845 0.881224 0.202951 0.8416
LOG(ASI) -1.915039 0.545711 -3.509256 0.0027
FSD -0.696490 0.113147 -6.155622 0.0000
TOPEN 0.039323 0.034130 1.152142 0.2652
INV 0.024530 0.081885 0.299571 0.7681
C 67.80926 7.929817 8.551175 0.0000
EC = AGEMP - (0.0647*MCAP + 0. 1788*STTRD -1.9150*LOG(A SI) -0.6965
*FSD + 0.0393*TOPEN + 0.0245*INV + 67.8093)
F-Bounds Test Null Hypothesis: No levels relationship
Test Statistic Val ue Signif. I(0) I(1)
Asymptotic:
n=1000

F-statistic 4.764484 10% 1.99 2.94
k 6 5% 2.27 3.28
2.5% 2.55 3.61
1% 2.88 3.99
156
Actual Sample Size 34
Finite Sample:
n=35
10% 2.254 3.388
5% 2.685 3.96
1% 3.713 5.326
Finite Sample:
n=30
10% 2.334 3.515
5% 2.794 4.148
1% 3.976 5.691
157
ARDL Error Correction Regression
Dependent Variable: D(AGEMP)
Selected Model: ARDL(4, 0, 2, 0, 2, 0, 2)
Case 2: Restricted Constant and No Trend
Date: 11/18/23 Time: 14:06
Sample: 1985 2022
Included observations: 34
E CM Regressio n
Case 2: Restricted Constant and No Trend
Varia ble Coe fficient Std . Error t-S tatistic P rob.
D(AGEM P(-1)) -0.1 29985 0.1 13299 -1.1 47279 0 .2672
D(AGEMP(-2)) 0.544683 0.105812 5.147637 0.0001
D(AGEMP(-3)) 0.463106 0.121273 3.818704 0.0014
D(STTRD) -0.332116 0.093345 -3.557928 0.0024
D(STTRD(-1)) -0.320362 0.107397 -2.982974 0.0084
D(FSD) -0.089476 0.036849 -2.428175 0.0266
D(FSD(-1)) 0.133960 0.034761 3.853787 0.0013
D(INV) -0.080890 0.020289 -3.986798 0.0010
D(INV(-1)) -0.096253 0.021472 -4.482643 0.0003
CointEq(-1)* -0.355031 0.048398 -7.335574 0.0000
R-squared 0.7 24020 Mean dependent var -0.50 9125
Adjusted R-squared 0.620527 S.D. dependent var 0.541160
S.E. of regression 0.333362 Akaike info criterion 0.880752
Sum squared resid 2.667123 Schwarz criterion 1.329682
Log likelihood -4.972790 Hannan-Quinn criter. 1.033850
Durbin-Watson stat 1.854541
* p-value incom patible with t-Bound s distribution.
F-Bounds Test Null Hypothesis: No levels relationship
Test Statistic Val ue Signif. I(0) I(1)

F-statistic 4.764 484 10% 1.99 2.94
k 6 5% 2.27 3.28
2.5% 2.55 3.61
1% 2.88 3.99
158
0
1
2
3
4
5
6
7
-0.6 -0.4 -0.2 0.0 0.2 0.4 0.6
Series: Residuals
Sample 1989 2022
Observations 34
Mean -5.33e-15
Median -0.001122
Maximum 0.589456
Minimum -0.557890
Std. Dev. 0.284292
Skewness 0.121593
Kurtosis 2.562051
Jarque-Bera 0.355497
Probability 0.837153
Breusch-Godfrey Serial Correlation LM Test:
F-statistic 0.9 46619 Prob. F(2,15) 0 .4101
Obs*R-squared 3.810405 Prob. Chi-Square(2) 0.1488
Heteroskedasticity Test: Breusch-Pagan-Godfrey
F-statistic 2.2 75965 Prob. F(16,17) 0 .0511
Obs*R-squared 23.17916 Prob. Chi-Square(16) 0.1090
Scaled explained SS 4.525877 Prob. Chi-Square(16) 0.9977
Ramsey RESET Test
Equation: EQ01
Specification: AGEMP AGEMP(-1) AGEMP(-2) AGEMP(-3) AGEMP(-4) MCAP STTRD STTRD(-1) STTRD(-2) LOG(ASI) FSD FSD(-1) FSD(-2) TOPEN INV INV(-1) INV(-2) C
Omitted Variables: Squares of fitted values
Val ue d f Proba bility
t-statistic 1.282589 16 0.2179
F-statistic 1.645034 (1, 16) 0.2179
F-test summa ry:
Sum of Sq. df
Mean
Squares

Test SSR 0.248654 1 0.248654
Restricted SSR 2.667123 17 0.156890
Unrestricted SSR 2.418469 16 0.151154
159
-12
-8
-4
0
4
8
12
2006 2008 2010 2012 2014 2016 2018 2020 2022
CUSUM 5% Significance
-0.4
0.0
0.4
0.8
1.2
1.6
2006 2008 2010 2012 2014 2016 2018 2020 2022
CUSUM of Squares 5% Significance
160
Hypothesis III
Dependent Variable: AGEX
Method: ARDL
Date: 11/18/23 Time: 14:09
Sample (adjusted): 1988 2022
Included observations: 35 after adjustments
Maximum dependent lags: 3 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (2 lags, automatic): MCAP STTRD LOG(ASI) FSD TOPEN INV
Fixed regressors: C
Number of models evalulated: 2187
Selected Model: ARDL(3, 0, 1, 0, 2, 1, 2)
Varia ble Coe fficient Std . Error t-S tatistic P rob.*
AGEX (-1) 1.0 00438 0.1 37379 7.2 82303 0 .0000
AGEX(-2) -0.874807 0.188141 -4.649747 0.0002
AGEX(-3) 0.318569 0.150934 2.110651 0.0483
MCAP 0.034367 0.040511 0.848327 0.4068
STTRD 0.176181 0.343922 0.512269 0.6144
STTRD(-1) 0.939329 0.251747 3.731249 0.0014
LOG(ASI) 0.000458 0.261772 0.001750 0.9986
FSD -0.251465 0.080025 -3.142315 0.0054
FSD(-1) 0.044541 0.094890 0.469401 0.6441
FSD(-2) 0.370550 0.077199 4.799916 0.0001

TOPEN -0.031745 0.019364 -1.639373 0.1176
TOPEN(-1) 0.084953 0.018001 4.719261 0.0001
INV 0.035916 0.043753 0.820868 0.4219
INV(-1) -0.095681 0.055569 -1.721851 0.1013
INV(-2) 0.164557 0.047411 3.470835 0.0026
C -7.806207 3.963923 -1.969313 0.0637
R-squared 0.9 19280 Mean dependent var 0.93 9986
Adjusted R-squared 0.855554 S.D. dependent var 1.570538
S.E. of regression 0.596898 Akaike info criterion 2.109237
Sum squared resid 6.769465 Schwarz criterion 2.820253
Log likelihood -20.91164 Hannan-Quinn criter. 2.354680
F-statistic 14.42552 Durbin-Watson stat 2.223735
Prob(F-statistic) 0.000000
*Note: p-valu es and any subsequ ent tests do n ot account for m odel selection.
161
ARDL Long Run Form and Bounds Test
Dependent Variable: D(AGEX)
Selected Model: ARDL(3, 0, 1, 0, 2, 1, 2)
Case 2: Restricted Constant and No Trend
Date: 11/18/23 Time: 14:09
Sample: 1985 2022
Included observations: 35
Conditional E rror Correction Regression
Varia ble Coe fficient Std . Error t-S tatistic P rob.
C -7.8 06207 3.9 63923 -1.9 69313 0 .0637
AGEX(-1)* -0.555800 0.114367 -4.859790 0.0001
MCAP** 0.034367 0.040511 0.848327 0.4068
STTRD(-1) 1.115510 0.404960 2.754614 0.0126
LOG(ASI)** 0.000458 0.261772 0.001750 0.9986
FSD(-1) 0.163627 0.055214 2.963499 0.0080
TOPEN(-1) 0.053208 0.019275 2.760401 0.0125
INV(-1) 0.104792 0.044767 2.340808 0.0303
D(AGEX(-1)) 0.556238 0.109727 5.069266 0.0001
D(AGEX(-2)) -0.318569 0.150934 -2.110651 0.0483
D(STTRD) 0.176181 0.343922 0.512269 0.6144
D(FSD) -0.251465 0.080025 -3.142315 0.0054
D(FSD(-1)) -0.370550 0.077199 -4.799916 0.0001
D(TOPEN) -0.031745 0.019364 -1.639373 0.1176
D(INV) 0.035916 0.043753 0.820868 0.4219
D(INV(-1)) -0.164557 0.047411 -3.470835 0.0026
* p-value inco mpatible with t-Boun ds distribution.
** Variable interpreted as Z = Z(-1) + D(Z).
L evels Equation
Case 2: Restricted Constant and No Trend
Varia ble Coe fficient Std . Error t-S tatistic P rob.

MC AP 0.0 61833 0.0 74087 0.8 34596 0 .4143
STTRD 2.007033 0.867513 2.313548 0.0320
LOG(ASI) 0.000824 0.471038 0.001750 0.9986
FSD 0.294399 0.113748 2.588174 0.0180
TOPEN 0.095732 0.039466 2.425641 0.0254
INV 0.188542 0.100815 1.870173 0.0769
C -14.04499 8.561025 -1.640573 0.1173
EC = AGEX - (0.0618*MCAP + 2.00 70*STTRD + 0.0008*LOG(AS I) + 0.2944
*FSD + 0.0957*TOPEN + 0.1885*INV -14.0450)
F-Bounds Test Null Hypothesis: No levels relationship
Test Statistic Val ue Signif. I(0) I(1)
Asymptotic:
n=1000
F-statistic 7.713161 10% 1.99 2.94
k 6 5% 2.27 3.28
2.5% 2.55 3.61
1% 2.88 3.99
162
Actual Sample Size 35
Finite Sample:
n=35
10% 2.254 3.388
5% 2.685 3.96
1% 3.713 5.326
163
ARDL Error Correction Regression
Dependent Variable: D(AGEX)
Selected Model: ARDL(3, 0, 1, 0, 2, 1, 2)
Case 2: Restricted Constant and No Trend
Date: 11/18/23 Time: 14:09
Sample: 1985 2022
Included observations: 35
E CM Regressio n
Case 2: Restricted Constant and No Trend
Varia ble Coe fficient Std . Error t-S tatistic P rob.
D(AGE X(-1)) 0.5 56238 0.0 80344 6.9 23199 0 .0000
D(AGEX(-2)) -0.318569 0.082675 -3.853252 0.0011
D(STTRD) 0.176181 0.163939 1.074673 0.2960
D(FSD) -0.251465 0.046611 -5.394920 0.0000
D(FSD(-1)) -0.370550 0.049336 -7.510810 0.0000
D(TOPEN) -0.031745 0.011688 -2.716190 0.0137
D(INV) 0.035916 0.028649 1.253647 0.2252
D(INV(-1)) -0.164557 0.030434 -5.407045 0.0000
CointEq(-1)* -0.555800 0.060485 -9.189060 0.0000
R-squared 0.8 66123 Mean dependent var -0.00 7283
Adjusted R-squared 0.824931 S.D. dependent var 1.219510

S.E. of regression 0.510259 Akaike info criterion 1.709237
Sum squared resid 6.769465 Schwarz criterion 2.109183
Log likelihood -20.91164 Hannan-Quinn criter. 1.847298
Durbin-Watson stat 2.223735
* p-value incom patible with t-Bound s distribution.
F-Bounds Test Null Hypothesis: No levels relationship
Test Statistic Val ue Signif. I(0) I(1)
F-statistic 7.713 161 10% 1.99 2.94
k 6 5% 2.27 3.28
2.5% 2.55 3.61
1% 2.88 3.99
164
0
2
4
6
8
10
-1.00 -0.75 -0.50 -0.25 0.00 0.25 0.50 0.75 1.00 1.25
Series: Residuals
Sample 1988 2022
Observations 35
Mean -1.20e-15
Median -0.006542
Maximum 1.027572
Minimum -0.827448
Std. Dev. 0.446208
Skewness 0.545385
Kurtosis 3.119454
Jarque-Bera 1.755905
Probability 0.415633
Breusch-Godfrey Serial Correlation LM Test:
F-statistic 0.1 77120 Prob. F(2,17) 0 .8392
Obs*R-squared 0.714429 Prob. Chi-Square(2) 0.6996
Heteroskedasticity Test: Breusch-Pagan-Godfrey
F-statistic 2.0 67658 Prob. F(15,19) 0 .0682
Obs*R-squared 21.70396 Prob. Chi-Square(15) 0.1158
Scaled explained SS 6.778037 Prob. Chi-Square(15) 0.9635
Ramsey RESET Test
Equation: EQ01
Specification: AGEX AGEX(-1) AGEX(-2) AGEX(-3) MCAP STTRD STTRD(
-1) LOG(ASI) FSD FSD(-1) FSD(-2) TOPEN TOPEN(-1) INV INV(-1)
INV(-2) C
Omitted Variables: Squares of fitted values
Val ue d f Proba bility
t-statistic 2.399317 18 0.1203

F-statistic 12.35399 (1, 18) 0.1203
F-test summa ry:
Sum of Sq. df
Mean
Squares
Test SSR 3.507421 1 3.507421
Restricted SSR 6.769465 19 0.356288
Unrestricted SSR 3.262044 18 0.181225
165
-15
-10
-5
0
5
10
15
2004 2006 2008 2010 2012 2014 2016 2018 2020 2022
CUSUM 5% Significance
-0.4
0.0
0.4
0.8
1.2
1.6
2004 2006 2008 2010 2012 2014 2016 2018 2020 2022
CUSUM of Squares 5% Significance
166
Biodata
A. Personal information
1. Full name: Kazeem Adewale OSHONIYI
2. Address: Road B Plot 41, Golden Estate, off Ajibode Ibadan.
3. Date and Place of Birth: 1st August, 1978. Ibadan North
4. Nationality: Nigeria
B. Name and Address of Next of Kin: Mrs. ADEWALE Ganiyah Motunrayo
Road B Plot 41, Golden Estate, off Ajibode Ibadan
C. Educational Background
Lead City University, Ibadan, Oyo State (MSc Economics) In view
Ladoke Akintola University of Technology, Ogbomosho Masters (Public Admin) 2022
University of Ibadan Bsc (Hons) Economics 2017
Federal Polytechnic, Ede, Osun State. HND Statistics 2003
Federal Polytechnic Ede, Osun State. ND statistics 1999
Federal Polytechnic Ede, Osun State. ND Secretariat Administration 1996
Oba Akinbiyi High school 1,Mokola Hill Ibadan. 1994
St. Johns RCM School, Nalende Ibadan 1989
D. Working Experience with Dates
O.P.S. Towojo & Co (Chartered Accountants) audit clerk 1993-1995

Nigerian Correctional Services, Prison's Staff College, Kakuri, Kaduna state)
(Advance Mathematics Instructor) 2003-2006
Oyo State Government (Senior Statistician) 2009 till date
Chairman Ibadan North local government 2019-2021
E. Award and Fellowship:
Second best LG Chairman, Oyo State 2020
Best LG chairman in Ibadanland 2020
Patron, Oyo State Man o war 2021
Patron NAPSGAST, Oyo State 2023
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F. Membership of Academic Professional Body:
Associates, Nigerian Institute of Management (MNIM)
Fellow, Institute of Professional Managers and Administrators (FIPMA)
Member, Ibadan Golf Club (MIGC)
G. Publications (if any): NIL

_____ _____
Signature Date
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University Compliance Certification
This is to certified that this thesis written by Kazeem Adewale OSHONIYI with Matric No: LCU/PG/002626 in the Department of Economics, Faculty of Management and Social Sciences, Lead City University, Ibadan, is in full compliance with the approved University format and style.

_____ _____
Signature Date