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FINANCIAL DEVELOPMENT, TRADE OPENNESS AND ECONOMIC GROWTH: EVIDENCE FROM THE SUB-SAHARAN AFRICAN COUNTRIES

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This is to certify that the thesis prepared by Worku Teshome entitled*: Financial Development, Trade openness and Economic growth evidence from the sub-Saharan African countries* and submitted in Partial Fulfillment of the Requirements for the award of Master of Science Degree in Economics (Economic Policy Analysis) complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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LIST OF ACRONYMS

CV	Control variable
FD	Financial development
FDI	Financial development index
FE	Fixed Effect
GCF	Gross capital formation
GDP	Gross domestic product
GLS	Generalised Least Squares
GNP	Gross national product
GMM	Generalized method of moments
GS	Government spending
IMF	International monetary fund
OLS	Ordinary Least Square
RE	Random Effect
RGDP	Real gross domestic product per capita
SSA	Sub-Saharan African countries
TO	Trade openness

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ABSTRACT

Over the last three decades, economists have paid close attention to the relationship between financial development, trade openness, and economic growth. Despite much research on the subject, empirical data is inconclusive. This is especially true for research that looks at African countries experiences. The main objective of this study was to examine the interaction between financial development, trade openness and economic growth in Sub-Saharan African (SSA) countries. The study applies System GMM (One-step system GMM and Two-step system GMM) dynamic panel data models for a sample of 32 Sub-Saharan Africa countries over the period from 2005 to 2019. Model diagnostic tests are used in the study to guarantee that the estimation results are accurate. According to the revealed results financial development and trade openness are both positive and have significant effect on economic growth in Sub-Saharan African countries. Our results also show that trade openness positively affects economic growth directly and indirectly through its positive effect on financial development. Furthermore, our results also show that government spending and inflation have a negative and significant effect on economic growth while, gross capital formation has positive and significant effect on economic growth in Sub-Saharan African countries. Moreover our findings show that there is bidirectional causality between GDP per capita and Trade openness. On the other hand, there is a unidirectional causation from financial development to GDP per capita and from trade openness to financial development. But the reverse is not true. These empirical findings have significant policy implications for governments pursuing financial development and trade openness initiatives to boost economic growth in Sub-Saharan Africa.

Key words: *financial development, trade openness, economic growth, SSA countries, System GMM*

CHAPTER 1: INTRODUCTION

1.1 Background

The level of financial development and the degree of trade openness are two macroeconomic variables that the empirical economic growth literature has found as being substantially linked with growth performance across countries(Beck, 2002).Theoretical perspectives on the finance-growth nexus offer a variety of ways by which financial development enhances economic growth. The growth of the financial sector provides for risk diversification and risk management, as well as easier exchange by lowering transaction costs and better resource allocation through the dissemination of information about investment opportunities (Goldsmith, 1969; Shaw, 1973; Bencivenga and Smith, 1991; King and Levine, 1993; Bencivenga, et al., 1995; De Gregorio and Guidotti, 1995). In terms of trade openness, the theoretical literature on international trade claims that trade promotes economic growth by allowing for more efficient resource allocation, spread of knowledge and technology, and better economies of scale(Grossman and Helpman, 1991,Markusen et al., 1995).Many developing nations have implemented liberalization policies with the goal of opening up and integrating themselves into the global market in order to promote their economic development in light of these anticipated benefits from trade and financial development.

Developing countries are unable to fully exploit the technological and economic benefits of technology transfer due to financial constraints. This may cause some countries to deviate from the global production frontier's growth pace(Aghion et al., 2005)

Developing countries with an under developed financial system have slower per-capita GDP growth and less financial development, and are more likely to be impoverished. This phenomenon can be interpreted as evidence that developing countries are caught in a vicious cycle: on the one hand, an underdeveloped financial system prevents a poor economy from fully utilizing financial services to promote economic growth, and on the other hand, slow economic growth does not generate sufficient demand for financial services required for financial development(Fung, 2009). Countries with more sophisticated financial systems, on the other hand, tend to grow quicker over time (Levine, 2005),

Others, emphasizes that financial development is a critical factor in fostering long-run economic growth because finance facilitates growth by allowing efficient intertemporal resource allocation, capital accumulation, and technological innovation(Levine, 2005). In addition, Blackburn and Hung's (1998)theoretical model indicates that both financial development and international trade liberalization will boost economic growth. This paper also devoted to examine the effect of financial development and trade openness on economic growth employing System Generalized Method of Moments (System-GMM) dynamic panel data estimation.

1.2 Statement of the Problem

In macroeconomics, the effects of financial development and trade openness on growth have been hotly debated. The debate has gotten more attention in the theoretical and empirical literature, but it is still unresolved. Most studies argued that financial development and trade openness have positive effects on economic growth(ASGHAR and HUSSAIN,2014 and Kar et al., 2008). Notwithstanding, other researchers emphasized financial development and trade openness have negative effects on economic growth (Samargandi et al., 2015);(Yücel, 2009) and Huchet-Bourdon et al.,(2018). The relationship between financial development, trade openness, and economic growth have long-run relationships(Chandrashekar et al., 2018,Zghidi and Abida, 2014). The relationship between financial development, trade openness, and economic growth have no long-run relationships(HONG et al., 2018). The effect of financial development and trade openness have no significant effect on economic growth(see Menyah et al., 2014).The effect of financial development and trade openness have significant effect on economic growth(see Zghidi and Abida, 2014) . Furthermore, there was no consensus in previous studies about the direction of causality between trade openness, financial development, and economic growth. So that financial development, trade openness, and economic growth have not yet provided a definitive answer to the question concerning the relationship between financial development, trade openness, and economic growth.

Even though there are many studies on financial development, trade openness, and economic growth, other few studies appear to be analyzed in Sub-Saharan African countries comprehensively. Among these Menyah et al(2014) and Gries et al(2009) investigated the relationship between financial development, trade openness, and economic growth specifically

on SSA countries. Both studies, however, did not go detail into the peculiar characteristics of Sub-Saharan African countries. Furthermore, this research looked into Sub-Saharan African countries in depth.

Another profound reason for this study is the lack of robust empirical evidence concerning financial development, trade openness, and economic growth in economics literature where previous studies mostly depend on the cross-sectional analysis(Ndebbio, 2004). Because the nature of growth is dynamic, cross-sectional analysis is not applicable. Instead, panel data analyses provide greater information, variability, and efficiency (Green, 2003).Other benefits include panel data are not only suitable to model or explain why individual units behave differently but also to model why a given unit behaves differently at different periods including better power properties of the testing procedures with dynamic analysis when compared to other methods (Verbeek, 2014).

In addition, many studies in the literature on financial development, trade openness, and economic growth used OLS, fixed or random effect estimation techniques to investigate the effect of financial development and trade openness on economic growth (see Bist(2018),Nyamongo et al.,(2012), Salahuddin and Gow(2016), Muhammad (2016)and Oloyede et al., (2021)). These estimating strategies, on the other hand, are skewed and fail to address the endogeneity problem that comes with dynamic panel data analysis (Roadman, 2009). Endogeneity, biasedness, country-specific heterogeneity, and serial correlation concerns were all addressed using the System Generalized Method of Moments (System-GMM), which was created by Blundell and Bond (1998) to handle OLS, fixed or random effect estimating problems.

Furthermore, to the best of the researcher's knowledge, previous studies in the literature on the relationship among financial development, trade openness, and economic growth have only used a single indicator to quantify financial development, like credit to the private sector as a percentage of GDP or broad money as a percentage of GDP (see De Gregorio and Guidotti, 1995; Demetriades and Hussein, 1996; Beck et al., 2000; Levine et al., 2000; Quartey and Prah, 2008; Uddin et al., 2013; Adeniyi et al., 2015), this gap is filled by a more comprehensive measure of financial development . In this study financial development measured by financial development index developed by international monetary fund (IMF). Financial development

index develop with a combinations of financial institutions (depth, access, and efficiency) and financial markets (depth, access, and efficiency).

The following are the central questions raised and addressed in this study:

I. Does financial development promote economic growth in Sub-Saharan African countries?
II. Does trade openness promote economic growth in Sub-Saharan African countries?
III. What appears to be the causal relationship between financial development, trade openness, and economic growth?

1.3. Objective of the Study

1.3.1. General Objective

The general objective of this study is examining the relationship among financial development, trade openness, and economic growth in SSA countries using System-GMM dynamic panel data estimation.

1.3.2. Specific Objective

I. To investigate the effect of financial development and trade openness on economic growth in Sub-Saharan African countries.
II. To examine the indirect effect of trade openness on economic growth though financial development.
III. To determine if there is causation between financial development, trade openness and economic growth and the direction of the causality.

1.4. Significance of the Study

In Sub Sahara African countries, the number of studies conducted so far on the relationship between financial development, trade openness, and economic growth which is investigated with advanced dynamic panel data model is limited in number, in which further study is require in the region. Therefore, this study will help in filling knowledge gap in the area. Specifically, the findings may help to understand the effect of financial development and trade openness on

economic growth and the indirect effect of trade openness on economic growth though financial development especially in Sub-Saharan African countries. The findings of this study will be valuable in enhancing policy design, institutional setup, and implementation of important policies on financial development, trade openness, and economic growth, particularly in Sub-Saharan African countries. Furthermore, it has the potential to spark future research in the area.

1.5. Scope and Limitation of the Study

This study used panel data from 2005 to 2019 Sub Saharan African countries to investigate the relationship between financial development, trade openness, and economic growth using the System-GMM estimation approach. This study is devoted to cover 32 Sub Saharan Africa countries under analysis based on data availability. As data on many of the variables considered in the study are not available for many of the nations before 2005, this study is confined to the years 2005 to 2019. As a result, one of the key limitations of this study is the difficulty in obtaining data for all SSA nations and for a longer period of time in the region.

1.6. Organization of the Study

The structure of this study is organized as follows: Chapter one presented the introduction part. In chapter two relevant theoretical, empirical, and conceptual frame works related to the topic has been presented. In Chapter three model specifications, data source and type, and the estimation techniques were discussed. The main findings and results are discussed in Chapter four. And the final part, chapter five forwards conclusions and policy implications.

CHAPTER 2: REVIEW OF THEORTICAL LITREATUE AND EMPIRICAL EVIDENCES

A review of the literature is critical not just for understanding the challenges at hand, but also for finding gaps, planning, and executing other people's experiences. Furthermore, the ability to recognize essential questions and gaps in empirical research provides a strategy for answering questions and filling gaps to the greatest extent possible, which aids in the study's logical conception. This chapter presents the review of theoretical literature and empirical findings of studies related to financial development, trade openness, and economic growth with an emphasis on their relationship. However, many theoretical and empirical studies on financial development, trade openness, and economic growth raise important questions about definition, measurement, data (i.e. inconsistency between official and other estimates), and the magnitude of shifts and factors affecting them. After that, in the last section of this chapter, the conceptual framework is built and provided in order to provide a legitimate formulation of the study.

2.1. Theoretical Literature Review

We'll now look at the definitions of concepts and theories related to financial development, trade openness, and economic growth, as well as their specific explanations and measurement issues.

2.1.1. Economic Growth

Some of the most interesting, important, and challenging areas of modern social science are the processes of economic growth and the sources of differences in economic performance across nations. The analysis of the process of economic growth was a central feature of the work of the classical economists, most notably Adam Smith, Thomas Malthus, David Ricardo, and Karl Marx, who were all concerned with the growth of the economy (I.e., economic growth is the increase in the production of goods and services over time).

Economic growth is defined as in different ways. Economic growth is defined as an increase in national income per capita, gross domestic product, and gross national product, hence increasing national wealth, including productive capacity, expressed in both absolute and relative size, per capita, and includes also economic structural changes(Haller, 2012). According to Todaro and

Smith (2003) and Gillis *et al.* (1987) economic growth defined as a steady process by which the productive capacity of the country's economy is increased over a period of time to bring about rising levels of national output and income. According to Kuznets (1974) economic growth defined as an increase in a country's per-capita real gross domestic product (GDP), this means widening of the scale of production in a country as a whole, or more efficient use of its scarce economic resources to produce goods and services.

2.1.2. Financial Development

The word "financial development" refers to an increase in the number of financial services provided by banks and other financial intermediaries, as well as an increase in capital market financial(Hussain & Chakraborty, 2012).The policies, circumstances, and institutions that contribute to efficient intermediation and effective financial markets are referred to as financial development(Adnan, 2011)

The financial sector is defined as "the wholesale, retail, formal, and informal institutions in an economy offering financial services to consumers, businesses, and other financial institutions; it includes everything from banks, stock exchanges, and insurers, to credit unions, microfinance institutions, and money lenders," according to the Department of International Development (2004). We may now refer to what financial sector development looks like from different researchers once we have a more comprehensive description for the financial sector. The concept of financial development has been defined by various academics: According to Shaw (1973)the accumulation of financial assets at a faster rate than non-financial assets is referred to as "financial development." For Levine(2005)financial development happens when financial instruments, markets, and financial intermediaries reduce, but do not necessarily eliminate, the costs of acquiring information, executing contracts, and transacting, and as a result, do a better job of providing financial services. Financial development can be characterized broadly as an increase in the quantity, quality, and efficiency of financial intermediary services.

Financial development is difficult to measure because it is a broad concept with many dimensions(Nastu et al., 2020). Ndikumana (2001) divided the financial development indicators utilized in empirical studies into three groups: monetary aggregates, stock market indicators, and structural and institutional indicators. Because monetary aggregates such as M1 and M3 are

publicly available, the indicators were first based on them. Researchers also changed to larger definitions (M3), which refers to the banking system's liquid liabilities. This measure, however, is not without criticism. First, it contains currency, which has been criticized for measuring monetization rather than financial intermediation; second, Demetriades and Hussein(1996)have questioned the validity of using such a variable (M3 expressed as a percentage of GDP) to test the hypothesis that financial development leads to economic growth because GDP is a component of both focus variables. Furthermore, as king and Mckinnon(2005) point out, the availability of foreign funds in the financial system makes this an insufficient indicator of financial development.

Bank credit to the private sector is an alternative and widely used measure of financial development, which is frequently believed to be a superior measure of financial development. The absence of loans to the public sector better reflects the level of efficient resource allocation since the private sector is able to use funds in a more efficient and productive manner than the public sector(Getachew, 2016.).

Another variable used as a measure is the ratio of commercial bank assets divided by commercial bank plus central bank assets, which was developed by King and Levine(1993). Despite the fact that all of these measures are closely connected, there is no consensus on which proxies are best for gauging financial development, others, such as(“Khan and Senhadji (2000) and Abg and Mckibbin (2005) have used principal component analysis to try to solve the difficulty of assessing the depth of financial development. This kind of study is used to generate a proxy that portrays the overall development of the financial sector while taking into account the relevant financial proxies. As a result, the new index adequately addresses the issues of multi-co linearity and over-parameterization.

All of the foregoing indicators, however, are proxy measures for a bank-based economy and do not take stock market fluctuations into consideration.(Demirguc-Kunt and Levine (1996)solved this challenge by constructing stock market development indicators based on data from 41 countries from 1986 to 1993. (a) Market size is determined by the market capitalization ratio, which equals the value of listed shares divided by GDP; (b) Market liquidity is determined by the total value traded ratio, which equals the total shares traded on the stock market exchange divided by GDP, and the turnover ratio, which equals the value of total shares traded divided by

market capitalization; and (c) Market volatility is determined by the twelve-month rolling standard deviation estimate based on market returns.

Structure and institutional indicators give data that can be used to measure the efficiency and sophistication of financial systems directly or indirectly. Financial structure indicators (bank-based or market-based financial systems), banking regulatory indicators, banking ownership structure indicators, and banking concentration indicators give information on the degree of concentration in the banking industry(Demirguc-Kunt & Levine, 1999).

Others have looked at the basic reasons of cross-country disparities in financial development in addition to discussing financial development measurement. Huang(2005), for example, claims that a country's level of financial development is determined by its institutional quality, macroeconomic policies, geographic characteristics, income level, and cultural characteristics, whereas Stiglitz (1994) and Demirgüç-Kunt and Levine (2008)emphasize the role of the state in shaping the operation of financial systems, particularly in developing countries.

Financial development, according to the international monetary fund (IMF) (2016), is a combination of market depth (market size and liquidity), access (individuals' and enterprises' ability to get financial services), and efficiency (ability of institutions to provide financial services at low cost and with sustainable revenues, and the level of activity of capital markets). Because financial systems differ so much between countries, it's necessary to look at a variety of metrics to assess financial development. To overcome the shortcomings of single indicators as proxies for financial development IMF developed financial development index from the combinations of financial institutions (depth, access, and efficiency) and financial markets (depth, access, and efficiency). As a result, a multifaceted strategy to defining financial development is required. My desire is for financial development to be measured in terms of financial institutions (depth, access, and efficiency) and financial markets (depth, access, and efficiency). Therefore we will use financial development index as a measurement of financial development.

2.1.3. Financial Development and Economic Growth

The debate over the role of financial development in economic growth continues to rage, attracting a slew of theoretical and empirical studies that look at the link between the two (Murinde, 2012). The essential question is (a) whether the financial sector drives economic growth or (b) if economic growth explains financial sector expansion. The first theory, known as ‘supply-leading,' asserts that financial development is a necessary precondition for economic growth; as a result, finance precedes economic growth, and causality runs from financial development to economic growth. The number and composition of financial development variables, according to proponents, cause economic growth by directly increasing savings in the form of financial assets, resulting in capital formation and thus economic expansion(King & Levine, 1993).In contrast to the preceding, the second theory, known as 'demand-following,' says that finance follows rather than leads economic growth, and that finance plays a minimal role in growth. Finance, according to this logic, is only a by-product or an effect of economic expansion on the real side (Robinson, 1952).As a result, more financial institutions, financial products, and services are said to arise in response to increased demand for financial services as an economy grows. As a result, as the economy's real sector improves, so does the financial system, expanding the chances for obtaining cash for investment and risk reduction. The lack of financial institutions in emerging countries, according to proponents of the "demand-following" hypothesis, indicates a lack of demand for their services.

A stronger and better financial system can also enhance GDP by increasing aggregate savings and investment rates, allowing physical capital to accumulate more quickly. Financial development also encourages growth by increasing competition and fostering creative activities that increase dynamic efficiency(Estrada et al., 2010). According to Bencivenga and Smith (1991), financial development affects economic growth primarily through boosting capital's marginal productivity by moving funds from less productive to more productive uses and also by increasing the rate of saving. Inefficient financial institutions are frequently connected with economic crises, whereas efficient financial institutions are usually associated with stronger economic growth (Ang, 2008). The financial sector, according to Schumpeter (1912), drives innovation, which in turn propels economic expansion. According to the World Bank (2001), financial development has a vital role in an economy's growth, that it is a basic prerequisite in

poverty alleviation, and that it is significant in income distribution improvement. A well-developed financial system could be a critical tool of promoting healthy and long-term growth. In contrast, an underdeveloped financial sector and limited access to credit are significant impediments to economic progress (Gelbarde and al, 2014).According to Schumpeter (1934), financial development acts as a catalyst for economic growth due to its influence on creative investments.

The financial system can influence the capital stock in three ways that are important for growth. First, through intermediation among various types of asset-holders, financial institutions can support a more efficient allocation of a given total quantity of physical wealth (capital in a wide sense) by bringing about changes in its ownership and composition. Second, by acting as a conduit between savers and entrepreneurs, financial institutions can support a more efficient allocation of new investment-additions to capital stock-from relatively less productive to comparatively more productive purposes. Third, they can improve the rate of capital accumulation by increasing the incentives to save, invest, and labor(Patrick, 1966). In a mature financial system, financial intermediaries can take on the responsibility of project monitoring, cutting transaction costs and channeling higher savings towards new investments, thereby enhancing economic growth(Blackburn and Hung, 1998) . The development of the financial sector has the potential to influence the saving rate, hence influencing the rate of economic growth (Tsuru, 2000).

2.1.4. Trade Openness

The sum of imports and exports, normalized by GDP, is the measure of trade openness(Lloyd & MacLaren, 2002). Trade openness is defined as the ratio of total trade to GDP. The degree to which an economy retains its outward orientation in commerce is known as trade openness(Fujii, 2019). The ratio of real exports plus imports to GNP or GDP is a typical indicator of trade openness. The figures in the numerator and denominator are in current prices, which make this measure difficult to use. Because of changes in the exchange rate or other relative price movements, the prices of products and services traded globally and those produced domestically may diverge over time. A second, more important issue is that this measure of openness is

influenced by two sets of factors: resource endowments, country size, tastes, technology, and other comparative advantage determinants, and trade barriers(Lloyd & MacLaren, 2002).

2.1.5. Trade Openness and Economic Growth

The importance of trade in supporting economic growth has sparked a growing number of economic studies since the works of Grossman and Helpman(1990),Romer(1990), and Young(1998).The question is whether trade, as stated by the trade-led growth theory, functions as an engine for economic expansion. Trade openness has been proved to increase economic growth in the long run by offering access to commodities and services, increasing resource efficiency, and enhancing total factor productivity through technological diffusion and knowledge dissemination(Barro and Sala-I-Martin(1997) and Rivera-Batiz and Romer(1991)).

Increased trade liberalization has both anti- and pro-growth consequences. Export expansion, according to neoclassical economists, is the primary engine of economic growth(Helpman & Krugman, 1985a). Bhagwati (1988) claimed that economic expansion promotes both the supply and demand sides of the economy, leading to the export hypothesis. The selection effects of the Hopenhayn–Melitz model raise the estimated cost of introducing a new variety, which leads to slow growth. The effect of freer trade on the marginal cost of inventing causes the pro-growth effect(Baldwin & Robert-Nicoud, 2008)

Grossman and Helpman (1991) created an endogenous growth model in which trade between rich and developing countries can increase the less developed country's long-term growth rate under specific conditions. In 1993, Taylor combined the Ricardian trade model of Dornbusch et al. (1977) with the quality ladder endogenous growth model of Grossman and Helpman (1991) (de Souza and Batista, 2011). They show that more trade openness leads to faster economic growth. Furthermore, trade openness encourages resource efficiency, factor accumulation, technological diffusion, and knowledge spillovers. Asia has been a display of economic performance, according to Kuroda (2006), where an external trade policy plays a vital role(Trejos & Barboza, 2015).Other theories for the Singer-Prebisch thesis, on the other hand, argue that trade openness may be detrimental to growth (Tekin, 2012). Spilimbergo (2000) proposes a model in which trade between advanced and developing countries can diminish the developed country's long-term growth rates.

Rivera-Batiz and Romer's (1991) and Grossman and Helpman's (1991) models established a solid theoretical basis for relating trade policy to economic growth. According to these models, trade openness provides four distinct prospects for economic growth:

I. Communication effect: Trade openness allows for communication with overseas counterparts, which facilitates technology dissemination.
II. Duplication effect: Some ideas and technology are duplicated in numerous nations due to a lack of trade openness. Openness promotes local enterprises to generate fresh and different ideas and technologies, preventing duplication of research and development efforts.
III. Integration effect: International trade instantly expands the market available to each firm. Assuming that both intermediate and final goods are exchanged across borders, a greater market size in the research and development sector increases research and development activity and, as a result, economic growth since this sector is subject to increasing returns to scale.
IV. Allocation effect: Trade openness, according to the principle of comparative advantage, enables countries to specialize in the production of commodities and services in which they are relatively most efficient. In other words, trade openness allows countries to optimize production from a given resource intake, which is a step toward environmental sustainability.

2.1.6. Financial Development and Trade Openness

There is now a growing body of research looking into the relationship between trade openness and financial development (Baltagi et al., 2009). According to Rajan and Zingales(2003), interest groups (incumbents) are frequently opposed to financial development because it creates more competition due to generates possibilities for new enterprises to establish themselves, which erodes their rents. They suggest that simultaneous liberalization of trade and capital flows will weaken incumbents' power, hence increasing financial development. Financial development is increased when a country's borders are open to both capital flow and trade at the same time(Law and Demetriades,2006). Beck (2002) observed that nations with a more developed financial system have a greater export share and positive trade balance in manufactured products.

According to McKinnon (1991), trade openness promotes financial development, particularly in developing nations. Trade openness does, in fact, play an important influence in determining the level of financial development. Trade openness has a negative short-run influence on financial development but a positive long-run effect. Trade liberalization will alter demand for external finance, and therefore financial depth, in trading countries. When a wealthy country begins dealing with a poor one, it will automatically boost production of the financially dependent good and strengthen its financial system. In the impoverished country, on the other hand, the financially dependent sector will contract, resulting in a reduction in the size and quality of the country's financial system (Do & Levchenko, 2004). In the end, when a poor country no longer requires the financially dependent good, trade reduces demand for foreign finance, and the local financial system suffers. This could result in trade losses for the poor countries, as one might predict given that the financially reliant industry has external consequences, resulting in increased returns to scale across the economy(Helpman and Krugman,1985)

2.1.7. Relationship between Financial Development, Trade Openness and Economic Growth

(Gries et al., 2009) argue that linking financial development and trade openness together could lead to more complex economic development paths. Increased trade openness, in particular, may increase economic growth where financial depth is found to enhance growth via the allocative and accumulative channels. However, if financial deepening leads to trade openness, it may support economic development in areas where trade openness is determined to be a growth factor.

The relationship between financial development and trade openness allows for numerous economic development paths. On the one hand, more trade opening can lead to increased financial development, which can boost economic growth, especially finance-led growth via the allocation channel and accumulation. Finance, on the other hand, can enhance growth by promoting trade openness, which is viewed as a growth factor. Trade openness can aid economic growth in a variety of ways, including as boosting a country's level of specialization or having a favorable effect on innovation and technology development(Ho et al., 2021).

The figure below indicates that financial development has a direct effect on economic growth, whereas trade openness has a direct and indirect effect on economic growth through financial development.

The possible relationships between the variables are illustrated in below diagram.

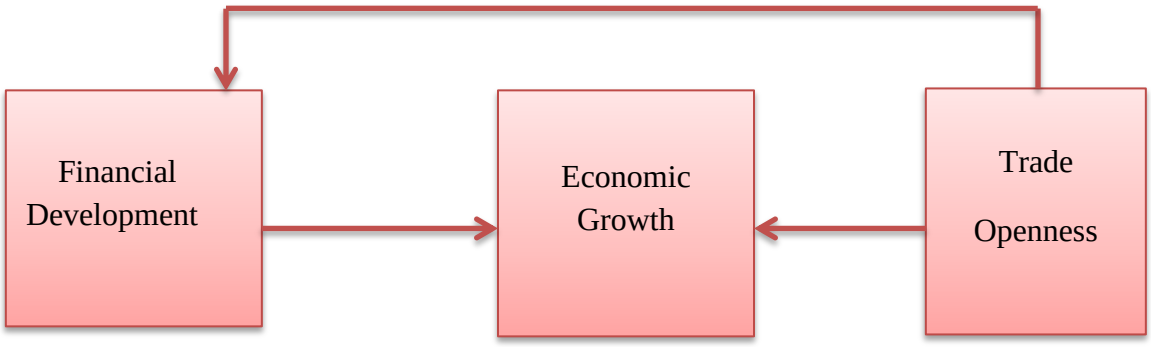

Figure 2.1:the relationship between financial development, trade openness and economic growth (source:Ho et al., 2021).

2.2. Empirical Evidences

Several empirical studies have attempted to analyze the relationship between financial development, trade openness, and economic growth. When we look at the empirical literature, we notice that most extant research on the issue have little in common. Some studies have successfully proven the beneficial association between financial development, trade openness, and economic growth, whereas others have been unable to do so. A number of these studies have found a positive and significant relationship between financial development, trade openness, and economic growth, including studies conducted by Udegbunam (2002) used the ordinary least square estimator to investigate the relationship between trade openness, economic growth, and financial development in Nigeria from 1970 to 1997. According to the study, a combination of financial development and trade openness had a strong positive and significant effect on Nigeria's economic growth. Beck and Levine (2004) examines the effect of stock market and bank expansion on economic growth in 40 countries from 1976 to 1998. The results of the Generalized Method of Moments (GMM) estimators reveal that financial development and trade openness have a beneficial and significant influence on economic growth. Mohamed Sghaier (2014) examines the link between trade openness, financial development, and economic growth

on a panel of four North African countries using a GMM panel data model over a five-year period from 1991 to 2015, founds that both trade openness and financial development have a significant and positive effect on economic growth. Kaplan (2008) used a VAR model to analyze the link between trade liberalization, financial development, and economic growth in Turkey from 1963 to 2005 and concluded that trade openness and financial development has a favorable long-run effect on growth. Mohammad Tash (2012) analyzed the joint effect of trade liberalization and financial development on economic growth by using VAR model from the period 1966-2010; founds that both trade openness and financial development have a significant and positive on economic growth. Chandio et al. (2017) using a VAR model to analyze the link between trade openness, financial development, and growth in Pakistan from 1970 to 2014; the results show that financial development and trade openness have a positive and significant effect on economic growth in Pakistan. Altaee and Al-Jafari (2014) using the ARDL model from 1980 to 2012 to explore the relationship between trade openness, financial development, and economic growth in the Kingdom of Bahrain. According to the study, both financial development and trade openness have a positive and significant effect on growth.

Others, in contrast to these studies that indicated a favorable relationship between financial development, trade openness and economic growth, have shown a negligible or negative relationship. For example Yucel (2009) investigated the links between financial development, trade openness, and economic growth in Turkey. The study found that financial development had a negative effect on growth using the VAR model from 1989 to 2007. Samargandi et al. (2015) used pooled mean group estimations to analyze the link between financial development and economic growth in a panel of 52 middle-income countries from 1980 to 2008. Financial development, according to the study, has a negative and insignificant effect on economic growth. Huchet-Bourdon et al (2018) investigated the relationship between trade openness and economic growth used a generalised method of moment estimator (GMM) on a panel of 169 countries between 1988 and 2014. The study found that trade openness had a negative effect on economic growth. Vlastou (2010) investigated the relationship between trade openness and economic growth for a sample of 34 African nations from 1960 to 2003 using panel co-integration analysis and causality tests, and found that trade openness has a negative influence on economic growth.

Table 2.2 Some Empirical Studies on financial development-trade openness-growth

Authors	Study Area	Method/estimation technique	Conclusion
Financial development, trade openness, and economic growth			
Asghar and Hussain (2014)	15developig countries	Panel data analysis/ causality approach	Financial development and trade openness positive effect on economic growth. The results of the study point out low effect of financial development on economic growth.
HONG et al., (2018)	China	ARDL model	Both financial development and trade openness promote economic growth. Financial development and trade openness reinforces each other.
Kar et al., (2008)	Turkey	VAR model	Financial development and trade openness positively contributes to economic growth.
Menyah et al., (2014)	Sub-Saharan Africa(21-countries)	Panel data analysis/ causality approach	Financial development and trade liberalization do not seem to have made a significant effect on growth.
Chandrashekar et al., (2018)	India	ARDL model and Granger causality test	A change in financial development precedes change in trade openness and this leads to increase in the economic growth.
Karet al., (2013)	Turkey	VAR model	Economic growth depends upon trade liberalization through external finance.
Danlamiet al.,(2018)	Nigeria	ARDL model	Financial development positive effect on economic growth. Trade openness did not have a meaningful contribution to output growth.

Ho et al(2021)	Asian(6-countries)	Panel data analysis/ Fixed effect model (FEM) and random effect model (REM	Trade openness has a significant positive effect on the economic growth whereas the financial development is positively, but insignificantly effect on growth.
Zghidi and Abida(2014)	North African (4- countries)	Panel data analysis/ GMM estimation	Trade liberalization and financial development both have a favorable effect on economic growth.
Keho(2020)	West African (11-countries)	Multiple regression /Correlated Mean Group method	On average, financial development and trade openness have a positive effect on real per capita income. There is no significant influence of financial development on real per capita GDP in three countries (Gambia, Mali, and Sierra Leone). Similarly, trade openness has no significant effect on economic growth in four nations (Burkina Faso, Gambia, Niger, and Nigeria). Trade openness, on the other hand, has a negative influence on Ghana's real per capita GDP.

2.3. Economic Growth, Trade Openness and Financial Development in SSA countries

While there are many reasons for Africa's poor economic growth, there is no doubting that past impediments to free international trade and a lack of financial development are two major aspects that may have contributed to the continent's poor economic performance(Beck et al., 2011;Ndulu,2007). Many African countries are still making relatively limited economic progress, despite recent policy improvements such as financial liberalization and development,

as well as increased attempts at integration into the global economy. Over the last two decades, Africa's financial systems have advanced. However, the promise of the 1980s' liberalization, privatization, and stabilization efforts has only been partially realized, and the benefits of deeper, broader, and more affordable finance have yet to be realized(Beck et al., 2011).

In general, Africa's financial sector is still fragmented, bank-based, government-controlled, and oligopolistic, with limited competition (Honohan and Beck, 2008;Ncube, 2007).Because of government control, resource allocation decisions are more likely to be based on political concerns than on economic feasibility (Honohan and Beck 2008;Ncube, 2007). Instead of lending to the private sector, SSA banks keep a considerable amount of their liquid assets in the form of Treasury Bills (see(Ncube, 2007). The interest rate spread in the SSA is likewise bigger than everywhere else in the world(Menyah et al., 2014).

Africa also has the worst savings rate in the world. For example, whereas the gross saving rate in the East and Pacific area, South Asia, and the world was nearly 45 percent, 33 percent, and 21.3 percent in 2005, it was only 15 percent in SSA, despite the fact that SSA's average saving rate in the 1970s was greater than South Asia's. Similarly, whereas the East and Pacific region's gross capital formation was 38.4 percent and the world average was 21 percent, Africa's was only 19 percent. Despite recent progresses, financial systems in low-income nations, particularly in Sub-Saharan Africa, remain limited. The huge disparities between deposit and lending rates in banking, which is the primary source of funding in many regions, reflect a lack of competition and prevent enterprises from growing to take advantage of economies of scale. Liberalization of the banking industry that stimulates competition (while keeping stability in mind) enhances growth(Menyah et al., 2014).

According to the IMF, developing nations with more open banking sectors grew at a pace of around 1% higher than developing economies with less open banking sectors (Ostry et al., 2008).While recent experience implies that progress has been achieved, Africa's financial and payment systems still have a long way to go before they can compete with the world's other successful areas ((Beck et al., 2011; Murinde, 2012).However, the unanswered empirical question that this study aims to answer is whether further financial and international trade innovations might accelerate the rate of economic growth.

2.4. Evaluation of the Theoretical and Empirical Literature

Recent researches have looked into the relationship between trade openness, financial development, and economic growth. To examine the link between the three variables, these researches used a variety of econometric approaches. On the subject of relationships, some research discovered positive relationships between variables, while others found negative relationships, and in the most extreme circumstances, no relationships between variables could be detected. The absence of analysis on the magnitude of the relationship is a key flaw in the literature. The majority of the literature ignores this issue; the observed relationship may be so minor that it fails to exert the required growth developments. Many studies in the literature used OLS, fixed or random effect estimation techniques to investigate the effect of financial development and trade openness on economic growth. These estimating strategies, on the other hand, are skewed and fail to address the endogeneity problem that comes with dynamic panel data analysis.

Furthermore, the majority of the researches on the topic focus on country-specific analysis, which, as previously stated, fails to account for potential biases arising from endogeneity of independent variables. By examining the effect of trade openness, financial development, and economic growth in a panel of 32 SSA countries, the study adds to the few existing panel studies that, when compared to country-specific analysis, use the most up-to-date estimating approaches.

2.5. Conceptual Framework

Trade openness may be linked to financial development. As a result, trade openness has the potential to influence economic growth both directly and indirectly through its effect on financial development(Pradhan et al., 2017). According to Edwards (1998), "finance influences economic growth through trade openness. According to Gries et al., (2009) and Ho et al.,(2021), the relationship between financial development and trade openness allows for numerous economic growth trajectories. As we discussed in the theoretical and empirical literature, there is no clear consensus that growth- trade openness nexus and financial development-growth nexus. Financial development and trade openness, according to Yücel(2009) and Huchet-Bourdon et al., (2018), have a detrimental effect on economic growth. Many literatures argued that financial development and trade openness significantly effect on growth(Menyah et al., 2014,Zghidi and

Abida, 2014).According to Ho et al.,(2021) and Danlamiet al.,(2018)financial development and trade openness insignificantly effect on growth. This study, on the other hand, looks into whether financial development and trade openness have a beneficial or negative effect on economic growth. Not only is that, but the effect of financial development and trade openness on economic growth also significant.

Finally, there is a multifaceted relationship between financial developments, trade openness, and economic growth. This thesis, on the other hand, focuses on one aspect of the interaction: how financial development influences growth and how trade openness influences growth. Moreover the indirect effect of trade openness through financial development. By taking into account the heterogeneity of growth, this thesis also aims to provide light on the differences in the structure of financial development and trade openness across and within selected Sub-Saharan African nations. Second, the inquiry will focus on additional factors that promote growth.

Based on the theoretical and empirical literature reviewed in this study the following conceptual frameworks built to easily understand the variable under study (see Figure 2.5.1)

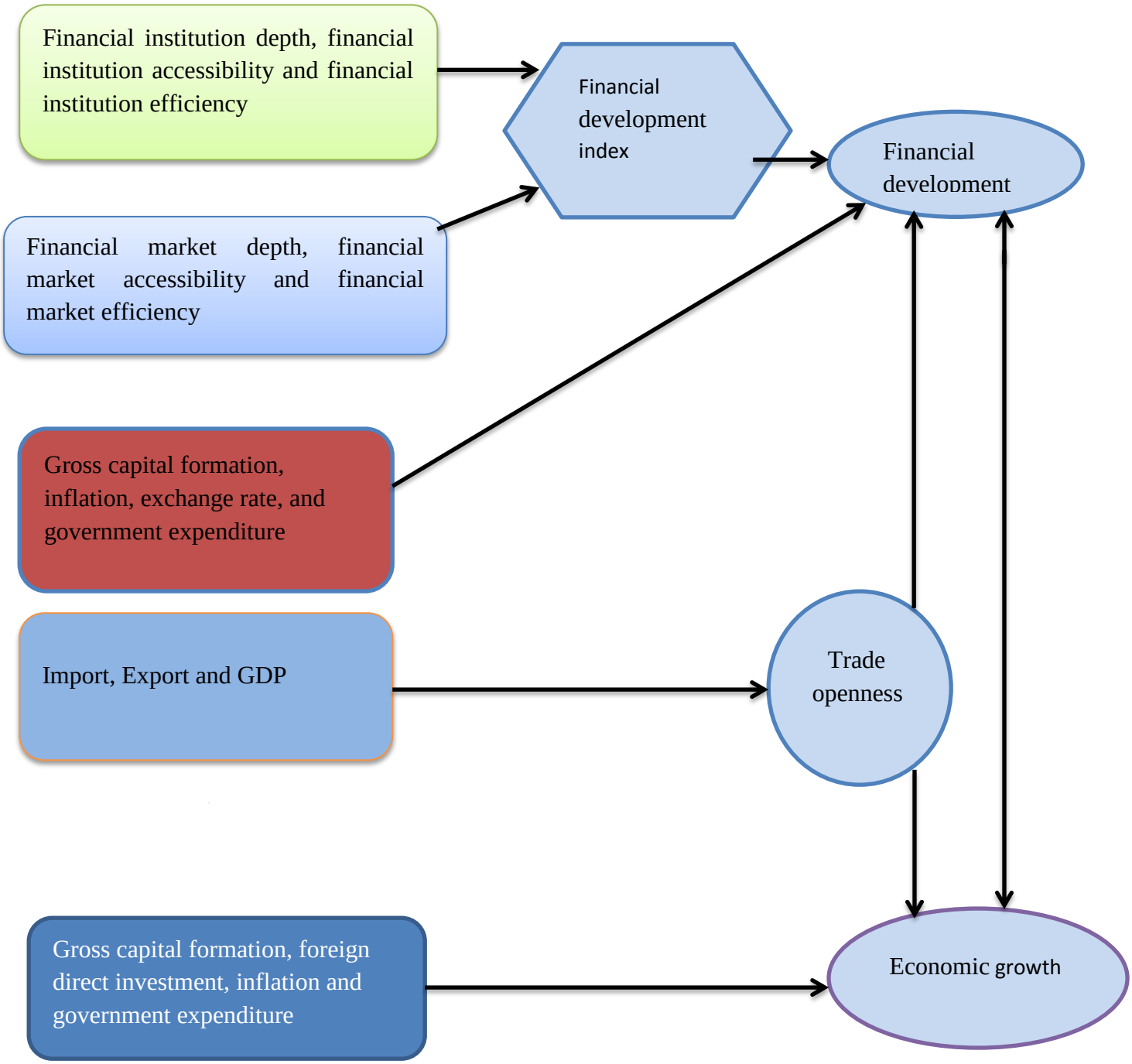

Figure 2.5.1: conceptual framework

Source: Authors' construction based on literatures

CHAPTER 3: METHODOLOGY

3.1. The Data Set

3.1.1. Definition and Measurement of Variables

This study used annual panel data from 2005 to 2019 for selected 32 SSA. However, in cross-country studies, data quality and measurement mistakes will be a top issue, especially when it comes to financial development data. In this thesis, a determined attempt will have been made to assure statistical comparability between countries and throughout time, with each country and year utilizing a similar variable description. The data are obtained from different sources. They were obtained from the World Bank's World Development Indicators (2021), pen world database and an international monetary fund (IMF) database. The variables used in the analysis are listed below, along with their definitions:-

Financial development: it can be measured using the financial development index developed by international monetary fund (IMF). The Financial Development Index ranks countries based on the depth, accessibility, and efficiency of their financial institutions and markets. It's a combination of the financial institution and financial market indexes. The financial institutions index is made up of the depth index, access index, and efficiency index of financial institutions. The Financial institutions depth index aggregates information on bank credit to the private sector as a percentage of GDP, pension fund assets as a percentage of GDP, mutual fund assets as a percentage of GDP, and insurance premiums, both life and non-life, as a percentage of GDP. The Financial Institutions Access Index gathers information on bank branches per 100,000 adults and ATMs per 100,000 adults. The Financial Institutions Access Index collects data on the number of bank branches and ATMs per 100,000 adults. The sum of the financial market depth index, financial market access index, and financial market efficiency index is the financial market index. Stock market capitalization to GDP, stock traded to GDP, foreign debt securities of the government to GDP, and total debt securities of financial and non-financial firms to GDP are all included in the financial market depth index. Financial market access index, which aggregates statistics on percent of market capitalization outside of the top ten largest firms and total number of debt issuers per 100,000 individuals (domestic and external, non-financial and financial

corporation's).The financial market efficiency index, which aggregates information on stock market turnover ratios, is a useful tool (stocks traded to capitalization) (source: IMF(2016))

- **Economic Growth**: The rate of expansion of GDP is referred to as economic growth. It is used to assess the market attractiveness of the host country. The real GDP per capita (RGDP) is utilized to measure economic growth in this study.
- **Trade openness**: The degree of international openness is measured. In this study, trade openness is measured as the total amount of trade divided by GDP. The total volume of trade is the amount of commodities and services exported and imported.
- **Gross capital formation:** is defined as outlays on additions to the economy's fixed assets plus net changes in the stock of inventories, according to the World Bank. Land upgrades, plants, machinery, and equipment purchases are examples of Land upgrades, plants, machinery, and equipment purchases are examples of fixed assets.
- **Population growth:** is based on a de facto population definition that includes all residents, regardless of legal status or citizenship.
- **Foreign direct investment:** According to the World Bank development indicator (2015), FDI is defined as the net amount invested or reinvested by non-residents to acquire a long-term interest in firms over which they have significant managerial control. In this study foreign direct investment measured as the value of real gross foreign direct investment inflows to GDP ratio.
- **Government expenditure:** The purchase of goods and services by the government, which includes public consumption and public investment, as well as transfer payments, which include income transfers (pension, social benefits) and capital transfers. In this study government expenditure measured central government expenditures to GDP ratio**.**
- **Inflation:** Inflation is defined as a rise in the Consumer Price Index (CPI), which is a weighted average of prices for various items. The index's selection of commodities is determined by which items are regarded representative of a common consumption basket. In this study inflation measured by the percentage change in the consumer price index over a year.

3.2. Model Specification

In this investigation we examine the relationship between financial development, trade openness and economic growth. So the researcher drives the growth model for the linkage between financial development, trade openness and economic growth. The goal of this empirical study is to see how financial development and trade openness affect economic growth in Sub-Saharan Africa Countries. In order to achieve this, we use a specification that is broadly comparable to others (e.g, Asghar and Hussain (2014 ;Gries et al., 2009; Herwartz and Walle, 2014 and Zghidi and Abida,2014).

The augmented production function of the neoclassical growth model is used as a basis for modeling the effect of financial development and trade openness on economic growth. In the neoclassical growth model, economic growth is mainly a function of the growth rates of the capital stock and labor. Financial development and trade openness is augmented as additional growth determining variable in this model as it is argued by many economists that trade openness causes direct and indirect effects on economic growth through financial development.

The model is given as follows:

Y=F (A, K, L, FD, TO, X)

Where Y is output variable, A the given technology, K is the level of capital stock, L is the available labor input, FD is the financial development, TO is trade openness and X is all other control variables. In this study, we adopted the approaches of Asghar and Hussain,2014 ;Gries et al., 2009; Herwartz and Walle, 2014 and Zghidi and Abida 2014) to model the relationship among financial development, trade openness and economic growth.

The growth equation to be estimated is given by:

$$Y_{it} = \alpha_0 + \alpha_1 Y_{it-1} + \alpha_2 FD_{it} + \alpha_3 TO_{it} + \alpha_4 GCF_{it} + \alpha_5 PO_{it} + \gamma X_{it} + \mu_t + \omega_i + \varepsilon_{it} \qquad (1)$$

Where; Y_{it} is the log real gross domestic product (GDP) per capita for country i at time t. Y_{it-1} is the log lagged is real gross domestic product (GDP) per capita for country i at time t-1. FD_{it} is the

log of financial development for country i at time t. TO_{it} is the log of trade openness for county i at time t. GCF_{it} is the log gross capital formation for country i at time t. PO_{it} is the growth of population for country i at time t. X_{it} is other explanatory variable for country i at time t. α_0, α_1, α_2, α_3, α_4 α_5, and γ are all expressed as elasticity's. μ_t is a time specific effect. $\square_i$ is an unobserved country-specific fixed effect and ε_{it} is the error term.

Economic growth is a dependent variable in this proposed study, and it is measured as real GDP per capita (proxy of economic growth). Economic growth is defined as a rise in the total amount of goods and services produced. i.e. Gross Domestic Product (GDP) growth, either in GDP per capita or total GDP growth (Ivić, 2015).GDP is a broad term that refers to a country's overall income. Financial development (FD) is measured by financial development index an aggregate of financial institution index (depth, access and efficiency) and financial market index (depth, access and efficiency). A stronger and better financial system can also enhance GDP by increasing aggregate savings and investment rates(Estrada et al., 2010).A positive coefficient is expected. Trade is the sum of imports and exports of goods and services, which is measured as share of GDP. When the trade percentage of GDP is high, the country is more open to commerce. As a result, trade openness is measured by the percentage of GDP spent on trade. A positive coefficient is expected if openness to international commerce is advantageous to economic growth.

We contented Gross capital formation (GCF) as an explanatory variable measured by investment per GDP. The ratio of gross fixed capital formation to GDP is defined as investment (percent GDP). Greater investment shares have been found to be favorably associated to economic growth; hence a positive coefficient is expected (Mankiw et al., 1992).We also added foreign direct investment (FDI) measures the value of real gross foreign direct investment inflows to GDP ratio. The net inflow of money to acquire a long-term managerial interest in a firm operating in a country other than the investor's is known as foreign direct investment. Spillover effects may have been noticed in the host countries; therefore a positive coefficient is expected. Government spending (GS) defined as the ratio of central government expenditures to GDP. An overly large government is likely to siphon resources away from the private sector, stifling economic progress. As a result, a negative coefficient is predicted also selected as an explanatory variable. We also incorporated inflation rate as an explanatory variable measured as the

percentage change in the consumer price index over a year. High inflation has been shown to have a detrimental effect on growth, thus a negative coefficient is expected (Elder, 2004) and we also add population growth as a control variable measured by fertility rate (FR) defined as total births per women thus a negative coefficient is expected.

Trade openness has been argued in the literature to have two transmission channels on growth: the direct effect, in which trade openness increase economic output by offering access to commodities and services, increasing resource efficiency, and enhancing total factor productivity through technological diffusion and knowledge dissemination(Barro and Sala-I-Martin(1997) and the indirect effect, more trade opening can lead to increased financial development, which can boost economic growth. Trade openness affects the level of financial development a country's borders are open Beck (2002) observed that nations with a more developed financial system have a greater export share and positive trade balance in manufactured products and as a result, economic growth will be increased indirectly as a result of the interaction between trade openness and financial development.

Therefore, we model the interaction of trade openness and financial development. Previous researcher looked at the effect of trade openness on financial development by modeling financial development as a function of trade and other factors(Beck, 2002; Svaleryd & Vlachos, 2005).Our objective is to examine the interaction of trade openness and financial development; hence we adopted the model of Zhang, Zhu, and Lu (2015), David et al. (2014) and Le et al. (2016), we define financial development in terms of trade openness and other factors. The following is our empirical specification:

$$FD_{it} = \beta_0 + \omega_i + \rho FD_{it-1} + \tau To_{it} + \sigma Z_{it} + \mu_t + \varepsilon_{it} \qquad (2)$$

Where;

FD_{it} is the log of financial development for country i at time t, FD_{it-1} is the log lagged of financial development for country i at time t-1, $TO_{it\ is}$ the log of trade openness for country i at time t, Z_{it} is the control variables for country i at time t $_i$ is an unobserved country-specific fixed effect, μ_t is a time specific effect, β_0, ρ, τ and σ are parameters to be estimated which are all expressed as elasticities. And ε_{it} is a composite error term.

Financial development measured in financial development index and trade openness also measure as total trade percentage of GDP and control variables are economic growth, government expenditure, exchange rate, investment, and inflation.

Therefore, our main model is comprised of the two simultaneous dynamic equations.

$$Y_{it} = \alpha_0 + \alpha_1 Y_{it-1} + \alpha_2 FD_{it} + \alpha_3 TO_{it} + \alpha_4 GCF_{it} + \alpha_5 PO_{it} + \gamma X_{it} + \mu_t + \omega_i + \varepsilon_{it} \quad (3)$$

$$FD_{it} = \beta_0 + \omega_i + \rho FD_{it-1} + \tau To_{it} + \sigma Z_{it} + \mu_t + \varepsilon_{it} \quad (4)$$

This system of equation can write in matrix form as follows:

$$\Gamma y + X'\Phi + \varepsilon = 0 \quad (5)$$

Where y is the vector of endogenous variables, X is the vector of exogenous variables, Φ is the vector of corresponding coefficients and ε is the vector of stochastic terms consisting of country-specific component, a time component and white noise. Formally written as:

$$\varepsilon_{it} = \beta_i + \lambda_t + v_{it} \quad (6)$$

The overall effect of trade openness on economic growth $\frac{\partial Y}{\partial TO}$ can be derived from the direct and indirect effects of trade openness on economic growth. That is $\frac{\partial Y}{\partial TO} = \frac{\partial Y}{\partial TO} + \left(\frac{\partial Y}{\partial FD}\right)\left(\frac{\partial FD}{\partial TO}\right)$

3.2.1. Deriving the Direct and Indirect Effects of Trade Openness on Economic Growth

To begin, we will substitute the FD equation from model 4 into the FD variables from model 3 growth model. After that, we collect the term on the right side that is similar to the term on the left side. Then we solve for Y_{it}

$$Y_{it} = \alpha_0 + \alpha_1 Y_{it-1} + \alpha_2 TO_{it} + \alpha_3(\beta_0 + \omega_i + \rho FD_{it-1} + \tau To_{it} + \theta Y_{it} + \sigma Z_{it} + \mu_t + \varepsilon_{it}) + \alpha_4 GCF_{it} + \alpha_5 PO_{it} + \gamma X_{it} + \mu_t + \omega_i + \varepsilon_{it} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{(7)}$$

$$Y_{it} = \alpha_0 + \alpha_1 Y_{it-1} + \alpha_2 TO_{it} + \alpha_3 \rho FD_{it-1} + \alpha_3 \tau TO_{it} + \alpha_3 \theta Y_{it} + \alpha_3(\beta_0 + \omega_i + Z_{it} + \mu_t + \varepsilon_{it}) + \alpha_4 GCF_{it} + \alpha_5 PO_{it} + \gamma X_{it} + \mu_t + \omega_i + \varepsilon_{it} \quad \ldots\ldots\ldots\ldots\ldots\ldots \text{(8)}$$

Then collect the like term of Y_{it}

$$Y_{it} - \alpha_3 \theta Y_{it} = \alpha_0 + \alpha_1 Y_{it-1} + \alpha_2 TO_{it} + \alpha_3 \rho FD_{it-1} + \alpha_3 \tau TO_{it} + \alpha_3(\beta_0 + \omega_i + Z_{it} + \mu_t + \varepsilon_{it}) + \alpha_4 GCF_{it} + \alpha_5 PO_{it} + \gamma X_{it} + \mu_t + \omega_i + \varepsilon_{it} \quad \ldots\ldots\ldots\ldots\ldots\ldots \text{(9)}$$

$$(1 - \alpha_3 \theta) Y_{it} = \alpha_0 + \alpha_1 Y_{it-1} + \alpha_2 TO_{it} + \alpha_3 \rho FD_{it-1} + \alpha_3 \tau TO_{it} + \alpha_3(\beta_0 + \omega_i + Z_{it} + \mu_t + \varepsilon_{it}) + \alpha_4 GCF_{it} + \alpha_5 PO_{it} + \gamma X_{it} + \mu_t + \omega_i + \varepsilon_{it} \quad \ldots\ldots\ldots\ldots\ldots\ldots \text{(10)}$$

Solving for Y_{it}

$$Y_{it} = \frac{\alpha_0 + \alpha_1 Y_{it-1} + \alpha_2 TO_{it} + \alpha_3 \rho FD_{it-1} + \alpha_3 \tau TO_{it} + \alpha_3(\beta_0 + \omega_i + Z_{it} + \mu_t + \varepsilon_{it}) + \alpha_4 GCF_{it} + \alpha_5 PO_{it} + \gamma X_{it} + \mu_t + \omega_i + \varepsilon_{it}}{1 - \alpha_3 \theta}$$

When we differentiate with respect to TO, we get

$$\frac{\partial Y}{\partial TO} = \frac{\alpha 2}{1 - \alpha_3 \theta} + \frac{\alpha_3 \tau}{1 - \alpha_3 \theta} \quad \ldots\ldots\ldots\ldots\ldots \text{(12)}$$

Where, $\frac{\alpha 2}{1 - \alpha_3 \theta}$ is the direct effect and $\frac{\alpha_3 \tau}{1 - \alpha_3 \theta}$ is the indirect effect of trade openness on economic growth.

3.2.2. Estimation Strategy

Pooled OLS (Ordinary Least Square), Fixed Effects (FE), Random Effects (RE), Generalised Least Squares (GLS), Difference-GMM, and System-GMM are the most commonly used panel data estimation techniques. However, the specified models equations (3) and (4) contain the lagged dependent variable along with the other regressors, resulting in an endogeneity problem that must be carefully addressed. Pooled OLS, predictably, makes an exo-geneity assumption (i.e OLS cannot be used: OLS has inconsistent estimator because of endogeneity). Furthermore, applying OLS to dynamic panel models results in biased and inconsistent parameter estimates (Baltagi, 2005). This is primarily due to the correlation of the lagged dependent variable and the country-specific effects, which violates the key assumption required for OLS consistency.

Fixed effects assume that individual heterogeneity is related to the explanatory variables/regressors. It is primarily intended for static panel models and not for dynamic panels, resulting in dynamic panel bias. As a result, even after the first differencing transformation, FE cannot be used because the error term and the lagged dependent variable are still correlated, i.e. the endogeneity problem (Roadman, 2009). Furthermore, the Within Group or Least Square Dummy Variable (LSDV) transformation is unsuitable for dynamic panel model estimation because it produces biased and inconsistent results (Nickell, 1981). The reason for this is that the transformed lagged dependent variable and error term are still correlated in the manner described above.

Random Effect, in contrast to FE, assumes that specific individual heterogeneity is uncorrelated with the regressors. However, if the model includes a lagged dependent variable as a regressor, RE faces an endogeneity problem. As a result, applying RE to a dynamic panel model is difficult. However, if the time period is too long, FE and RE asymptotic estimators can reduce the bias. The problem is that this study only has a few years to overcome the bias, making it difficult to use both estimation techniques.

The Generalised Least Squares (GLS) estimator is another estimation technique. This method was created to address the issue of heteroscedasticity. However, it suffers from the same flaw as the preceding model estimation methods in that it fails to address the issue of endogeneity. So, what should be done to address the issue of endogeneity? Roadman (2009) proposed the

techniques of Differenced-GMM and System-GMM estimation. GMM controls for endogeneity, unobserved panel heterogeneity, autocorrelation, omitted variable bias, and measurement errors in general (Ullah and Akhtar, 2018). To address the issue of endogeneity, it employs explanatory variables that are orthogonal to the error term but highly correlated with the regressors. GMM is also designed for a large group and a short year. It is also designed to control for arbitrary distributed fixed effects.

The differenced GMM approach corrects endogeneity by first differencing all regressors and removing fixed effects. However, the first difference transformation has a flaw in that it subtracts the previous observation from the current one, which magnifies gaps in data loss (Ullah and Akhtar, 2018). As a result, it has an effect on the estimated result to some extent. However, using Differenced GMM to estimate dynamic models would result in poor precision and large finite sample bias because the past value is a poor instrument for the first difference (Alonso-Borrego, 1996). As a result, Blundell and Bond (1998) and Arellano and Bond (1998) introduce System GMM (1991).

To dramatically improve efficiency, the System GMM approach corrects endogeneity by introducing more instruments for the lag dependent variable and any other endogenous variable, and it transforms the instruments to make them uncorrelated (exogenous) with fixed effects. System GMM also employs orthogonal deviation rather than subtracting the previous observation from the current one, as Differenced-GMM does; instead, it subtracts the average of all future available variable observations (Roodman, 2009).

The GMM (system) employs a greater number of moment conditions. Monte Carlo evidence also suggests that when time is limited and the dependent variable is persistent, there is an increase in precision and a reduction in small sample bias (Blundell et al, 2000). The GMM (system) has asymptotic efficiency gain. It is an enhancement to the Differenced GMM, and studies show that System GMM is a superior estimation technique in the dynamic panel model (Blundell and Bond, 1998).

In order for system GMM estimations to be reliable the validity of instruments is assumed. The Sargan-Hansen test of over-identifying constraints and the test of second-order serial correlation of error term are used to examine this assumption. The difference-in-Hansen test is used to

determine the validity of extra instruments utilized in the equation depending on levels. In addition, the number of instruments used in each estimate is reported, ensuring the Sargan-Hansen test's reliability.

In the fundamental specification, both independents and lagged dependents variable are treated as endogenous and instrumented with its own lags. Such a procedure allows for controlling the potential reverse causation running from the dependent variable to the independent variables. However, whether independent variable should be seen as an endogenous or exogenous characteristic is still a point of debate. As a result, independent interest variable was also regarded as exogenous to test the robustness of the results under alternate formulation. This study also takes into consideration (Roodman, 2009) approach to account for the problem of "too many instruments" by requiring that the number of variables in the instrumental matrix be less than the number of nations. It's important to remember, though, that even System GMM have shown to be subject to weak instruments problems (Bazzi & Clemens, 2013).

CHAPTER4: RESULTS AND DISCUSIONS

In this chapter, the researcher presents the analysis of financial development, trade openness, and economic growth in SSA countries using different interesting techniques. In economical and statistical analysis the first step is step of the empirical analysis contains the descriptive statistics which provides the detail description of the statistical properties data using summary statistics (measures of central tendency, and measures of dispersion), table and graph and pair wise relationship of variables to provide preliminary support for the stated hypothesis. The importance of descriptive statistics in this study is used to show that different distribution of financial development, trade openness and economic growth variables across SSA countries and over time and easily to understand trends of our main variables.

The second step is the discussion of estimation results that we specified in chapter three. In this regard, we begin with the estimation of our baseline dynamic model of the within system GMM estimator (One Step System GMM, and Two-Step System GMM estimation techniques). Finally in the third step, we present analysis and discussions to make sense of the estimation results presented in step two of this chapter. More importantly this section discusses the channels through which financial development and trade openness could affect economic growth and which trade openness could affect indirectly economic growth through financial development across SSA countries and over time. Altogether, this chapter chiefly discusses and explores analysis of financial development and trade openness along with economic growth and trade openness along with financial development based on dynamic panel model and panel dataset.

4.1. Descriptive Statistics

This section presents tables and charts that compare the means, standard deviation, maximum and minimum values and the number of observations of selected variables in the 32 sub-Saharan Africa countries studied across regions from 2005 to 2019. Our discussion starts with the basic descriptive statistics of variables calculated in the level of the series/ data of variables not in the transformed form.

Table 4.1(a) Summary Statistical results for 32 countries the data series of 2005-2019

VARIABLES	N	Mean	Std. Dev.	min	Max
Real GDP per capita (USD$)	480	2380.08	2958.298	278.312	15913.95
Financial development	480	0.1577677	0.1287118	0.0291346	0.645767
Trade openness –%GDP	480	69.39316	34.54228	1.218845	225.0231
Gross capital formation –%GDP	480	24.14758	9.311002	6.699039	79.40108
Foreign direct investment-%GDP	480	4.258148	6.255899	-11.19897	57.83755
Government spending-%GDP	480	14.62385	5.590498	3.587513	39.45063
Inflation	480	6.606059	7.183634	-8.97474	63.29251

Source: Authors computation using STATA.

As show in table 4.1(a), the number of observation (N) is similar (480) for all the variables under consideration implying the fact that the panel data used in the study is balanced panel data with non-missing points in the selected sample. According to our data, the average real GDP per capita in Sub-Saharan African countries was 2380.08 USD, with a standard deviation of 2958.298 and minimum and maximum values of 278.312 and 15913.95, respectively, from 2005 to 2019.

The mean of financial development equals 0.1577677% and the standard deviation of this variable is 0.1287118. The minimum values 0.0291346 and maximum values are 0.645767 respectively. The mean value of trade openness as a percent of GDP in selected sample Sub-Saharan Africa countries for the period of 2005 to 2019 equals 69.39316% with the standard deviation of 34.54228. The minimum and maximum values are 1.218845 and 225.0231. The mean of Gross capital formation –%GDP and Foreign direct investment-%GDP equals 24.14758 % and 4.258148 % and the standard deviations are 9.311002 and 6.255899. The maximum values are 79.40108 and 57.83755. The minimum values are 6.699039 and -11.19897. The mean of government spending-%GDP in Sub-Saharan countries for the period of 2005 to 2019 equals

to 14.62385 % with the standard deviation of 5.590498. The minimum and maximum values are 3.587513 and 39.45063 respectively. The mean of inflation values are equals 6.606059 with the standard deviation of 7.183634. The minimum and maximum values are -8.97474 and 63.29251 respectively.

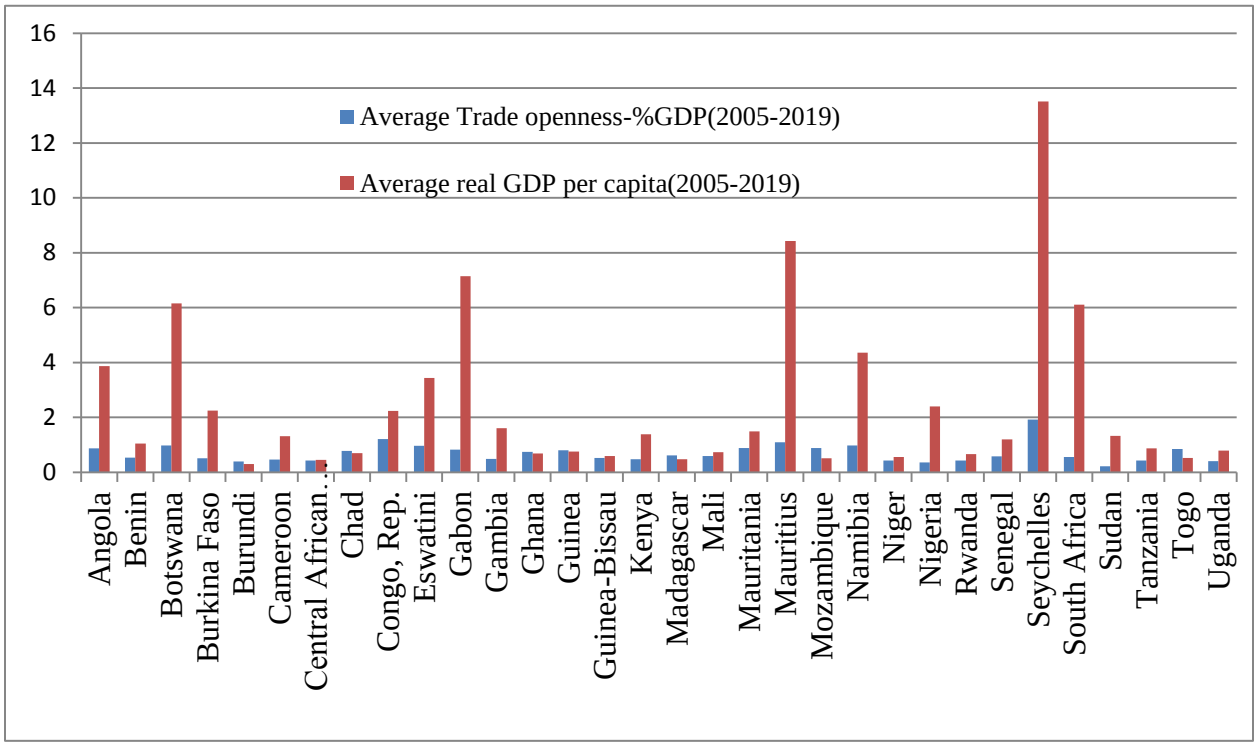

Figure 4.1(a): Real GDP per capita in thousands and trade openness-%GDP in hundreds in SSA for the period 2005 – 2019 (averages)

Source: Authors computation of data obtained from IMF and World Bank

Figure 4.1(a): shows the average of real GDP per capita and trade openness in sub-Saharan African countries from 2005-2019. For the period under review, Seychelles recorded the highest GDP per capita 13509.8$ followed by Mauritius (8425.71$), Gabon (7142.85$), Botswana (6149.1$), South Africa (6112.23$), Namibia (4355.2$), Angola (3873.15), Eswatini (3443.23$), Nigeria (2398.02$), Burkina Faso,(2244.77$), Congo republic(2237.3$) Gambia(1601.36$), Mauritania(1492.75$), Kenya(1383.71$), Sudan (1329.65$), Cameroon (1314.67$), Senegal (1198$) and Benin (1041.99$), whilst the remaining selected samples (11 nations out of 32) reported below 1000 dollars and Burundi (304.128$) registered the lowest average GDP per capita.

Similarly, among the countries in our sample, Seychelles was the highest trade openness percent of GDP (191.672%) followed by Congo republic (121.295%), Mauritius (109.813), Botswana (97.9922%), Namibia (97.653%) and Eswatini (96.0546%), while the lowest is registered by Burundi (39.5738%), Nigeria (35.35%) and Sudan (21.69%) respectively. Furthermore, when we compare the countries, we can see that some have a high GDP per capita and a high level of trade openness, while others have a lower GDP per capita and a lower level of trade openness. Among the countries in our sample, Nigeria and Sudan ranked in the highest average GDP per capita of 2398.02$ and 1329.65$ respectively. However, in our data range (2005-2019) Nigeria and Sudan had lowest trade openness as a proportion of GDP with 35.3545 % and 21.6907 %, respectively. This example appears to contradict our argument, but a closer examination of the Nigerian and Sudanese economies reveals a probable reason. Many studies have shown that population density has a substantial effect on a country's growth, particularly in the early phases of development. Nigeria, being the African country with the largest population, has reaped huge benefits from its inexpensive labor market.

In contrast, Congo Republic, achieved the highest level of trade openness, with a trade/GDP ratio of 121.295% but, its performance on economic growth is only 2237.3$, and it is lower than the other sub-Saharan African countries, such as: Mauritius (8425.71$), Gabon (7142.85$), Botswana (6149.1$), South Africa (6112.23$), Namibia (4355.2$), Angola (3873.15), Eswatini (3443.23$), Nigeria (2398.02$), Burkina Faso,(2244.77$) all have lower percentage of trade openness in GDP than Congo Republic . The Congo Republic's economy, which includes crude petroleum, refined copper, refined petroleum, and rough timber, is relatively open to international trade. More over half of Congo Republic's total exports come from this sector (WTO, 2016). Congo Republic, like all other manufacturing-led African countries, has reaped enormous benefits from international trade; yet, with a trade/GDP ratio of 121.295 percent, it is debatable if such a high reliance on trade is beneficial to all economies.

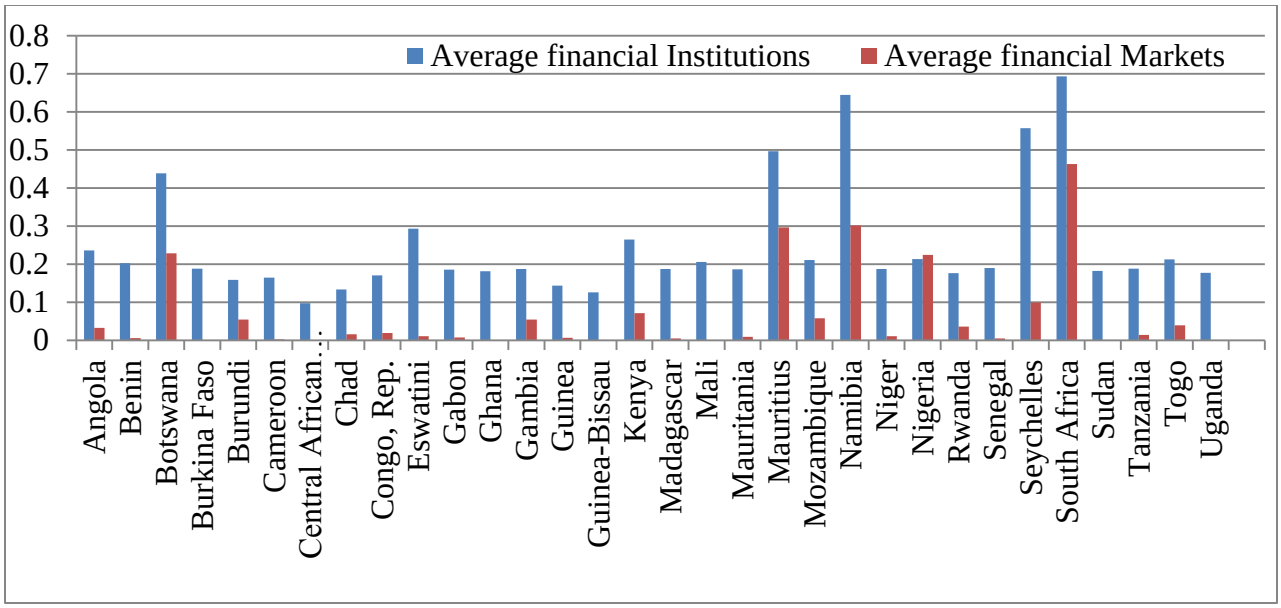

Figure 4.1(b): financial Institutions and financial Markets in SSA for the period of 2005-2019 (averages)

Source: Authors computation of data obtained from IMF

Figure 4.1 (b) depicts the varied distribution of averaged financial institutions and financial markets across Sub-Saharan African nations during the study period. From 2005 to 2019, the average financial institution index was higher than the average financial market index in all Sub-Saharan African nations. When we compare countries, we see that countries with higher financial institution indexes have higher financial market indexes, whereas countries with lower financial institution indexes have lower financial market indexes. South Africa (0.69), Namibia (0.64), Seychelles (0.56), Mauritius (0.49), and Botswana (0.43) had the highest financial institution indexes among the countries in our sample from 2005 to 2019. Similarly high financial market index which is registered the value of 0.46, 0.30, 0,099 0.29 and 0.23 respectively. Furthermore, Guinea-Bissau (0.13) and Central African Republic (0.098) had lower financial institution index and lower financial market index, both of which were zero.

Furthermore, as indicated in figure 4.1 (b), the average financial institution index (from 2005 to 2019) in Eswatini, Kenya, Angola, Nigeria, Togo, Mozambique, Mali, and Benin was between 0.29 and 0.2, whilst the remaining selected samples (19 nations out of 32) was reported below 0.2. The average financial market index of Kenya, Mozambique, Burundi, Gambia, Togo,

Rwanda, Angola, Congo republic, Chad, Niger, Tanzania, and Eswatini was between0.078 and 0.011, whilst the remaining selected samples (13 nations out of 32) reported below 0.011 and Sudan which has registered a value of zero.

In contrast to other Sub-Saharan African countries, Nigeria's average financial institution index was lower than the average financial market index, which are 0.21347 and 0.22454, respectively, among the countries in our sample. South Africa yields the highest financial institution index and financial market index (0.69, 0.46) and Central African Republic registered the lower financial institution index and financial market index (0.098, 0) in our data range (2005-2019). In general, we can see in figure 4.1 (b) the distribution of financial institutions is bigger than the distribution of financial markets in Sub-Saharan African nations for the period 2005-2019.

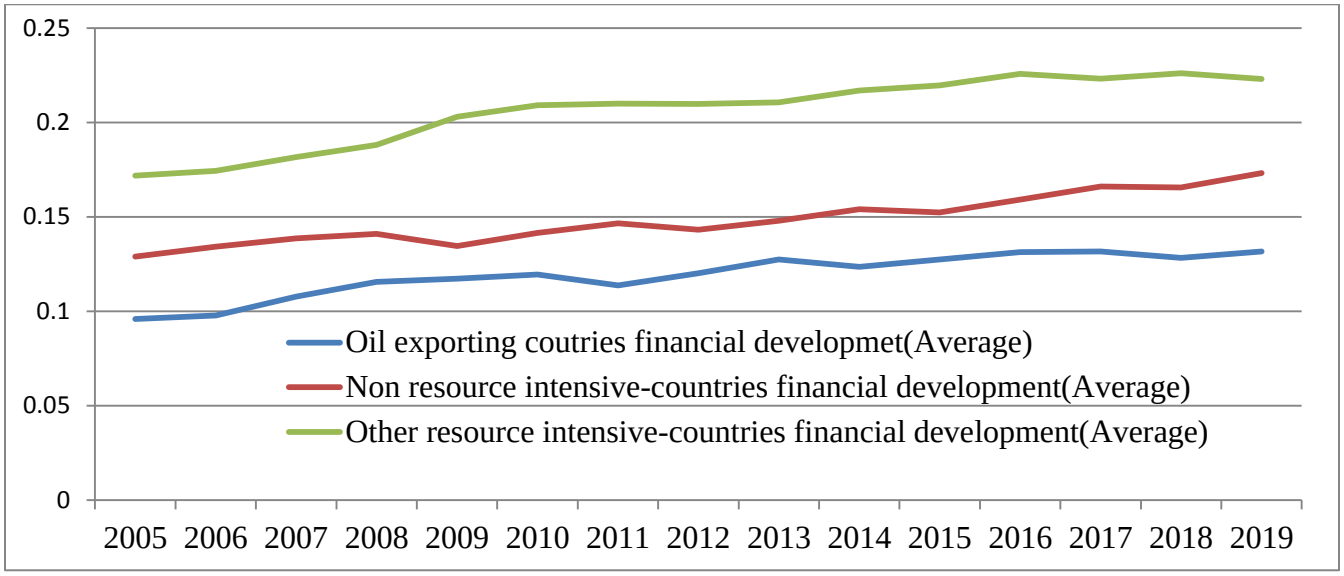

Figure 4.1(c): Average financial development in SSA (2005-209)

Source: Authors computation of data obtained from IMF using World Bank country classification as Oil exporting, other resource-intensive, and Non-resource intensive countries.

Figure 4.1(c) above shows averaged financial development index of the selected sample of Sub-Saharan African countries based on oil exporting, other resource-intensive and non-resource intensive countries classification for the period 2005-2019. As shown in figure 4.1(c) above, the prevalence of heterogeneity within the region; for instance, average total financial development varies from Other-resource intensive countries (0.21) to non-resource intensive countries (0.15)

and the lowest performance is registered by oil exporting countries (0.12) for the period 2005-2019. Further, on a country specific level of some selected sample, the highest average financial development index is observed in South Africa(0.59) followed by Namibia (0.48), Mauritius (0.40), Botswana (0.34), Seychelles (0.33), Nigeria (0.22) and Kenya (0.17), while Chad (0.076), Guinea-Bissau(0.063) and Central Africa(0.049) registered the lowest average financial development. As shown in figure 4.1(c) above, average financial development index over the period 2005-2019 in non-resource intensive countries showed pronounced fluctuations compared to oil exporting and other intensive countries. And particularly, average financial development in non-resource intensive countries has increased continuously from 2005 to2008 reaching to 0.140 and showed decline in 2009 to 0.13, in the period of 2010 and 2011 increased and in 2012 decreased. And also in the period of 2013-2017 the average financial development in non-resource intensive countries has continuously increased and reaching to 0.166 and showed decline in 2018 to 0.164, and also in 2019 increased to 0.173.

As show in the above figure 4.1(c) the average financial development in oil exporting countries has increased continuously from 2005-2010 and it reaching 0.09 to 0.12 and in 2011 decline to 0.11. And also from 2012-2017 oil exporting countries of financial development has continuously increased and it reaching to 0.13 and in 2018 decline to 0.128. Furthermore the average financial development in other intensive countries has no fluctuate compared with oil exporting and non-intensive countries. Moreover as show in the figure above between the years 2005-2019 other intensive countries registered the highest average financial development 0.23 in 2019 and the lowest average financial development was registered in oil exporting countries 0.096 in 2005.

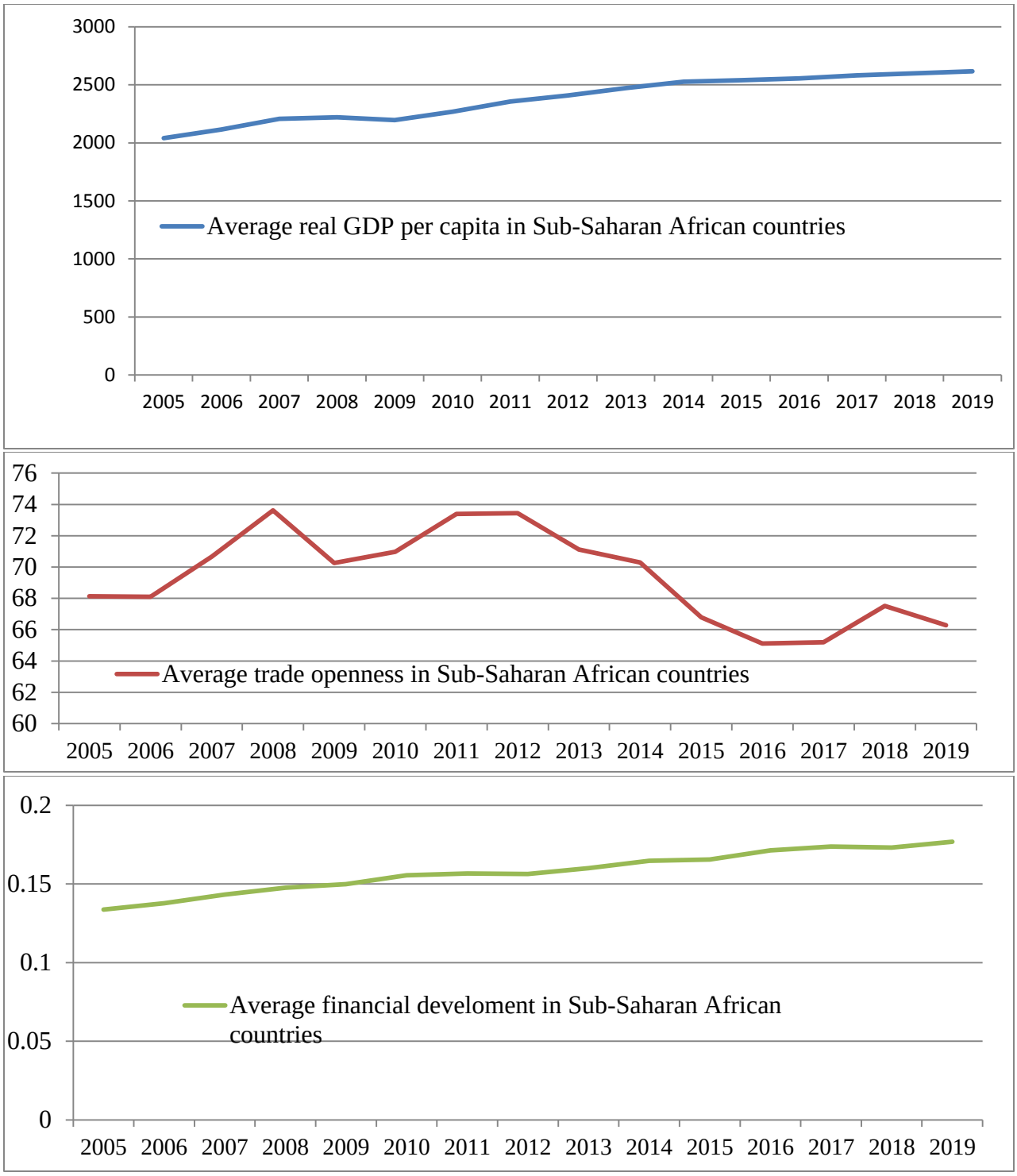

Figure 4.1(d): Average real GDP per capita, trade openness and financial development in SSA countries for the period of 2005-2019.

Source: Authors computation of data obtained from IMF and World Bank.

As show in the above figure 4.1(d) average real GDP per capita was increased continuously from 2005-2008 and it reaching to 2219.373 $ and showed decline in 2009 to 2195.977 $. For the period of 2010-2019 the average GDP per capita was increased continuously from year to year and it reaching 2616.856$ in 2019. Based on our sample, in figure 4.1(d) we observe that the highest GDP per capita was registered in 2019 (2616.856$) and the lower GDP per capita registered in 2005 (2040.384$).Figure 4.1(d) shows that average trade openness fluctuated significantly as compared to GDP per capita and financial development. And particularly, average trade openness as %GDP in SSA countries has increased continuously from 2005- 2007 reaching its peak of 73.63%, and showed decline in 2009 to 70.25%. As show in the above figure between 2015-2019 average trades openness was below 70% and from 2010-2014 was above 70% but not greater than 73% and the lower trade openness was registered in 2016 (65.11%). Moreover average financial development was increased continuously from 2005-2019 in the selected sub-Saharan Africa countries.

Based on the discussion of some of the summary statistics, it is confirmed that Sub Saharan African countries and particularly the selected samples possesses heterogeneity in terms of financial development, trade openness and economic growth, which actually entails country specific effects do really matters.

4.2. Estimation and Econometric Results

In this section we discuss estimation results for models specified in chapter three. Let us look at the empirical results of the relationship between economic growth, trade openness, and financial development. Firstly, we estimate the growth model that mainly explores the connection between economic growth, trade openness and financial development in sub-Saharan African countries. Secondly, we estimate the financial development model, to explore indirect effect of trade openness on economic growth though financial development in sub-Saharan Africa countries.

We try to study most of the estimating techniques that are applicable to the dynamic panel model in order to estimate these models. We used One-Step Difference GMM, Two-Step Difference GMM, One-Step System GMM, and Two-Step System GMM estimation approaches to run a number of simulations in STATA software. However, models using One-Step Difference GMM and Two-Step Difference GMM, on the other hand, failed to pass the majority of the relevant

tests. As a result, we choose the best model from System GMM estimation that best fits the growth and financial development models. In the table below we report the result for the growth models with the relevant tests. Arellano and Bond test for second order autocorrelation (AR (2)) and the Hansen's J statistics, which is the test for instrumental validity and efficiency test of System GMM estimator or a test for over-identifying restriction are among the tests available.

The Hansen J test is used to determine the validity of instruments: it examines the null hypothesis of overall instrument validity (Roodman, 2009). Failures, to reject the null hypotheses give support to the choice of the instruments. The autocorrelation/serial correlation test for the error term is also shown, which is used to test the null hypothesis that the differenced error term is first and second order serially correlated. If the null hypothesis of no second order serial correlation is rejected, it means the initial error term is serially uncorrelated and the moment requirements are appropriately provided (AR (2) >0.05).

Table 4.2(a): The Growth model estimation result

VARIABLES	(1) One-step system GMM	(2) Two-step system GMM
Lag GDP per capita	0.969***	0.977***
	(0.011)	(0.011)
Financial development	0.039**	0.031**
	(0.018)	(0.014)
Trade openness	0.010*	0.007*
	(0.005)	(0.004)
Gross capital formation	0.058***	0.043**
	(0.022)	(0.020)
Foreign direct investment	-0.001**	-0.000
	(0.000)	(0.000)
Government Spending	-0.002*	-0.002*
	(0.001)	(0.001)
Inflation	-0.001*	-0.001*
	(0.000)	(0.000)
Population growth	-0.011*	-0.008
	(0.006)	(0.008)
Year	-0.002***	-0.002***
	(0.001)	(0.001)
Constant	4.836***	4.011***
	(1.480)	(1.506)
Number of observation	448	448
Number of groups	32	32
AR(1)	0.030	0.041
AR(2)	0.509	0.486
Joint P-value	0.000	0.000
Hansen statistics	0.139	0.229
Number of Instruments	24	29

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4.2(a): above shows the results of estimating the economic growth model using one-step System GMM and two-step System GMM estimation techniques. To start presents with the diagnostic test results given in table 4.2(a), all variables included in the model are jointly significant as indicated by Wald test statistics for the overall regressions. This shows that variables selected for the estimation procedure are valid jointly i.e. financial development, trade openness, lagged GDP per capita, government consumption, gross capital formation, inflation, foreign direct investment and population growth are relevant in explaining economic growth of Sub-Sahara Africa countries jointly. According to Roodman(2009), the appropriate range for Hansen's J statistics is between (0.1 – 0.25), which is the test for instrumental validity and over identifying restriction. Moreover, the Z-statistics test of the Arellano-Bond AR(2) of second-order autocorrelation in residuals, as given in table 4.2 (a), confirms the absence of second-order autocorrelation, signifying the absence of more lagged dependent variables on the right hand side. The p-values of second-order serial correlation and Hansen's over identification tests indicate that the model is adequately specified.

Further based on our finding in One-step system GMM of table 4.2 (a),the coefficient of financial development and trade openness are both positive and statistically significant at the 5 % and 10% level respectively, which suggests that both trade openness and financial development play a positive role in boosting the economic growth in sub-Saharan African countries. At 5% of level of significance, a 1% rise in financial development leads to 0.039% increase in economic growth and At 10% of level of significance, a 1% rise in trade openness leads to 0.01% increase in economic growth. Furthermore the lagged real GDP per capita is positively related with the current real GDP per capita at 1% level of significance. Thus, the current year GDP per capita depends on that of the previous year real GDP per capita. In other words, past real GDP per capita status is found to be significant in explaining present real GDP per capita. On the other hand, the coefficient of gross capital formation is positive sign and statistically significant. At 5% level of significance, a 1% rise in gross capital formation leads to 0.058% increase in economic growth. Government spending has negative effect on economic growth at 10% level of significance. This means an excessively large government spending is expected to crowd out resources from the private sector and be harmful to economic growth. The coefficient of foreign direct investment has the unexpected sign (negative) and statistically significant at 5% level. The coefficient of inflation has expected sign (negative) and statistically significant at 10% level.

Population growth are turn out statistically significant and expected sign (negative) in explaining economic growth in Sub-Saharan African countries.

Moreover Two-step system GMM estimation is depicted in column (2). When heteroscedasticity and serial correlation are present; a Two-Step GMM should be employed to leverage a whiting matrix with residuals from the first step. In a finite sample, however, such standard errors tend to be downward biased, prompting practitioners to employ the Windmeijer adjustment to correct for such small sample bias. As a result, adopting this estimating technique produces reliable findings. The results indicate that in column 2 the coefficients of financial development has positive sign and statistically significant at 5% level of significance implying a 1% rise in financial development boosts economic growth in SSA by 0.031%. Trade openness increases economic growth by 0.007% at a 10% level of significance. Moreover gross capital formation and government spending are statistically significant at a 5% and 10% level respectively. On the other hand, the lagged real GDP per capita affects the current real GDP per capita at 1% level of significance and the sign is positive. Furthermore inflation has negative sign and statically significant at 10% level. On the other hand foreign direct investment and population growth have the same sign with One-step system GMM estimation, but statistically insignificant in Two-step system GMM. Similar to with one-step system GMM estimation, the two-step system GMM estimation result shows that financial development, trade openness, lagged real GDP per capita, gross capital formation, government spending and inflation have the same coefficient sign and statistically significant. Foreign direct investment and population growth both have the same sign with the one-step system GMM estimation, but statistically insignificant in Two-step system GMM estimation. Column (2), Two-Step System GMM estimation, yields a more robust result.

In our estimation, we employed both collapsing and limiting the numbers of lags used as instruments, and managed to bring the P-values of Hansen-J test for over-identification statistic to the level that Roodman (2009) suggested which is within the range of (0.1 – 0.25). These outputs are obtained after a series of attempts in making Hansen-J statistic to the recommended level, and the P-values of AR (1) and AR (2) to the acceptable range. Therefore, the assumptions needed for the system GMM estimator to be valid are not ruled out.

Table 4.2(b): below presents the results of the System GMM regression of the financial development model. Specifically, it presents our results from the One-Step system GMM and

Two-step system with instrumental variables estimation. Overall, the model is a good fit as indicated by the Wald test statistics for the overall regressions. We also report the tests of over-identifying restrictions for the variable instrumentation of regressions (Hansen's J statistics, the appropriate range is between 0.1 – 0.25) and the Z-statistics test of the Arellano-Bond (AR (2), this indicates that the initial error term is serially uncorrelated and that the moment conditions are met (AR (2) >0.05).

Table 4.2(b): The financial development model estimation result

VARIABLES	(1) One-step system GMM	(2) Two-step system GMM
Lag financial development	0.886***	0.905***
	(0.55)	(0.045)
Trade openness	0.045**	0.046**
	(0.022)	(0.022)
GDP per capita	0.077*	0.065**
	(0.039)	(0.028)
Gross capital formation	0.002**	0.0023*
	(0.005)	(0.0012)
Government spending	0.0045**	0.0041*
	(0.0019)	(0.0021)
Inflation	-0.0017	-0.0012
	(0.0015)	(0.0015)
Exchange rate	-0.0034**	-0.0032**
	(0.0014)	(0.0013)
Constant	-0.955**	-0.842***
	(0.421)	(0.321)
Number of observation	448	448
Number of groups	32	32
AR(1)	0.001	0.003
AR(2)	0.638	0.605
Joint P-value	0.000	0.000
Hansen statistics	0.164	0.164
Number of Instruments	31	31

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Further based on our finding in One-step GMM and Two-step GMM estimation of table 4.2 (b), trade openness positively affects financial development in SSA which is in line with the researcher's prior expectation. At 5% level of significance, a 1% rise in trade openness leads to 0.046% increase in financial development in SSA countries. When we observe the coefficient of Lagged financial development in table 4.2(b) above, it is positive and statistically significant in

both estimation techniques. Thus, the lagged financial development is strongly positively correlated with current financial development. The coefficient of lagged financial development is 0.886% reported in One-Step System GMM and 0.905% reported in Two-Step System GMM. And the coefficient of lagged financial development is similar in sign in both specifications. Real GDP per capita has positively affects financial development in one-step and two-step system GMM estimations techniques in SAA countries at 1% and 5% level of significance respectively.

In the One-Step System GMM specification, the coefficients of gross capital formation and government spending are both positive and significant (Table 4.2(b), columns (1)). The corresponding Two-Step System regression (shown in column 2) is indeed shown the same result. On the other hand the coefficient of inflation is negative and statistically insignificant in both estimation techniques. In our estimation Hansen-J statistic is 0.164 and the p-value of AR (2) is 0.638, these outputs are obtained after a series of attempts in making Hansen-J statistic to the recommended level, and the P- AR (2) to the acceptable range. Therefore, the assumptions needed for the system GMM estimator to be valid are not ruled out.

All in all, the empirical results given in Table 4.2 indicate that financial development and trade openness positively affects economic growth in Sub-Saharan African countries. On the other hand trade openness affects economic growth in two ways: in the first place, a direct manner through increase economic output by offering access to commodities and services, increasing resource efficiency, and enhancing total factor productivity through technological diffusion and knowledge dissemination and in the second place indirectly, through its effect on financial development. The overall effect of trade openness on economic growth is equal to $\frac{\partial Y}{\partial TO} = \alpha_3 + \alpha_2 \tau = 0.012 \; and \; 0.008$ for One-step system GMM and Two-step system GMM estimations respectively, while the direct effect is 0.01 and 0.007.

4.3. Making Sense of the Results

Our empirical analysis suggests that financial development and trade openness are associated with economic growth. The role of financial development and economic growth seems to have been important to boosts economic growth in the Sub-Saharan African countries. In this section

our empirical findings are compared to existing theoretical and empirical literature, and we attempt to make sense of the findings.

Let us look to general theory and empirical evidence to understand our findings. Financial development, in theory, has a favorable effect on economic growth in Sub-Saharan Africa countries through numerous pathways. First, it aids in the conversion of savings into more useable forms, as well as the efficient allocation of capital and increased total factor productivity (TFP). Second, it encourages risk diversification and management. Third, it lowers information inequities as well as transaction and monitoring expenses. Fourth, it can minimize economic volatility by providing people and businesses with a variety of instruments and information to help them cope with adverse shocks through consumption and investment smoothing(Mlachila et al., 2016).

In a comprehensive analysis of the literature, Levine (2005) discovers a strong positive relationship between financial development and economic growth. By raising aggregate savings and investment rates, financial development can help boost economic growth(Estrada et al., 2010). The financial sector propels economic expansion by driving innovation (Schumpeter, 1912).

Financial development, in general, boosts economic growth in Sub-Saharan African countries, according to our empirical findings. In other words, increased financial development leads to increased economic growth. Our finding is comparable to the works of(Asghar & Hussain, 2014);(Zghidi & Abida, 2014);(Chandrashekar et al., 2018);(HONG et al., 2018); (Mohamed Sghaier, 2014) and(Kar, Osman, et al., 2008). We also found a similar result with empirics of(Mlachila et al., 2016);(De Gregorio & Guidotti, 1995);(Khan & Senhadji, 2000);(Ram, 1999);(Hassan et al., 2011) and (Assefa & Mollick, 2017) are among others. All of the above researches agree that financial development positive effect on economic growth.

Furthermore, our empirical finding depicted that trade openness positively affects economic growth in SSA countries. Trade openness has a favorable effect on economic growth through increasing technology transfer and knowledge-related externalities, as well as increasing competitiveness. These outcomes have a favorable effect on local enterprises and sectors productivity patterns, resulting in increased value added and income. A country's potential to

profit from technological advancements, diversification of industrial production, and export base, on the other hand. Essentially, it assumes that differences in industrial development and technological capabilities between countries may be linked to possible different effects of trade openness on economic growth, depending on the size of the economy, technological proficiency, and degree of industrial diversification. Finally, while global trade openness may boost global economic growth, it has a negative effect on individual countries(Silajdzic & Mehic, 2018). Similar to the findings of (Akinlo & Okunlola, 2021); (Sukar et al., 2001); (Ltd, 2018); (Deng, 2010) and (Okungbowa et al., 2018) , our empirical result asserted that trade openness has positive effect on economic growth in SSA countries.

Let us now consider some more explanatory variables that influence economic growth. Gross capital formation has a favorable effect on economic growth in Sub-Saharan African countries, according to our empirical findings. Domestic investment is used to measure gross capital formation in this study. Domestic investment has a necessary component to foster economic growth (ODI, 2016). According to Keynes, new and additional investment boosts the economy's aggregate demand (Tobin, 1965). When current enterprises make new investments or new domestic investors enter the market, there is an increase in domestic investment (Faulkner, Loewald & Makrelov, 2013). In conclusion, this process may result in a high degree of capital formation, which will lead to greater productivity and, in turn, long-term economic growth. Greater investment shares have been found to be positively associated to economic growth(Mankiw et al., 1992). Our findings are consistent with the findings of(Dritsakis et al., 2006); (Alemu & Lee, 2015) and (Ibrahim & Alagidede, 2018).

Moreover, our findings confirmed that government spending has negative effect on economic growth in Sub-Saharan Africa countries. Excessive government expenditure affects productivity by diverting resources away from the productive private sector and into the unproductive public sector. This is expected to crowd out resources from the private sector and be harmful to economic growth(Mitchell,2005). Similar to the findings of Hermes and Lensink (2003) and (Kamara, 2010), our empirical result asserted that in One-step system GMM estimation foreign direct investment has negative effect on economic growth in SSA countries. Dependency theorists argue that reliance on foreign investment will have a negative effect on growth and income distribution in the modernization perspective. According to Bornschier and Chase-Dunn

(1985), foreign direct investment, generates an industrial structure dominated by monopoly, resulting in underutilization of productive forces. The assumption being that an economy controlled by foreigners would not develop organically, but would rather grow in a disarticulated manner (Amin, 1974). This is due to a poor multiplier effect, in which demand in one sector of an economy generates demand in another, resulting in stagnant growth in developing countries. This point is relevant since the natural resource sectors (Pigato, 2000) receive the majority of FDI to Africa and have high entry barriers. Foreign direct investment, on the other hand, negatively affect to economic progress. Foreign direct investment has the potential to harm the host economy by decreasing the balance of payments due to repatriated profits, lack of positive linkage with local businesses, negative environmental effect, and crowding out domestic investment (Kumar, 1990).

Furthermore, our findings confirmed that inflation has a negative effect on economic growth in Sub-Saharan Africa countries. According to Barro (1995), high inflation diminishes investment, and lower investment has a negative effect on economic growth. All taken together, our empirical findings revealed that financial development and trade openness both have a favorable effect on economic growth in Sub-Saharan African countries. Gross capital formation captured by domestic investment, on the other hand, was found to have a positive effect on economic growth. Furthermore, our empirical findings revealed that government spending and inflation had a detrimental effect on economic growth in Sub-Saharan African nations, which is statistically significant.

4.4. Causality and Panel Unit root test

4.4.1. Panel Unit root test

Before proceeding to determine the causalities among the main target variables, we should test their level of stationarity. Levin-Lin-Chu panel unit root test is used and the results show that the variables do not have unit root at level. That is they are I (0) variables as shown in Table 4.4(a).

Table 4.4(a): ADF Test based on Levin-Lin-Chu panel unit root test

Variables	Stationarity level	Levin-Lin-Chu panel unit root test	
		Statistic	P-value
Real GDP per capita	I(0)	-1.8428	0.0327
Financial development	I(0)	-6.0616	0.0000
Trade openness	I(0)	-2.7455	0.0030

Since the target variables are found to be stationary at level, it implies that there are no long run relationships. Therefore we don't need to perform a cointegration test among the variables. However we can test the causality between the variables and the direction of causation.

Dumitrescu-Hurlin (2012) made an extended panel data version of the granger causality test which was introduced by Granger (1969). The regression to test panel causality is given by

$y_{it} = \alpha_i + \sum_{k=1}^{k} \delta_{ik}\, y_{it-k} + \sum_{k=1}^{k} \theta_{ik}\, x_{it-k} + \varepsilon_{it}$

Where, y_{it-k} is a matrix of past values of the dependent variables y_{it} and x_{it-k} are the lags of the explanatory variablex_{it}. The approach for determining the existence of causality, as in Granger (1969), is to test for substantial effects of previous values of x on the present value of y. The null hypothesis of no causality for all the individuals in the panel is given by

H0: $\theta_{i1} = ... = \theta_{ik} = 0, \forall\ i = 1... N$

By using the panel VAR model lag selection criteria of the Bayesian Information Criterion (BIC), the Hannan-Quinn Criterion (HQC), and the Akaike Information Criterion (AIC) proposed by Andrews and Lu (2001), we selected the optimal lag and found it to be lag 1. Then after running the VAR model and testing for granger causality, we have come up with the following granger causality results.\

Table 4.4(b): granger causality result

Dependent	Independent	chi2	df	Prob> chi2
Real GDP per capita				
	Trade openness	20.822	1	0.000
	Financial development	16.731	1	0.000
	All	35.971	2	0.000
Trade openness				
	Real GDP per capita	4.546	1	0.033
	Financial development	0.743	1	0.389
	All	5.044	2	0.08
Financial development				
	Real GDP per capita	0.382	1	0.537
	Trade openness	6.177	1	0.013
	All	6.91	2	0.032

As it is indicated in Table 4.4(b), there is bidirectional causality between GDP per capita and Trade openness. On the other hand, there is a unidirectional causation from financial development to GDP per capita and from trade openness to financial development. But the reverse is not true.

Chapter 5: Conclusions and Policy Implication

The conclusions and policy implications obtained from the estimation result and analysis presented in Chapter 4 are presented in this chapter. The conclusion of our study is discussed in part 5.1, followed by policy implications in section 5.2.

5.1. Conclusions

Over the last three decades, economists have paid close attention to the relationship between financial development, trade openness, and economic growth. Despite much research on the subject, empirical data is inconclusive. This is especially true for research that looks at African countries experiences. This study has investigated the relationship between financial development, trade openness and economic growth (real GDP per capita) in 32 Sub-Saharan African countries using a system GMM (One-step system GMM and Two-step system GMM) panel data model over the period of 2005-2019. We utilized macroeconomic data from World Bank's World Development Indicators (2021), pen world database and an international monetary fund (IMF). Our empirical findings of this study revealed that both trade openness and financial development have a significant and positive effect on economic growth in Sub-Saharan Africa Countries. Furthermore, the results derived from the estimations give us empirical evidence that trade openness positively affects economic growth directly and indirectly through its positive effect on financial development. Other economic factors such as lagged real GDP per capita and gross capital formation has significant and positive coefficients meaning that these variables promote economic growth to Sub-Saharan African countries. The findings of the study indicate that government spending and inflation have a significant and negative effect on economic growth in Sub-Saharan African countries. Furthermore, our results show that there is bidirectional causality between GDP per capita and Trade openness. On the other hand, there is a unidirectional causation from financial development to GDP per capita and from trade openness to financial development. But the reverse is not true.

The main objective of this study was to analyze the relationship among financial development, trade openness and economic growth in Sub-Saharan Africa countries. The empirical result provides strong evidence that financial development, trade openness and economic growth has positive relationship in Sub-Saharan African countries for the period of 2005-2019.

5.2. Policy Implication

Based on our findings, countries in the Sub-Saharan area should pursue policies aimed at increasing finance sector development in order to expedite their economic growth. Small financial systems that allocate capital inefficiently are one of the factors impeding African growth. One policy recommendation is to increase the number of people and economic sectors that have access to inexpensive credit and financial services. Promoting the use of current information and communication technologies, such as electronic money and mobile banking, and supporting the growth of microfinance institutions, particularly in rural regions, can boost access to financial services. This would boost the economy's liquidity as well as small and medium-sized businesses' access to capital. Furthermore, governments should improve financial markets to allow for more efficient and effective resource allocation among productive sectors, which will boost long-term economic growth.

The general findings of this study's policy implications show that financial development appears to be a policy variable for increasing economic growth in Sub-Saharan countries. The government must deepen the financial sector and take necessary steps to strengthen the long-term relationship between financial development and economic growth in order to preserve sustainable economic growth. More financial integration and elevating the status of financial institutions are among these approaches. Aside from these steps, the macroeconomic climate must be stabilized in order to promote financial sector development. Efficiency and accountability tend to broaden attractiveness and confidence in investments, which may become more appealing over time as political risk is decreased. As a result, the creation of high-quality institutions can influence investment attractiveness and contribute to financial development, which boosts economic growth. Furthermore, financial system regulation and oversight should be reinforced, as they play an important role in defining both stability and the scope of services delivered.

According to the conclusions of this study, trade openness benefits economic growth in Sub-Saharan African countries. As a result, more efforts should be taken to allow countries to have more trade openness in order to achieve high and long-term economic growth. Under the Prebisch–Singer law of decline in the terms of trade, however, a heavy reliance on foreign

commerce may be harmful to fiscal sustainability and economic growth. The majority of African countries export mostly primary goods, the pricing of which are volatile and set on the international market. Sub-Saharan African countries should change the content of their exports from raw materials and semi-manufactured commodities to high-value-added items in order for their outward-oriented policy to have a considerably greater effect on economic growth. Furthermore, trade policy should encourage investments in capital-intensive industries and the development of human capital capable of absorbing advanced-country innovations.

However, it should be acknowledged that using a full-fledged CGEM to capture and understand the economy's entire dynamics in terms of connection impulses and shocks is required (computable general equilibrium models). Using a single equation model to assess broad policy, as we did in this case, may be overly ambitious. However, by using robust estimates for important parameters based on a very comprehensive model, one may be able to make predictions about the most likely outcome and the policy implications for a more particular economic sector. As a result, we request that full-fledged Computable General Equilibrium Models be used to conduct a more in-depth and robust analysis of financial development, trade openness, and economic growth among Sub-Saharan African countries.

REFERENCES

Akinlo, T., & Okunlola, C. O. (2021). Trade openness, institutions and economic growth in Sub-Saharan Africa.

Alemu, A. M., & Lee, J.-S. (2015). Foreign aid on economic growth in Africa: A comparison of low and middle-income countries. *South African Journal of Economic and Management Sciences*.

Asghar, N., & Hussain, Z. (2014a). Financial Development, Trade Openness and Economic Growth in Developing Countries: Recent Evidence from Panel Data.

Assefa, T. A., & Mollick, A. V. (2017). Financial Development and Economic Growth in Africa. *Journal of African Business*, *18*(3), 320–339.

Baltagi, B. H., Demetriades, P. O., & Law, S. H. (2009). Financial development and openness: Evidence from panel data. *Journal of Development Economics*, *89*(2), 285–296.

Barro, R. J., & Sala-I-Martin, X. (1997). Technological Diffusion, Convergence, and Growth. *Journal of Economic Growth*, *2*(1), 1–26.

Beck, T. (2002). Financial development and international trade: Is there a link? *Journal of International Economics*, *57*(1), 107–131.

Beck, T., Maimbo, S. M., Faye, I., & Triki, T. (2011). *Financing Africa: Through the Crisis and Beyond*. World Bank.

Bist, J. P. (2018). Financial development and economic growth: Evidence from a panel of 16 African and non-African low-income countries. *Cogent Economics & Finance*, *6*(1), 1449780.

Blackburn, K., & Hung, V. T. Y. (1998a). A Theory of Growth, Financial Development and Trade. *Economica*, *65*(257), 107–124.

Blundell, R., & Bond, S. (n.d.). *GMM estimation with persistent panel data: An application to production functions*. 24.

Chandrashekar, R., Sampath, T., & Chittedi, K. R. (2018). Financial development, trade openness and growth in India.

De Gregorio, J., & Guidotti, P. E. (1995). Financial development and economic growth. *World Development*, *23*(3), 433–448.

Demirgüç-Kunt, A., & Levine, R. (2008). *Finance, Financial Sector Policies, and Long-Run Growth*. World Bank.

Estrada, G. E. B. B., Park, D., & Ramayandi, A. (2010). Financial Development and Economic Growth in Developing Asia.

Fujii, E. (2019). What Does Trade Openness Measure? *Oxford Bulletin of Economics and Statistics*, *81*(4), 868–888.

Fung, M. K. (2009). Financial development and economic growth: Convergence or divergence? *Journal of International Money and Finance*, *28*(1), 56–67.

Gries, T., Kraft, M., & Meierrieks, D. (2009). Linkages Between Financial Deepening, Trade Openness, and Economic Development:

Grossman, G. M., & Helpman, E. (1991). Trade, knowledge spillovers, and growth. *European Economic Review*, *35*(2), 517–526.

Haller, A. (2012). *Concepts of Economic Growth and Development. Challenges of Crisis and of Knowledge*.

Helpman, E., & Krugman, P. (1985). *Market Structure and Foreign Trade: Increasing Returns, Imperfect Competition, and the International Economy*.

Ho, C. H. P., Pham, N. N. T., & Nguyen, K. T. (2021). Economic Growth, Financial Development, and Trade Openness of Leading Countries in ASEAN.

HONG, X., YIFEI, C., Sam, C., & Chang, T. (2018). Revisit Financial Development, Trade Openness and Economic Growth Nexus in China.

Huang, Y. (2005). *What Determines Financial Development?* (SSRN Scholarly Paper ID 925051). Social Science Research Network.

Huchet-Bourdon, M., Le Mouël, C., & Vijil, M. (2018). The relationship between trade openness and economic growth: Some new insights on the openness measurement issue.

Hussain, F., & Chakraborty, D. K. (2012). Causality between Financial Development and Economic Growth: Evidence from an Indian State. *Romanian Economic Journal*, *15*(35), 27–48.

Ivić, M. M. (2015). Economic Growth and development. *Journal of Process Management. New Technologies*, *3*(1), 55–62.

King, R. G., & Levine, R. (1993). Finance and Growth: Schumpeter Might Be Right*. *The Quarterly Journal of Economics*, *108*(3), 717–737.

Menyah, K., Nazlioglu, S., & Wolde-Rufael, Y. (2014). Financial development, trade openness and economic growth in African countries:

Mohamed Sghaier, I. 2014.). Trade openness, financial development and economic growth in North African countries. *International Journal of Finance & Economics.*

Murinde, V. (2012). Financial Development and Economic Growth: Global and African Evidence. *Journal of African Economies.*

Ncube, M. (2007). Financial Services and Economic Development in Africa 1. *Journal of African Economies.*

Ndebbio, J. E. U. (2004, August 1). *Financial Deepening, Economic Growth and Development: Evidence from Selected Sub-Saharan African Countries*.

Ndikumana, L. (2001). *Financial Markets and Economic Development in Africa.*

Ndulu, B. J. (2007). *Challenges of African Growth: Opportunities, Constraints, and Strategic Directions*. World Bank.

Okungbowa, O., Ogbeide, A., & Eseohe. (2018). *Openness, Government Expenditure and Economic Growth in SuB-Saharan Africa*.

Oloyede, B. M., Osabuohien, E. S., & Ejemeyovwi, J. O. (2021). Trade openness and economic growth in Africa's regional economic communities: Empirical evidence from ECOWAS and SADC. *Heliyon, 7*(5), e06996. https://doi.org/10.1016/j.heliyon.2021.e06996

Patrick, H. T. (1966). Financial Development and Economic Growth in Underdeveloped Countries.

Rajan, R. G., & Zingales, L. (2003). The great reversals: The politics of financial development in the twentieth century. *Journal of Financial Economics*.

Ram, R. (1999). Financial development and economic growth: Additional evidence. *The Journal of Development Studies, 35*(4), 164–174.

Roodman, D. (2009). A note on the theme of too many instruments. *Oxford Bulletin of Economics and Statistics*, *71*(1), 135–158.

Salahuddin, M., & Gow, J. (2016). The effects of Internet usage, financial development and trade openness on economic growth in South Africa.

Samargandi, N., Fidrmuc, J., & Ghosh, S. (2015). Is the Relationship Between Financial Development and Economic Growth Monotonic? Evidence from a Sample of Middle-Income Countries. *World Development*, *Volume 68*, Pages 66-81.

Shaw, E. S. (1973). *Financial deepening in economic development*.

Tekin, R. B. (2012). Economic growth, exports and foreign direct investment in Least Developed Countries: A panel Granger causality analysis. *Economic Modelling*, *29*(3), 868–878.

Verbeek, M. (2014). A Guide to Modern Econometrics. *Applied Econometrics*, *8*, 125–132.

Young, A. (1998). Growth without Scale Effects. *Journal of Political Economy*, *106*(1), 41–63.

Yücel, F. (2009). Causal Relationships between Financial Development, Trade Openness and Economic Growth: The Case of Turkey.

Zghidi, N., & Abida, Z. (2014). *Financial Development, Trade Openness and Economic Growth in North African Countries*.

APPENDIX

Appendix A: List of countries included in our sample

Angola	Eswatini	Gabon	Gambia
Benin	Guinea	Guinea-Bissau	Kenya
Botswana	Madagascar	Mali	Mauritius
Burkina Faso	Mauritania	Mozambique	Namibia
Burundi	Niger	Nigeria	Rwanda
Cameroon	Senegal	Seychelles	South Africa
Central Africa	Sudan	Tanzania	Togo
Chad, Congo Republic	Uganda	Chad	Ghana

Appendix B: World Bank classifies countries as Oil exporting, other resource intensive, and non-resource intensive.

Oil exporting SSA	**other resource intensive SSA**	**Non-resource intensive SSA**	
Angola	Botswana	Benin	Seychelles
Cameroon	Burkina Faso	Burundi	Togo
Chad	Ghana	Eswatini	Uganda
Congo Republic	Guinea	Gambia	
Gabon	Mali	Guinea-Bissau	
Nigeria	Namibia	Kenya	
	Niger	Madagascar	
	South Africa	Mauritius	
	Tanzania	Mozambique	
		Rwanda	
		Senegal	

Appendix C: One-step system GMM for growth model

Dynamic panel-data estimation, one-step system GMM

Group variable: c_Id		Number of obs	= 448
Time variable : Yr		Number of groups	= 32
Number of instruments = 24		Obs per group: min	= 14
Wald chi2(9) = 6.81e+06		avg	= 14.00
Prob > chi2 = 0.000		max	= 14

lnGDP_P	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
lnGDP_P						
L1.	.9686219	.0111211	87.10	0.000	.9468249	.9904189
lnFD	.0389749	.0177819	2.19	0.028	.0041231	.0738267
lnTO	.0095496	.0050801	1.88	0.060	-.0004072	.0195063
lnGCF	.0582065	.0217197	2.68	0.007	.0156366	.1007764
FDI	-.0006977	.0002966	-2.35	0.019	-.001279	-.0001165
GS	-.0021551	.0011315	-1.90	0.057	-.0043728	.0000626
IF	-.0005672	.0002958	-1.92	0.055	-.0011469	.0000125
POG	-.0108371	.0062672	-1.73	0.084	-.0231207	.0014465
Yr	-.0023073	.0007097	-3.25	0.001	-.0036983	-.0009163
_cons	4.83565	1.480025	3.27	0.001	1.934853	7.736446

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Arellano-Bond test for AR(1) in first differences: z = -2.17 Pr > z = 0.030

Arellano-Bond test for AR(2) in first differences: z = -0.66 Pr > z = 0.509

Sargan test of overid. restrictions: chi2(14) = 40.19 Prob > chi2 = 0.000

(Not robust, but not weakened by many instruments.)

Hansen test of overid. restrictions: chi2(14) = 19.72 Prob > chi2 = 0.139

(Robust, but weakened by many instruments.)

Appendix D: Two-step system GMM for growth model

Dynamic panel-data estimation, two-step system GMM

Group variable: c_Id				Number of obs	= 448
Time variable : Yr				Number of groups	= 32
Number of instruments = 29				Obs per group: min	= 14
Wald chi2(9) = 1.22e+07				avg	= 14.00
Prob > chi2 = 0.000				max	= 14

lnGDP_P	Coef.	Corrected Std. Err.	z	P>|z|	[95% Conf.	Interval]
lnGDP_P						
L1.	.9766694	.0109473	89.22	0.000	.9552131	.9981257
lnFD	.0314155	.0143669	2.19	0.029	.003257	.0595741
lnTO	.0070033	.0038015	1.84	0.065	-.0004475	.014454
lnGCF	.0428296	.0205021	2.09	0.037	.0026463	.0830129
FDI	-.0003853	.0003955	-0.97	0.330	-.0011605	.0003899
GS	-.0019862	.0011114	-1.79	0.074	-.0041646	.0001922
IF	-.000611	.0003167	-1.93	0.054	-.0012317	9.60e-06
Yr	-.0019157	.0007304	-2.62	0.009	-.0033473	-.0004842
POG	-.0075262	.0077862	-0.97	0.334	-.0227869	.0077346
_cons	4.013777	1.505464	2.67	0.008	1.063122	6.964433

Arellano-Bond test for AR(1) in first differences: z = -2.04 Pr > z = 0.041

Arellano-Bond test for AR(2) in first differences: z = -0.70 Pr > z = 0.486

Sargan test of overid. restrictions: chi2(19) = 54.53 Prob > chi2 = 0.000

(Not robust, but not weakened by many instruments.)

Hansen test of overid. restrictions: chi2(19) = 23.18 Prob > chi2 = 0.229

(Robust, but weakened by many instruments.)

Appendix E: One-step system GMM for financial development model

Dynamic panel-data estimation, one-step system GMM

Group variable: c_Id			Number of obs	=	448
Time variable : Yr			Number of groups	=	32
Number of instruments = 31			Obs per group: min	=	14
Wald chi2(7) = 119948.96			avg	=	14.00
Prob > chi2 = 0.000			max	=	14

lnFD	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
lnFD						
L1.	.8864973	.0549203	16.14	0.000	.7788554	.9941392
lnGDP_P	.0770657	.0393076	1.96	0.050	.0000243	.1541071
lnTO	.0450587	.0221269	2.04	0.042	.0016908	.0884267
GCF	.0019573	.0010811	1.81	0.070	-.0001615	.0040762
EX	-.0033504	.001409	-2.38	0.017	-.0061119	-.0005888
GS	.0045191	.0018521	2.44	0.015	.000889	.0081492
IF	-.0017003	.0014501	-1.17	0.241	-.0045424	.0011417
_cons	-.9553113	.4212932	-2.27	0.023	-1.781031	-.1295919

Arellano-Bond test for AR(1) in first differences: z = -3.26 Pr > z = 0.001
Arellano-Bond test for AR(2) in first differences: z = -0.47 Pr > z = 0.638

Sargan test of overid. restrictions: chi2(23) = 24.87 Prob > chi2 = 0.357
(Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(23) = 29.52 Prob > chi2 = 0.164
(Robust, but weakened by many instruments.)

Appendix F: Two-step system GMM for financial development model

Dynamic panel-data estimation, two-step system GMM

Group variable: c_Id				Number of obs	=	448
Time variable : Yr				Number of groups	=	32
Number of instruments = 31				Obs per group: min	=	14
Wald chi2(7) = 39919.54				avg	=	14.00
Prob > chi2 = 0.000				max	=	14

lnFD	Coef.	Corrected Std. Err.	z	P>|z|	[95% Conf.	Interval]
lnFD						
L1.	.9052597	.045321	19.97	0.000	.8164321	.9940872
lnGDP_P	.065043	.0287831	2.26	0.024	.0086292	.1214569
lnTO	.0463074	.0216792	2.14	0.033	.003817	.0887977
GCF	.0022992	.0012272	1.87	0.061	-.0001059	.0047044
EX	-.0032389	.0013211	-2.45	0.014	-.0058283	-.0006496
GS	.0040766	.0020827	1.96	0.050	-5.46e-06	.0081586
IF	-.0011954	.0015548	-0.77	0.442	-.0042428	.001852
_cons	-.8429987	.3213856	-2.62	0.009	-1.472903	-.2130944

Arellano-Bond test for AR(1) in first differences: z = -2.97 Pr > z = 0.003
Arellano-Bond test for AR(2) in first differences: z = -0.52 Pr > z = 0.605

Sargan test of overid. restrictions: chi2(23) = 24.87 Prob > chi2 = 0.357
(Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(23) = 29.52 Prob > chi2 = 0.164
(Robust, but weakened by many instruments.)

DECLARATION

I, the undersigned, declare that this thesis is my original work, and prepared for the first time using our own knowledge and understanding. Besides all sources and information used in this paper are carefully acknowledged. I further confirm that the thesis has not been submitted either in part or in full to any other higher learning institution for the purpose of earning any degree.

_____ _____

Name Signature

Addis Ababa University, Addis Ababa, Ethiopia

June, 2022