EFFECTS OF REGULATIONS ON BANK EFFICIENCY AND STABILITY COMPARATIVE STUDY OF ETHIOPIA AND SUB-SAHARAN AFRICAN COUNTRIES

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STATEMENT OF DECLARATION

I declare that, except for specific reference to the contributions of others, this dissertation entitled “Effects of regulations on bank efficiency and stability comparative study of Ethiopia and Sub-Saharan African countries” is the original work of my own and has not been submitted for any other degree at Addis Ababa University or any other institution.

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CERTIFICATE OF APPROVAL

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ABBREVIATION/ACRONYMS

CAR	Capital Adequacy Regulation
CIR	Cost to Income Ratio
BCBS	Basel Committee on Banking Supervision
BIS	Bank for International Settlement
BRSS	Bank regulation and Supervision Survey
FEIV	Fixed Effect Instrumental Variable
GLS	General Lease Square
IV	Instrumental Variable
NIM	Net Interest Margin
REIV	Random Effect Instrumental Variable
ROA	Return on Asset
ROE	Return on Equity
RWA	Risk Weighted Asset
SA	Standardized Approach
SSA	Sub-Saharan Africa
WBG	World Bank Guideline

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ABSTRACT

The financial system is essential for a healthy economy, transferring funds from surplus to deficit units. Banks, as the backbone, play a crucial role in this process, influencing economic growth and development. Proper financial regulations and oversight are necessary for an efficient and stable banking sector. However, research on the effect of financial regulation on banks' performance and stability, and comparisons across countries, are limited. Therefore, the objective of the study is to assess the effect of bank regulations on bank operational efficiency and financial stability, and to compare Ethiopian foreign bank entry regulations with those of other SSA countries. To conduct the analysis, the researcher uses panel data from 2000–2021 to better understand the policy effects. This study utilizes aggregate bank efficiency and stability data from the World Bank. Country-based banking aggregate Z–score and Cost-Income-Ratio are used to measure financial stability and efficiency of the banking sector, respectively. Variables such as foreign bank entry restrictions, banking activity restrictions, and strict capital regulation are selected to measure bank regulation across SSA. The data sources include the National Bank of Ethiopia, Global Financial Development Database, Bank Regulation and Supervision Survey, World Development Indicators Database, and Worldwide Governance Indicators database. A Random Effect Instrumental Variable (REIV) approach is used to analyze the relationship between foreign bank entry restrictions and bank efficiency; the Taylor-Hausman model assesses the effect of foreign bank entry restriction on bank stability; and Generalized Method of Moments (GMM) is applied to examine the relationship between banking activity restrictions, stringent capital regulation, and both bank efficiency and stability. The empirical findings of the paper are used by policymakers, regulators, and bank management. Specifically, the results help policymakers and regulators understand the effects and consequences of existing regulations on bank efficiency and stability, and provide insights into the outcomes of strict regulation. The Ethiopian banking industry has been unique in the sense that government owned banks dominate, the market is closed to foreign banks and there are strict regulations. This offers a good opportunity to perform a comparative analysis, contribute to the literature, and make policy recommendations. The findings show that restrictions on foreign bank entry have a significant negative effect on bank operational efficiency but a positive effect on bank stability; bank operational efficiency is negatively affected by restricted banking activities and stringent capital regulation; and bank stability is positively affected by restricted banking activities and negatively affected by strict capital regulation. The first policy recommendation is to liberalize foreign bank entry cautiously, relaxing banking activities and capital regulation. The public interest argument is also a very important tool. Swift liberalization in an imperfect market structure, underdeveloped financial system, and inadequate supervision can all lead to inefficiency and instability.

Keywords: bank; regulation; entry restriction; activity restriction; capital regulation; efficiency; stability

CHAPTER ONE: INTRODUCTION

This chapter discusses the study's background overview, problem statements, objectives, significance, scope, and organization of the paper.

1.1 Background overview

The central bank is the national financial organization that regulates and supervises critical aspects of the finance industry. Financial markets and institutions are essential parts of the financial system and play a vital role in transferring large sums of money across the economy (Gakunu, 2007). Commercial banks are the most common type of deposit-taking institution. They transfer funds from savers to investors and are considered the backbone of the financial system. They can also engage in different types of activities depending on the country's banking regulations, practices, and the level of financial system complexity (IMF, 2019).

Bank regulations are rules that govern how banks operate, and it is clear that banking practices are crucial components of a financial system. The methods by which regulatory bodies monitor and control banks vary from one country to another. The approaches used to regulate banks range from very light to comprehensive, from episodes of free banking to highly interventionist regulations, and even complete government ownership. For example, the global minimum capital requirement ratio ranges from 4 percent to 20 percent. Actual capital ratios vary from nearly 0 to almost 80 percent (no country reported that their banks' net worth was negative). Additionally, the percentage of government ownership in banking system assets ranges from 0 percent to 98 percent. The proportion of a nation's banking industry made up of foreign banks ranges from 0 to 100 percent (Barth et al., 2006).

In recent years, the effect of bank regulation on banks performance has become a subject of growing interest; and adequate standards and competent supervisory agencies are necessary for effective regulation. These authorities must have sufficient resources and incentives that align with the regulatory goals (Castro et al., 2025). Because a healthy and successful banking industry is well prepared to absorb negative shocks and help to maintain the stable financial system (Athanasoglou et al., 2008). Sound banks have favorable effect on the poor by accelerating general growth. Barth et al. (2006) state that since capital goes to the best projects rather than the wealthiest, nations with superior banks see an unreasonably beneficial influence on GDP and quicker declines in poverty. Conversely, poor functioning banks have a very detrimental impact on the poor and small enterprises as they just provide credit to influential people and elites, which hinder their ability to develop. Regrettably, billions of people live in nations with poor banking systems (Barth et al., 2004)

Whatever the benefits of banking system to the economy of a country, it may not always function in a beneficial way because banks fail sometimes. Since banks convert short-term liquid deposits into longer-term, less-liquid loans and investments, they are susceptible to liquidity and solvency problems. They also lend to a diverse range of customers whose risk profiles are not usually readily apparent (Barth et al., 2004).

Banking crises may completely disrupt economies. Weaknesses in the preparation and implementation of bank regulations and supervision are among the factors that contribute to banking crises, which have the potential to completely disrupt economies (Anginer et al., 2019; Miele & Sales, 2011). Anginer et al. (2019) states banking crises frequently happen as a result of weaknesses in the formulation and execution of bank regulation and supervision. For instance, the 1990s Japanese financial crisis was predicted to cost more than 20 percent of GDP and the 1980s and 1990s developing countries banking crises exceeded $1 trillion (Caprio et al., 2009). Even though governments and central banks support the financial sector through capital injections, debt guarantees, asset purchases, liquidity and lending

provisions, the 2007-2009 financial crises confirmed the need for prudential regulation (Miele & Sales, 2011). Hence, as organizations of public trust, banks are subject to proper regulation and supervision by regulatory bodies (Siddika & Haron, 2016).

Both established and emerging countries frequently experience financial crises in general and banking crises in particular. Since the 1970s, the frequency of financial crises has significantly increased. Additionally, it was demonstrated that the currency crisis and the banking crises frequently coincide. Theoretical models suggest that banking weaknesses can destabilize exchange rates and then currency crises can lead to banking crises, or both issues may emerge concurrently. Furthermore, models linking banking crises to subsequent currency crises align with third generation currency crisis theories, focusing on balance sheet mismatches caused by foreign currency obligations and domestic borrowing. Twin crises, consisting of banking and currency crises, have a profound effect on economic welfare, often resulting in extended recovery periods. The exploration of their causes and effects is critical due to their significant costs, particularly highlighted since the late 1980s (Eijffinger & Karata, 2019).

Both short-term domestic economic factors (low banking-sector net interest rate spreads; a shallow yield curve) and longer-term structural features (financial development and trade openness) are significant predictors of banking crises one to two years in advance. The most significant indicators of currency crises are country-specific and short-term: the most significant indicators of a crisis are an overpriced currency and high short-term rates (Joy et al., 2015).

A financial crisis is a condition of financial instability characterized by a sharp decline in asset prices, a lack of liquidity in financial institutions, and the incapacity of consumers and businesses to fulfill their financial commitments. The structural differences among advanced economies provide crucial insights into a country vulnerable to a banking crisis; economies with greater financial development are occasionally, but not always, more vulnerable (depending on a number of

prevailing macroeconomic factors); similarly, trade openness can indicate greater vulnerability if the government yield curve is shallow (Joy et al., 2015).

The noted shortcomings in bank regulation in the Sub-Saharan Africa (SSA) region have resulted in a number of financial crises. For example, 39 systemic banking crises occurred between the 1970s and the mid-1990s. It accounts 43.5 percent of all systemic banking crises worldwide (Valencia & Laeven, 2012). McKinsey (2016), states that the effect of regulation on banks' performance will continue by increasing operational costs, which comes from the implementation of new regulatory obligations, additional rules on compliance, new reporting and model requirements, and new rules imposing additional capital requirements.

Hence, to achieve this important goal an appropriately designed financial regulations and supervision are essential. Chronopoulos et al. (2015) demonstrate the strong and deep importance of regulatory frameworks, and the fact that regulations are vital to bank performance by analyze a sample of American banks from 1984 to 2010. Achieving a sound banking system through good regulations plays an essential role in macroeconomic growth and development (Barth et al., 2013). On the other hand, if the overall actions of banks are significantly influenced by the financial regulations, which have effect on the efficiency and stability of banks too and it leads to improve financial stability of the whole system. It is easier and more transparent to keep an eye on bank operations when the legal regulatory structure is more rule-based (Neyapti & Dincer, 2005). By contrast, liberalizing restrictions may create powerful pressure to improve domestic regulations and supervision (Levine, 1996). It is crucial to remember that the quality of regulation does not necessarily mean that it is strict as well.

This study intended to fills the gap in the literature by analyzing the effect of bank regulations on the operational efficiency and stability of the banking sector in sub-Saharan African (SSA) countries, with a special emphasis on Ethiopia policy on foreign banks. The study provides a good opportunity to perform a comparative analysis, contributes to the literature, and helps make policy recommendations.

1.2 Statement of the problem

Sub-Saharan Africa banking history has evolved considerably over the past fifty years. The 1960s and 1970s saw the implementation of the first wave of financial sector reforms by the governments of newly independent states. At the time of independence, the financial systems of the majority of African countries were dominated by foreign-owned institutions. During the colonial period, foreign banks provided short-term working capital and trade financing to non-African residents and foreign enterprises. Subsequently, governments felt foreign banks did not meet new state development goals, leading to political pressure to interfere in the financial sector. Most governments formed state-owned banks to address financing gaps, while local private banks come into the market in Kenya and Nigeria (Austin & Uche, 2007). However, these initiations are not long-lasting due to external shockwaves and weakening domestic policies in 1980s, except for Ethiopia. The political pressure, a lack of technical know-how, and poor management causes state-owned institutions going bankrupt, which led to economic crisis in Africa (Austin & Uche, 2007).

As a result, in the late 1980s, several SSA countries implemented financial sector reforms; which involved considerable revisions in the banking regulatory and supervisory frameworks (Nyantaky & Sy, 2015). Such as, entry barriers, capital adequacy requirements, ownership structure and restrictions, activity regulations, macro prudential policies. Consequently the trend was reversed with the arrival of financial liberalization (Beck et al., 2014).

The 1990s and 2000s are the years for SSA countries experienced financial liberalization and enacted various reforms including increasing competition, more privatization, and better governance. During this period, a number of Middle East and North Africa (MENA) countries—including Egypt, Tunisia, Morocco, and Jordan, among others—have also implemented significant financial reforms (Naceur & Omran, 2008). These reform has been profound and led to various policy improvements and technological changes, as well as increased deregulation in the

financial sector (Akhter, 2018). Finally, it leads to the sale of failed state-owned and private banks to the global investors or multinational banks, which resulting in increased foreign bank participation particularly in South Africa, Nigeria, and Kenya. By the mid-2000s through increasing global and regional economic integration, particularly on financial services, as well as deregulation, the numbers of foreign banks in SSA increased and controlled a large number of African banking systems once again (Beck et al., 2014).

However, the Ethiopian financial sector is reluctant to financial deregulations. Doors were closed to foreign banks since foreign owned banks was nationalized during 1976 (The Monetary and Banking Proclamation No. 99/1976), and foreign direct investment is not allowed in major sectors of the economy, such as banking and insurance (UNECA, 2002). The government intervention rate in the financial system is high and follows a protectionist approach (Addison & Alemayehu, 2001). State-owned banks dominate the industry (Kozo et al., 2007). The government owned Commercial Bank has been the leading bank in the deposit and loan markets (Tesfaye, 2014). The Ethiopian banking sector is among areas of investment exclusively reserved to Ethiopian nationals (Matiwos, 2020). Hence, such a structure obstructs both the performance of the industry and the competition with others.

The nationalization of all private banks during the Derg Socialist Regime (1974–1991) signaled a dramatic change toward a centralized, state-run banking sector. This change drastically restricted private sector involvement and limited access to financial services in an effort to bring financial operations into line with socialist ideals. Ethiopia experienced significant financial repression during the Derg socialist era from 1974 to 1991. The government exerted tight control over the banking and financial sector by nationalizing and owning all major financial institutions (Alemayehu, 2006; Gebrehiwot & Wolday, 2008).

The Revolutionary Democracy of the EPRDF (1991-2018): A new era of financial liberalization and privatization started with the fall of the Derg regime. To create a more competitive banking environment and expand access to financial services, the Ethiopian People's Revolutionary Democratic Front (EPRDF) made changes allowing private commercial banks to operate alongside state-owned institutions (Alemayehu, 2006). In many ways, the administration implemented reforms in the financial system, demonstrating a tendency to ease restrictions and improve both financial and economic sectors, thereby reinforcing its authority. Instead of being introduced all at once, the financial liberalization reform strategy was implemented gradually (Tesfaye & Fava, 2024).

The Present Era of Prosperity and Integration (2018–Present): With continuous efforts toward modernization and liberalization, the government has recently placed a strong emphasis on expanding the financial sector and increasing its integration. Initiatives to strengthen regulatory frameworks, promote foreign investment, and improve financial inclusion have been implemented during this time (Tesfaye & Fava, 2024). However, studies that focus on the Ethiopian banking financial regulations, efficiency and stability level with other neighbor countries are scanty.

The capital regulation in SSA shows that the majority of countries have fully adopted the Basel I framework (Bank Regulation and Supervision Survey, 2019). However, the minimum regulatory capital ratios (Tier 1 and total capital) in majority countries are significantly higher than the levels recommended by the Basel Committee on Bank Supervision (BCBS). This partly reflects the high credit risk common in the region. These higher regulatory capital requirements compel banks to operate at or just above the regulatory minimum because increasing equity is expensive in most countries. In other words, the "capital buffer," or the difference between the amount of capital that banks actually hold and the regulatory minimum, remains relatively small (Gondwe et al., 2023).

Bank activity restrictions are also a way of regulating the banking system (Nyantaky & Sy, 2015). Although banks vary considerably from one country to

another, they often engage in lending and deposit activities, securities investing, insurance, real estate, and non-financial businesses. Banking activities in SSA countries range from highly restricted to more relaxed regulation depends on the country's policies.

As far as the primary purpose of regulation in economic activity is to safeguard customers from a range of market flaws; countries have an incentive to avoid too strict regulations (Pacces & Heremans, 2011). The policy failures in this area can be expensive and can have significant negative externalities (Pasiouras, 2008b); and have a substantial influence on bank performance (Naceur & Omran, 2008). Therefore, a banking regulation must be effective in guaranteeing economic sustainability (Akhter, 2019).

Research on financial regulations and their effects on bank efficiency and stability have long attracted both theoretical and empirical interest because banks operate in one of the most tightly regulated environments. Since efficiency is a measure of bank performance and is explained as making banks capable of withstanding shocks, it has a significant impact on growth (Diallo & Koch, 2018). Financial stability is also expressed as the capacity of the financial system, including markets, financial intermediaries, and market infrastructure, to withstand shocks and avoid financial imbalances, thereby reducing the possibility of disruptions in the financial intermediary process. Hassan & Sanchez (2007) for instance, state that the most common sources of efficiency are regulations and greater direct control by the government and excessive government interference may lead to inefficiency. Efficiency increased during deregulation in China (Wu, 2003). The inefficiencies in Gambia's financial sector are attributable to its heavy regulatory framework (Agu, 2004). A well-functioning financial system contributes more to productivity and economic growth, and it more effectively generates and allocates resources. The competitiveness and operational efficiency of the banking market serve as indicators of macroeconomic conditions, regulations, and institutions, all of which affect the banking sector's performance.

At the international level, (Barth et al., 2004, 2006, 2008, 2013; Barth, Caprio, et al., 2001a; Čihák, Demirgüç-Kunt, Feyen, et al., 2012; Demirgüç-Kunt & Detragiache, 2002; Demirguc-Kunt & Honohan, 2008; Kosmidou et al., 2005; Pasiouras et al., 2009; Pasiouras, 2008b) examine regulatory and supervisory measuring variables on bank performance, stability, and development for a broad range of areas. To examine the relationship between certain regulatory and supervisory practice and the development, efficiency, and fragility of the banking industry, Barth et al. (2004) for instance, look at the regulation and supervision of banks in 107 countries. Barth et al. (2008) also provides new and official survey data on bank regulations in 142 countries and compare with the two previous surveys. Barth, et al. (2013) analyze whether bank regulation increase or impedes bank operational efficiency based on an unbalanced panel analysis of 4050 observations in 72 countries during the period 1999–2007. The overall results indicate that looking the reform of bank regulation and supervision as a narrow technical issue is risky because the impact of bank regulation reflects host countries' complex economic and political institutions.

Studies on the relationship between the entry of foreign banks and stability and efficiency suggest that foreign banks can improve the availability and quality of financial services by fostering competition. They can also influence domestic financial markets by making it easier to adopt modern banking management, technology, and skills. For example, foreign banks have been shown to positively impact bank efficiency (Barth et al., 2004, 2006, 2008; Claessens et al., 2001; Demirgüç-Kunt et al., 1998; Jeon et al., 2011; Kozo et al., 2007; Lee & Chih, 2013; Lensink & Hermes, 2004; Levine, 1996; Ukaegbu & Oino, 2014). Similarly, Barth et al. (2004, 2006, 2008); Demirgüç-Kunt et al.(1998); Jeon et al. (2011); Kozo et al. (2007); Lensink & Hermes, (2004); Levine (1996); Ukaegbu & Oino (2014) show a positive relation between foreign banks entry and stability. Conversely, Claessens et al. (2001); Fu et al. (2014); Gondwe et al. (2024); Lee & Chih (2013) report negative effects on bank stability.

While theory provides conflicting predictions about restricting the range of bank activities, findings by Barth et al. (2006, 2008, 2013); Barth, Caprio, et al. (2001a); Kosmidou et al. (2005) support the idea that fewer regulatory restrictions can increase banks' franchise value and encourage prudent behavior. Alternatively, banks involved in diverse activities may find it easier to diversify income sources and operate more efficiently, which can positively influence the stability of the financial system. Countries that relaxed restrictions on bank activities to allow diversification observed positive effects on banking system stability (Barth et al., 2004, 2006, 2008; Barth, Caprio, et al., 2001a; Barth, Gerard Caprio, et al., 2001; Beck et al., 2006; Gondwe et al., 2022; Laeven & Levine, 2009). However, Fell & Schinasi (2005; Fernández & González (2005); Lee & Chih (2013) reported negative results.

The relationship between strict capital regulations and bank efficiency is reported as negative (Barth et al., 2008; Barth, Caprio, et al., 2001; Kosmidou et al., 2005), but others (Ahamed et al., 2021; Barth et al., 2013; Mahmud, 2022; Pasiouras et al., 2009) find a positive correlation. Although many countries have responded to Basel standards by strengthening supervisory structures and capital requirements, these changes may not necessarily improve bank stability or efficiency (Barth et al., 2008).

Strict bank regulation in general may not only lower banking efficiency but also increase the probability of a banking crisis. Further, restrictions on the entry of new banks and restrictions on bank activities adversely affect banking system performance (Barth et al., 2006). The result implies that bank activity restrictions are negatively associated with bank efficiency (Barth et al., 2013)

Recently, Gondwe et al. (2022, 2023, 2024) investigate capital regulation impact; cross border banking; and regulations effectiveness in SSA. Gondwe et al. (2022) investigate the effectiveness of regulations in modifying Bank risk (instability) in SSA. The study focuses on examining the implications of four regulations (capital, activity restrictions, supervisory power and market discipline) on risk-taking

behavior of banks. This study uses the World Bank- bank regulation and supervision Survey database to construct regulation indices. To estimate the impact of each regulation on bank risk a two-step system generalized method of moment estimator is used. The overall results show that activity restrictions reduce bank stability.

Gondwe et al. (2023) broaden the investigation to find out how capital regulation affects interest rate pass-through in Sub-Saharan Africa. The result indicates that while stricter regulatory capital requirements are a useful macro prudential tool for improving banking sector stability, they may also have the unforeseen effect of restricting economic growth. The implementation of monetary and bank regulatory policies in the area must carefully consider and balance this trade-off.

Furthermore, Gondwe et al. (2024) examine the cross-border banking and bank stability in Sub-Saharan Africa using bank-level data from 29 countries in the region between 2005 and 2019. The impact of increased cross-border banking on the stability of the domestic banking sector is examined using panel fixed effects (FE) and two-step system GMM estimators. The finding implies that banks stability decline in host countries with an increased existence of foreign banks.

Most studies on bank regulation, such as, Barth et al. (2004, 2008, 2013); Barth, Gerard Caprio, et al. (2001); Pasiouras (2008a), use instrumental variable regression and tobit regression to predict the effects of various regulations that may significantly affect bank performance. They used aggregated data. Although these authors conclude that financial regulation is a critical issue for any country, whether developing or developed, to achieve long-term financial sustainability and promote economic growth, most studies focus globally with more emphasis on developed nations. SSA receives little attention. The recent papers by Gondwe et al. (2022, 2023, 2024) focus on SSA from different perspectives. However, they do not perform a meaningful analysis of bank regulations by specifically grouping countries with relaxed and strict policies to examine the impact on bank efficiency and stability.

In doing so, our paper contributes to closing the gap by focusing on SSA countries particularly. We also compare regulatory practices between countries with flexible and restricted policies. Motivated by a long-standing policy discussion in Ethiopia over the extent to which foreign bank entry, banking activity, and capital regulation restriction exist, we were eager to see what the neighboring countries looked like.

To the best of my knowledge, no prior research has looked at the effects of foreign bank entry, capital regulations and banking activity constraints on the efficiency and stability of SSA. This paper broadens and improves the previous research. First, this paper uses cross country data over time for substantially (57%) sub-Sahara Africa countries. Second, the model used is different from the previous studies on this area. Third, comparative analysis based on points of difference on foreign bank entry policy is made.

The empirical finding is useful to regulators, policymakers, and bank management. In particular, the findings help regulators and policymakers understand the effects and implications of present constraints on bank stability, as well as the consequences of severe regulation. As a result, legislators should enact laws that assist banks in becoming more stable and high efficient while lowering the excessive risks they face.

1.3 Research questions

Based on the identified problems and reviewed literatures, the researcher has develop the following research questions that need to be investigated in the SSA countries banking regulations.

- What is the relationship between a country's tighter foreign bank entry restriction and operational efficiency?
- What is the relationship between a country's tighter foreign bank entry restriction and bank stability?
- What is the relationship between countries that enforce tighter restrictions on non-lending bank activities and operational efficiency?

- What is the relationship between countries that enforce stringency capital on the ability of commercial banks and operational efficiency?
- What is the relationship between countries that enforce tighter restrictions on non-lending bank activities and bank stability?
- What is the relationship between countries that enforce stringency capital on the ability of commercial banks and bank stability?

The answers to these questions have significant theoretical and policy implications. Many SSA countries are experimenting with their banking policies. So, the results of this study inform these policy reforms. Thus, in light of the inquiries above, the purpose of this research is to examine the effect of bank regulation on bank efficiency and stability in Sub-Sahara African countries, and undertake comparatives analysis on foreign bank entry.

1.4 Objectives of the study

The SSA region's growing working-age population, rising urbanization, and new technological developments in several economic sectors contribute to higher labor productivity and investment levels. Despite their importance in this region, commodities are not the only drivers of steady growth. It is also necessary to enhance financial institutions' capabilities and implement macroeconomic and structural policies. The growth process also depended heavily on the development of the financial sector (Mlachila et al., 2013).

Compared to other regions, SSA still has weak banking and financial systems. The financial systems in most SSA countries were underdeveloped during the colonial period, and following independence, the financial sector in SSA remained limited, with commercial banks being the sole major players (Gakunu, 2007).

The region's banking systems are highly concentrated, incur high operating costs, and typically inefficient in terms of financial intermediation (Mlachila et al., 2013). The diversity of financial institutions in SSA is limited, and the assets of most low-

income African nations are fewer than those of a single medium-sized bank in developed nations (Gulde et al., 2006).

The general objective of the study is to analyze the effects of the bank regulations on bank efficiency and stability in SSA. The specific objectives are;

- The effects of foreign bank entry restrictions on bank efficiency
- The effects of foreign bank entry restrictions on bank stability
- The effects of activity restrictions on bank efficiency
- The effects of capital regulations on bank efficiency
- The effects of activity restrictions on bank stability
- The effects capital regulations on bank stability

1.5 Significance of the study

To the best of our knowledge, empirical studies on bank regulation in many SSA African countries are scant; even the existing limited studies have methodological gaps and inconclusive results. Thus, this study attempts to fill these gaps by using an appropriate model to add to the existing knowledge for policy decisions in SSA countries, particularly in Ethiopia. Therefore, this study provides some academic additions to existing knowledge.

Ethiopia's banking sector suffers from a lack of transparency and limited data availability, which hampers comprehensive econometric analyses of bank efficiency and stability compared to SSA countries those have more accessible data. There are only a few studies (Addison & Alemayehu, 2001; Asfaw & Kassahun, 2014; Bogale, 2017; Tesfaye, 2014) (as far as authors' knowledge) on the Ethiopian banking sector regulation framework compared with the more liberalized frameworks across SSA, and very few empirical studies analyze foreign entry and bank performance. Most existing research concentrates on Ethiopia's banking sector performance but it is difficult to compare with SSA countries that have longer histories of foreign bank presence.

The purpose of this research is to fill the gap in the existing literature on the effect of foreign bank entry, bank capital stringency, and activity restrictions on banking efficiency and stability in SSA and make comparisons with Ethiopian banks on foreign bank restriction. We expand the existing understanding on the relation between bank regulations and bank sector performance in the SSA region using major regulatory variables in detail in our estimation models. The rationale for adopting such variables is because the region's banking systems are highly concentrated and inefficient in terms of financial intermediation, with low diversification of financial institutions (Gulde et al., 2006). And the empirical findings of the paper are used by policymakers, regulators, and management of banks. Specifically, the results benefit policy-makers and regulators to understand the impact and consequence of already implemented regulations on the efficiency and stability of banks and help to know outcomes of strict regulation. Therefore, policymakers should design such policies that help the banks to increase their efficiency and mitigate the excessive risk taken by them.

1.6 Scope of the study

The scope of the study is delaminated to the bank regulation in Sub-Saharan Africa countries, specifically on the three major bank regulatory variables; foreign bank entry, bank activity, and capital regulation. The subject of the study is only on selected SSA countries compared with Ethiopia. The study measured the efficiency of bank and stability by using aggregate measures. The study covers only the SSA commercial banks efficiency and stability. The study not covered all Africa countries and the study also not addressed other bank regulatory and supervision variables.

1.7 Organization of the paper

This research is organized into five chapters. The first chapter deals the paper's introduction, which includes the research's background, problem statement, research questions, study objectives, significance, and scope of the study. The

second chapter reviews relevant literature. This chapter covers a review of relevant literatures pertaining to the issue under discussion. The third chapter discusses study methodology, which includes the research philosophy, techniques, and designs employed during the data gathering and analysis procedures. The fourth chapter presents the general findings and discussion of the study that focuses on the effect of bank regulation on bank efficiency and stability. Finally, chapter five presents the study's conclusion and recommendations.

CHAPTER TWO: LITERATURE REVIEW

In this part, we present a brief overview of various theoretical and empirical researches relevant to the three regulations consideration in the current study. Because research on the link between bank regulation, efficiency, and stability in sub-Saharan Africa is scanty, the majority of the empirical material reviewed is from developed nations or areas outside of Africa.

2.1 Theoretical framework

2.1.1 Financial repression and liberalization school

The school of financial repression and the school of liberalization are two opposing theories of financial regulation. The former views government intervention in the financial sector as essential for economic growth, with interest rate control serving as a key policy tool. Conversely, the latter emphasizes privatizing government-owned financial institutions and adopting financial liberalization as main policy

strategies. According to the World Bank, the International Monetary Fund, and McKinnon and Shaw (1973), quoted in Asfaw & Hagos (2014), financial liberalization has been highly prioritized for developing nations. Although liberalization has delivered societal and economic advantages to the financial sector, it has also introduced certain risks. Therefore, when deciding whether to liberalize, it is important to carefully evaluate the potential risks and benefits.

Economic theory also presents conflicting opinions on whether financial institutions should be liberalized. Given the positive impacts of competition and the negative consequences of entry restrictions, some contend that efficiently selection of bank entry helps to promote stability (Barberis et al., 1998). Some argue that monopolistic banks have greater franchise values, which encourages risk-averse conduct (Keeley, 1990).

Foreign banks are not the sole engines of growth in any developing country, but they play a dominant role in most countries by stimulating financial development, thereby promoting economic growth (Levine, 1996). However, policymakers continue to discuss on the advantages of opening the financial sector to foreign ownership.

Regarding the concept of foreign bank entry there are two groups: the advocates and opponents. The advocates of foreign bank entry liberalization argue that it increases competition in domestic banking markets, enhances the efficiency of domestic bank operations, offers financial services at lower costs, and promotes economic growth by boosting resource allocation efficiency (Jeon et al., 2011; Lensink & Hermes, 2004; Levine, 1996).

In countries with foreign banks, financial service quality and availability can improve by encouraging competition and the ability to challenge domestic financial markets through modern banking skills, technology, and management. For example, foreign banks may pressure traditional banking practices. Additionally,

increased competition may lower interest rate margins and profits (Lensink & Hermes, 2004).

Foreign banks can also boost human capital in the domestic banking system by importing skilled managers and training local staff, leading to more efficient practices and lower costs, despite high initial staffing expenses. Over the long term, costs may decrease.

Countries have worked to enhance their financial policies and infrastructure to foster development. The entry of foreign banks improves regulation, supervision, and banking operations, which can enhance the quality of domestic banking services.

The presence of foreign banks could also reduce government's influence over the domestic banking system, thus reducing the significance of direct credit policies. All of these effects reduce costs through promoting more efficient domestic banking operations.

Conversely, opponents worry foreign banks might selectively serve low-risk, high-quality borrowers, forcing domestic banks to focus on higher-risk clients, which could make them unprofitable, inefficient, and less competitive. They also claim foreign banks tend to charge higher net interest margins and pursue rent-seeking behaviors, which can reduce market competitiveness.

Some countries are worried about the feebleness on entry of foreign banks, which could hinder the financial development and the delivery of financial services and capital.

Levine, (1996) and Demirgüç-Kunt, Levine and Min, (1998) analyzed four broad categories of country concerns. First, foreign banks are accused of encouraging capital flights due to their close ties with the international financial community, currency crises, and financial instability.

Second, foreign banks tend to withdraw when local or global market problems arise. Foreign banks' lack of commitment to domestic markets can increase financial system fragility in the domestic financial system, particularly if they dominate a significant market shares.

Foreign bank entry might lead to more supervision and regulation, potentially overwhelming domestic officials and creating a riskier environment (Demirgüç-Kunt et al., 1998). They are also accused of targeting their services, such as serving profitable market segments or dominating domestic markets. However, the market-based business strategy suggests that they aim to carve out competitive advantages, successfully develop services in other countries, and follow corporations from their respective base countries. Many countries fear domestic markets becoming dominated by foreign banks, prompting restrictions justified by "infant industry" arguments.

However, there is no consistent evidence that foreign banks cause capital flight or systemic fragility (Demirgüç-Kunt et al., 1998). If there are strong incentives for capital to flee, capital controls are ineffective, and the fear of capital flight does not justify restrictions on foreign bank entry. In countries with open capital accounts, foreign institutions can facilitate flight if allowed, whereas in countries with closed accounts, they can facilitate foreign investment and contact parent institutions (Musalem et al., 1993). Instead, poor policy, political uncertainty, and high taxes make domestic markets unattractive and risky place for investment (Gordon & Levine, 1987). Countries might safely liberalize foreign bank entry by capping foreign ownership; say at 40 percent, reducing fears of foreign dominance.

Country fears of foreign bank entry are natural but should not be used as a pretext for restricting foreign bank entry (Demirgüç-Kunt et al., 1998; Jeon et al., 2011). The authors argue that creating an attractive investment climate can prevent capital flight, and that foreign banks' strategies may vary across countries. They also suggested that domestic regulators should be able to safeguard a sound financial system.

The rising market share of foreign banks in developing and transition economies has results from factors like, privatization of state banks, and the sale of distressed banks after crises (often restructuring at the host country's expense). According to Although, Gelb & Sagari (1990), in a sample of twenty developing countries, foreign banks' median share of total assets is about 6%. In Central Europe, foreign-controlled banks increased from 8% of total assets in 1994 to 56% in 1999. In some Latin American countries, almost one-half of all bank assets are held by foreign institutions (IMF, 2021).

Now a day, the foreign bank share in Sub-Saharan Africa grew from about 30.6% in 2000 to 66.3% in 2005, reaching approximately 64.2% in 2019 (Gondwe et al., 2024). Foreign owners bring capital, technology, expertise, and independence from local elites (Demirguc-Kunt & Honohan, 2008). However, in some nations, foreign banks play a minor role; for example, Indian public sector banks are more efficient than private and foreign banks (Sathye, 2003). Therefore, fears of foreign banks dominating should not prevent easing entry restrictions. While individual foreign banks seek profitable niches, their strategies will differ and represent the natural competitive process to improve financial services. Although entry into retail markets may be hard for foreign banks due to high barriers, this is part of normal market behavior and competitive forces at work. Therefore, most countries may likely obtain the benefits from foreign banks without incurring the costs; however entry should not run ahead of the ability of domestic regulators and supervisors to protect a stable financial system. Finally, easing restrictions on foreign banks' admission into developing countries might be advantageous if they have a strong supervisory and regulatory framework to guarantee the security, stability, and openness of the financial system (Levine, 1996).

In this regard, the Ethiopian government recognizes the need and relevance of financial liberalization for the country's financial development, although it will take a gradualist approach to liberalization. Since 2024, Ethiopia's banking sector has not been liberalized, and emerges as exceptional compared with its neighbors Kenya, Tanzania, Uganda, and other emerging countries.

Whatever the foreign banks have, greater capital and experience than domestic banks, they can stymie the development of domestic banks. In Ethiopia the financial sectors are young, small and less experienced to compete with foreign entities (Asfaw & Kassahun, 2014).

The concern of the Ethiopian government about foreign bank entry is that if foreign banks enter the domestic market, their credit policies may favor large-scale industries, urban residents, and established industries because of their reputation and ample collateral. As a result, the contribution of foreign banks to rural development will likely be limited. Since most citizens live in rural areas, Ethiopia's credit policy favors the agricultural sector, small-scale industries, and rural dwellers (Asfaw & Kassahun, 2014).

Another concern of the Ethiopian government regarding foreign bank entry is the potential foreign exchange shortage: foreign banks' participation might lead to a shortage of foreign currency, which could negatively affect the balance of payments and the capital account (Asfaw & Kassahun, 2014). Therefore, the first empirical question this research aims to explore is how restrictions on foreign bank entry impact bank efficiency and stability.

2.1.2 Public interest and private interest approach

The theoretical viewpoint on the precise influence of bank regulation and supervision is unclear due to some general ideas held in the sector. (Barth et al., 2006) explained two general views that provide conflicting predictions.

The public interest approach, which dominates studies of banking regulation in the twentieth century. The ‘public interest view’ holds that the government acts in the interests of the public and regulates banks to promote efficient banking and ameliorate market failures for the benefit of broader civil society. Pigou's theory serves as the foundation for many arguments in favor of government intervention. Government interventions may be beneficial in mitigating market failures and enhancing societal welfare due to the presence of monopolistic power,

externalities, and informational asymmetries (Stigler, 1971). According to the Pigouvian perspective, there are market failures and the government can correct them.

Pigou (1938), cited in Barth et al. (2006), states that monopolies are examples of market defects that can hinder market operation and provide the government a potentially beneficial role in promoting social welfare. This helping-hand or public interest perspective assumes that (1) there are substantial market failures and (2) the government has the resources and incentives to address these market shortcomings. Others disagree, arguing that market failures are not very significant or that governments frequently ignore these market failures and act in their own interest (Laporta et al., 1998). This perspective holds that regulations allowing the private sector to monitor banks would work better than direct government interventions meant to enhance bank stability and performance.

The other view which is, 'the private interest view' (Stigler, 1971) posits regulation is often used to promote the special interests of the few, not the broader public, thereby hindering bank efficiency and stability. The private interest view (or the economic, or political/regulatory) accepts the presence of market failures, and conceives of regulation as a product, with various demanders and suppliers interacting to determine the exact shape and purpose it serves. Moreover, it posits that restrictions can be designed to give regulatory discretion, increasing their bargaining power for rent seeking (Djankov et al., 2002).

Proponents of the private interest school expect regulations to increase the power and wellbeing of bankers and politically connected groups. In fact, Banks' central role in resource allocation makes them vulnerable to influence from interest groups, including bankers involved in connected lending, politicians directing loans to friends, families, or supporters, and others seeking financial advantage. Consequently, many groups attempt to sway banking policies at national or regional levels for their benefit, even if it does not optimize social welfare. Accordingly, the private interest view advocates for greater market discipline, minimal regulation,

transparency, and close oversight of regulatory processes (Shleifer, 2005). Therefore, empirical evidence is essential to inform policy decisions amid these opposing viewpoints and their conflicting predictions about how regulations influence bank performance.

2.1.3 Why governments regulate banks?

As financial intermediaries, banks play a vital role in the economy. They evaluate potential borrowers, monitor customer behavior, provide liquidity risk coverage, and develop secure assets. Banks help reduce moral hazard and adverse selection by collecting information from depositors, identifying attractive investments, and allocating funds to profitable ventures. However, their effectiveness as financial intermediaries is not perfect, necessitating regulation and supervision (Nyantaky & Sy, 2015).

The 2007 U.S. financial and economic crisis reignited debates regarding the need for and method of bank supervision and regulation. Despite the absence of global banks such as the so-called "too-big-to-fail," oversight and regulation remain as crucial in Africa (Nyantaky & Sy, 2015).

The major goal of financial regulation is to maintain the stability of the financial system by reducing excessive risk-taking that could harm creditors' interests and averting systemic crises that could impair the whole economy. To guarantee the proper channeling funds from lenders to borrowers, banks should be subject to regulation and oversight and any violation of this duty might disrupt the economic system and perhaps result in financial and economic crises (Botha & Makina, 2011). In support of this goal, Crockett (1997) outlines four main reasons why bank regulation is important.

First, the consumer protection argument contends that bank regulation protects depositors from losses caused by banks' excessive risk-taking behavior. Depositors keep a sizable amount of their assets in banks in industrialized countries (and increasingly in emerging nations). In this instance, depositors are concerned about

the stability of the banking system and any doubt about the security of their funds might result in a bank run (Diamond & Dybvig, 1983). Individual depositors find it difficult, if not impossible, to oversee banks, necessitating the establishment of a delegated authority capable of regulating and supervising them. Because financial markets in developing nations, such as Africa, are undeveloped, banks often play a central role in the financial system.

Second, the systemic risk argument deal with bank regulation reduces the possibility of bank risk during moments of financial instability. This reduces the transfer of financial risks that originate in one bank and are passed to the other banks.

Third, considering that certain banks are regarded too large to fail and warrant government bailouts (Dam & Koetter, 2012). According to the fiscal argument, government losses as a lender of last resort in the event of a bank failure are prevented by bank regulation.

Finally, the efficiency argument contends that by promoting the most efficient use of financial resources, bank regulation fosters financial development in the economy (Thamae et al., 2023)

2.1.4 How to regulate banks?

Many tools can be used to regulate and supervise banks. According to Barth, Caprio, et al. (2001a), these tools range from limits on asset holdings and operations, separation of traditional banking from other financial service, restrictions on computation, capital requirements, disclosure requirements, and a risk-based deposit insurance premium, to bank chartering and bank examination.

Banks are prevented from taking excessive risk by restricting their asset holdings and activities. The asset side of banks may be subject to government regulation. When banks are prohibited from investing in certain assets generally or in especially risky assets specifically, this is known as an asset-side restriction.

Banks may also be required to keep traditional banking separate from other financial service industries. They might be barred from investing in sectors such as insurance or real estate; the goal is to prevent commercial banks from combining banking with other activities. The Glass-Steagall Act, which was in effect in the US for over 50 years after the Great Depression, is a well-known example of this regulation. Another reason for limiting banks' participation in other financial activities is that, as financial intermediaries, they could gain unfair competitive advantages over other financial institutions or receive implicit or explicit subsidies because they are considered too big to fail. For example, Madagascar permits investments in securities and real estate but bans investments in insurance. In Seychelles, banks are only allowed to invest in securities activities (World Bank, 2019).

Restrictions on the level of competition also aim to prevent banks from taking excessive risks. When competition is high, banks may take on too much risk to maintain profits, which could lead to a crisis and destabilize the financial system. Limits on competition include, but are not limited to, barriers to entry for foreign banks, restrictions on the total number of banks within an economy, and limits on branch expansion.

Regulations also include minimum capital requirements to reduce the risk of financial instability. The most common form of this regulation is the capital adequacy ratio, which ensures banks have enough capital to absorb shocks and remain solvent.

Disclosure requirements and deposit insurance are also crucial parts of modern banking regulation, though these topics are outside the scope of this study. The next section will examine each method of bank regulation in detail.

2.1.5 Theoretical reasons on Bank activity restriction

The most popular services provided by commercial banks are accepting deposits and offering loans or other finance service to businesses and households. In many

countries, they are required to maintain reserves at the central, which are frequently calculated as a specific percentage of their deposit liabilities (IMF, 2019).

Accepting deposits and offering loans or other financial services to businesses and people are the two most common services offered by commercial banks. They must maintain reserves at the central bank in many nations, which are frequently calculated as a specific percentage of their deposit liabilities.

Bank activity restriction is among the way of regulating the banking system (Nyantaky & Sy, 2015). Albeit banks are not the same across countries, their activities are usually shared between deposit and lending, securities investment, insurance, real estate activities and non-financial businesses. Barth et al. (2004) empirically examined bank regulation and supervision for 107 countries and put forward various reasons for and against restricting bank activities. Barth et al.(2006) and Claessens et al. (2001) also discussed the potential theoretical justifications for permitting banks to engage in a wide variety of activities other than the conventional way of accepting deposits and granting loans.

Fewer activity restrictions allows to exploit economies of scale and scope in gathering and processing information about enterprises, creating reputational capital, and delivering a variety of services to clients. Second, fewer regulatory restrictions may boost a bank's capacity to diversify income sources and brand value, which might incentivize more prudent behavior (Hellmann et al., 2000).

There are five primary theoretical reasons why nations throughout the world restrict bank operations and banking commerce linkages. The first reason is that conflict of interest might raise when banks participate in a variety of operations such as securities underwriting, insurance, real estate investing, and non-finance company activity. Such banks may seek to "dump" stocks on uninformed investors in order to aid corporations with outstanding debts. Second, wide financial activity may exacerbate moral hazard issues, encouraging riskier conduct and causing institutions to take on more risk (Boyd & Smith, 1998). Third, complicated banks

are hard to regulate. Fourth, broad activities might result in the establishment of exceedingly huge and complex organizations that are difficult to oversee and "too big to discipline" (Laeven & Levine, 2005). Lastly, large financial conglomerates can diminish competition and efficiency. These opinions support the view that governments may enhance banking by limiting its operations. Managing diverse activities can be difficult for less-developed institutions, and managing these activities under a single conglomerate can be difficult without financial regulation (Barth et al., 2004; Boyd & Smith, 1998; Laeven & Levine, 2005).

The banking industry in Ethiopia has limited banks' investment levels but has not banned them from dealing in securities, insurance, or real estate. For example, the directive prohibits banks from investing more than 20% of their equity capital in real estate, non-banking businesses, and insurance companies; they are also prohibited from investing more than 10% of their net worth in other securities; and they are prohibited from investing more than 50% of their net worth at any one time (excluding government securities).

Therefore, the effect of bank activity restrictions on bank efficiency and stability is also an empirical question that the researcher explores. Late in 2019, the NBE approved more banking regulations. Commercial banks can purchase equity interests in capital market service providers, with the exception of credit rating organizations, with prior clearance from the central bank. They can also invest in real estate and own equity shares in a single insurance firm. However, the directive includes strict prohibitions on some acts. Banks are expressly prohibited from directly operating in insurance operations, providing capital market services, investing in non-banking enterprises, or owning equity interests in credit rating organizations.

The directive limits aggregate equity investment in non-banking enterprises, including as insurance companies and capital market service providers, to 15% of a bank's total capital. Banks are not permitted to spend more than 10% of their total

capital in real estate purchase and development, save for company premises, without prior clearance from the National Bank of Ethiopia (NBE).

Globally, countries like Austria, Australia, Germany, Russia, India, United Kingdom, and Zambia are among the countries that do not restrict banks' capacity to conduct securities dealings. On the other hand, banks or their subsidiaries are not allowed to engage in securities activities in China, Vietnam, or Cambodia. In general, bank operations are subject to stricter regulations in poor countries than in rich ones (Barth et al., 2004).

2.1.6 Regulatory Capital stringency

Typically, a company's capital includes both long-term debt and stock. The share capital is the equity component of the capital structure. The reason for regulating share capital is that a bank's ability to withstand losses is directly linked to its level of capital, which helps make it more resilient to external shocks.

Capital is an important element in managing a business and the minimum level of capital required by the regulatory authority is called regulatory capital. The capital adequacy ratio, or the percentage of risk-weighted assets required to be kept in equity, is used to limit banks' risk, enhance their capacity to absorb losses, and avoid moral hazard (Miele & Sales, 2011; Siddika & Haron, 2016). This regulation aims to decrease risk and bank failure by regulating the amount of capital required to compensate for losses (Asfaw & Kassahun, 2014).

The Capital Adequacy Ratio (CAR) is a ratio that shows how capable a bank is of providing reserves to cover risks like credit risk, operational risk, and market risk. To put it simply, a bank's capital serves as a safety net against any losses, safeguarding both depositors and other lenders. It is stated as a proportion of a bank's risk-weighted credit exposures (Pradhan & Shrestha, 2017). Since there is a significant chance of loss in the banking industry, bank management must constantly monitor and preserve capital to lower the risks (Puspitasari et al., 2021).

Therefore properly implemented capital regulation incentivizes banks to improve risk management.

Toward the standardization in banking operation and supervision the oldest international financial organization, Bank for International Settlement (BIS), was founded in 1930 and its members are central banks or the regulatory authorities of 60 nations. The main objective of BIS is to promote global cooperation and act as a regulatory body for monetary and financial stability. BIS established the "Committee on Banking Regulations and Supervisory Practices," commonly known as the Basel Committee on Banking Supervision (BCBS), at the end of 1974 in order to provide comprehensive recommendations for managing bank capital in order to protect against operational and financial risk in an international standard. The committee published Basel I, Basel II, and Basel III guidelines on capital adequacy.

The Basel Capital Accord requires at least 8 % of risk-weighted assets (RWA) that a bank to have as a "regulatory capital" (through combinations of equity, loan-loss reserves, subordinated debt, and other accepted instruments). Loans and securities, for example and asset equivalent off-balance sheet exposures (such as loan commitments, standby letters of credit, and obligations on derivatives contracts) as capital; of which 50% must be Tier 1 or core capital. The minimum capital requirement of the bank is calculated by multiplying the total risk-weighted assets by 8% (Federal Reserve Bank, 2003).Investments in subsidiaries operating in the banking and financial industry that are not part of the national system, goodwill (deduction from Tier 1 capital), and increased equity as a result of securitization exposure are all to be subtracted from the capital base.

Basel I encouraged banks to have higher capital ratios, but its simplicity in measuring risks led to regulatory arbitrage. Subsequently, in 1996, the Basel Accord was criticized for its use of book value accounting measures of capital instead of market values. Its emphasis on credit risk also left important exposures related to liquidity and operational risks, which hindered Basel I's ability to fully

standardize practices (World Bank., 2019). It lead to an amendment to incorporate market risk to address banks' exposure to foreign currency risk, securities trade, equities, commodities, and options (Siddika & Haron, 2016). This change made it possible for the bank to measure market risk and related capital using an internal model.

In order to accommodate highly complex on- and off-balance sheet items, promote more risk-sensitive capital requirements over banks' own assessments, and increase transparency, the originally created Basel I was significantly changed in 2004 to create the more sensitive Basel II capital requirement (Siddika & Haron, 2016). Under Basel II, BCBS also suggests a minimum capital requirement of 8%. The Basel II Accord was built around three interconnected pillars: Minimum criteria for own funds - The capital adequacy ratio, which is calculated as the ratio of the bank's equity to assets, must be at least 8% for own funds. This time, the assets are weighted according to three risks: credit, market, and operational risk. The supervisory process for bank activity- includes the internal performance evaluation methods of the bank's own equity. The supervisory authority is in charge of the way banks conduct assessments, enhancing communication between banks and supervisors, and acting swiftly to stop capital fall. Market discipline- The Central Bank and the general public must report ownership structure, risk exposures, and capital adequacy to the risk profile with more precision in order to maintain market discipline. These criteria include the regular release of information (every six months for national banks and quarterly for foreign institutions).

Then, in response to the 2007-2009 global financial crises, Basel-III was introduced as a more resilient regulatory framework that addresses pre-crisis failings and serves as the foundation for a resilient banking system by improving regulatory capital quality, risk capture, and macro prudential elements (BIS, 2017). Basel III is the third and most recent advancement of the Basel Accords, and it is a global regulatory standard established by the BCBS on capital adequacy (including a new leverage ratio and capital buffers), market liquidity risk (with new short-term and long-term liquidity ratios), and stability-focused stress testing. The G-20 agreed on

Basel III improvements to global regulatory standards in November 2010, which were subsequently announced by the Basel Committee on Banking Supervision in December 2010.

The primary goal of these changes is to tighten the capital adequacy criteria on the quality and quantity of capital that banks must keep in order to absorb losses. The Basel III framework, which focuses on improving the safety and stability of the banking industry, emphasizes the need for improving the quality and quantity of capital components, leverage ratios, liquidity norms, and increased disclosures. Basel III is thus an attempt to address the root causes of the most recent crisis (BCBS, 2010).

African countries, like any other emerging or developed country in the globe, have been attempting to implement various phases of the Basel Accords to strengthen financial stability and the economy as a whole. However, the results in Sub-Saharan Africa (SSA) banking financial stability yield two contrasting findings.

The first group states African financial systems are quite stable, owing to regulatory improvements in most African nations during the last two decades, as well as banks' strong capitalization and liquidity levels. Aside from a few minor hidden pockets of fragility, the continent has only suffered one major banking crisis during the previous 15 years, in Nigeria (Beck et al., 2014).

Contrary, the second group articulates SSA's banking and financial systems remain inadequate, and the problem of financial instability derives from the poor implementation of financial liberalization policies that led to financial monopoly (Fowowe, 2011). Banking instability is driven by a poor regulatory system of central banks in SSA economies, as opposed to other sub-regions such as Asian and Western nations (World Bank., 2019). The majority of SSA nations' financial systems were undeveloped throughout the colonial period, and the post-independence SSA financial sector remained shallow, with commercial banks dominating (Gakunu, 2007).

Both cases emphasize the importance of regulatory frameworks in banks. McKinsey, (2016) and Anginer et al., (2019) highlight the need for prudential regulation during financial crises, despite government support and capital injections. The financial crisis of that era shows how strong banking systems contribute to economic growth and emphasizes the benefits of having well-functioning banking systems (Barth et al., 2004).

In BRSS 2019, all the surveyed nations' reports adopting one of the Basel regimes, but several continued to use Basel I or Basel II. Conversely, high-income nations embraced Basel III faster than middle- or low-income nations. A third of lower-middle-income nations and almost half of upper-middle-income countries used Basel III in 2016, compared to 85% of high-income countries. Nepal was the first low-income nation to declare utilizing Basel III (World Bank., 2019). The banking industries in nations with weaker institutional structures and where market discipline and supervisory capability are lacking may even suffer as a result of Basel II and III's dependence on these two factors (Barth et al., 2008).

Anginer et al. (n.d.) analyzed bank capital regulation developments across 120 economies based on the World Bank's 2019 BRSS. Key conclusions include that post-crisis reforms raised capital requirements and regulatory capital at financial institutions, often leading to a preference for lower-risk-weight assets. The reliability of this increased regulatory capital as a stability indicator is contingent on the accuracy of risk weights. Notably, while the variety of instruments meeting Tier 1 capital requirements has expanded, the quality of bank capital has not shown significant improvement, and although the Basel III framework has raised regulatory capital ratios, it has not resulted in stricter leverage ratios or enhanced Tier 1 capital composition standards. Further demonstrates that the quality of bank regulatory capital and bank standalone risk are more strongly correlated in nations with more stringent regulations, less concentrated and competitive banking systems, and more robust private market participant oversight (Anginer et al., n.d.)

Academic experts from around the world were surveyed to gather their opinions on bank capital requirements and other regulations. Despite a range of viewpoints, the consensus suggests that the ideal (or "optimal") level of bank capital requirements, particularly the leverage ratio, is significantly higher than the current standards. Interestingly, the average preferences for the minimum risk-weighted capital requirement and the leverage ratio are similar. However, the average respondent from North America advocates for a much higher minimum leverage ratio requirement compared to their European counterparts.

Additionally, the responses suggest broad support for both the addition of a supplementary market-based capital requirement to the existing regulatory toolkit and the new components of the Basel III reform. The survey also provides additional insight into the mechanisms by which bank capital requirements determine the trade-off between economic activity and bank safety. The respondents' opinions indicate that this trade-off primarily affects the cost of bank lending: those who think that greater capital requirements increase the cost of bank lending more favor comparatively lower capital requirements (Ambrocio et al., 2020)

In Ethiopia, the minimum capital requirement for banks to obtain a license and operate is 8%. However, the total capital considered includes only paid-up capital, legal, and general reserves, or solely core capital. The NBE issued various directives. For example, Directive No SBB/78/2021 states that the minimum paid-up capital required to obtain a banking license is Birr 5 billion, which must be fully paid in cash and deposited in a bank or banks in the name and account of the bank under formation. Directive No SBB/3/95 emphasizes that capital contributions in kind are not allowed to fulfill the minimum requirement unless valued by professionals and approved by NBE. Even if the bank meets its capital requirement, contributions in kind must not exceed 25% of paid-up capital. Contributions in kind include items such as built-in vaults, buildings, essential vehicles, and others. Similarly, Directive No SBB/4/95 requires banks to maintain sound reserve accounts with the NBE after meeting the initial minimum capital requirement. This

involves transferring 25% of their annual profit to their reserve account until the reserve equals the bank's capital. Once the reserve reaches the amount of the bank's capital, only 10% of profits are required to be transferred to the reserve account.

2.2 Empirical framework

In the next sub-section, the empirical studies examining bank regulation in SSA, and the relationship between foreign bank entry, restrictions on bank activities, and strict capital regulation on bank efficiency and stability, are extensively reviewed and discussed.

2.2.1 Banks in Sub Saharan Africa

Despite progress made by Africa's banking systems over the past twenty years, they remain relatively small, costly, and focused on the short-term end of the yield curve, making them neither efficient nor inclusive (Beck et al., 2023). Africa's banking systems tend to be shallower than those of non-African developing countries. Indicators such as bank accounts per 100 adults and bank branches per 100,000 adults are significantly lower in the median African country compared to the median non-African developing country (Beck et al., 2023). Beck et al. (2019) argued that the shallowness of Africa's banking systems helped them weather the 2008 global financial crisis better than some other regions.

The financial systems in most African countries are also characterized by relatively low intermediation ratios and high cost of financial services. Despite efforts made to strengthen the banking sector, reports indicate that the highly concentrated banking industry within the SSA region is developing slowly. The primary cause of the slower rate of growth of the banking sector in SSA is weak regulatory processes that fall short of international standards (European Investment Bank 2016). Factor that mitigating the growth of the banking sector in the Sub-Saharan Africa (SSA) includes excessive or stringent regulations, market segmentation, high interest rates, information asymmetry, low credit status and uneven distribution of credit (Akinbowale & Mulatu, 2025). Additionally, Diaconu and

Oanea (2014) noted that the banking environment volatility creates much uncertainty to the extent that foreign investors are discouraged to inject capital into the sector. The world Economic Outlook (2018) had further highlight that the political influence in the activities of the central banks pose threats to the efficient supervision of banks and the effectiveness of monetary policies.

2.2.2 Ownership structure in SSA banks

Post-colonial foreign banks presences in SSA have been begun during the liberalization phase in the 1990s and 2000s and have a significant share. The average proportion of foreign-owned banks' assets is grew from 35% in 1995 to over 65% in 2019 (Beck et al., 2023). the growth is about 30.6% in 2000; 66.3% in 2005 and stood at around 64.2% in 2019 (Gondwe et al., 2024). The asset share of foreign-owned banks in the median non-African developing country was 23% in 2019 but it is 65% in African countries (Beck et al., 2023).

Despite fluctuations in foreign bank ownership in SSA, the structure of the country's financial systems has changed dramatically during the previous five decades since independence. The onset of global financial crises may have contributed to the ups and downs; the crises prompted central banks in SSA countries to tighten regulatory standards. Afterward some SSA countries made numerous reforms and nowadays, SSA has the highest proportion of foreign-owned banks (Beck et al., 2011). Increased foreign bank involvement may be owing to untapped potential.

2.2.3 Bank concentration in SSA

Top 5/3 bank assets as a percentage of total bank assets are a common measuring to bank concentration. The higher the percentages indicate a more concentrated banking system. Supposed the average bank concentration in the previous two decades show slight decline the overall concentrations are higher. Based on their income classification the lower income countries are the first, upper middle income countries are the second and then the lower middle income countries are stand last

in the SSA bank concentration. The average SSA banking concentration is all greater than 75 percent in the previous two decades with a great cross-country variation. For instance, the bank concentration is below 50 percent in larger financial system, such as, Ghana and 60 percent in Kenya and Ethiopia in 2021. Contrary it is above 90 percent in Botswana, South Africa, Benin, Zimbabwe, Burundi, and Mozambique. Consistent with their small size, Africa's financial systems are primarily concentrated, and few banks share a limited clientele. The scale of African financial systems, both in terms of absolute and relative magnitude, may be connected to this concentration.

2.2.4 Bank operating efficiency in SSA

Efficiency is a key concept for financial institutions in general, and banking sector in particular (Dinberu & Wang, 2018). It measures bank performance by showing how well a bank utilizes its resources compared to competitors within the industry (Adusei, 2016). This assessment is based on comparing performance to the best-practice point of profit maximization within the data set (Berger & Mester, 1997). Therefore, it is critical to analyze the efficiency of banks from its cost, revenue and profit perspectives (Dinberu & Wang, 2018).

Broadly speaking, efficiency is defined as performing an activity in the shortest possible time and at the lowest cost, while maintaining quality (Chorafas, 2015). Depending upon the structure and activities of the relevant economy, the efficiency analysis of the banking sector is quite important, both in developed and developing economies (Wozniewska, 2008).

The banking sector's efficiency has become a multidimensional concept and is widely studied in the literature, measured through traditional, parametric, and non-parametric methods around the world. According to Wozniewska (2008), efficiency measurement classified into three main categories: traditional, parametric, and non-parametric.

The traditional method involves ratio analysis, calculating numerous accounting ratios to assess the overall financial health of financial institutions and the operation efficiency of its management. Financial statements serve as the primary source of information for these calculations (Tuškan & Stojanović, 2016). This approach is based on the idea that a company's performance is reflected in its balance sheet and that useful information from these statements can help predict future performance (ho & Zhu, 2004).

While ratio analysis accurately reflects a company's situation, it has limitations. Accounting ratios are relatively easy to compute since they are based on financial statement data such as net profit or profit before taxes, total or average assets, total or average equity, total income, and total expenses (Jurčević & Žaja, 2013). However, there is no standard for selecting ratios that everyone agrees on, and added or simplified ratios may not meet user needs (ho & Zhu, 2004).

Bank profitability measures serve as indicators of the efficiency or inefficiency of the banking system (Demirgüç-Kunt & Huizinga, 1999).These can be assessed using accounting indicators like Cost to Income Ratio (CIR), Return on Assets (ROA), Return on Equity (ROE), and Net Interest Margin (NIM).

Parametric methods, also known as "parametric programming," estimate the characteristics of production or expense functions, measure economies of scale, and include approaches such as the Stochastic Frontier Approach, Thick Frontier Approach, and Distribution-Free Approach (Berger & Humphrey, 1997; Tuškan & Stojanović, 2016)

The Stochastic Frontier Approach (SFA) is an econometric technique that models the cost, profit, or production relationships among inputs, outputs, and environmental factors. It accounts for random errors and does not assume specific distributions of inefficiencies or errors (Berger & Humphrey, 1997). Researchers like Fiordelisi et al. (2011) have used SFA in their efficiency studies. The Distribution-Free Approach (DFA) also has a functional form but does not heavily

rely on specific distributional assumptions about inefficiencies or errors. The Thick Frontier Approach (TFA) estimates overall efficiency levels but does not provide precise point estimates for individual firms (Berger & Humphrey, 1997).

Non-parametric methods, on the other hand, evaluate efficiency using Decision-Making Units' (DMUs) efficiency frontiers (Charnes et al., 1978).These techniques rank efficiency scores and identify productive units based on multiple outputs and inputs. Data Envelopment Analysis (DEA) constructs a non-parametric efficiency frontier using linear programming to form a piecewise linear envelope (Berg et al., 1993). Non-parametric techniques focus more on technological efficiency than economic efficiency. One limitation is that they generally assume no random measurement error, attributing all differences to inefficiency, although some advances are being made (Berger & Mester, 1997).

In banking, efficiency reflects the effectiveness of macroeconomic policies (Iršová & Havránek, 2010). Operational efficiency is vital for the survival and stability of the financial system (Alam & Akhter, 2019). Improving efficiency creates value and competitive advantages. Banking efficiency impacts financial stability and overall economic health (Banya & Biekpe, 2018). Studies indicate that more efficient banks tend to outperform less efficient ones in terms of costs and competitiveness (Fogge et al., 2012). Today, efficiency is a key competitive factor in banking, especially with globalization, mergers, acquisitions, and technological advancements. Bank managers are focused on reducing operating costs and offering more efficient products and services. Greater operational efficiency can enhance financial stability (Fogge et al., 2012).Consequently, banking efficiency is of great interest to policymakers and regulators (Akhter, 2019).

Many empirical studies have examined bank efficiency worldwide. For example, Pasiouras (2008a) analyzed the Greek commercial banking sector from 2000 to 2004. The findings suggest that banks expanding abroad are generally more technically efficient than those operating only nationally, and that higher capitalization, loan activity, and market power contribute to increased efficiency.

However, results regarding banks operating abroad through subsidiaries versus branches are mixed.

In Africa, Hassan & Jreisat (2016) and Agu (2004) measure the efficiency of banking sectors in Egypt and Gambia respectively. Hassan & Jreisat (2016), measure the efficiency of 14 banks operating in Egypt from 1997 to 2013 and compared the efficiency of foreign and domestic banks through balanced panel data. The result shows that foreign banks are the most efficient ones. Agu (2004) also analyzes the efficiency of Gambian banks, and the result indicates that the Gambian banking sector has not performed as efficiently as it should be. The main causes of inefficiencies are the high regulatory framework.

Government banks are more efficient than private banks in Ethiopia (Lelissa 2014). Commercial Bank of Ethiopia are the most efficient bank than all other commercial banks (Dinberu & Wang 2018). Government support for public banks in creating an easy market for deposits, loans, and foreign exchange caused the efficiency variances across various groups (Lelissa 2014).

In the recent year, banking systems all over the world show pervasive development and expanded internationally through acquiring foreign subsidiaries and branches or by taking over established foreign banks (Claessens et al., 2001). The internationalization of the banking sector has been encouraged by the liberalization of financial markets worldwide. The post-crisis financial reform exertion is the most important factor that gives emphasis on removing entry barriers to foreign bank penetration, leading to widespread and increased internationalization of domestic banking markets. Liberalizing foreign bank entry restrictions may create powerful pressures to improve domestic bank regulations and supervision (Levine, 1996). The developing economies also experiences significant transformation from financial liberalization due to international capital flows, and financial and technological innovations (Ukaegbu & Oino, 2014).

Crystal et al. (2002) compared the performance of foreign and domestic banks in select Latin American countries during 1995-2000, and the result reveals that while foreign banks differed little from their domestic counterparts in overall financial condition, foreign banks exhibited healthier loan growth, a more aggressive response to asset quality deterioration, and a greater ability to absorb losses characteristics that could help strengthen the host countries' financial systems.

In developing country, like Kenya, the percentage of foreign banks has increased from 24% in 1999 to 35% in 2009. The Central Bank of Kenya's (CBK) adoption of financial liberalization policies may be attributed for this expansion. These regulations allow local banks to become (at least partially) foreign-owned and allow foreign banks to open branches (Ukaegbu & Oino, 2014).

Contrary, Terrell (1986), as cited in Claessens et al. (2001), compared the banking markets of 14 developed countries (8 of which allow foreign bank entry) for 1976 and 1977. The result shows that countries with liberalized foreign bank entry policies on average experience lower gross interest margins, lower pre-tax profits, and lower operating costs (all scaled by the volume of business).

In the next sub-sections, we review the specific relationship between bank regulation variables with bank efficiency and stability in SSA.

2.2.4.1 Foreign Bank Entry and banks operating efficiency

Amel & Liang (1992) defined entry into domestic banking market as either the establishment of a new bank or a branch opening by a firm that previously did not operate in that domestic market. Banks are defined as foreign-owned if at least 51 percent of its capital ownership is held by foreign individuals, firms (including banks), or international organizations (Jeon et al., 2011).

In the second half of the 1990s, there was a significant increase in foreign banks' engagement in evolving markets due to the motives of the local banking sector to recapitalize following financial crises and broader industry trends of consolidation,

privatization, and liberalization. These periods saw particularly sharp expansion of foreign bank presence in Latin America and Eastern Europe, with foreign institutions now accounting for 50 percent or more of system assets in several countries (Crysta et al., 2002).

Hermes & Meesters (2015) investigates how financial liberalization and regulations affect bank efficiency. They found that commercial banks' profit efficiency was conditional on the degree of financial regulation and liberalization. Countries implementing strong bank regulation while liberalizing their financial markets may see increases in efficiency; otherwise, efficiency may actually decrease.

Global experience suggests that greater competition between domestic and foreign banks can lead to improved efficiency. For instance, Demirgüç-Kunt et al. (1998), and Ukaegbu & Oino (2014) studied the impact of foreign bank entry on domestic bank profitability and efficiency. Demirgüç-Kunt et al. (1998) state that liberalizing restrictions on foreign bank entry enhanced the domestic banking sector's efficiency and contributed to long-term economic growth. Competitive pressures created by foreign bank entry stimulate domestic banking efficiency.

Ukaegbu and Oino (2014) analyzed the impact of foreign bank entry on domestic banking in Kenya using bank-level data. They found that foreign bank entry could make domestic banks more competitive and thus improve their efficiency.

In order to determine whether international financial liberalization speeds up economic growth by enhancing the performance of domestic financial markets and banks, Levine (2001) compiled current theory and data. First, easing limitations on foreign portfolio movements tends to increase stock market liquidity. Consequently, increases in stock market liquidity stimulate productivity growth, which in turn speeds up economic growth. Second, the efficiency of the domestic banking system is generally improved by permitting a larger presence of international banks. Better banks, in turn, accelerate productivity growth, which in

turn promotes economic growth. Levine & Zervos (1998) finds also a strong and positive relationship between financial development and economic growth and the financial factors are integral part of the growth process. Therefore, by fostering advancements in the domestic financial system, international financial integration can support economic development and have favorable effects on long-term productivity growth.

Crysta et al. (2002) and Kozo et al. (2007) also state that foreign banks' entry helps improve bank soundness in host countries. When foreign parent banks originate from well-regulated financial systems and are healthier than domestic banks, this implicitly allows the host country to import stronger prudential regulations and enhances the soundness of the local banking sector. Levine (1996) finds that foreign banks improve a country's access to international markets, thereby increasing liquidity. Kozo et al. (2007) show that financial liberalization has positive effects on banking efficiency in the host market because domestic banks are compelled to compete with more efficient foreign banks, which helps them improve their skills and technology. However, regulation also increases operating costs and capital requirements due to new regulatory obligations (McKinsey, 2016).

Fetene & Adem (2021) study used a dynamic generalized method of moment estimator to examine the direct relationship between foreign bank entry and economic growth in Sub-Saharan African nations. Additionally, it used descriptive analysis to compare the financial environments of SSA nations that allow and prohibit foreign ownership in banking sectors. According to the descriptive analysis, SSA nations that permit foreign banks to operate have greater depth, competition, and access to banking services than those that prohibit foreign ownership in their banking sectors. A foreign bank's asset share directly boosts economic growth, according to econometric estimation results. The study's conclusions have crucial policy implications for SSA nations who have closed their banking sectors to outside investment. They might allow international banks to participate in the banking sector and gain from all the advantages enjoyed by SSA nations that allow foreign investment in their banking sectors.

Regarding the relationship between market entry and legal restrictions, Amel & Liang (1992) find that relaxing regulatory entry restrictions can significantly affect the local banking market structure and profitability. Foreign bank entry can strongly impact domestic banks at lower levels of economic development (Lensink & Hermes, 2004). Initially, domestic banks had strong market power in less developed markets due to the fact that these markets are rather segmented. Therefore they can raise interest rate margins and non-interest rate income to pay for the investments made. However, at higher levels of development, the impact on costs, profits, and margins is less clear. Despite their smaller scale, foreign banks exert strong competitive influence, and the market can respond accordingly. There is a positive correlation between foreign bank penetration and banking competition in emerging economies in Asia and Latin America (Jeon et al., 2011), with "de novo penetration" having a more substantial impact than domestic bank mergers or acquisitions. Foreign bank entries have been shown to increase profits and reduce overhead expenses for domestic commercial banks (Denizer, 1999).

Poghosyan & Poghosyan (2010), however, demonstrated that the mode of foreign entry significantly influences post-entry performance in developed Central and Eastern European countries. The efficiency of foreign-acquired banks initially deteriorates but improves later. Banks that expand operations abroad tend to be more technically efficient than those remaining only domestically (Pasiouras, 2008a).

In contrast, if foreign bank entry restriction is relaxed in feeble domestic prudential regulation and supervision, it can lead to increased competition, reduced profits, lower noninterest income, lower overall expenses, and destabilizing effects on the domestic financial system (Claessens et al., 2001).

According to Oberholzer & Dawit (2024), the inflation issue, foreign exchange shortage, and financial barriers to investment in green growth and development cannot be resolved by eliminating financial repression, liberalizing the financial sector, eliminating capital controls, or focusing solely on controlling the amount of

money. Instead, using tools like differentiated reserve requirements; monetary authorities can begin meeting commercial banks' demand for reserves while directing funds away from speculative ventures and toward profitable green initiatives.

2.2.4.2 Regulatory restriction on bank activities and banks operating efficiency

Greater restrictions on bank activities may relate to a higher probability of distress as well as lower banking-sector efficiency. Studies on financial regulations such as (Barth et al., 2006, 2008, 2013; Barth, Caprio, et al., 2001a) find the negative association between tighter restrictions on bank activities with bank efficiency. Stricter regulations may be beneficial for bank stability but not bank efficiency (Lee & Chih, 2013). Kosmidou et al. (2005) also find that lower restrictions on bank activities results in higher overall performance. Ahamed et al. (2021), similarly find that limited restrictions on banking activities lead to greater flow of low-cost fund and high return on investments. Contrary, Djalilov and Piesse (2019), find bank activity restrictions improving banking efficiency in the transition economy countries. Higher (lower) restrictions lead to lower (higher) cost efficiency and higher (lower) profit efficiency (Pasiouras et al., 2009). This suggests a potential trade-off where banks sacrifice cost efficiencies from not being able to engage in a diverse set of activities, but exploit opportunities for greater profit efficiency instead. Activity restrictions might reduce the capacity of banks to diversify income streams. However, Barth et al. (2004) found no countervailing positive effects.

In general, with some exceptions, the empirical finding implies that great restriction on bank activities has a detrimental effect on bank efficiency. These arguments seem to imply a negative relationship between activity restrictiveness and bank efficiency.

2.2.4.3 Stringent capital regulation and banks operating efficiency

One of the main elements influencing a bank's efficiency is capital regulation. Barth, et al. (2013), greater capital regulation stringency has positive effect on bank efficiency. Stricter capital requirements have also been reported by Pasiouras et al., (2009) to have a positive effect on cost efficiency. Mahmud, (2022) shows that stringent capital requirement has positive and very significant impact on bank profitability. As well stringent high capital regulation leads to greater flow of low-cost fund and to high return on investments (Ahamed et al., 2021). However, Barth et al. (2006), state that strong regulators and capital adequacy standards do not improve bank efficiency.

2.2.5 Bank Financial Stability

High degree of financial development through a stable financial system every nation needs for economic stability. Bank stability refers to a strong and resilient banking system that can endure global financial stresses, regulatory constraints, and economic challenges while sustaining healthy competition in the allocation of capital and financial resources (Financial Stability Report, 2020).

A sound banking system is all about building resilience and confidence in the banking sector so that it can resist external pressures caused by financial crises and bad economic activity. A stable banking industry can manage risk, allocate resources efficiently, and correct financial imbalances occur as a result of unexpected actions (Lakner & Milanovic, 2013). It addresses systemic financial risk, preventing economic loss or trust loss, affecting individual investors, savers, and the overall economy (Pacces & Heremans, 2011).As a result, banking stability is thought to be a key factor driving growth.

Financial regulations forced by central banks to improve bank stability have a significant influence on bank operations as a whole. This, in turn, contributes to a greater overall financial stability of the system. Thus, building a healthy banking sector through efficient inspection and regulation is critical for macroeconomic

growth. A more rule-based legal regulatory system increases transparency and hence makes bank activities easier to monitor. The primary purpose of regulation in economic activity in general has always been to safeguard (uninformed) customers from a range of market flaws (Pacces & Heremans, 2011)

Every country in the world has banking regulation and monitoring, although these policies vary from extremely lax to very stringent, from heavily invasive to entirely governmental, and from partial government control to times of "free" banking (Barth, Caprio, & Levine, 2001a).

In SSA, the weak integration of the regional banking sector with the global economy makes the banking industry in the sub-region less vulnerable to the dangers of financial crises. On the other hand, the emergence of global financial crises has influenced central banks in SSA to tighten regulatory requirements, resulting in stricter bank supervision. Consequently, international banks have retreated from operating in the SSA sub-region, paving the way for the strengthening of Pan-African banks across the region (Beck et al., 2023). Recent efforts to strengthen banking institutions in some Sub-Saharan economies aim to achieve resilience and stability in the banking sectors (World Bank., 2018). The rapid adoption of technology in the banking sector and increases in minimum capital requirements are two key developments that have characterized banking operations in the SSA region(Beck et al., 2023).

Beck et al. (2023) state that African banks have moderate capitalization levels, relatively good liquidity, and are quite profitable when comparing 307 banks from low- and lower-middle-income countries in Africa with 720 banks from non-African developing countries. Čihák et al. (2012) Compared regulation and supervision before and after the global crisis, and there were significant changes in capital ratios and it was also the time for introducing bank governance and bank resolution.

Safeguarding financial stability is widely recognized as crucial for maintaining macroeconomic and monetary stability and for achieving sustainable growth. Many advanced-country central banks, including those under the auspices of the Bank for International Settlements, along with the International Monetary Fund, dedicate substantial resources to monitoring and assessing financial stability and publishing related reports (Fell & Schinasi, 2005). Financial stability reflects overall financial sector activities. If any institution, like a bank, engages in inappropriate activities, it can cause financial losses that may impact not only the bank but also the entire financial system and the country's GDP (Jawad & Jihad, 2020). Therefore, financial stability is regarded as a vital feature of the financial sector.

Prudential regulation and supervision are essential to ensure individual financial entities, such as banks, adhere to standards that maintain financial stability. The results by Mathuva & Nyangu (2025) also reveal that a stricter regulatory regime is associated with higher bank earnings quality.

Given the importance of financial stability for broader macroeconomic health, economic literature typically distinguishes between ‘macro-’ and ‘micro-’ prudential regulation, each with specific objectives: macro-stability concerns the health of the entire financial system, including key institutions and markets, while micro-stability focuses on individual intermediaries and system users (Borio & Disyatat, 2011).

The underlying question is here whether these financial rules and regulations truly boost bank growth, or if they make things worse (Barth et al., 2006). It is important to remember that stringent regulation does not necessarily correlate to excellent control (Neyapti & Dincer, 2005). Lee & Chih (2013), argue that more regulation benefit bank stability. Naceur & Omran (2008), concludes that regulatory considerations have a substantial and favorable impact on bank performance.

2.2.5.1 Foreign Bank Entry and Bank Financial Stability

There has been considerable debate over the role of foreign banks in developing countries. The World Trade Organization and the International Monetary Fund advocate that the banking sector's integration fosters economic growth in emerging economies. Many researchers also argue that foreign banks, especially large international ones, should operate in developing countries because their presence can have positive effects on economic growth of the host countries (Claessens et al., 2001). However, the empirical findings on relationship between bank regulation and stability are mixed.

A study of 14 Asia-Pacific economies from 2003 to 2010 found that stricter entry restrictions improved bank stability (Fu et al., 2014). Lee & Chih (2013) also state that stricter regulations benefit bank stability. Implementing rigorous regulatory standards can strengthen the banking industry and support long-term stability and economic growth. Gondwe et al. (2024) recently found that the presence of foreign banks correlates with decreased financial stability in host countries, measured through the bank's Z-score and probability of bankruptcy.

Contrary, Barth et al. (2004, 2006, 2008), examined the association between various regulatory and supervisory practices and banking efficiency and stability based on the Bank Regulation and Supervision Survey (BRSS) datasets. The results show that foreign bank entry restrictions hurt banking system performance and positively associated with bank fragility.

2.2.5.2 Regulatory restriction on bank activities and Bank Financial Stability

The empirical results on the relationship between bank regulation and stability are also mixed. (Barth et al., 2004, 2013; Barth, Gerard Caprio, et al., 2001; Beck et al., 2006; Fell & Schinasi, 2005; Fernández & González, 2005); and (Gondwe et al., 2022) examined the association between bank activity restriction and bank financial stabilities. (Barth, Caprio, et al., 2001a; Barth, Gerard Caprio, et al., 2001; Fell & Schinasi, 2005; Fernández & González, 2005) find that activity restrictions

reduce risk taking; higher restrictions on bank activities are relates to a lower probability of instability and it is effective at reducing banking risk and help banks in attaining financial stability. The implementation of strict regulatory standards will make the banking industry more robust and safeguard its long-term stability and sustained economic growth.

Contrary, Barth et al. (2004, 2008); Beck et al. (2006); and Gondwe et al. (2022) finds that restricting bank activities do not necessarily reduce financial fragility. They find negative relationship between bank activity restriction and banking sector stability. Activity restrictions are associated with a lower z-score. According to Barth et al. (2008), bank fragility increases when banking activities are restricted. Banks with a wide range of operations might find it simpler to diversify their sources of income, making them more shock-resistant and contributing to the stability of the banking system. Fewer restrictions on banking activities may also increase the banks franchise value and thereby enhance bankers to behave more prudently, with positive implications for bank stability (Barth et al., 2004). Countries with greater regulatory restrictions on the securities activities of commercial banks have a significantly higher likelihood of experiencing a major banking crisis (Barth et al., 2004).

Furthermore, activity restrictions are linked to a notably high rise in bank risk when a bank has a significant owner (Laeven & Levine, 2009). According to private interest viewpoints, restrictions may allow regulators pleasure for rent seeking (Djankov et al., 2002). Activity restrictions might therefore have a positive or negative effect on banks' risk-taking behavior.

2.2.5.3 Strict capital regulation and Bank Financial Stability

Banking crises significantly impact the entire economy. Hellmann et al. (2000), states that bank crisis disrupt banks' performance and stability. Regulations on capital holding are crucial for understanding bank performance and fragility (Barth et al., 2006). The capital-at-risk effect suggests banks are more disciplined and

cautious about excessive risk-taking, while the franchise-value effect suggests higher capital requirements may reduce financial stability by encouraging banks to take greater risks to restore profits and franchise (Gondwe et al., 2022).

Of the 30 countries that the World Bank surveyed in Africa between 2009 and 2019, more than half increased their regulatory capital requirements; 16 of these countries fully migrated to Basel II while few countries (South Africa, Mauritius, Kenya, Nigeria, and Namibia) that are either in the process of migrating to Basel III or have partially implemented some of its provisions (Gondwe et al., 2023). In addition to improving stability objectives, adoption of Basel capital standards by SSA countries is essential to maintain international correspondent banking relationship (Gondwe et al., 2022). Correspondent banks in advanced countries require banks operating in developing countries to adhere to and keep the same international regulatory standards, failure of which risks isolating these countries from global commerce (Gondwe et al., 2023)

Stringent regulation introduced in the post-crisis period have influenced banks' capital (Castro et al., 2025). Kosmidou et al. (2005) find a negative link between strict capital requirements and bank financial health. With the exception of major banks, increasing capital requirements significantly raises financial instability in Africa. Barth et al. (2004); Beck et al. (2006) found no evidence that capital stringency is strongly associated with banking sector stability, development, or bank performance after adjusting for various supervisory and regulatory measures. The specific features of deposit insurance plans, the authority given to supervisors, or a regulatory framework that allows private monitoring may all influence how much capital requirements relate to the growth, performance, and fragility of banks(Barth et al., 2004)

The study investigated how Basel III regulatory harmonization affects banking stability in 21 African countries between 2011 and 2022 using a system-GMM estimation to eliminate endogeneity and improve causal interpretation, Z-scores, non-performing loan ratios, and weighted composite indices are used to

operationalize stability, providing a comprehensive, multifaceted view of systemic resilience. Results indicate that Basel III compliance improves stability across important indicators, but they also show a trade-off: if liquidity buffers are not appropriately adjusted to local conditions, they may reduce operating efficiency. Additionally, institutional quality—especially governance and property rights protections—amplifies the regulatory impact and promotes the financial system's resilience and transparency. Therefore, in order to support sustainable economic growth throughout the area, it is essential to strengthen regulatory and governance frameworks while maximizing financial resilience (Minyahil et al., 2025).

The study examined whether institutional quality influences the trade-off between bank stability and economic growth that is induced by regulatory bank capital. Using data from 71 banks in 9 Sub-Saharan African (SSA) nations between 2007 and 2021, the study empirically assessed the model using a number of estimators, including the system generalized methods of moments (SGMM), fixed effects (FE), two-stage least squares (2SLS), and Bayesian approaches. Contrary to the belief that increased regulatory capital will cause economic issues, this study find that regulatory capital can sustain bank stability and economic growth. This suggests opportunities rather than a capital-induced trade-off between bank stability and economic growth.

Furthermore, institutional quality amplifies the beneficial impacts of regulatory capital on economic growth, even if it does not directly affect this relationship. The results imply that in order to accomplish economic growth, governments must guarantee robust institutional and capital policies. However, the results imply that regulatory capital enhances stability, enabling banks to fund the economy. Additionally, this study provides bank management, policymakers, governments, and financial regulators with insights to oversee effective capital regulations and improve the subpar institutional environment in SSA by demonstrating that the positive impact of bank stability on economic growth is stronger at higher levels of bank capital and institutional quality. Strong financial supervisory monitoring,

cooperative capital regulation, and institutional reforms are all made possible by this guidance (Bawuah, 2024).

In contrast, capital regulation has unwanted side-effects and may even be counterproductive. Capital regulation may increase looting, and in extreme cases even risk shifting (Boyd & Hakenes, 2014). A bank can increase the risk of its asset portfolio ("risk shift"), convert bank assets to the personal benefit of the bank manager ("loot"), or do both. A regulator can restrict the bank's investment choices; it can make looting more costly; and it can force banks to hold more equity(Boyd & Hakenes, 2014)

Regulations may impact bank risk by affecting bank valuations. If imposed regulations reduce a bank's value, this could increase the owners' risk-taking incentives. The view that capital regulations increase owners' risk-taking incentives is supported by Laeven & Levine (2009). However, regulation might also influence risk through other channels, including how bank borrowers response to changes in interest rates induced by regulation and the level of bank competition (Boyd & De Nicoló, 2005; Hellmann et al., 2000). An association exists between risk and bank regulations may exist, independent of bank valuation. In the absence of a powerful owner, the stringency of capital regulations has little marginal effect on risk. Conversely, a large owner can induce the bank to increase its risk-taking behavior in response to stricter capital requirements.

Barth et al. (2008) compare the first three BRSSs (covering 1999-2005) and state that even if many countries strengthen their capital regulations, these reforms have not improved bank stability or efficiency. Thus, the influence of capital on bank risk can go either way.

The relationship between bank stability and bank regulation has become a popular research topic in banking. However, research that specifically investigates the effect of regulations on bank efficiency and stability in the SSA banking sectors has gotten very little attention. The goal of this research is therefore to address a

gap in the current knowledge in foreign bank entry, banking activity restriction and strict capital regulation effects on banking efficiency and stability in SSA. The empirical finding is useful to regulators, policymakers, and bank management. In particular, the findings help regulators and policymakers understand the effects and

Foreign banks Entry restriction	**Efficiency**

implications of present constraints on bank stability, as well as the consequences of severe regulation.

Many SSA countries' financial markets are now undergoing regulatory changes. With the onset of globalization and a rising demand for modernization, several countries are opening their markets to foreign entities; relax their limit on banking activities; and capital regulation. This research is timely and informs current regulatory changes.

Table 2.1: Summary of Empirical review

(Barth et al., 2004)	Bank regulation and supervision: What works best?	+
(Barth et al., 2008)	Bank regulations are changing: For better or worse?	+
(Claessens et al., 2001)	How does foreign entry affect domestic banking markets?;	+
(Demirgüç-Kunt et al., 1998)	Opening for Foreign Banks: Issues of Stability, Efficiency and Growth;	+
(Jeon et al., 2011)	Do foreign banks increase competition? Evidence from emerging Asian and Latin America	+
(Kozo et al., 2007)	The Case for Financial Sector Liberalization in Ethiopia	+
(Lee & Chih, 2013)	Does financial regulation affect the profit efficiency and risk of banks? Evidence from China's commercial banks;	+
(Lensink & Hermes, 2004)	The short-term effects of foreign bank entry on domestic bank behaviour: Does economic development matter?	+
(Levine, 1996)	Foreign Banks, Financial Development, and Economic Growth	+
(Ukaegbu & Oino, 2014)	The impact of foreign bank entry on domestic banking in a developing country: The Kenyan perspective	+
Foreign banks Entry restriction		**Stability**
(Claessens et al., 2001)	How does foreign entry affect domestic banking markets?	+
(Fu et al., 2014)	Bank competition and financial stability in Asia	+
(Gondwe et al., 2024)	Cross-border banking and bank stability: evidence from Sub-Saharan Africa	+
(Lee & Chih, 2013)	Does financial regulation affect the profit efficiency and risk of banks? Evidence from China's commercial banks	+
(Barth et al., 2004)	Bank regulation and supervision: What works best?, 2006Rethinking bank regulation: till Angels Govern	-
(Barth et al., 2008)	Bank regulations are changing: For better or worse?	-
(Demirgüç-Kunt et al., 1998)	Opening for Foreign Banks: Issues of Stability, Efficiency and Growth;	-
(Jeon et al., 2011)	Do foreign banks increase competition? Evidence from emerging Asian and Latin America markets	-
(Kozo et al., 2007)	The Case for Financial Sector Liberalization in Ethiopia	-
(Lensink & Hermes, 2004)	The short-term effects of foreign bank entry on domestic bank behaviour: Does economic development matter?	-

(Levine, 1996)	Foreign Banks, Financial Development, and Economic Growth	-
(Ukaegbu & Oino, 2014)	The impact of foreign bank entry on domestic banking in a developing country: The Kenyan perspective	-
Bank Activity restriction		**Efficiency**
(Barth et al., 2006)	Rethinking bank regulation:till Angels Govern,	-
(Barth et al., 2008)	Bank regulations are changing: For better or worse?	-
(Barth et al., 2013)	Do bank regulation, supervision and monitoring enhance or impede bank efficiency?	-
(Barth, Caprio, et al., 2001a)	Banking Systems around the Globe: Do Regulation and Ownership Affect Performance and Stability?	-
(Kosmidou et al., 2005)	Determinants of profitability of domestic UK commercial banks : panel evidence from the period 1995-2002	-
(Djalilov & Piesse, 2019)	Bank regulation and efficiency: Evidence from transition countries	+
(Barth et al., 2004)	Bank regulation and supervision: What works best?	Insig.
(Pasiouras, 2008)	International evidence on the impact of regulations and supervision on banks' technical efficiency: An application of two-stage data envelopment analysis	Insig.
Bank Activity restriction		**Stability**
(Fell & Schinasi, 2005)	Assessing financial stability: Exploring the boundaries of analysis	+
(Fernández & González, 2005)	How accounting and auditing systems can counteract risk-shifting of safety-nets in banking: Some international evidence	+
(Lee & Chih, 2013)	Does financial regulation affect the profit efficiency and risk of banks? Evidence from China's commercial banks	+
(Barth et al., 2004)	Bank regulation and supervision: What works best?	-
(Barth et al., 2006)	Rethinking bank regulation:till Angels Govern	-
(Barth et al., 2008)	Bank regulations are changing: For better or worse?	-
(Barth, Gerard Caprio, et al., 2001)	The Regulation and Supervision of Banks around the World	-
(Barth, Caprio, et al., 2001a)	Banking Systems around the Globe: Do Regulation and Ownership Affect Performance and Stability?	-
(Beck et al., 2006)	Bank concentration, competition, and crises: First results	-
(Gondwe et al., 2022)	Bank regulation and risk-taking in sub-Sahara Africa	-

(Laeven & Levine, 2009)	Bank governance, regulation and risk taking	-
Stringent capital regulation		**Efficiency**
(Barth, Caprio, et al., 2001b)	The Regulation and Supervision of Banks around the World: A New Database	-
(Barth et al., 2008)	Bank regulations are changing: For better or worse?	-
(Kosmidou et al., 2005)	Determinants of profitability of domestic UK commercial banks : panel evidence from the period 1995-2002	-
(Ahamed et al., 2021)	Inclusive banking, financial regulation and bank performance: Cross-country evidence	+
(Barth et al., 2013)	Do bank regulation, supervision and monitoring enhance or impede bank efficiency?	+
(Mahmud, 2022)	Impact of Bank Regulation on Banks' Profitability: Cross-Country Evidence	+
(Pasiouras et al., 2009)	The impact of banking regulations on banks' cost and profit efficiency: Cross-country evidence	+
(Barth et al., 2006)	Rethinking bank regulation:till Angels Govern	Insig.
Stringent capital regulation		**Stability**
(Lee & Chih, 2013)	Does financial regulation affect the profit efficiency and risk of banks? Evidence from China's commercial banks	+
(Gondwe et al., 2022)	Bank regulation and risk-taking in sub-Sahara Africa	-
(Kosmidou et al., 2005)	Determinants of profitability of domestic UK commercial banks : panel evidence from the period 1995-2002	-
(Barth et al., 2004)	Bank regulation and supervision: What works best?	Insig.
(Beck et al., 2006)	Bank concentration, competition, and crises: First results	Insig.

2.3 Conceptual framework

A conceptual framework is a structure that the researcher feels best describes the natural course of the phenomena under study. It is connected to the concepts, empirical research, and significant theories employed by the researcher to promote

and systematize the knowledge adopts. It illustrates the link between the study's primary themes. The framework enhances the researcher's ability to specify and identify ideas within the study's topic (Adom et al., 2018).

A variable is a measurable characteristic with varying values between participants. Independent variables refer to changes in an experiment that are directly caused by the experimenter. The study's independent variables include foreign bank entry, bank activity, and stringency capital regulation. The dependent variables are bank efficiency and bank stability. Both independent and dependent variables depicted in figure 2.1 below.

Bank regulation variables

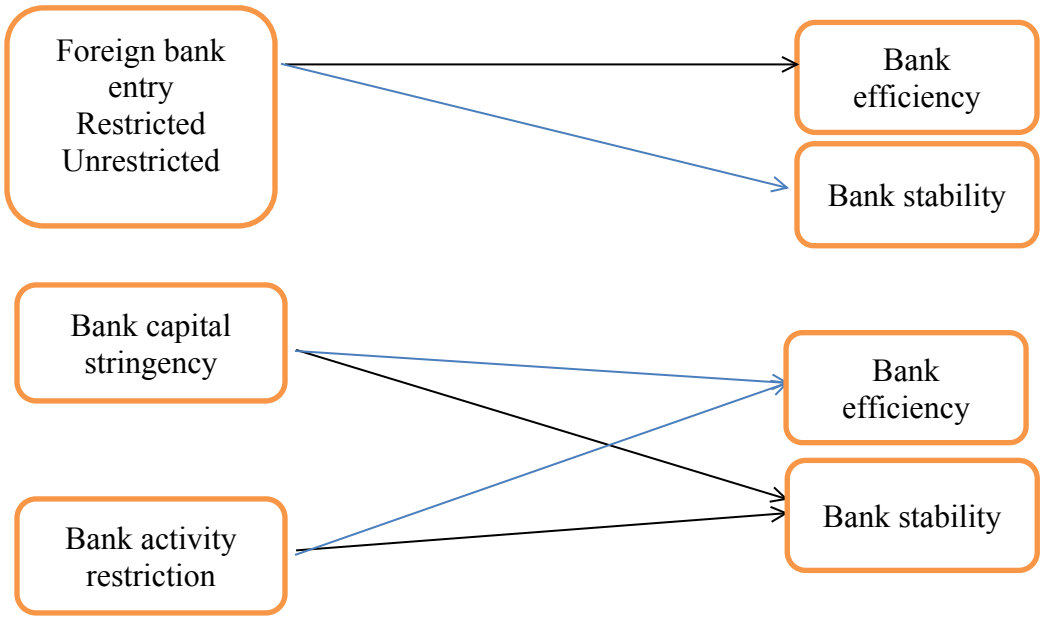

Figure 2.1: Conceptual framework

Research gap

The study of bank regulation and its effect on bank efficiency and stability in Sub-Saharan African (SSA) countries reveals several research gaps. These gaps arise from inconclusive findings and limited data. Below are the key research gaps

identified based on available evidence and the specific context of Ethiopia and SSA. The first research gap comes from inconclusive results. The effect of financial regulation on bank performance as well as on bank risk has not been definitively determined. The other research gap is limited data. Most of the studies are focused on developed countries, while research in SSA is scarce, particularly regarding comparison across different regulations. Therefore, this study fills the literature gap by analyzing the effects of bank regulations on the efficiency and stability of the commercial banking sector in sub-Saharan African (SSA) countries, with a particular focus on Ethiopia's foreign entry regulation compared to other SSA nations. It employs a random effect IV model, Hausman &Taylor model and dynamic panel model to estimate bank efficiency and bank stability based on research objectives. The study also addresses data sources gaps by utilizing worldwide financial databases from the World Bank. It offers a valuable opportunity to perform a comparative analysis, contributes to the literature, and helps make policy recommendations. To the best of the authors' knowledge, this study provides initial empirical evidence on the association between financial regulation and country-level bank efficiency and stability, and present comparative analysis between restricted and liberalized regulation.

CHAPTER THREE: RESEARCH METHODS AND MATERIALS

On this chapter the study research philosophy, research approach, research design, population and sample size, sampling technique, types and source of data, measurements of variables, methods of data analysis, validity and reliability are explained briefly.

3.1 Research philosophy

The research philosophy in this study is positivist. Since positivism uses the hypothetico- deductive method, which helps identify functional links between explanatory and causative factors (independent variables) and outcomes (dependent variables), the study considers valid prior assumptions, often expressed numerically (Park et al., 2019). This approach focuses on quantitatively examining whether there are relationships between bank regulation variables and bank efficiency and stability.

3.2 Research approach

This study investigates the effect of bank financial regulation on bank stability and efficiency using a quantitative research approach. The reason for choosing a quantitative methodology is that it generates ideas, hypotheses, and insights into the context of the situation. The goal of quantitative research is to gather information and understand the various hypotheses developed during the study. With minor modifications, the survey questions developed by the World Bank for each variable are used to collect secondary quantitative data. Consequently, there is a cycle of successive stages involving hypothesis formation, creativity, patience, and discipline during the planning and design phases.

3.3 Research design

A research design is the overall strategy or framework for a study. Kothari (2004) states that a research design is the best way to describe the current state of the topic;

it serves as a blueprint for collecting, measuring, and analyzing data; and it involves various types of surveys and fact- finding investigations. A descriptive study aims to describe the current state of affairs as they are. While there are different types of research designs, the most suitable one for this study depends on the type of research and the nature of the problem. The design is used to describe the features of the independent variables (foreign bank admission, activity, and capital regulation). This provides insights into the current status of the phenomena (bank performance and stability). According to the author, a descriptive design presents a well- structured and accurate report on the topic. Explanatory research, on the other hand, describes and explains behavior patterns. This study is based on a combination of descriptive and explanatory research designs, aiming to describe the relationship between independent factors (regulation) and dependent variables (efficiency and stability).

3.4 Population and sample size

Target Population: The entire set of elements from which a sample is drawn is called population. The study's population comes from countries in Sub-Saharan Africa. The sample comprised a segment of the population under study. Among 48 countries in the SSA region, Based on data accessibility on Bank Regulation and Supervision Survey 2003, 2007, 2011, and 2019; and the global financial development dataset, 26 (12 lower income, 9 lower middle income, 4 upper middle, and 1 higher income) countries have been used as a research sample. This made up fifty-four (54%) of all the countries in SSA.

Angola, Benin, Botswana, Burundi, Burkina Faso, Cote d'Ivoire, Ethiopia, Ghana, Gambia, Kenya, Madagascar, Mozambique, Mauritius, Mali, Malawi, Namibia, Niger, Nigeria, Senegal, Seychelles, Sierra Leone, Tanzania, Togo, Uganda, South Africa, and Zimbabwe are the SSA countries chosen for the study.

3.5 Sampling techniques

Purposive sampling, which was chosen, based on data accessibility on the global financial development database and the BRSS for the study period (2000–2021), is used for sampling.

3.6 Type and source of data

Secondary data gathered from all relevant materials such as books, reports, journal articles, periodicals, and published research are used for better theoretical and empirical analysis in this work. The data on bank-regulation variables, efficiency, stability, macroeconomic variables and governance indictors come from the World Bank data sources.

Data for the two dependent variables — bank operating efficiency and financial stability— were collected from Global Financial Development Datasets. All bank data were consolidated and placed at the country level. Therefore, the researchers used bank aggregate efficiency and stability measures, because bank-specific data for each country were difficult to obtain for the sampled SSA countries. The researchers' reasoning for using this data source is that bank-level data for all studied nations are difficult to obtain. Even when some data are available, comparing them is challenging because the methods of data collection vary between countries; therefore, the researcher is concerned about potential bias.

Bank financial regulation variable are collected from the World Bank's BRSS (Bank Regulation and Supervision Surveys) from 2003, 2007, 2011, 2019, and mainly 2011. Because the aim of the study was to assess the effect of bank regulation on efficiency and stability in SSA countries, the most common and recent data source used for comparisons between Ethiopia and other SSA countries was BRSS 2011. In this survey, approximately 630 bank regulation and supervision features are covered across 14 broad areas. The researcher's main focus is on the three major regulatory variables (entry into banking, capital, and activity) that may help to measure and compare bank regulatory policies across SSA countries.

Data on macroeconomics variables, namely GDP per capital and inflation were taken from the World Development Indicators (WDI) database maintained by the World Bank. Data to measure Control of Corruption (CC), Government Effectiveness (GE), Political Stability and Absence of Violence/Terrorism (PS), Regulatory Quality (RQ), Rule of Law (RL), and Voice and Accountability (VA) were taken from the worldwide governance indicator (WGI) database and data on the technology variable is taken from the global economy.com.

3.7 Measurement of variables

We measure operational efficiency by Cost-income ratio (CIR). CIR is the cost to income ratio and it is an important measure of bank performance and it is calculated by dividing operational cost to operational income. The higher the ratio implies the lower the efficiency of banking sector. Country-based banking aggregate CIR is used to measure banking sector operational efficiency. studies by Ayinuola et al. (2023); Kedir et al. (2018); and Kumar & Srivastava (2021) used to measure operational efficiencies.

Bank stability is measured by z-score. Z-score is the distance from insolvency. It is calculated as the number of standard deviations a return has to fall before depleting bank equity. A higher z-score, therefore, implies a lower probability of insolvency. We use country-based banking aggregate Z–score to measure banking sector financial stability. studies by Boyd & Runkle (1993); Čihák & Hesse (2010); Demirguc-Kunt & Honohan (2008); Detragiache et al. (2008); Fu et al. (2014); Rashid et al. (2017) used Z-score to measure bank stability on their studies. Z-score popularity stems from the fact that it is inversely related to the probability of a financial institution‘s insolvency, i.e. the probability of assets value becoming lower than the debt value. The z-score has gained traction as a measure of an individual financial institution's soundness (Beck et al., 2013; Boyd & Runkle, 1993; Čihák & Hesse, 2010; Demirguc-Kunt & Honohan, 2008; Detragiache et al., 2008; Fu et al., 2014; Laeven & Levine, 2009; Rashid et al., 2017).

Z-scores have several advantages and limitations. It can be used for institutions for which more sophisticated, market-based data are not available. Also, it allows comparing the risk of default in different groups of institutions which may differ in their ownership or objectives. The most important Z-score limitation is that it is based purely on accounting data. They are only good if the underlying accounting and auditing framework is good. If financial institutions can smooth out the reported data, the z-score may provide an exaggeratedly positive assessment of the financial institutions 'stability.

Foreign bank entry

We focus on testing the effects of three bank regulation variables: foreign entry, capital stringency, and bank activity restrictions. We measure foreign entry by dummy variable. To categorize SSA countries in two groups' -restricted/ unrestricted- the study used the survey question number 1.8 "Are foreign entities prohibited from entering through the following? " and Countries with at least one entry method among the four methods - acquisition, subsidiary, branch and joint venture- are considered as liberalized foreign banks entry; unless restricted policies are exist.

Bank capital stringency

Capital stringency measures by the index which is a compound measure that aggregates multiple indicators; the higher the index, the higher the stringency of capital regulation. The first index, which has eleven questions, evaluates the overall capital stringency by considering risk elements and deducting market value losses from capital before the minimum capital adequacy is determined. The second index, which has three questions, measures initial capital stringency by verifying the funds used for initial capitalization. The third index is an aggregation of the previous two indices and provides an overall picture of capital regulation in banks (all these questions are discussed in the result and discussion section).

Bank activity restriction

It refers the extent to which a national regulatory body restricts banks from engaging in the following four activities: (1) security underwriting, (2) insurance underwriting and selling, (3) real estate investment, and (4) non-financial activities. We use indexes to measure each activity's restrictiveness. Each component is scored from 1 to 4, with higher values indicating greater restrictions on the specific banking activity. Individual activity indexes are combined to form an aggregate index that ranges from 4 to 16.

We include macroeconomic variables such as GDP per capita, inflation, technology, banking industry concentration, rule of law, voice and accountability, regulatory quality, government effectiveness, political and corruption of the country as control variables. We measure banking concentration by the assets of three largest commercial banks as a share of total commercial banking assets. We use worldwide governance index to measure the country's overall governance indicators.

Gross domestic product (GDPpc)

Gross domestic product per capital or GDP per capital, is a measure of a country's economic production per person that is determined by dividing the total GDP by the total population. It allows comparing the average economic prosperity of various nations or areas.

Inflation (INF)

It refers to a general increase in the prices of goods and services in an economy over time. It is measured by the percentage change in the consumer price index. Inflation shocks seem to be passed mainly through the deposit rate, which means that banks bear the entire negative cost of inflation (Naceur & Omran, 2008).

Bank concentration (BC)

Bank concentration is the amount to which a few major banks control a country's banking system, as measured by the proportion of total assets owned by the largest banks. It simply measures the extent of competition in the banking sector. Bank

concentration is measured by the Assets of three largest commercial banks as a share of total commercial banking assets on this study. Boyd & De Nicoló, (2005) find a positive relationship between concentration and bank fragility. At the country banking system level, we include a measure of banking system concentration that equals the percentage of banking system assets held by the three largest banks (concentration) as a control variable because many debate the link between bank concentration and risk (Boyd & De Nicoló, 2005).

Technology (TC)

Technology is the use of scientific knowledge for practical purposes, and for solving problems. Internet user percentage of population is used to measured technology on this study.

Political Stability (PS)

Political Stability and Absence of Violence/Terrorism measures perceptions of the likelihood of political instability and/or politically-motivated violence, including terrorism. Estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately -2.5 to 2.5.

Regulatory Quality (RQ)

Regulatory Quality is the perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development. Estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately -2.5 to 2.5.

Voice and Accountability (VA)

Voice and Accountability the perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media. Estimate gives the country's

score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately -2.5 to 2.5.

Corruption (CC)

Control of Corruption captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests. Estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately -2.5 to 2.5. Corruption increases the cost efficiency (Naceur & Omran, 2008).

Government Effectiveness (GE)

Government Effectiveness is captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. Estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately -2.5 to 2.5.

Rule of Law (RL)

Rule of Law is captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. Estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately -2.5 to 2.5.

3.8 Method of Data Analysis

This section describes the method of data analysis on the effects of bank regulatory variables on bank efficiency and stability.

The data was analyzed using Microsoft Excel and STATA software, with descriptive analysis techniques such as measures of central tendency (e.g., mean, average), and inferential analysis (e.g., correlation, regression). The data was presented using statistical tools like tables, figures, bar charts, and more. To further explore the relationship between variables, regression analysis was conducted. Additionally, variables were regressed using a model, with all coefficients interpreted. The model followed the sequence of research objectives.

3.8.1 Effect of foreign entry on efficiency and stability

To analyze data and understand results, descriptive statistics such as mean, standard deviation, minimum, and maximum are employed. They are the most popular statistical metrics for numerical variables (Glewwe & Levin, 2005). Purposive sample is chosen based on data availability from a bank regulation and supervision survey conducted over the research period (2000-2021).

Before developing the model, the researcher assessed the variables using summary statistics (mean, standard deviation, minimum, and maximum) to describe the variables at the level, natural logarithm, and correlation matrix to investigate the relationship between cost-to-income ratio (CIR) and foreign bank entry restrictions. Based on the set objectives, the following equations were developed:

First, the general model of Y_{it} as a function of the predictors is

$$Y_{it} = \alpha + Z_i\gamma + X_{it}\beta + \eta i + e_{it}$$

where Y_{it} represents dependent variable for Country i and time t; α is intercept; Z_i and X_{it} are the time-invariant and time-varying independent and control variables, respectively; β and γ are coefficients associated with time-varying and time-invariant observable variables respectively; and ηi and e_{it} are time-invariant and time-varying error terms.

In addition,

$$BE_{it} = \alpha + Z_1 FBER_i + \beta_1 lGDP_{it} + \beta_2 INF_{it} + \beta_3 lBC_{it} + \beta_4 TC_{it} + \beta_5 RQ_{it} + \beta_6 VA_{it} + \beta_7 PS_{it} + \beta_8 CC_{it} + \eta i + e_{it} \ldots\ldots \quad (1),$$

$$BS_{it} = \alpha - Z_1 FBER_i + \beta_1 lGDP_{it} + \beta_2 INF_{it} + \beta_3 lBC_{it} + \beta_4 TC_{it} + \beta_5 RQ_{it} + \beta_6 VA_{it} + \beta_7 PS_{it} + \beta_8 CC_{it} + \eta i + e_{it} \ldots\ldots \quad (2),$$

where BE_{it} is the bank operating efficiency in country i during the period t; BS_{it} is the bank stability in country i during the period t; a is Y-intercept (constant term); $\beta_{1\text{-}8}$ are regression coefficients for explanatory variables; $FBER_i$ is a measure of foreign bank entry restriction in country i; and $IGDP_{it}$ is Log Gross domestic product per capital is control variable for economic difference of country i during the period t. Furthermore, INF_{it} is a control variable inflation in country i during the period t; lBC_{it} is Log bank concentration is a control variable in country i during the period t; PS_{it} is a control variable for the political stability of country i during the period t; CC_{it} is a control variable for corruption in country i during the period t; RQ_{it} is a control variable for Regulatory Quality in country i during the period t ; VA_{it} is a control variable for Voice and Accountability in country i during the period t; TC_{it} is a control variable for the technology of country i during the period t; and $\eta i + e_{it}$ is error term.

The study employed a panel data technique to estimate the influence of foreign bank entry restrictions (FBER) on CIR and Z-scores, while accounting for the roles of macroeconomic variables, governance indicator variables, technology, and bank concentration. The rationale behind using panel model techniques was that they were based on time series (2000–2021) and cross sections of 26 SSA countries. It has been argued that efficiency and stability are better studied and modeled with panels (Coelli et al., 2005). As the main objective of this study was to examine the effect of foreign bank entry on bank operating efficiency and financial stability, we consider the regulations that the Ethiopian government has a strong preference for and that have been implemented by the National Bank of Ethiopia as a base.

All variables included in the research objective are listed in Table 3.1 below, along with the corresponding measurements and data sources.

Table 3.1: Effects of Foreign entry on efficiency and stability

Variables	Measurement	Data sources
Bank Efficiency (BE_{it})	CIR	GFD
Bank Stability (BS_{it})	Z-Score	GFD
Foreign Bank Entry Restriction (FBER)	Dummy unrestricted =1 Restricted = 0	BRSS
Log of GDP (lGDP)	GDP per capital (current US$)	WDI
Inflation (INF)	% change in consumer price index	WDI
Technology (TC)	Internet users % of population	The global economy.com
Log Bank Concentration (lBC)	Assets of three largest commercial banks as a share of total commercial banking assets	GFD
Voice and Accountability (VA)	Indexed -2.5 to +2.5	WGI
Political Stability (PS)	Indexed -2.5 to +2.5	WGI
Corruption (CC)	Indexed -2.5 to +2.5	WGI
Regulatory Quality (RQ)	Indexed -2.5 to +2.5	WGI
Rule of Law (RL)	Indexed -2.5 to +2.5	WGI
Government Effectiveness (GE)	Indexed -2.5 to +2.5	WGI

The testable hypothesis for this objective is here below;

H_1: Foreign bank entry restriction has negative effect on bank efficiency

H_2: Foreign bank entry restriction has positive effect on bank stability

3.8.2 Effect of activity restriction and stringent capital on efficiency

To assess the effect of bank activity restriction and capital regulations on bank efficiency while accounting for the macroeconomic, governance, and financial conditions in Sub-Saharan Africa, the study uses panel data from 26 SSA countries for the period 2002–2021. The sample comprised 520 observations. After excluding outliers, missing observations, inconsistencies, and reporting errors, the final

sample contains 480 observations. Finally, outliers from the dataset were removed to reduce their potential to bias the estimated coefficients.

We perform a regression analysis using the differenced variable as the dependent variable and its lagged value from the previous period as the independent variables, following the demeaned data transformation method. After transforming the initial dataset, we measure the cross-sectional dependence among the individual explanatory variables as per (Pesaran, 2007). The dynamic relationships are characterized by the presence of lagged dependent variable appears as independent variable with other regressors. The long-run estimation under dynamic panel econometric models explains macroeconomic events by specifying preferences, technology and institutions and predicts what is actually produced, traded and consumed and how these variables respond to various shocks (William, 2010). Based on lagged observations used as the explanatory variables, dynamic estimators are designed to address the problems of the unobserved specific effects and the joint endogeneity of explanatory variables (Alonso-Borrego and Arellano, 1996). In the presence of endogeneity problem, estimation becomes bias and inconsistent. The following general equation is then estimated:

$$BE_{i,t} = \beta_o + \beta_1 BE_{i,t-1} + \beta_2 Y_{i,t} + \beta_3 X_{i,t} + \beta_4 Z_{it} + \eta i + e_{it} \ldots (3)$$

$$BE_{i,t} = \beta_o + \beta_1 BE_{i,t-1} + \beta_2 (BCS_{it}) + \beta_3 (BAR_{it}) + \beta_4 (INF_{it}) + \beta_5 (TC_{it}) + \beta_6 (BC_{it}) + \beta_7 (CC_{it}) + \eta i + e_{it}$$

Where; i and t refer to the country and year, respectively. $BE_{i,t}$ (Bank Efficiency) is the bank operating efficiency indicator of the bank in country i at time t. $BE_{i,t-1}$ is the lagged value of operating efficiency. $Y_{i,t}$ denotes a vector of bank regulatory variables (bank capital stringency and bank activity restrictions). $X_{i,t}$ is the vector of the macroeconomic variables (GDP, inflation, aggregate country-level bank concentration, technology). Z_{it} is the vector of governance indicators (regulatory quality, voice and accountability, political stability and corruption). ηi controls the variant behavior of fixed characteristics of countries (or country heterogeneity) and e_{it} is the independently and identically distributed (iid) disturbance term to account for all unobservable factors. All variables included in

this research objective are listed in Table 3.2 below, along with the corresponding measurements and data sources.

Table 3.2: Effects of activity and capital on efficiency

Variable	Measurement	Data source
Bank Efficiency (BE_{it})	Cost To Income Ratio (CIR)	GFD
Lag of Bank Efficiency ($BE_{i,t-1}$)	CIR (t-1)	GFD
Bank Activity Restriction (BAR)	indexed	BRSS
Bank capital stringency (BCS)	indexed	BRSS
GDP per capital	GDP per capita (current US$)	WDI
Inflation (INF)	Percentage change in Consumer price index	WDI
Technology (TC)	Internet users % of Population	The global economy.com
Bank Concentration (BC)	Assets of three largest commercial banks as a share of total commercial banking assets.	GFD
Voice and Accountability (VA)	Indexed -2.5 to +2.5	WGI
Political Stability (PS)	Indexed -2.5 to +2.5	WGI
Corruption (CC)	Indexed -2.5 to +2.5	WGI
Rule of law (RL)	Indexed -2.5 to +2.5	WGI
Government Efficiency(GE)	Indexed -2.5 to +2.5	WGI

Source: Authors' computation (2023)

The testable hypothesis for this objective is listed below.

H_3: Stringent capital regulation has negative effect on bank efficiency.

H_4: Bank activity restriction has negative effect on bank efficiency.

3.8.3 Effect of activity restriction and stringent capital on stability

To assess the effect of bank activity restriction and strict capital regulation on bank stability while controlling for the macroeconomic, governance, and financial environment in the sub-Saharan region the study uses panel data of 26 Sub-Saharan African countries over the period 2003-2021. The total raw data from these countries during the sample period cover 494 observations. Data are checked for

outliers, missing observation, inconsistencies and reporting errors and finally 459 observations used in this study. The following general model of $IBS_{i,t}$ as a function of the predictors is estimated:

$$\mathbf{IBS_{i,t} = \beta_o + \beta_1 lBS_{i,t-1} + \beta_2 Y_{i,t} + \beta_3 X_{i,t} + \beta_4 Z_{it} + \eta i + e_{it} \ldots\ldots\ldots (eq\text{-}4)}$$

$$\mathbf{IBS_{i,t} = \beta_o + \beta_1 lBS_{i,t-1} + \beta_2 BCS_{i,t} + \beta_3 BAR_{i,t} + \beta_4 lGDPpc_{it} + \beta_5 INF_{it} + \beta_6 BC_{it} + \beta_7 CC_{it} + \eta i + e_{it}}$$

Where, the indices 'i' and 't' refer to country and time respectively. $lBS_{i,t}$ is the bank financial stability indicator of bank in country i at time t. $lBS_{i,t-1}$ is its lagged value of log bank stability. $Y_{i,t}$ denotes a vector of bank regulatory variables (bank capital stringency and bank activity restriction), $X_{i,t}$ specific a vector of the macroeconomic variables (i.e. GDP per capital income, inflation, and bank concentration); Z_{it} specific a vector of governance indicator (corruption); ηi controls the variant behavior of fixed characteristics of countries (or country heterogeneity) and e_{it} is the independently and identically distributed (iid) disturbance term, which contains all factors that cannot be observed by the researcher. All variables included in this research objective are listed in Table 3.3 below, along with the corresponding measurements and data sources.

Table 3.3: Effects of activity and capital on stability

Variables	Measurement	Data source
Log of Bank Stability (lBS_{it})	log(Z-Score)	GFD
Lag (log of Bank Stability ($BS_{i,t-1}$))	lBS (t-1)	GFD
Bank Activity Restriction (BAR)	indexed	BRSS

Bank capital stringency (BCS)	indexed	BRSS
lGDP per capital	Log of GDP per capita (current US$)	WDI
Inflation (INF)	Percentage change in Consumer price index	WDI
Bank Concentration (BC)	Assets of three largest commercial banks as a share of total commercial banking assets.	GFD
Corruption (CC)	Indexed -2.5 to +2.5	WGI

Source: Authors' computation (2023)

The testable hypothesis here is;

H_5: Stringent capital regulation has positive effect on bank stability

H_6: Bank activity restriction has positive effect on bank stability

3.9 Validity and reliability

All the data set here are collected from the globally trusted data sources and data are checked for outliers, missing observation, inconsistencies and reporting errors in order to reduce their potential biased in estimated coefficients.

CHAPTER FOUR: RESULTS AND DISCUSSIONS

This section presents both descriptive and inferential statistics results in the order outlined in the objective section. The main objective of this study was to examine the effects of bank regulation on bank efficiency and stability in SSA. Accordingly, this chapter offers the results, interpretation, and discussion derived from the survey data. The data were exclusively collected from the World Bank database. The survey questions were adapted and designed to align with the study's objectives.

Responses based on country code and year were compiled and entered into statistical software for data science (STATA) version 14 (64-bit) software for analysis. The data are presented through tables and figures. The chapter presented the descriptive statistics first and then the econometrics analysis and discussions based on the research hypothesis.

The cost to income ratio (CIR) was used as a proxy of bank efficiency to measure the operating efficiency of banks. The lower (higher) the ratio, the better (worse) the efficiency (Kedir et al., 2018). CIR is a key financial measure for evaluating the value of bank performance, and it depicts a bank's expenditure in relation to its income. This can be measured as the ratio of a firm's operational costs (such as administrative costs, staff salaries, and property costs, excluding losses due to bad and nonperforming loans) to operating income, expressed as a percentage (Ayinuola et al., 2023).

The Z-score was used as a proxy for financial stability, which measures banks' stability by indicating their distance from insolvency. It is a key variable used to measure bank financial stability. It is combining accounting measures of profitability, leverage and volatility, which has been widely used in the recent literature. It indicates the number of standard deviations by which a bank's return on assets falls below its expected value before its equity is depleted and the bank becomes insolvent (Boyd & De Nicoló, 2005; Roy, 1952). The Z-score uses the probability of default as derived from (Roy, 1952). It is defined as z = (ROA+CAR)/SD (ROA). Specifically, if we define insolvency as a state where losses exceed equity (E< p) (where E is equity, p is profits, A is total assets, ROA = p/A, and CAR = E/A), then the probability of insolvency can be expressed as prob (ROA < CAR). Assuming profits follow a normal distribution, it can be shown that z = (ROA+CAR)/SD (ROA) is the inverse of the probability of insolvency. A higher z-score, therefore, implies a lower probability of insolvency.

4.1 Effect of foreign bank restriction on efficiency and stability in Ethiopia and in the rest of SSA countries

4.1.1 Descriptive statistics

For data analysis and interpretation of results, descriptive statistics, such as mean and standard deviation, as well as regression analysis, were used. A panel data analysis was employed to determine the degree of significance and effects of bank regulation on bank efficiency and stability.

The researchers made basic assumptions for the panel data analysis. Outliers are removed from the datasets to reduce their potential effects on the estimated coefficients. Winsor was the top 1% and bottom 0.7% of CIR, top 1.2% of Z-score, top 1.4% of GDP, top 0.9% of INF, and top 10% of TC. In addition, the GDP per capita and BC are presented in log form. Before estimation coefficients, we have to conduct some necessary tests such as the normality of residuals, homoscedasticity, multicollinearity, endogeneity, serial correlation, omitted variables, and cross–sectional dependence.

The study categorized the sampled countries into two groups: those that allowed foreign banks to enter domestic banks and those that restricted foreign bank entry into domestic banks. The first category consists of Angola, Benin, Botswana, Burkina Faso, Burundi, Cote d'Ivoire, Ghana, Gambia, Kenya, Mozambique, Mauritius, Madagascar, Mali, Malawi, Namibia, Nigeria, Niger, Senegal, South Africa, Sierra Leone, Seychelles, Togo, Tanzania, Uganda, and Zimbabwe. All of them deregulated their policies and allowed foreign investment in domestic banking. Foreign entry may occur in one or more forms of Acquisition, Branch, Subsidiary, and/or joint ventures.

Table 4.1: Forms of foreign bank entry

Are foreign entities prohibited from entering through the following?			
Forms of foreign bank entry	Proportion in	Proportion	Proportion in

		2003 BRSS (18 obs.)	in 2011 BRSS (26 obs.)	2019 BRSS (24 obs.)
Acquisition	Yes	0	0.038	0
	No	1	0.962	1
Subsidiary	Yes	0	0.038	0
	No	1	0.962	1
Branch	Yes	0.11	0.615	0.609
	No	0.89	0.385	0.391
Joint venture	Yes	-	0.115	0.043
	No	-	0.885	0.957
Source: Author's computation (2023)				

All the studied SSA countries, except Ethiopia, permit foreign bank entries in the form of acquisitions, subsidiaries, and joint ventures, but most of them restrict branches. As seen in 2019 BRSS, all entries can be made by acquiring domestic institutions, purchasing shares of host country banks, or forming joint ventures, but there are limits on branches. Especially, after the 2007-2009 financial crisis, nearly 30 percent of developing countries implemented restrictions on foreign bank branches (World Bank, 2019). Togo, Senegal, Niger, Mali, Ghana, Gambia, Côte d'Ivoire, Benin, Burkina Faso, South Africa, Madagascar, and Burundi are among the SSA countries that impose restrictions on foreign bank entry through branches. They comprise 50 percent of the SSA stop allowing foreign entry through branch, foreign banks escape the local or home markets during the crisis period may reasons for restriction. Foreign banks are more likely to operate as branches in countries that have higher taxes and lower regulatory restrictions on bank entry and on foreign branches (Cerutti et al., 2007).

Ethiopia is in the second category; it is a unique country with restricted regulation on foreign bank entry. Many African countries, to list a few, Chad, Central Africa, Equatorial Guinea, Gabon, and Liberia, are also reluctant to open their banking sectors to foreign investors (Bogale, 2017). However, the study does not include them due to inaccessibility of data.

In recent decades, while developed and developing countries increasingly allow banks to be foreign-owned. Ethiopia banking sector is close to foreign banks, and

there are strict regulations that emerge as exceptional compared to Group 1 countries.

The descriptive statistics shows the mean, standard deviation, minimum and maximum detail of variables used to examine the effect of foreign bank entry on bank efficiency and stability is listed in Tables 4.2 and Table 4.3 below.

Table 4.2: Descriptive statistic for restricted regulation

FBER=Restricted=0	No. observation 22			
Variable	Mean	Std.Dev.	Min	Max
Bank efficiency	40.810	8.911	29.680	58.310
Bank stability	10.145	1.346	8.479	12.790
Foreign entry	0	0	0	0
Log GDP	5.838	0.752	4.705	6.830
Inflation	12.979	11.560	-8.238	44.357
Technology	5.878	7.121	0.015	16.698
Log Bank con.	4.408	0.143	3.937	4.581
Reg.quality	-1.032	0.113	-1.316	-0.848
Voice & acc.	-1.232	0.117	-1.433	-1.032
Political stabil.	-1.532	0.244	-2.068	-0.946
Corruption	-0.600	0.148	-0.907	-0.365
Rule of law	-0.675	0.183	-0.984	-0.392
Govt effic.	-0.677	0.217	-1.207	-0.437

Source: Author's computation (2023)

Table 4.3: Descriptive statistic for liberalized regulation

FBER= Unrestricted =1		No. observation 550		
Variable	Mean	Std.Dev.	Min	Max
Bank efficiency	58.167	9.679	29.680	82.110
Bank stability	13.799	5.027	2.731	25.760
Foreign entry	1	0	1	1
Log GDP	6.981	1.119	4.739	9.458
Inflation	9.217	15.281	-3.233	98.546
Technology	11.710	13.265	0.036	39.363
Log Bank con.	4.247	0.293	3.149	4.605
Reg.quality	-0.435	0.546	-1.685	0.768
Voice & acc.	-0.264	0.612	-1.725	0.983
Political stabil.	-0.377	0.842	-2.523	1.283
Corruption	-0.499	0.605	-1.581	0.994
Rule of law	-0.480	0.604	-1.870	0.949
Govt effic.	-0.548	0.611	-1.629	1.161

Source: Author's computation(2023)

The mean efficiency value in countries with loosened regulations 58.17 is higher than that of those with restricted regulations 40.81, and the stability value is greater in countries with liberalized regulations 13.8 but lower in those with restricted regulations 10.15. When all other things remain constant, the efficiency of countries with liberalized regulation is lower than the one that has restricted regulation. While, the stability are better in liberalized regulation than restricted one. However, as compared to the global banks, SSA banks often have lower Z-scores and higher CIRs, indicating relative instability and inefficiency. These findings highlight the need for improved financial efficiency and stability in SSA countries.

The following consecutive figures depict the average financial efficiency and stability of SSA banks over the past two decades.

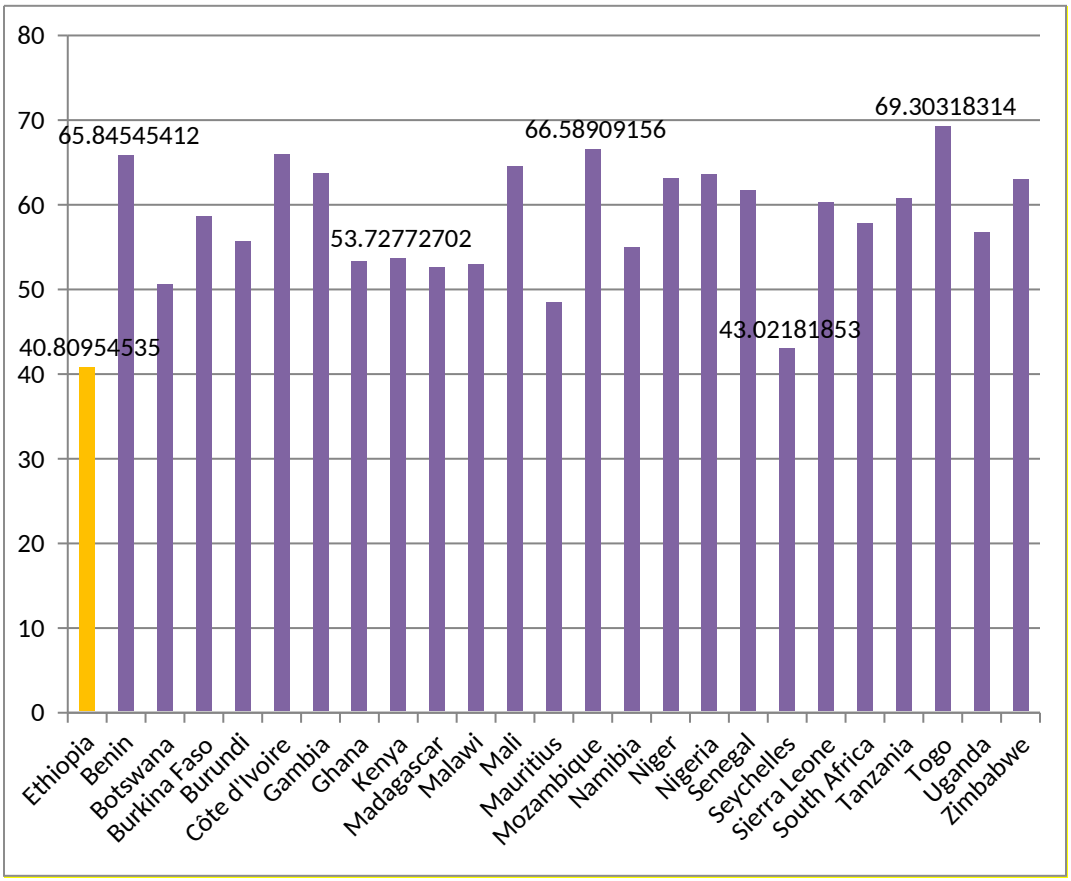

Figure 4.1 Bank efficiency in SSA

Source: Author's computation (2023)

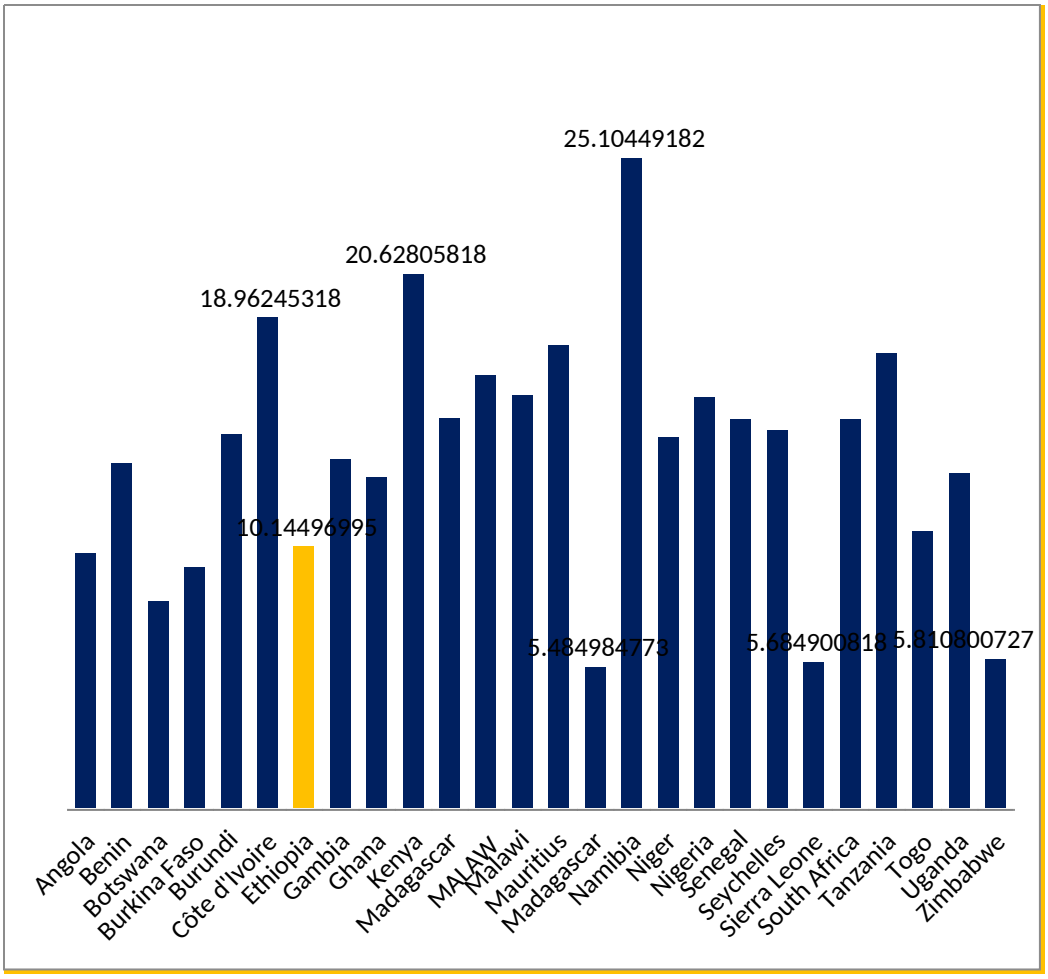

Figure 4.2 Bank stability in SSA

Source: Author's computation (2023)

4.1.2 The econometrics approach

Correlation analysis is a statistical method used to determine the interdependence between variables, using the Pearson correlation coefficient to measure the relationship between the dependent and independent variables. The coefficient indicates whether changes in one item will affect the other, with a weaker, a moderate, and a strong positive or negative relationship. The result of the Pearson correlation is presented in Table A2 in the appendix.

The study finds high correlation between Corruption and Regulatory Quality, and Voice and Accountability and Regulatory Quality. Multicollinearity may be present

in the regression analyses, but the Variance Inflation Factors (VIF) show a mean value of 2.987, indicating no multicollinearity problem.

This study tests whether the residuals are normally distributed using skewness and kurtosis statistics, indicating Bank Efficiency (BE) and Bank Stability (BS) are normally distributed. The Breusch–Pagan test measures heteroscedasticity, indicating that it exists for BS, but not for BE, and Prob > chi2 = 0.3154 and 0.0042 for BE and BS, respectively. The Ramsey reset test revealed no omitted variables in the BE case but not in the BS Prob > F = 0.3217, 0.0002, respectively. The Wooldridge test showed a serial correlation for both BE and BS (Prob > F = 0.0000), indicating a strong correlation.

Another essential test for figuring out the correlation between units within a single cross-section in panel datasets is cross-sectional dependency (csd). Estimation becomes biased and inconsistent if it is made with the presence of cross-sectional dependency (Andrews, 2005). This study uses a simple econometric test developed by Pesaran, (2004) for each variable and for OLS regression residuals to determine whether cross-sectional dependence (CD) exists.

For this test, the null hypothesis is cross-sectional independence between the panel units, whereas the alternative hypothesis is cross-sectional dependence between the panel units (De Hoyos & Sarafidis, 2006; Pesaran, 2004, 2007). In addition to being applicable to both balanced and unbalanced panels, the CD-test statistic thrives in small sample sizes and is robust to non-stationary.

The panel cross sectional dependency (xtcsd) test proposed in Frees (2004, 1995); Friedman (1937); and Pesaran (2004) used for large N and small T scenarios, addressed this issue. The result shows no significant cross-sectional dependency among the sampled SSA countries, with P-values of 0.1796 and 0.2581 for the bank efficiency and bank stability, respectively.

The study reveals that country with restricted foreign entry regulation has different mean efficiency (CIR) and stability (Z-scores) value from the rest of the group,

indicating that group identification is mandatory. Two-sample t test is used with unequal variances for restricted and unrestricted highlight the differences exist between these two groups and it is appropriate to make groups (see table A3.1 in the appendix).

The study also compare the CIR and Z-scores before and after the 2008 crisis using two-sample t test and founds no significant changes exist before and after the crisis period (See table A3.2 in the appendix). Despite the effect of the financial catastrophe on some countries, regulatory responses have generally been slow (Čihák, Demirgüç-Kunt, Pería, et al., 2012)

Random effects are then compared with pooled OLS (POLS) using panel data, which provide more informative, variable-specific, and efficient data, enhancing empirical analysis beyond cross-sectional or time-series data (Gujarati, 2003). The Breusch-pagan LM test results suggest rejecting the null hypothesis of zero variance across entities and support using the panel data model for bank efficiency and bank stability, with prob > chi2 = 0.000.

The study then aimed to determine whether a fixed effect model (FEM) or a random effects model (REM) was more suitable for examining the effect of a time-invariant variable on efficiency and stability. The Hausman specification test Hausman, (1978) was used to compare the results; the fixed effect model is consistent when ηi (unobserved component) and x_{it} (explanatory variables) are correlated, and random effect model is inconsistent (Gujarati, 2003). The Hausman test for bank efficiency (Prob > chi2 = 0.4727) indicates not to reject the null hypothesis of the random effects model, but bank stability (Prob > chi2 = 0.0078), the null hypothesis is rejected. Using random effect generalized least squares (GLS) estimation, allows for efficient handling of heteroskedasticity and serial correlation due to unobserved time-constant factors (Wooldridge, 2002). Since the research primarily focused on examining the effects of a time-invariant foreign bank entry variable in a panel data setting, random-effects models were preferred because of their ability to include observed time-invariant characteristics. However, the random effect model is

inconsistent with bank stability; therefore, the Hausman and Taylor model is an option for addressing time-invariant variables within the fixed-effect framework.

Hausman and Taylor (1981) (HT) use a mixed structure that combines the efficiency and applicability of a random-effects model with the consistency of a fixed-effects model to assess the effect of a time invariant variable, foreign bank entry, on bank stability (Hausman & Taylor, 1981).

Furthermore, the correlation between regressors and error terms can indicate endogeneity, which may result from simultaneous causality, autoregression, errors-in-variables, or omission of important variables (Wooldridge, 2002). Instrumental variable (IV) estimation is often used to estimate the parameters of interest when there is strong evidence on significant correlation exists between regressors and model error terms (Papies et al., 2017). Even small levels of endogeneity can lead to biased and inconsistent results, increasing the likelihood of making incorrect causal inferences (Semadeni et al., 2014).

Relevance and exogeneity are two key requirements for instrumental variables (Kennedy, 2008). The endogenous variable should be replaced with a strong instrumental variable. However, obtaining valid instrumental variables is a major challenge in this methodology (Lu et al., 2018; Zaefarian et al., 2017). Regarding the econometric approach, researchers often use the two-stage least squares (2SLS) estimation method for panel data if the instruments meet both relevance and exogeneity criteria. The concept is straightforward when z is an instrument for x, as explained Aghion & Howitt (2009).

According to the literature, GDP has an endogeneity problem (Josheski et al., 2016). The control variable, GDP, likewise exhibits endogeneity in our case, according to an individual-variable measure of endogeneity. Therefore, the researcher took instrument factors into account to verify and resolve the endogeneity issue in GDP. However, it is not always possible to determine a

suitable proxy. By substituting a proxy variable for the unobservable variable, this method aims to address the issue of missing variable (Wooldridge, 2009).

Law and order rating factors were used by Josheski et al. (2016) as instrumental variables in place of GDP, and it is anticipated that these characteristics will positively correlate with the average growth of GDP per capita. Likewise, the government efficiency (GE) and rule of law (RL) is used as instrumental variables for GDP in this study case and the correlation between GDP and RL, and GDP and GE is 0.58 and 0.72, respectively.

In terms of instrument strength, the equivalent F-test(test to weak instrument) result was 57.89, which is significantly greater than the suggested value of 11.59 for two instruments (Stock et al., 2002). Durbin (P = 0.0058) and Wu–Hausman (P = 0.0061) tests for GDP endogeneity demonstrate that the variable is endogenous. When the number of instruments is equal to the number of endogenous variables, the IV model considers that a model is just identified; when the number of instruments is greater than the number of endogenous variables, the model is over-identified (Lu et al., 2018). The Sargan–Hansen test statistics uses whether extra instruments are exogenous, assuming there are enough valid instruments to identify the coefficients of interest, and the Sargan–Hansen test statistic was P= 0.1033. for the bank efficiency. The higher the p-value, the better the instrument specification (Roodman, 2006).

Random effect instrumental variable (REIV) is usually preferred over fixed effect instrumental variable (FEIV) for efficiency reasons when the selected instrumental variables are exogenous with regard to both heterogeneity and idiosyncratic errors, and it would be desirable to use a random effects version of the two stage least square (2SLS) (Joshi & Wooldridge, 2019). Then, the study uses Hausman test to select between two models and the result prefer random-effects IV model Prob > chi2 = 0.0000 is consistent estimator for bank efficiency. The random effects IV model G2SLS estimators are popular for endogeneity (D.Levitt, 1995; Han, 2016; Imai et al., 2009; Papke, 2005; Papke & Wooldridge, 2008; Wooldridge, 2009).

4.1.2.1 Effects of foreign bank entry restriction on bank efficiency

The effect of foreign bank entry restriction (FBER) on bank efficiency (BE), proxies by CIR in SSA countries, is summarized as follows.

Table 4.4: Regression result: Foreign bank entry on bank efficiency (FBER: 0 for restricted; 1 for unrestricted)

Variable	Random Effect Model	Random Effect IV Model
FBER(Restricted)	-16.066**(2.57)	-25.212***(3.14)
Log GDP	-1.046(-1.30)	-17.997*** (-3.47)
Inflation	-0.100***(-3.65)	-0.199*** (-4.29)
Technology	-0.001(-0.03)	0.413*** (3.08)
Log bank concentration	-2.100(-1.12)	-6.084** (-2.18)
Regulatory quality	0.052(0.03)	9.893** (2.47)
Voice& accountability	0.577(0.35)	-0.046 (-0.02)
Political stability	1.466*(1.67)	2.591** (2.13)
Corruption	-5.016***(-2.83)	-2.810 (-1.15)
cons	57.480***(4.86)	185.297*** (4.47)
N	572	572
R^2	25.8%	12%
Prob > chi2	0.000	0.000

***Significance at 1% level. **Significance at 5% level. *Significance at 10%. t/z-value in parenthesis.

Source: Author's computation (2023)

Both the random-effect GLS and G2SLS estimation for the panel data are shown in Table 4.4 above. This result is used to understand the effect of foreign bank entry restriction on bank efficiency in SSA countries. The overall R^2 was 12.1%, indicating that the independent variable explained only 12.1% of the total variance; the other variables are omitted in the model. However, the main purpose of the study is not to achieve the higher R-squared; while reporting that the R-squared for the IV estimate is not inherently harmful, it also limited practical value (Wooldridge, 2009). The R-squared holds little meaning when x_{it} and υ_{it} are correlated; goodness-of-fit is not a relevant. "A high R-squared resulting from OLS

is of little comfort if we cannot consistently estimate" (Wooldridge, 2009). Prob > chi2 = 0.0000 indicates that the model is fits well.

The test result show that the regression coefficient for FBER is (-25.212), which is significance at 1%. This indicates that restrictions on foreign bank entry have a significantly negative effect on bank efficiency. These findings are supported by studies (Barth et al., 2006; Claessens et al., 2001; Demirgüç-Kunt et al., 1998; Jeon et al., 2011; Kozo et al., 2007; Lee & Chih, 2013; Lensink & Hermes, 2004; Levine, 1996; Ukaegbu & Oino, 2014).

The two macroeconomic variables, lGDP and INF, are highly significant at 1%, with coefficients of -17.997% and -0.199, respectively. Additionally, central banks and regulators must closely monitor macroeconomic developments, such as inflation and economic growth, to proactively adjust monetary and regulatory policies (Minyahil et al., 2025). TC and lBC are significant at the 1% and 5% levels, with coefficients of 0.413 and -6.084%, respectively. The worldwide governance indicators, regulatory quality (RQ) and political stability (PS) are also significant at the 5% level, with coefficient of 9.893 and 2.591, respectively.

Test of Hypothesis 1: Foreign bank-entry restrictions (FBER) have a significant negative effect on bank efficiency (BE)

As shown above, the regression results imply that the hypothesis (H1) that foreign bank entry restrictions negatively affect bank efficiency is supported. The findings suggest that the financial regulations imposed by central banks on foreign banks significantly influence bank efficiency. Therefore, the following regression equation demonstrates the reliability of these results, and the evolving multiple regression equation is as follows:

$$BE_{it} = 185 - 25\left(FBER_{it}\right) - 17\left(lGDP_{it}\right) - 0.2\left(INF_{it}\right) + 0.41(TC_{it}) - 6.08(lBC_{it}) + 9.9\left(RQ_{it}\right) + 2.59(PS_{it})$$

4.1.2.2 Effects of foreign bank entry restriction on bank stability

The other regression result on foreign bank entry restriction effects on bank stability in SSA countries and compare with Ethiopia is presented below in Table 4.5. The fixed effects, random effects IV model, and Hausman & Taylor model results are presented consecutively from left to right. However, the Hausman-Taylor estimate with cluster standard error performs better on the coefficient of variables and their significance.

Table 4.5: Regression result: Foreign Bank Entry on Bank Stability (BS); FBER: 0 for restricted; 1 for unrestricted.

	FE Model	REIV Model	Hausman &Taylor model (Std. Err. adjusted for 2 clusters in FBER
VARIABLES	Z-Score	Z-Score	Z-Score
Foreign Bank Entry Restriction.0	-	-0.161	3.850***
		(-0.0231)	(45.37)
Log GDP	0.933***	6.803***	0.952***
	(3.695)	(2.841)	(13.46)
Inflation	0.0146*	0.0610***	0.0131***
	(1.871)	(2.725)	(7.828)
Technology	-0.00896	-0.131**	-0.0101***
	(-0.894)	(-2.574)	(-5.365)
Log Bank Concentration	1.496***	3.060***	1.499***
	(2.788)	(3.109)	(8.846)
Regulatory quality	-1.690***	-3.891***	-1.371***
	(-2.878)	(-2.935)	(-3.927)
Voice & Accountability	-0.551	-0.618	-0.351**
	(-1.125)	(-0.890)	(-2.085)
Political stability	0.374	0.432	0.292*
	(1.434)	(1.166)	(1.735)
Corruption	-1.133**	-0.505	-1.128***
	(-2.144)	(-0.648)	(-5.432)
Constant	-0.561	-47.50**	-4.207***
	(-0.182)	(-2.469)	(-3.154)
Observations	572	572	572
R-squared	0.073		
F	5.303	.	.
chi2	.	19.30	9.945
Prob > chi2	2.03e-06	0.0227	0.00161

***Significance at 1% level. **Significance at 5% level. *Significance at 10%. t/z-value in parenthesis.

Source: Author's computation (2023)

According to the test results, the foreign bank entry restriction coefficient is (3.85), and this finding has 1% significance level. The finding suggests that entry restrictions on foreign banks have a considerable positive effect on bank stability. This was also reported in (Claessens et al., 2001; Fu et al., 2014; Gondwe et al., 2024; Lee & Chih, 2013).

The macro-economic variables lGDP and INF are statically significant at 1% with coefficients of 0.95% and 0.013, respectively. This finding is revealed by a previous study (Pham et al., 2021). Log Bank concentration (lBC) is also significant at 1% level with a coefficient of 1.5%. Technology is also significant at 1% with a coefficient of -0.0101. The worldwide governance indicators of regulatory quality and corruption are significant at 1% with the coefficient of -1.33 and -1.13, respectively. Voice and accountability, and political stability are significant at 5% and 10% with the coefficients of -0.351 and 0.292, respectively.

Test of Hypothesis 2: Foreign bank-entry restrictions (FBER) have a significant positive effect on bank stability (BS)

The results demonstrate that restricted foreign entry is significantly improving bank financial stability. The regression result shows that the financial regulations placed by the central banks on foreign banks upon their entry had a noteworthy effect on bank stability. Therefore, the following regression equation demonstrates the reliability of these results, and the evolving multiple regression equation is as follows:

$$BS_{it} = -4.21 + 3.85\left(FBER_{it}\right) + 0.95\left(lGDP_{it}\right) + 0.013\left(INF_{it}\right) - 0.010\left(TC_{it}\right) + 1.5(lBC_{it}) - 1.37\left(RQ_{it}\right) - 0.35\left(VA_{it}\right) + 0.29\left(PS_{it}\right) - 1.13(CC_{it}) + \ldots \upsilon_{it}$$

According to this study, SSA countries that permitted international banks to operate within their borders have lesser levels of financial stability but greater levels of operational efficiency than prohibited such regulations. Contrary, the efficiency of Ethiopia's commercial banks is significantly and negatively affected by the

financial regulation imposed by central bank, whereas financial stability is positively affected. It has discouraging effect on efficiency.

The idea behind liberalizing restrictions is to exert strong pressure on domestic banks to strengthen their regulations and supervision. Africa, with the exception of a few countries like Ethiopia, followed these routes.

Opening the banking system to international banks has two main features. On one hand, foreign banks are often suspected of encouraging capital flight, which could have negative consequences; during times of crisis, foreign banks might withdraw, leading to financial instability, currency crises, and capital outflows. They may also cease participating in cross-border banking operations to focus on domestic lending in response to capital or funding shocks. This could result in parent banks' lending less money to their overseas affiliates, which might negatively affect the amount of credit these affiliates can provide in the host market.

Foreign banks may cherry-pick high-quality (low default risk) borrowers, forcing domestic banks to serve high-risk customers, making them unprofitable, inefficient, and less competitive. They also tend to charge higher net interest margins than domestic banks and pursue rent-seeking behaviors, which reduce market competitiveness All these actions are aimed at carving out competitive advantages, expanding services abroad, and following corporations from their home countries.

The concern about foreign banks dominating the entire financial system stems from the "infant industry" arguments. Ethiopia has agreed to restrict foreign entry. However, recent research indicates that foreign banks have long been present in SSA and are expanding over time. Aside from minor restrictions on branch creation, no country has rolled back regulation in SSA.

If capital controls are ineffective, strong incentives exist for capital to flee, thus, the fear of capital flight does not justify restrictions on foreign bank entry. Instead, poor and inconsistent regulations, political uncertainty, and high or unpredictable taxes make the domestic market unattractive and risky for investment. Some argue

that banks with monopolistic power possess greater franchise value, which encourages risk-averse behavior. Since the global financial crisis, the role of foreign banks in relation to banking stability has become a top priority for policy and research. Foreign banks can have both beneficial and detrimental effects on financial instability.

Foreign bank operations are not necessarily detrimental; they can potentially strengthen stability. It is essential to recognize that international banks can provide beneficial diversification services and withstand market shocks. During a crisis in the host country, foreign banks may improve financial stability, according to several studies (Barth et al., 2004, 2006, 2008).

On the other hand, foreign banks promote financial development through increased competition in domestic banking sector, improving operational efficiency and offering financial services at lower costs, which fosters economic growth. For example, the entry of a foreign bank may challenge traditional banking practices. Allowing more foreign banks could also reduce government control over the domestic banking industry. Additionally, foreign banks encourage improvements in domestic financial infrastructure and policies, which would enhance the quality and availability of services provided by local banks.

There has also been much discussion about the contribution of foreign banks in emerging countries. According to the World Trade Organization and the International Monetary Fund, the integration of the banking sector promotes economic growth in emerging nations. A number of scholars also argue that foreign banks, especially large international banks, should be allowed to operate in developing countries since their presence may benefit the economic development of the host country directly or indirectly through the domestic banking industry (Claessens et al., 2001).

The direct influence of foreign banks might lead to competitive pressures that boost stability, innovation, and efficiency, as well as improve institutional conditions such as regulation and supervision in emerging countries (Lensink & Hermes, 2004). By relaxing restrictions on foreign bank operations, banking services could improve in quality and economic growth could be stimulated.

Domestic banks in developing countries may adopt modern strategies and technology of their international counterparts. Therefore, foreign banks may have an indirect influence on the banking sector and stimulate growth. They might also put domestic banks under competitive pressure to increase efficiency to maintain their market shares (Lensink & Hermes, 2004). Furthermore, foreign banks will offer superior banking services, better risk management strategies, more effective organizational structures, advanced data processing technologies, excellent screening capabilities, and staff training abroad. When considering whether or not to liberalize, it is essential to carefully weigh the risks and rewards.

4.2 Effect of activity restriction and capital stringency on bank efficiency and stability

The panel estimation result and a discussion on the effects of bank activity restrictions and capital stringency on bank operating efficiency and stability in SSA countries are present in this section.

4.2.1 Descriptive Analysis

The trends of SSA countries bank efficiency and stabilities are presented below. The first line chart depicts the trend of SSA banking efficiency over the past two decades. There are continuous fluctuations during the study periods. For example, the average higher operational efficiency score was 55.74 in 2021, while the lower efficiency point was 59.4 in 2009.

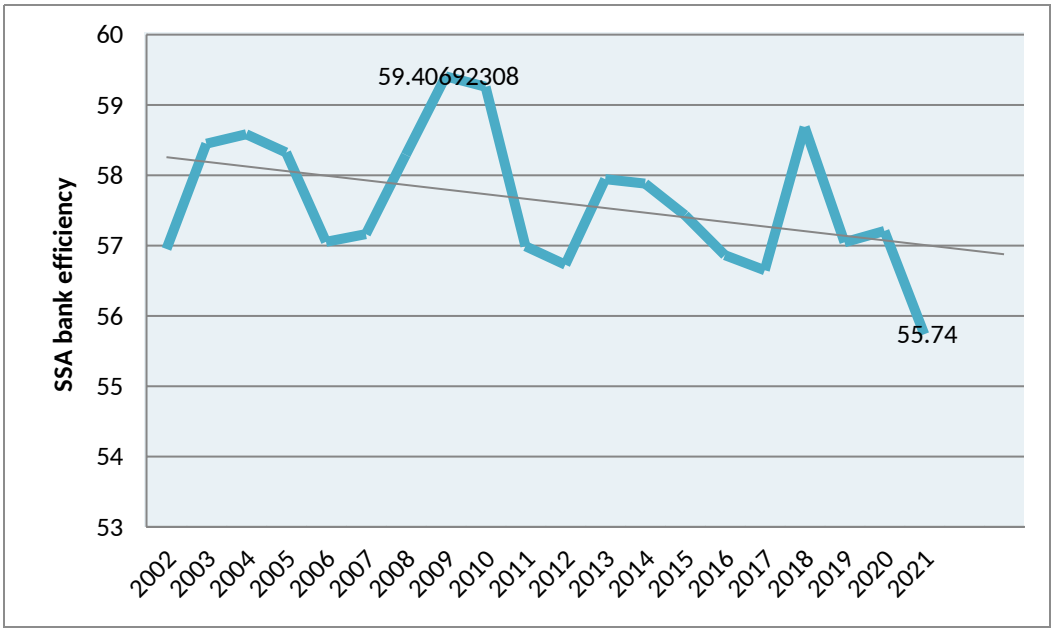

Figure 4.3: Trends of Bank Efficiency in SSA

Source: Author's computation (2023)

The ongoing debate surrounding the financial stability in SSA has been highly contentious, yet no definitive conclusion has been reached. One perspective argues that African financial systems are quite stable specifically regulations are improved over the last two decades. Contrary, the second group argues that SSA's banking and financial systems are instable emanates from weak implementation of financial liberalization policies. However, there are no clear cut results on financial system stability in SSA. Bank regulation control bank activity and their practices are undoubtedly critical components of the financial system.

The line chart below depicts the trend of SSA financial stability over the past two decades. There are ups and downs during the study periods. For example, the median lower point was registered in 2007 at 12.9, while the highest stability point was 15.2 in 2012.

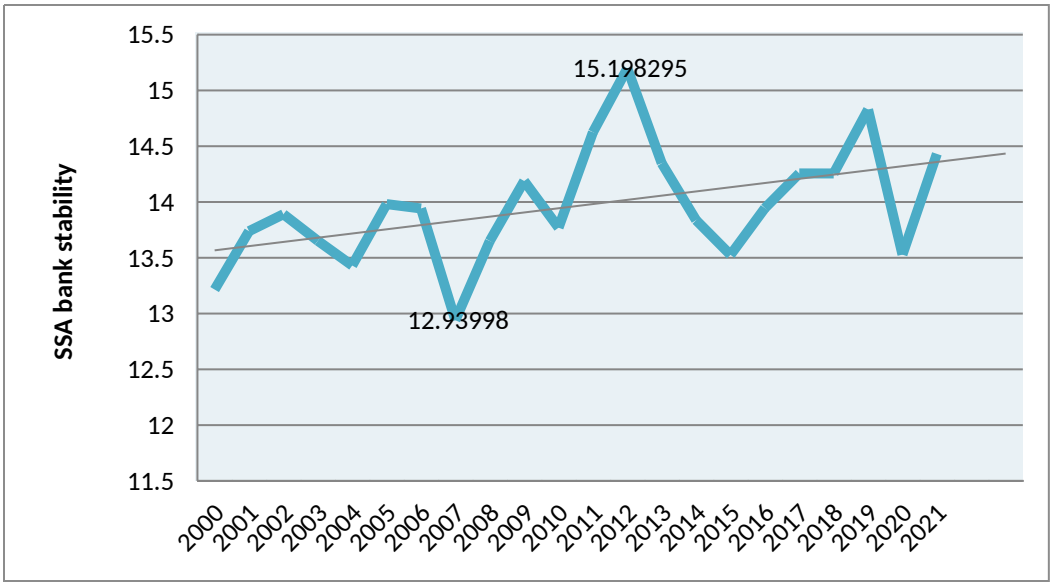

Figure 4.4: Trends of bank stability in SSA

Source: Author's computation (2023)

Bank capital regulation in SSA

Bank regulations govern bank behavior, and their practices are clearly important parts of the banking system. Financial regulations placed by central banks to increase efficiency have a significant impact on the overall functioning of banks, and their implementation may improve or delay bank efficiency depending on their restrictiveness. The SSA banking capital regulations are described below.

The first global capital requirement, a ratio of banks' assets based on counterparty type, was established in 1988. Basel I encouraged higher capital ratios but faced criticism for its simplicity in measuring risks, book value accounting, and focus on credit risk leaves important exposures linked to liquidity and operational risks unaddressed (World Bank., 2019). Basel I accord was amended in 2004 to Basel II, a more sensitive capital requirement, to accommodate complex items, encourage risk-sensitive requirements, and enhance transparency (Siddika & Haron, 2016).

Then Basel-III, introduced in response to the 2007-2009 global financial crises, is a more resilient regulatory framework that addresses pre-crisis failings and

provides a base for a resilient banking system, enhancing regulatory capital quality, risk capture, and macro prudential elements (BIS, 2017). Basel III was implemented in 85% of the high-income countries in 2016, with almost half of the upper-middle-income countries and a third of the lower-middle-income countries following suit. Nepal is the only low-income country that acknowledges the use of Basel III (World Bank., 2019). High-income countries accepted Basel III more quickly than middle- or low-income nations.

Of the sample SSA countries, 71% use Basel-I, 33% use Basel-II, and 17% use Basel-III (see Table 4.6 below). The result indicates that most SSA nations were in the first stage of the Basel Accord implementation while the World moves to more advanced Basel accord. Basel-I is implemented in Angola, Benin, Burkina Faso, Côte d'Ivoire, Ethiopia, Gambia, Ghana, Madagascar, Mali, Niger, Senegal, Tanzania, and Togo for commercial banks.

The Basel-II guideline is implemented in Burundi, Malawi, Mozambique, Namibia, Seychelles, and Zimbabwe. Basel-III is only in effect for all banks in Mauritius. However, some countries like Kenya and Nigeria apply Basel I, II, and III to their banks to varying degrees. Kenya applies Basel I and II to commercial banks, including state-owned and private banks. A few Basel III components are also deeply ingrained in Kenya's central bank's laws and regulatory frameworks, which are applicable to all mortgage finance firms and commercial banks.

Nigeria applies Basel-II and III to commercial and merchant banks and Basel-I to non-interest banks. The regulatory capital requirements for South African commercial banks, foreign banks, and bank-holding corporations were established by Basel-III, with Basel-I also being effective for mutual banks. Nyantaky & Sy (2015) found that emerging countries apply more capital rules than wealthy countries. Furthermore, North Africa is identified as the region with the greatest amount of capital control internationally.

Table 4.6: Basel-I, II, III, and leverage ratios in SSA

	Mean
Basel-I	.7083333
Basel-II	.3333333
Basel-III	.1666667
Leverage ratio	.1666667

Source: Author's computation

Most SSA countries do not impose restrictions on minimum leverage ratios which are calculated by dividing tier 1 capital by a bank's average total consolidated assets; only 17% impose regulations on required leverage ratios. For instance, Burundi requires a 7% leverage ratio on its commercial banks and financial establishments; Namibia, 6% for all banks; South Africa, 4% for commercial banks, foreign banks, and bank holding companies; and in Zimbabwe, all banks are subject to a minimum leverage ratio of 6%.

The Capital Adequacy Ratio (CAR), is a ratio that shows how capable a bank is providing reserves to cover risks like credit risk, operational risk, and loss potential. Most SSA countries considered market, operating, and other risks to determine risk-weighted assets. Regulatory minimum capital covers credit risk in 96% of the SSA nations (see Table 4.7). However, 21% also consider other risks when calculating the minimum regulatory capital needed, and 54% further subtract operational and market risks

Table 4.7: Proportion of credit, market, operational, and other risks deducted from minimum capital requirements in SSA (2019 BRSS), obs. = 24

	Mean
Credit risk	.9583333
Market risk	.5416667
Operation risk	.5416667
Other risks	.2083333

Source: Author's computation

The Basel Capital Accord requires at least 8% of risk-weighted assets (RWA) that a bank should have as "regulatory capital". This can be achieved through combinations of equity, loan-loss reserves, subordinated debt, and other accepted instruments (e.g., loans and securities), and asset-equivalent off-balance sheet exposures (e.g., loan commitments, standby letters of credit, and obligations on derivatives contracts) as capital, of which 50% must be Tier 1 or core capital.

In SSA, 40% is in the minimum capital required stage of 8%, and the remaining 60% is implementing 9.75%–15% CAR (Capital Adequacy Ratio) (see Table 4.8). One-third of SSA countries have a minimum capital requirement of 8% to 12% (Laeven & Levine, 2009).

Table 4.8: SSA with their respective CARs (Capital Adequacy Ratio)

CAR	Countries	Percent
8	10	40.00
9.75	1	4.00
10	6	24.00
12	3	12.00
14.5	3	12.00
15	2	8.00
Total	25	100.00

Source: Author's computation

All sampled SSA countries deduct goodwill from Tier 1 regulatory capital. Intangibles and investment in the capital of certain banking, financial, and insurance entities outside the scope of consolidation are also considered deductions from Tier 1 regulatory capital (see Table 4.9 below).

Table 4.9: Deduction from Tier 1 regulatory capital

	20 SSA Mean in 2019 survey	26 SSA Mean in 2011 survey
Goodwill	1	.833
Deferred tax assets	.35	.64
Intangibles	.95	.88
Unrealized losses in fair valued exposures	.3	.4
Investment in the capital of certain banking, financial and insurance entities which are outside the scope of consolidation	.85	.833
Cash flow hedge reserve	.25	.
Shortfall of the stock of provisions to expected losses	.35	.
Gain on sale related to securitization transactions	.2	.
Investments in own shares (treasury stock)	.25	.

Source: Author's computation

In all sampled SSA countries, regulators or supervisory authorities ascertain the fund sources used to determine capital adequacy (see Table 4.10). Of the 26 SSA countries, 73% prohibit the initial distribution or future injections of capital using assets other than cash or government securities, and 80% prohibit the use of borrowed funds as a source of capital.

In general, SSA's capital regulations are moderately stringent; Basel-I implementations do not progress quickly, nor do they accept Basel-II and Basel-III. The banking sectors of countries with weaker institutional systems and where market discipline and supervisory capacity are lacking may suffer from Basel II and III's reliance on strong supervisory capabilities and market discipline (Barth et al., 2008).

Table 4.10: SSA sources of funds verification (yes=1 and No=0)

T

Mean estimation	Proportion	Std.Err.
Are the sources of funds to be used as capital verified by the regulatory/supervisory authorities?		
0		
1	1	0
Can the initial disbursement or subsequent injections of capital be done with assets besides cash or government securities?		
0	0.731	0.089
1	0.269	0.089
Can initial disbursement of capital be done with borrowed funds?		
0	0.808	0.079
1	0.192	0.079

Source: Author's computation

Banking Activity restriction in SSA

Banking activity is another government's concern on bank regulation. It is the degree to which banks can participate in securities, insurance, real estate, and other non-financial business is indicated by the regulations pertaining as indicated in Table 4.11.

Table 4.11: Proportion of bank activities in SSA countries

	Number of obs.=26	
Mean estimation	Mean	Std.Err.
Security activity	2.038462	.141212
Insurance activity	2.846154	.1635407
Real estate activity	2.807692	.184134
Nonfinancial activity	3.346154	0951486

Source: Author's computation

The SSA's score of 2.04 (62% of the sampled SSA) is nearly identical to the score of 2.29 in Nyantaky and Sy (2015), indicating that securities underwriting are permitted but subject to some restrictions. African countries do not have more restriction on securities activities than do other emerging countries. However, securities activities in industrialized nations are not subject to many restrictions (Nyantaky & Sy, 2015).

SSA insurance activities also have a higher restricted score (2.85), and 42% of the sampled SSA permitted insurance activities with some restrictions. Compared with securities activities, insurance activities are more restricted throughout Africa (Nyantaky & Sy, 2015).

The other banking activity real estate operations and nonfinancial activity are subject to more limitations than security and insurance-related activities in SSA (Nyantaky & Sy, 2015). 58% of SSA has limited regulation of real estate activity. Real estate operations in SSA have more restrictions than security and insurance-related activities. 3.34 (65% of SSA are prohibited from operating in nonfinancial businesses other than those that serve as an auxiliary to the banking industry. It means that most nations in SSA are either authorized or subject to restricted restrictions on banking participation into activities outside than the primary purpose of the banking company. This finding implies that most countries in SSA put limits on banking activities other than the primary purpose of banking businesses. If we grasp the basic regulations governing SSA banking activity, we will go on to the inferential statistic results in the following section.

4.2.2 The econometrics approach

4.2.2.1 Effects of activity restriction and strict capital on bank efficiency

The cost-to-income ratio (CIR) is a key indicator for assessing a bank's operational efficiency. CIR is calculated by dividing a bank's operating expenses by the sum of its net-interest revenue and other operating income. This financial metrics helps evaluate a bank's performance by comparing its operating costs to its operating income. A lower CIR, expressed as a percentage, indicates better efficiency, while a higher CIR suggests there is room for improvement (Ayinuola et al., 2023)

To ensure accurate estimations, the researchers established basic assumptions for the panel data analysis. Outliers were carefully removed from the data set to minimize their potential impact on the estimated coefficients. This step aims to improve the validity and reliability of the results related to operating efficiency.

To further refine the data set, we winsorized the top and bottom 1% of CIR, top 1.4% of GDP, top 0.9% of INF, and top 10% of technology control (TC). This approach minimizes the influence of extreme values on the statistical analyses and allows for a more robust examination of operating efficiency.

To validate the findings, a series of diagnostic tests was performed. The normality of residuals, homoscedasticity, multicollinearity, endogeneity, serial correlations and omitted variables were thoroughly checked.

Person's Correlation analysis was conducted to identify potential multicollinearity among the independent variables (see table A4 in the appendix). The results showed strong correlations between GE and RL, GE and CC, GE and RQ, and RL and RQ. Consequently, multicollinearity between variables was assessed using the Variance Inflation Factor. The result indicated that the VIF for GE and RL exceeded 10, leading to the exclusion of these two variables from the study. Bank activity restrictions, inflation, political stability, and GDPpc exhibited signs of endogeneity, and first-order autocorrelation was present.

Regression analysis was performed using Stata MP 14 (64-bit), a versatile software platform well-suited for precise computations and statistical analyses. In this study, we conduct an in-depth analysis of bank regulations and summarize the statistics of variables in SSA commercial banks. By examining key regulatory indicators and macroeconomic factors, we aim to gain insights into the operational efficiency and regulatory environment of these banks.

The summary statistics of variables are presented in Table 4.12 below

Table 4.12: Summary statistics-(capital and activity effect on efficiency)

Variable	N	Mean	Std. Dev.	Min	Max
Operating efficiency (%)	520	57.63	10.024	29.68	82.11
Lagged opera. Efficiency	519	57.63	10.298	29.68	82.11
Bank capital stringency	514	6.93	3.16	1	13
Bank Activity Restriction	481	10.62	1.539	7	16
Inflation	520	8.89	14	-3.23	98.55
Technology	520	12.5	13.33	.036	39.36
Regulatory quality	520	-.461	.545	-1.69	.77
Voice & Accountability	520	-.298	.626	-1.725	.94
Political Stability	520	-.42	.858	-2.523	1.201
Corruption	520	-.505	.593	-1.581	.994
GDPpc	520	2162.7	2909.9	110.46	12808
Bank concentration	520	72.33	18.6	23.32	100

Source: Author's computation

The mean operating efficiency is 57.63%, ranging from 29.68% to 82.11%. Since the cost-to-income ratio was used as a proxy for bank operating efficiency, higher ratios indicate greater inefficiency. A CIR above 0.60 may pose significant challenges to operational efficiency and, in the medium run, undermine banks' financial stability (Kumar & Srivastava, 2021).

SSA has an average bank capital stringency of 6.93, indicating intermediate capital restrictions. Additionally, the average score for bank activity restrictions is 10.62, showing that banks are permitted to operate but with certain limitations

An analysis of macroeconomic factors reveals that GDP per capita and INF have average values of $2162.7 and 8.89%, respectively. In 2021, the average GDP per capita and inflation rate were $2598.8 and 12% respectively, which significantly deviate from the global averages of $12,316, and 3.48%. Notably, SSA exhibits lower GDP and higher inflation than the global norm.

The bank concentration (BC) in SSA has a mean of 72.3%, with a minimum 18.6% and maximum 100%. The assets of three largest commercial banks as a share of total commercial banking assets in 2021 are 70.28 (roughly 70%), surpassing the world average of 67.43%. This high concentration suggests potential challenges related to competition and market dynamics within the region's banking industry.

The average percentage of internet users in the population is 12.5%. Specifically, the average level of internet user in SSA, serving as a proxy of technology adoption, is 39.10%, which significantly deviates from the global average of 69.7% by 2021. This highlights a substantial technology gap between SSA and the rest of the world, emphasizing the need for technological advancement in the region's banking sector.

The governance indicators—political stability (PS), voice and accountability (VA), corruption (CC), and regulatory quality (RQ)—show negative mean values, ranging from -0.505 for corruption to -0.42 for political stability. The most recent SSA governance indicators in 2021 are (-0.64,-0.27,-0.37, and -0.48), compared to the global averages (0.07,-0.05,-0.04, and -0.04 for political stability, voice and accountability, corruption, and regulatory quality respectively), indicating weaker governance within SSA.

A general method of moment (GMM) estimation was used because the Panel GMM model (Arellano & Bover, 1995; Blundell & Bond, 2000) helps address possible endogeneity, heteroskedasticity, and autocorrelation issues. utilizing GMM improves research accuracy, producing unbiased and normally distributed results (Djalilov & Piesse, 2019; Naceur & Omran, 2008; Pham et al., 2021).

The study employs a dynamic panel data model with a two-step system GMM estimation technique to examine the effects of bank capital stringency and activity restrictions on bank efficiency in SSA Countries.

Table 4.13 presents the results of the two-step system GMM model estimation. A static version of the system GMM was also used to verify the robustness of the findings alongside the dynamic system GMM (see table A5 in the appendix).

Table 4.13: Dynamic model results: 2-step system GMM

Dependent variable is Operational Efficiency

Variable	2-Step System GMM
Lag Bank efficiency	0.406***(3.08)
Bank capital stringency	-0.680*(-1.93)
Bank activity restriction	-2.531**(-2.59)
GDP	0.000373(0.21)
Inflation	-0.301*(-2.01)
Technology	-0.246**(-2.55)
Bank concentration	-0.169**(-2.26)
Political stability	-7.530 (-1.53)
Regulatory quality	11.27 (0.64)
Voice & accountability	-5.679 (-0.81)
Corruption	12.86*(2.05)
Constant	89.20***(4.38)
year dummies	yes
No Observations	480
Number of ID	26
F-statistics	424.301
Group/Instrument	26/25
AR/(1)	0.015
AR(2)	0.109
Hansen statistics	0.497

Notes: ***, **, and * indicate statistically significant at the 1%, 5% and 10% levels, respectively. t-value (in parentheses); P-values reported for AR(1),AR(2) and Hansen statistic

Source: Author's computation (2023)

As suggested by Bond et al. (2001), the Pooled Ordinary Least Square (POLS) estimate is regarded as an upper-bound estimate for the regression coefficient Φ1, while the corresponding fixed effects(FEM) estimate functions as a lower-bound estimate. In this scenario, the upper-bound POLS estimate for the regression coefficient (BE_{t-1}) was 0.74, the corresponding lower-bound fixed-effect estimate

was 0.56, and the difference GMM was 0.42. Therefore, if the regression coefficient (BE_{t-1}) from the difference GMM falls below both the POLS and FEM estimates, the system GMM is preferred.

Several tests can evaluate the absence of endogeneity. We treat regulation, governance, and technology variables as endogenous. System GMM assumes that the only available instruments are the lags of instrumented variables (Roodman, 2006). The validity of the instruments is tested using the Hansen-test. Based on the Hansen test results (Prob > chi2 = 0.497) and Sargent test (Prob > chi2 = 0.27), it can be concluded that GMM is suitable for the model and effectively addresses endogeneity concerns.

Although Table 4.13 demonstrates the presence of first-order autocorrelation, this does not imply that the estimates are inconsistent, as this would only occur if second-order autocorrelation was present (Arellano & Bond, 1991). The Arellano-Bond AR (2) test results (Pr > z = 0.101) show no evidence of second-order autocorrelation.

Initially, we estimate the model with all control variables and year dummies. We then remove the least significant variable and re-estimate the model. This process repeats until the model meets the required criteria.

The test results show that the regression coefficient of bank capital stringent (BCS) is -0.68, which is significant at the 1% level. This indicates that stricter capital requirements have a significantly negative effect on banks' operating efficiency. As a result, capital regulation is regarded as a key instrument for monitoring banks, primarily aimed at limiting risks, increasing their ability to absorb losses through their own financial resources, and avoiding moral hazard (Miele & Sales, 2011). However, strict regulation also causes banks to operate less efficiently by lowering capital levels, supporting finding by (Barth et al., 2008, 2013; Barth, Caprio, et al., 2001b; Kosmidou et al., 2005).

The test result for bank activity restriction (BAR) shows a negative and significant effect on bank efficiency (BE), with a coefficient of (-2.53) and significance at the 1% level. This implies that more restrictions on bank activity reduce operational efficiency. These results align with those found by (Barth et al., 2006, 2008, 2013; Barth, Caprio, et al., 2001a; Kosmidou et al., 2005).

Strict activity restrictions hinder the use of economies of scale, the acquisition and processing of information about enterprises, the development of reputational capital, and the provision of a diverse of client services. Conversely, fewer regulations enhance a bank's ability to diversify income streams and franchise value, which may promote more responsible behavior and contribute to the development of more efficient and stable institutions.

The lag of efficiency has a significant positive effect (at 1% level) with a coefficient of 0.406. Among the macro-economic variable, INF, BC, and TC have significant coefficients. Higher inflation and technology are associated with reduced efficiency, likely due to by increased costs, and are statistically significant with negative effects, consistent with findings by Kasman & Yildirim, (2006) and Pasiouras et al. (2009).

The BCS coefficient is -0.68, significant at the 10% level, supporting our hypothesis 3. Stringent capital imposed by central banks through financial regulations notably hampers the operational efficiency of commercial banks in SSA.

Similarly, bank activity restrictions (BAR) have a negative coefficient of -2.531, significant at 5%, aligning with hypothesis 4 that such restrictions substantially decrease bank efficiency. Results from Barth et al.'s (2013) also support this conclusion. The regression analysis indicates that these financial regulations from central banks have a major detrimental effect on the efficiency of commercial banks across SSA countries. Consequently, the test outputs discussed below significantly

increase the reliability of the findings, and the multiple regression equation that emerges is

$$BE_{i,t} = 89.2 + 0.406\left(BE\_L_{it-1}\right) - 0.68\left(BCS_{it}\right) - 2.531\left(BAR_{it}\right) - 0.301\left(INF_{it}\right) - 0.246(TC_{it}) - 0.169\left(BC_{it}\right) + 12.8(CC_{it}) + \ldots \upsilon_{it}$$

4.2.2.2 Effects of activity restriction and capital stringency on stability

The subsequent subsection presents the econometric analysis result, interpretation and discussion on the effects of bank activity restriction and strict capital on bank stability.

Table 4.14: Summary statistics- (activity and capital on stability)

Variable	Obs	Mean	Std. Dev.	Min	Max
logBankStability (lBS)	494	13.65	5.02	2.73	25.76
Lag log Bank Stability(lBS_L1)	494	13.61	5.02	2.73	25.76
Bank Activity Restriction (BAR)	459	10.62	1.56	7	16
Bank capital stringency (BCS)	488	7.15	3.09	1	13
Log gross Domestic Product (lGDP)	494	7.04	1.1	4.74	9.46
Inflation(INF)	494	8.73	13.37	-3.23	98.55
Bank Concentration(BC)	494	71.91	18.53	23.41	100
Corruption (CC)	494	-0.506	0.593	-1.58	0.994
Source: authors' computation (2023)					

The mean bank stability is 13.65, with ranging of 2.73 to 25.76. Because the z-score was utilized as a proxy for bank stability, higher rates suggest a greater capacity to withstand bankruptcy. It suggests that SSA has an intermediate level of financial stability.

The mean bank capital stringency for SSA is 7.15, which indicates intermediate capital restrictions. Additionally, the average bank activity restriction score is 10.62, indicating that bank operations are allowed but subject to certain restrictions.

The average GDP per capita and INF are 7.04% and 8.73%, respectively. SSA is notable for having a higher inflation rate and a lower GDP than the world average.

The average bank concentration (BC) in the SSA is 71.9%, higher than the global average of 67.43%. The banking sector in the area may face difficulties due to market dynamics and competition, as indicated by this high concentration.

Corruption (CC) exhibit negative mean values of -0.506 it is above the global average governance points of -0.04, indicating weaker corruption control exists in the SSA region.

To validate the findings, a series of diagnostic tests was performed. The normality of residuals, homoscedasticity, multicollinearity, endogeneity, serial correlations and omitted variables were thoroughly checked. Pairwise Pearson's correlation matrix is also performed to judge the potential multicollinearity concerns (see table A5 in the appendix)

This empirical strategy are based on the micro-panel techniques panel-data GMM designed for panels having large N and small T as introduced by Arellano & Bond, (1991) and Blundell & Bond, (2000), where the latter technique provides consistent and efficient parameter estimates when the independent variables are strictly exogenous, and the error term is cross-sectional independent. We use the generalized method of moments (GMM) as a method for dealing with endogeneity. The researchers conduct general method of moment (GMM) estimation. Panel GMM model (Arellano & Bover, 1995; Blundell & Bond, 2000) is used to address potential endogeneity, heteroskedasticity and autocorrelation problems. Through the utilization of GMM, endogeneity issues can be effectively addressed, resulting in improved research results that are more accurate, unbiased, and normally distributed (Pham et al., 2021).

Table 4.15: Result: Dynamic model; two step system GMM; dependent var. Bank stability

VARIABLES	2stepSystem GMM
Lag bank stability	0.0549***(4.35)
Bank activity restriction	0.0305*(1.89)
Bank capital stringency	-0.00904*(-1.90)
Log GDP	0.104**(2.23)
Inflation	-0.00176(-1.45)
Bank concentration	-0.000545(-0.40)
Corruption	-0.191*(-1.71)
Constant	0.768(1.51)
Observations	459
Number of ID	26
Year Dummies	Yes
F-Statistics	4553.9
Groups/Instruments	26/25
AR(1)	0.05
AR(2)	0.275
Hansen statistics	0.611

Notes***, **, * are statistically significant at 1,5 and 10% Significance level, respectively; t-value (in parentheses); P-values reported for AR(1),AR(2) and Hansen statistic

Source: Author's computation (2023)

The Generalized Method of Moments (GMM) regression technique provides a viable solution to account for several types of endogeneity, including unobserved heterogeneity, simultaneity, and dynamic endogeneity. GMM is the preferred method for treating endogeneity. Incorporating GMM allows researchers to improve the overall performance of their models while removing intrinsic faults. For this study, a dynamic panel data model using two-step system GMM estimation technique is employed.

As suggested by Bond et al., (2001) the POLS estimate is considered an upper-bound estimate for the regression coefficient Φ1, while the corresponding fixed effects estimate serves as a lower-bound estimate. In this scenario, the upper bound estimate POLS for the regression coefficient (BS_{t-1}) is 0.75, the corresponding lower bound FEM estimate is 0.39 and the Difference GMM is 0.26. Therefore, if the coefficient of regression (BS_{t-1}) from the DGMM falls below the coefficient of POLS and FEM estimates, system GMM is preferred.

To evaluate the absence of endogeneity, several tests can be employed. Based on the results of tests such as the Hansen test (Prob > chi2 = 0.611), the Sargent test (Prob > chi2 = 0.912), and the AR (2) test (Pr > z = 0.275), it can be concluded that GMM is suitable for the model and effectively resolves endogeneity concerns.

The test result shows that regression co-efficient of bank capital stringency (BCS) is (-0.009), with significance at 10%. The result found by Gondwe et al. (2022); Kosmidou et al. (2005) also revealed this. This implies that there is a significance negative effect of capital stringent on bank stability.

The test result for bank activity restriction (BAR) shows that there is a positive and significant effect of BAR on BS with a (0.0305) significant at 10%. The result found by Fell & Schinasi (2005); Fernández & González (2005); and Lee & Chih (2013) also revealed this.

Previous year stability also has a significant positive effect on current year stability with a coefficient of (0.0549) at 1% significance level. Macro-economic variable lGDP is significant at 5% with a coefficient of (0.104). The worldwide governance indictors' corruption is negative and significant (-0.191) at 10%.

BCS coefficient is -0.009, significant at 10% level. This is inconsistent with our hypothesis 5. The outcome demonstrates that the capital stringent coefficient is significant and negative. The finding indicates to reject the null hypothesis that bank capital stringency (BCS) significantly reduces bank stability. The result of the regression analysis shows that the capital stringency imposed by the central

bank on financial institutions had a noteworthy detrimental effect on the bank stability of commercial banks in Sub-Saharan African nations.

Contrary, bank activity restrictions (BAR) has a (0.0305) significant at 10% coefficient. This is consistent with our hypothesis 6 that the BAR significantly improves BS.

The result reveals that bank activity restriction has a positive and substantial coefficient. This is also revealed by the findings of (Barth, Caprio, et al., 2001a; Barth, Gerard Caprio, et al., 2001; Fell & Schinasi, 2005; Fernández & González, 2005; Lee & Chih, 2013). The central bank's financial regulations have effect on the bank stability of commercial banks in Sub-Saharan African nations. Consequently, the test outputs discussed below significantly increase the reliability of the findings, and the multiple regression equation that emerges is

$$lBS_{it} = 0.768 + 0.055\left(lBS\_L_{it-1}\right) - 0.009\left(BCS_{it}\right) + 0.030\left(BAR_{it}\right) - 0.104\left(lGDP_{it}\right) - 0.002(INF_{it}) - 0.001\left(BC_{it}\right) - 0.191(CC_{it}) + \ldots \upsilon_{it}$$

Bank activity restrictions are one way to control the financial sector. Although banks vary across countries, their activities generally include deposit and lending, securities investment, insurance, real estate activities, and non-financial businesses. Non-traditional activities range from full direct operation within banks to none being allowed in either banks, subsidiaries, or other parts of a common holding company or parent. In SSA countries, security underwriting and insurance activities are moderately restricted, but real estate and non-financing businesses are highly restricted. Overall, activity restrictions in SSA are moderate.

The other regulatory variable, capital, is an important element in managing a business; it requires proper management; otherwise it can lead to a crisis. Bank capital regulation in SSA is also moderate, as measured by the index from the World Bank survey, and the trends fluctuate over time. SSA's capital adequacy ratio is relatively higher, aiming to reduce risk and prevent bank failure. Even though Basel-I accords focus more on credit risk, SSA countries consider all risk

components to determine the minimum capital adequacy. However, most SSA countries are still under Basel-I. Basel-II and III have more advanced regulations and require sophisticated supervision.

The impact of the global financial crisis on SSA was not significant. The region's banking sector was less exposed to global financial crisis due to either a stabled financial system exists in the region with strong capitalization and liquidity levels or with weak integration into the global economy. It is proved by only a few crises have occurred in the continent over the past 15 years (Nyantaky & Sy, 2015). Contrary, though SSA's capital regulation is moderate, it needs further improvement, because, banking and financial systems in SSA remain inadequate. The systems generally continue to be highly concentrated and incur high operating costs, which affect bank stability and performance. The problem of financial instability stems from weak implementation of financial liberalization policies that have led to financial monopolies.

The strictness of banking regulation has an effect on the stability and efficiency of banks in SSA. Higher restrictions on banking activities and relaxed capital regulations lead to more stable banks. Because managing various activities can be difficult for less developed institutions, and managing these activities within a single conglomerate can be hard to monitor and may lead to bankruptcy. Governments, therefore, enhance banking stability by banning certain activities.

From a theoretical point of view, countries limit bank activities to avoid conflicts of interest, exacerbate moral hazard issues, and promote banking stability. Similarly, higher capital regulations may undermine financial stability by encouraging banks to take higher risks in order to recover earnings and franchises.

For the past two decades, the global financial landscape witnessed a significant shift with the rise of financial deregulation and liberalization. This transformation greatly affected the operations of financial intermediaries, including banks and insurance companies. Traditionally, banks were prohibited from participating in

non-banking services. However, since deregulation, banks have significantly increased the range of products they offer, putting them in competition with brokers, investment banks, and insurance providers. According to economic theory, more industry competition boosts efficiency and deters monopolistic practices (Zhang, 2012)

CHAPTER FIVE: CONCLUSION AND RECOMMENDATIONS

This chapter presents conclusions and recommendations made to help and improve bank regulation based on the objectives of the study. The chapter also recommended on the areas for further research work.

5.1 Conclusion

A healthy and vibrant economy requires a financial system that transfers funds from surplus units to deficit units. Financial intermediaries and financial markets, the pillars of the financial system, has vital role by moving huge flows of funds throughout the economy (Gakunu, 2007). Banks are among the major player that moves funds from people who save to people who invest and it is considered to be the backbone of the financial system. a well-functioning banking systems therefore are important for the economic growth and development (Barth et al., 2013).

Bank regulations govern bank behavior, and their practices are clearly important parts of the banking system. Financial regulations placed by central banks have a significant effect on efficiencies and stabilities of the financial industries at large. Since banks are considered as the backbones of financial institutions, appropriate regulation must be met to safeguard against inefficiencies and disruptive economies.

This dissertation extensively reviews the literature on banking regulations and their impacts on bank efficiency, and stability. The literature is extensive with varying theories and empirical results. This study contributes to the literature by analyzing the effects of banking regulations on performance based on a sample of Sub-Saharan African (SSA) countries. The study focuses on regulations that deal with capital adequacy, foreign bank entry and bank activity restrictions. The methodology employs advanced econometrics techniques such as system GMM with appropriate testing as necessary.

The banking systems and regulations in SSA are evolving. The countries have different levels of strictness in their banking regulations. The trends in bank efficiency and stability in SSA countries reveal fluctuations over the past two decades. Bank efficiency peaked in 2021 and was lowest in 2009. Financial stability experienced similar variability, with its lowest point in 2007 and highest in 2012.

Bank efficiency in SSA is positively impacted by foreign bank entry, relaxing banking activities and capital regulation whereas restriction on foreign bank entry, banking activities are good for banking stabilities in SSA.

The test result shows that the regression coefficient for foreign bank entry restriction is (-25.212), which is significant at 1%. This indicates that restrictions on foreign bank entry have a significantly negative effect on bank efficiency. These findings are supported by studies (Barth et al., 2006; Claessens et al., 2001; Demirgüç-Kunt et al., 1998; Jeon et al., 2011; Kozo et al., 2007; Lee & Chih, 2013; Lensink & Hermes, 2004; Levine, 1996; Ukaegbu & Oino, 2014). GDP, inflation, technology, bank concentration, regulatory quality, and political stability all have significant effects on bank efficiency.

The foreign bank entry restriction coefficient is 3.85, with a significance threshold of 1%, the finding suggests that entry restrictions on foreign banks have a considerable positive effect on bank stability. This was also reported in (Claessens et al., 2001; Fu et al., 2014; Gondwe et al., 2024; Lee & Chih, 2013). GDP, inflation, bank concentration, technology, regulatory quality, corruption, voice and accountability, and political stability are significant coefficients.

According to the study results, Sub-Saharan African countries that significantly liberalized foreign bank restrictions built highly efficient but lower stability banking sectors. Comparatively, Ethiopia with no foreign bank activities in the domestic market has less efficient but stable banking system.

With the exception of Ethiopia, all of the SSA nations under study allow international banks to enter through joint ventures, acquisitions, and subsidiaries;

nevertheless, the majority of them impose restrictions on branches. There are restrictions on the number of branches, but all entry can be made by acquiring domestic institutions, buying shares in banks in the host nation, or creating joint ventures. There are several reasons why 50% of the SSA prohibits foreign entry through the branch, including foreign banks fleeing the domestic or local markets during the crisis.

The test result shows that the stricter the bank capital requirements have significantly negative effect on banks' operating efficiency and stability. Capital regulation is regarded as a key instrument for monitoring banks, primarily aimed at limiting risks, increasing their ability to absorb losses through their own financial resources, and avoiding moral hazard. However, strict regulation also causes banks to operate less efficiently by lowering capital levels.

The test result for bank activity restriction shows a negative and significant effect on bank efficiency (BE), and a positive and significant effect on bank stability. Strict activity restrictions hinder the use of economies of scale, the acquisition and processing of information about enterprises, the development of reputational capital, and the provision of diverse services. Conversely, fewer regulations enhance a bank's ability to diversify income streams and franchise value, which may promote more responsible behavior and contribute to the development of more efficient and stable institutions.

Previous year stability, GDP, and corruption have significant effect on bank stability. The lags of efficiency, inflation, bank concentration, and technology have significant effect on bank efficiency.

Reducing barriers to bank activity have also a significant positive effect on bank efficiency but detrimental effect on stability. Strict capital regulation has a significant negative effect on bank efficiency and stability. Generally, our variables of interest remain statistically significant demonstrating that foreign bank entry, capital control, and activity restriction influence bank efficiency and bank stability.

Policymakers should take these findings into account in order to promote efficient and stable financial sectors, while also balancing the requirement for cautious regulation and risk management.

In conclusion, trends in financial deregulation and liberalization profoundly affected financial institutions, primarily banks. Over the past two decades, the global financial landscape witnessed a significant shift with increasing financial deregulation and liberalization. This transformation significantly affected the operations of financial intermediaries, including banks.

Opening the banking system to international banks; relaxing the stringency of capital regulation; and allowing banks to participate in non-banking services, such as selling insurance products, real estate management, and securities underwriting all enhance efficiency and profitability, but result in instability. However, after deregulation, banks substantially expanded their product offerings by competing with brokers, investment banking firms, and insurance companies.

Restricting foreign banks entry in this era of globalization may result in isolation and hinder the benefits of globalization. While this dissertation was in progress, Ethiopia officially opened its banking sector to foreign investors in 2024; a long-awaited move that could reshape the country's financial landscape. The National Bank of Ethiopia announced that international investors can now apply for banking licenses, and foreign players are allowed to set up subsidiaries, branches, or representative offices in the country. They can also buy stakes in local banks, with foreign ownership capped at 49%, while the majority 51% is reserved for Ethiopian nationals to safeguard national interests.

Ethiopia cannot be isolated in the age of globalization; the Ethiopian central bank expects this move to attract more capital, improve service quality, and make the sector more efficient and inclusive. Ethiopia's banking industry currently includes 32 institutions, led by the state-owned Commercial Bank of Ethiopia, which holds about 22% of the market.

As this dissertation shows, foreign bank entry improves banking efficiency. However, close monitoring is necessary to minimize the destabilizing effects of foreign banks. It is crucial and demands attention to balance the risks of loosening restricts on foreign banks' entry with the advantages of liberalizing financial institutions, particularly in the face of a weak local prudential regulatory and supervisory framework. Efficient screening of bank entry and continuous monitoring are essential to promote stability.

The 12th World Bank Group President Jim Yong Kim said. *"International banking does create risks of exporting instability, especially for countries with poor regulations and institutions, and those risks need to be mitigated. But without a competitive banking sector, the poor will not be able to access basic financial services, many businesses will be locked out of markets, and growth in developing countries will stall."*

5.2 Recommendations

This study presents recommendations based on its findings. I strongly believe that implementing these suggestions will improve bank regulation, boost efficiency through competition, and ultimately help maintain a healthy financial system. The risk of a financial crisis will increase unless the government considers such actions. All the recommendations are directed at central banks and commercial banks' management in the Sub-Sahara Africa to enhance strictness on foreign banks, capital regulations, and banking activities, aiming for a more stable banking sector and a resilience financial industry.

The initial policy recommendation leans toward cautious liberalization. By relaxing restrictions on foreign bank admissions, countries can accelerate the efficiency of their banking sectors.

Relaxing regulations in the public interest, with appropriate capital and activity restrictions, is also a key policy recommendation for governments. While the world transitions to Basel-IV, many SSA countries are still implementing Basel-I, which

often has stricter restrictions on activities like real estate and non-financial businesses.

The public interest argument is an important tool that the researchers suggest for policymaking in developing countries. Governments regulate banks to serve the public interest, promote efficiency, and prevent market failures for the benefit of society at large. Rapid liberalization in the face of imperfect market structures, underdeveloped financial systems, and insufficient supervision can lead to inefficiency and instability.

Domestic regulators should aim to protect a sound financial system. Inconsistent policies, political uncertainty, and high or irregular taxes should be managed carefully.

Financial stability can be reinforced through effective cross-border prudential supervision, which requires ongoing oversight from both home and host country regulators and improving local supervisors' capacity to evaluate the impacts of new products introduced by foreign banks.

Local majority owners can oversee the general activities of banks, though international banks might participate as minority partners in various joint ventures.

Identifying banks with strong financial positions that are committed to a medium-term strategy to enhance their local market presence can help establish a more stable banking system. Entry of foreign banks tends to contribute positively in this regard.

Looking at other countries' experiences is instructive. For example, Canada’s banking system has performed well due to prudent risk management and a strong regulatory framework. Brazil’s banking market, where the government controls a significant portion of bank assets, remains less dominated by foreigners, despite having a well-capitalized and well-managed private banking sector in Latin America.

Compared to Central Europe or Latin America, foreign banks have a smaller footprint in most Asian financial systems. This is partly due to regulations that limit entry, especially into local retail banking markets. These restrictions limit both the number of foreign banks allowed and the number of branches they can establish.

Countries could significantly liberalize foreign bank entry by setting a cap on the maximum share foreign banks can hold in the domestic market. This may reduce fears associated with foreign banks dominance of the local financial system.

Limitation and directions for future research

Limitations and areas for future research include the fact that this study focuses solely on Sub-Saharan Africa, excluding other African nations that have experienced various financial reforms. Some parts of SSA are also omitted due to data inaccessibility.

Additionally, the study did not analyze bank-level data. Future studies should explore these links using detailed bank-level data and expand to include all African countries. The research only examined three main bank regulatory variables, but future work could consider alternative scenarios where interactions between variables depend on other regulations and supervisory practices.

Ethiopia, currently liberalizing its foreign bank entry, presents a case for further work on the effects of such reforms. Future studies should also investigate recent reforms in capital regulation and banking activities too.

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APPENDICES

Table A1: lists of sample countries based on foreign bank entry regulation

Country	Code	Foreign Banks entry	Income
Angola	AGO	Allowed	Lower middle income
Burundi	BDI	Allowed	Low income

Benin	BEN	Allowed	Lower middle income
Burkina Faso	BFA	Allowed	Low income
Botswana	BWA	Allowed	Upper middle income
Côte d'Ivoire	CIV	Allowed	Lower middle income
Ethiopia	ETH	Not Allowed	Low income
Ghana	GHA	Allowed	Lower middle income
Gambia, The	GMB	Allowed	Low income
Kenya	KEN	Allowed	Lower middle income
Madagascar	MDG	Allowed	Low income
Mali	MLI	Allowed	Low income
Mozambique	MOZ	Allowed	Low income
Mauritius	MUS	Allowed	Upper middle income
Malawi	MWI	Allowed	Low income
Namibia	NAM	Allowed	Upper middle income
Niger	NER	Allowed	Low income
Nigeria	NGA	Allowed	Lower middle income
Senegal	SEN	Allowed	Lower middle income
Sierra Leone	SLE	Allowed	Low income
Seychelles	SYC	Allowed	High income
Togo	TGO	Allowed	Low income
Tanzania	TZA	Allowed	Lower middle income
Uganda	UGA	Allowed	Low income
South Africa	ZAF	Allowed	Upper middle income
Zimbabwe	ZWE	Allowed	Lower middle income

Table A2: Pearson's correlation (foreign entry effect)

Variables	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	-11
(1) CIR	1										
(2) Z-score	-0.104	1									
(3) FBER	0.327	0.141	1								
(4) lGDP	-0.226	0.252	0.195	1							
(5) INF	-0.172	-0.236	-0.048	-0.11	1						
(6) TC	-0.153	0.121	0.086	0.678	-0.09	1					
(7) lBC	-0.067	-0.13	-0.107	-0.16	-0	-0.231	1				
(8) RQ	-0.199	0.311	0.209	0.626	-0.36	0.332	-0.07	1			
(9) VA	-0.093	0.268	0.296	0.543	-0.31	0.354	-0.13	*0.813	1		
(10) PS	-0.109	0.034	0.26	0.476	-0.18	0.228	0.208	0.645	*0.689	1	
(11) CC	-0.293	0.141	0.033	0.615	-0.25	0.407	0.131	*0.822	*0.763	0.71	1

Source: Authors' computation (2023)

Table A3.1: Two-sample t test for Restricted and Unrestricted

	Restricted	unrestricted	Mean restricted	Mean unrestricted	dif	Std. err.	t	p
BE by FBER:	22	550	40.810	58.168	-17.36	1.94	-8.93	0
Z-score by FBER:	22	550	10.145	13.799	-3.65	.358	-10.2	0
Source: Author's computation (2023)								

Table A3.2: Two-sample t test before and after 2008 global financial crisis

	Before 2008	After 2008	Mean Before 2008	Mean after 2008	dif	St Err	t	p
BE by year	364	208	57.581	57.358	.224	.888	.25	.801
BS by year	364	208	13.671	13.635	.036	.434	.1	.934
Source: Author's computation(2023)								

Table A4: Pearson's correlation (capital and activity on efficiency)

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) BE	1												
(2) BCS	-0.128	1											
(3) BAR	-0.281	0.016	1										
(4) GDPpe	0.399	0.264	0.236	1									
(5) INF	-0.141	-0.004	-0.06	-0.1	1								
(6) TC	-0.2	0.348	0.13	0.647	-0.07	1							
(7) BC	-0.069	-0.361	-0.16	0.092	-0.03	-0.2	1						
(8) RQ	-0.276	0.229	0.303	0.628	-0.35	0.37	-0.073	1					
(9) VA	-0.165	0.248	0.125	0.523	-0.3	0.388	-0.127	0.817	1				
(10) PS	-0.18	0.067	0.149	0.542	-0.16	0.264	0.194	0.641	0.677	1			
(11) CC	-0.311	0.102	0.285	0.695	-0.26	0.447	0.124	*0.836	0.79	0.729	1		
(12) RL	-0.335	0.169	0.343	0.627	-0.31	0.416	-0.005	*0.892	*0.858	0.762	*0.877	1	
(13) GE	-0.4	0.213	0.34	0.782	-0.19	0.49	-0.014	*0.887	*0.815	0.7	*0.883	*0.905	1

Source: Author's computation (2023)

Table A5: Static model; two step system GMM; dependent var. BE

	Static SGMM
BE	
BCS	-0.622(-0.376)
BAR	-2.837**(-1.212)
GDPpc	0.000215(-0.001)
INF	-0.338*(-0.184)
TC	-0.361**(-0.154)
BC	-0.0791(-0.113)
PS	-11.49*(-5.908)
RQ	9.325(-9.064)
VA	5.416(-13.72)
CC	12.4(-11.04)
Constant	111.0***(-23.6)
Year dummies	Yes
No of Observations	481
Number of ID	26
F-statistics	273.64
Group/Instruments	26/25
AR(1)	0.68
AR(2)	0.036
Hansen statistics	0.796

Notes: ***, **, and * indicate statistically significant at the 1%, 5% and 10% levels, respectively. t-statistics (in parentheses) are based on white heteroskedasticity consistent std.errors; P-values reported for AR(1),AR(2) and Hansen statistic

Source: Author's computation (2023)

Table A6: system GMM result on BE, ROA, ROE, and NIM

Variable	2-Step System GMM			
	BE	ROA	ROE	NIM
BE_L1	0.406***(0.132)			
ROA_L1		-0.0528(0.296)		
ROE_L1			-0.223(-0.273)	
NIM_L1				0.23-(0.293)
BCS	-0.680*(0.352)	-0.0486(0.0896)	-0.911(-0.608)	-0.223(-0.171)
BAR	-2.531**(0.978)	0.311(0.297)	0.895(-2.211)	0.56(-1.011)
GDP	0.000373(0.0018)	2.12e-05(000720)	0.00327(-0.00443)	-0.00014(-0.00065)
INF	-0.301*(0.149)	0.00718(0.0387)	0.0665(-0.184)	-0.0109(-0.0245)
TC	-0.246**(0.096)	-0.0106(0.0473)	-0.673(-0.399)	0.0302(-0.0784)
BC	-0.169**(0.074)	0.0333(0.0367)	0.0732(-0.203)	0.00782(-0.0651)
PS	-7.530 (4.922)	-0.0510(1.528)	-11.16(-9.737)	1.075(-3.692)
RQ	11.27 (17.48)	4.152(3.230)	8.541(-18.04)	4.836(-4.519)
VA	-5.679 (7.043)	1.582(2.653)	27.82(-20.09)	0.662(-5.568)
CC	12.86*(6.281)	-4.715**(2.282)	-12.16(-20.63)	-6.6(-12.14)
Constant	89.20***(20.35)	-3.545(5.267)	14.94(-30.17)	-0.702(-19.26)
year dummies	yes	Yes	yes	Yes
No Observations	480	481	481	429
Number of ID	26	26	26	26
F-statistics	424.301	4.75	6.33	36.74
Group/Instrument	26/25	26/25	26/25	26/25
AR(1)	0.015	0.232	0.402	0.078
AR(2)	0.109	0.869	0.614	0.147
Hansen statistics	0.497	0.402	0.103	0.470

Source: Author's computation (2023)

Table A7: Pearson's correlation (activity and capital on stability)

Variables	1	2	3	4	5	6	7	8
(1) BS	1							
(2)BS_L1	0.939	1						
(3) BAR	0.031	0.026	1					
(4) BCS	0.052	0.057	0.021	1				
(5) lGDP	0.198	0.206	0.152	0.358	1			
(6) INF	-0.223	-0.244	-0.04	0.023	-0.095	1		
(7) BC	-0.108	-0.097	-0.165	-0.363	-0.144	-0.03	1	
(8) CC	0.088	0.104	0.297	0.105	0.642	-0.253	0.116	1

Source: Author's computation (2023)

Table A8: Simultaneously regression of bank regulation on BE & BS

	EFFICENCY	STABILITY

VARIABLES	G2SLS random-effects IV regression	Hausman-Taylor estimation
FBER(unrestricted)	37.36***-7.312	2.319(5.419)
BCS	0.700**(0.278)	-0.0891**(0.0424)
BAR	0.413(0.318)	0.00182(0.0765)
lGDP	-14.41***(3.950)	1.642***(0.336)
INF	-0.183***(0.0360)	0.0172**(0.00857)
TC	0.235***(0.0804)	-0.0108(0.0106)
lBC	0.256(2.174)	1.267**(0.571)
RQ	3.708(2.857)	-1.169*(0.647)
VA	-0.305(1.807)	-0.374(0.515)
PS	1.982**(0.997)	0.467*(0.273)
CC	0.157(2.331)	-1.362**(0.586)
Constant	113.2***(23.36)	-5.921(6.182)
Observations	519	519
Number of country ID	26	26

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1
Source: Author's computation

Table A9: Information on Bank regulation variables

Variable	definition	Source and qualification	World bank guide question
1. bank entry regulatory variables			
(a) Limitations on foreign bank entry/ownership	Whether foreign entities prohibited from entering to domestic market	WBG 1.8.a-d Yes=1; No=0 high value mean prohibited foreign enters	a. Acquisition. Yes/No b. Subsidiary. Yes/No c. Branch. Yes/No d. Joint venture. Yes/No
2. Bank activity regulatory variable			
(a) Securities activities	The extent to which banks may engage in underwriting, brokering and dealing in securities, and all aspects of the mutual fund industry.	WBG(world Bank Guide 4.1 (higher values, more restrictive) Unrestricted = 1: full range of activities can be conducted directly in the bank; Permitted = 2: A full range of activities are offered but all or some of these activities must be conducted in subsidiaries, or in another part of a common holding company or parent,; Restricted = 3: Less than the full range of activities can be conducted in banks, or subsidiaries, or in another part of a common holding company or parent, and Prohibited = 4: None of these activities can be done in either banks	4. 1 What are the conditions under which banks can engage in securities activities? (the ability of banks to engage in the business of securities underwriting, brokering, dealing, and all aspects of the mutual fund industry?

		or subsidiaries, or in another part of a common holding company or parent.	
(b) Insurance activities	The extent to which banks may engage in insurance underwriting and selling.	WBG 4.2 (higher values, more restrictive) Unrestricted = 1: full range of activities can be conducted directly in the bank; Permitted = 2: A full range of activities are offered but all or some of these activities must be conducted in subsidiaries, or in another part of a common holding company or parent,; Restricted = 3: Less than the full range of activities can be conducted in banks, or subsidiaries, or in another part of a common holding company or parent, and Prohibited = 4: None of these activities can be done in either banks or subsidiaries, or in another part of a common holding company or parent.	4.2 What are the conditions under which banks can engage in insurance activities? (the ability of banks to engage in insurance underwriting and selling)?
(c) Real estate activities	The extent to which banks may engage in real estate investment, development and management.	WBG 4.3 (higher values, more restrictive) Unrestricted = 1: full range of activities can be conducted directly in the bank; Permitted = 2: A full range of activities are offered but all or some of these activities must be	4.3 What are the conditions under which banks can engage in real estate activities? (the ability of banks to engage in real estate investment, development, and management?

		conducted in subsidiaries, or in another part of a common holding company or parent,; Restricted = 3: Less than the full range of activities can be conducted in banks, or subsidiaries, or in another part of a common holding company or parent, and Prohibited = 4: None of these activities can be done in either banks or subsidiaries, or in another part of a common holding company or parent.	
(d) Non-financial activities	The extent to which banks may engage in nonfinancial businesses except those businesses that are auxiliary to banking business (e.g. IT company, debt collection company etc.)	WBG 4.4 (higher values, more restrictive) Unrestricted = 1: Nonfinancial activities can be conducted directly in banks, Permitted = 2 Nonfinancial activities must be conducted in subsidiaries, or in another part of a common holding company or parent; Restricted = 3: Nonfinancial activities may be conducted in subsidiaries, or in another part of a common holding company or parent, but subject to regulatory limit or approval, and Prohibited = 4: None of these activities can be done in either banks or subsidiaries, or in another part of a common holding	4.4 What are the conditions under which banks can engage in nonfinancial businesses except those businesses that are auxiliary to banking business (e.g. IT company, debt collection company etc.) ?

		company or parent	
3. Capital regulatory variables			
(a) Overall capital stringency	Whether the capital requirement reflects certain risk elements and deducts certain market value losses from capital before minimum capital adequacy is determined.	WBG 3.1 + 3.2a + 3.2b + 3.2c+3.2d +3.18.3a +3.18.3b + 3.18.3c + 3.18.3d +3.18.3e + (1 if 3.18.2. < 0.75) Yes = 1; No= 0 Higher value indicate greater stringency	3.1. Is the minimum capital-asset ratio requirement risk weighted in line with the Basel guidelines? Yes/No Yes- Basel-I/Basel-II/ Basel-III/ Leverage ratio No-other 3.2a. credit risks are covered by the current regulatory minimum capital requirements. yes/No 3.2b. market risks are covered by the current regulatory minimum capital requirements. yes/No 3.2c. operational risks are covered by the current regulatory minimum capital requirements. yes/No 3.2d. other risks are covered by the current regulatory

			minimum capital requirements 3.18.3a. are goodwill deducted from regulator capital? Yes/No 3.18.3b. are deferred tax assets deducted from regulator capital? Yes/No 3.18.3c. are intangibles deducted from regulator capital? Yes/No 3.18.3d. are Unrealized losses in fair valued exposures deducted from regulator capital? Yes/No 3.18.3e. are Investment in the capital of certain banking, financial and insurance entities which are outside the scope of consolidation deducted from regulator capital? Yes/No 3.18.2 What fraction of revaluation gains is allowed as part of capital?
(b) Initial capital	Whether certain funds	WBG 1.4.2: Yes = 1, No= 0: WBG	1.4.2 Are the sources of funds

stringency	may be used to initially capitalize a bank and whether they are officially verified.	1.4.3 and 1.5: Yes = 0, No= 1. Higher value indicate greater stringency	to be used as capital verified by the regulatory/supervisory authorities? Yes/No 1.4.3 Can the initial disbursement or subsequent injections of capital be done with assets other than cash or government securities? Yes/No 1.5 Can initial disbursement of capital be done with borrowed funds? Yes/No
c. capital regulatory index	The sum of (a) and (b)	(a) +(b) higher value indicate greater stringency	

Source: Adapted from (Barth et al., 2004)