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Foreign Bank Entry Restriction Effect on Bank Efficiency and Stability: A Comparative Study of Ethiopia and Sub-Saharan African Countries

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Abstract

This study measures the foreign banks' entry restriction effect on bank efficiency and stability in commercial banks from sub-Saharan African (SSA) countries and compared Ethiopia with other SSA countries based on their foreign banks' entry restrictiveness. Bank financial stability was measured by z-score and bank efficiency proxies using the cost-to-income ratio (CIR). Country-based banking aggregate z–score and CIR were used to measure banking sector financial stability and efficiency, respectively. Some selected SSA countries are used as a sample over the period 2000-2021 and a panel data regression techniques random effect IV model and Hausman and Taylor model are used for measuring bank efficiency and stability, respectively. The empirical findings show a significant negative relationship between restricted financial regulation and bank efficiency, while restricted financial regulation has a significant positive effect on bank stability. Finally, the result inclined toward the theory of liberalization. Through liberalizing foreign bank entry, banks can boost the efficiency of the banking sector.

Keywords: banking regulation, foreign bank entry restriction, bank efficiency, bank stability

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Introduction

Bank regulations refer to the rules governing the behavior of banks, and the banking practices are clearly important parts of a banking system. The overall activities of banks are significantly influenced by the financial regulations imposed by central banks, which improves the efficiency and stability of banks and leads to an increase in the financial stability of the system. Achieving a sound banking system through good regulations plays a vital role in macroeconomic growth.

The approaches to bank regulation have varied from extremely light to all-encompassing, from highly interventionist regulations and even outright government ownership to episodes of free banking (Barth et al., 2006). However, the question is whether the implementation of these financial rules and regulations really enhances or slows down the bank efficiency and stability. Weaknesses in the design and implementation of bank regulations and supervision have led to banking crises (Miele & Sales, 2011), (Anginer et al., 2019). The more rule based the legal regulatory framework is, the more transparent and easier it is to monitor bank operations (Neyapti & Dincer, 2005). By contrast, liberalizing restrictions may create powerful pressure to improve domestic regulations and supervision (Levine, 1996). However, it is important to note that the quality of regulation does not necessarily mean that it is strict as well.

Over the past three decades, financial reform in Africa has been profound and led to various policy improvements and technological changes, as well as increased deregulation in the financial sector (Akhter, 2018). Banking systems have experienced severe transformations, such as increased openness to international capital flows and financial and technological innovations. However, the Ethiopian financial sector is still close to foreign banks, 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 & Geda, 2001).

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 that have more accessible data. There are only a few studies (Addison & Geda, 2001;

Asfaw & Kassahun, 2014; Bogale, 2017) (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 analyse 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.

This study fills the literature gap by analysing the effect of foreign bank entry regulations on the efficiency and stability of the commercial banking sector in sub-Saharan African (SSA) countries, with a special emphasis on Ethiopia by employing random effect IV model and Hausman &Taylor model on bank efficiency and bank stability estimation respectively. The study also addresses gaps in research data sources by utilizing worldwide financial databases from the World Bank and the IMF. The study provides a good 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 relationship between financial regulation and country level bank performance and present comparative analysis between restricted regulation and liberalized regulation.

Related Literature Review

Theoretical Review

The school of financial repression and the school of liberalization are two opposing theories of financial regulation. The former considers government intervention in the financial sector as crucial for economic growth in the form of interest rate control as an important policy tool, whereas the latter considers the privatization of government-owned financial institutions and financial liberalization as key policy tools.

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 debate the merits of opening the financial sector to foreign ownership.

Regarding the concept of foreign bank entry, it is possible to identify the following two groups: the advocates and opponents. Foreign bank entry liberalization proponents contend that this will increase competition in domestic banking markets, strengthen domestic bank operations'

efficiency, lower the cost of financial services, and advance economic growth by improving the efficiency of resource allocation (Jeon et al., 2011; Lensink & Hermes, 2004; Levine, 1996).

In the presence of foreign banks, countries can improve the quality and availability of financial services by stimulating competition, and the ability to contest domestic financial markets by facilitating the application of modern banking skills, technology, and management. For instance, the presence of foreign banks may exert pressure on old-style banking practices. Furthermore, greater competition may lead to lower interest rate margins and profits (Lensink & Hermes, 2004).

Foreign banks can enhance the quality of human capital in their domestic banking system by importing skilled bank managers and training local employees. This can lead to more efficient practices and lower costs, even though the initial costs of staff upgrades are high. However, long-term cost reduction may occur.

Countries have stimulated the improvement of domestic financial policies and infrastructure, which promote development. Foreign bank entry enhances regulation and supervision, and improves banking operations in recipient countries. This may enhance the quality of domestic banking operations.

The arrival of foreign banks could also lessen the government's influence over the domestic banking industry, thus reducing the significance of directed credit policies. All these effects help lower costs by promoting more effective domestic banking operations.

Opponents, on the other hand, fear that foreign banks would selectively target high-quality (low default risk) borrowers, pushing domestic banks to focus on supplying clients with higher risk and thus become less competitive, unprofitable, and inefficient. Additionally, they contend that foreign banks often adopt rent-seeking practices and demand larger net interest margins than domestic banks, which reduces competition in the domestic banking sector

Countries are worried about the feebleness of foreign bank entry, which may actually stymie financial development instead of enhancing the delivery of financial services and capital.

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

Second, foreign banks flee when faced with problems in the local or home markets. Foreign banks' lack of commitment to domestic markets can increase the fragility of the domestic financial system, particularly if they dominate a significant share.

Foreign bank entry can lead to increased supervision and regulation, potentially overwhelming domestic banking officials and creating a riskier environment (Demirgüç-Kunt et al., 1998). Foreign banks 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 foreign banks domination on the entire financial sector, leading to entry restrictions justified on "infant industry" arguments.

Contrary to these claims, there is no systematic evidence of foreign banks' capital flight and fragility (Demirgüç-Kunt et al., 1998). Capital controls are ineffective when there are strong incentives for capital to flee, and the fear of capital flight does not justify restrictions on foreign bank entry. Instead, poor and inconsistent policies, political uncertainty, and high and inconstant taxes make the domestic market an unattractive and risky place for investment (Gordon & Levine, 1987).

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.

Empirical review

Regarding the relationship between entry into banking markets and changes in legal restrictions on entry (Amel & Liang, 1992), it was found that the relaxation of regulatory entry restrictions could have substantial effects on the local banking market structure and profitability. Foreign bank entry can significantly impact domestic banking at lower economic development levels (Lensink & Hermes, 2004). Initially, domestic banks had strong market power in less developed markets. Despite their small-scale operations, foreign banks have a strong effect on competition, and the market can compete. There is a positive correlation between foreign bank penetration and banking competition in Asian and Latin American emerging economies (Jeon et al., 2011), and "de novo penetration" has a greater impact than domestic bank mergers or acquisitions.

Poghosyan and Poghosyan, (2010), however, attempted to demonstrate the crucial impact of the mode of foreign entry on post-entry performance in developed Central and Eastern European countries. Foreign-acquired banks see a decline in efficiency at first, but thereafter an improvement. Banks that have expanded their operations abroad appear to be more technically efficient than those operating only at a national level (Pasiouras, 2008).

In contrast, in feeble domestic prudential regulation and supervision, foreign bank entry restrictions are relaxed. Weak domestic regulations 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).

Based on the above empirical and theoretical reviews, this study developed the following research hypotheses:

H_1: Foreign bank entry restriction has a significant negative effect on bank efficiency.

H_2: Foreign bank entry restrictions have a significant positive effect on banks' financial stability.

Materials and Research Methods

Study Area

SSA has encountered significant problems but also has a great potential. It has a lower level of human development, pervasive poverty, and growth, which are not inclusive. The region also has a vast infrastructure gap, and its investment climate and regulatory environment are poor. Weaknesses also exist in governance and institutional capacity (Mlachila et al., 2013).

Financial systems in most SSA countries were underdeveloped during the colonial period, and the financial sector in post-independence SSA remained shallow, with commercial banks being the only dominant institution (Gakunu, 2007). SSA's financial and banking systems remain underdeveloped. The banking systems in this region are highly concentrated and generally inefficient (Mlachila et al., 2013). Hence, this study focuses on SSA countries.

Data Collection

Global Financial Development Datasets: Data for the two dependent variable—bank operating efficiency and financial stability—and data for the controlling variable bank concentration 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. Bank-level data sources for all studied nations are challenging to get. Even if some of them are accessible, comparing them is challenging since the technique of taking account varies between nations; hence, the researcher is concerned about bias.

World Bank, (bank regulation and supervision surveys from 2003, 2007, 2011, 2019, but mainly 2011 BRSS). Because the major study objective was to measure the effect of bank financial regulation policies on efficiency and stability across SSA countries, the most common and recent data source that may be used to make comparisons between Ethiopia and other SSA countries was BRSS 2011. In this survey, approximately 630 features of bank regulation and supervision are covered in 14 broad areas. The researcher focused on a major regulatory variable (entry into banking) that may help measure and compare bank regulatory policies across SSA countries. These selections are based on the point of difference between Ethiopia and other SSA countries. The researcher also tried to examine whether there were any bank policy changes in the major

selected variables among the 2003, 2007, 2011, and 2019 BRSS. Although, Ethiopia was not included in 2003 or in the last survey conducted in 2019.

World Development Indicators Database: Data on inflation and GDP were obtained from the World Development Indicators.

Worldwide governance indicator database: Data to measure Voice and Accountability (VA), Political Stability and Absence of Violence/Terrorism (PV), Government Effectiveness (GE), Regulatory Quality (RQ), Rule of Law (RL), and Control of Corruption (CC) were taken from the worldwide governance indicator (WGI) database.

Technology: the global economy.com

Countries Selected for the Analysis

Among 48 countries in the SSA region, 26 (12 lower-income, 9 lower middle income, 4 upper middle, and 1 higher income) were selected based on data accessibility from both the BRSS 2011 (for bank regulation variables) and the global financial development database (for bank efficiency and financial stability) for the research period (2000–2021). This constitutes 54% of all SSA countries.

Data Analysis Methods

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

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

where Y_{it} represents dependent variables for Country i and time t; A 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 $\eta i + e_{it}$ are time-invariant and time-varying error terms.

In addition,

$$BE_{it} = \alpha + Z_1 FBER_{it} + \beta_1 lGDP_{it} + \beta_2 INF_{it} + \beta_3 lBC_{it} + \beta_4 TC_{it} + \beta_5 RQ_{it} + \beta_6 VA_{it} + \beta_7 PS_{it} + \beta_8 CC_{it} + \eta i + e_{it} \ldots..EQ\text{-}1,$$

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

where BE_{it} is the bank 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; $FBER_{it}$ is a measure of foreign bank entry restriction in country i during the period t; 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 effect of foreign bank entry restrictions (FBER) on bank efficiency and stability, and considering 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 modelled with panels (Coelli et al., 2005).

Bank efficiency is proxies by CIR and bank financial stability is proxies by Z-scores. The cost-to-income ratio (CIR) is a vital proxy for evaluating bank operating efficiency (Ayinuola et al., 2023; Kedir et al., 2018). This financial measure helps gauge a bank's performance by examining the ratio of its operational costs to its operating income. When expressed as a percentage, a lower CIR signifies better efficiency, whereas a higher CIR indicates room for improvement.

The Z-score is also a key variable used to measure bank financial stability, indicating the distance from insolvency. The Z-score measures the number of standard deviations that a bank's return on assets drops below its expected value before equity is depleted and the bank is insolvent ($z=(k+\mu)/s$, where k is equity capital as a percent of assets, μ is return on assets, and s is the standard deviation of return on assets as a proxy for return volatility) (Boyd & De Nicoló, 2005; Roy, 1952). A higher z-score, therefore, implies a lower probability of insolvency. 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. It combines accounting measures of profitability, leverage, and volatility, and is widely used in literatures (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)**.**

As the main objective of the study is 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.

Econometric Analysis and Findings

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 foreign bank entry on bank efficiency and stability.

The researcher 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 TEC. In addition, the GDP per capita and BC are presented in log form. We tested the normality of residuals, homoscedasticity, multicollinearity, endogeneity, serial correlation, and omitted variables. The Stata MP 14 (64-bit) software was used for running regression.

The 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. 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.

Ethiopia is in the second category; it is a unique country with restricted regulations on foreign bank entry. It is close to foreign banks, and there are strict regulations that emerge as exceptional compared to Group 1 countries.

The variables used to examine the impact of foreign bank entry on bank efficiency and stability are listed in Tables 1 and 2.

Table 1. Variable Description

	Variables	Category	Measurement	Data Source
1	Bank Efficiency (BE_{it})	Dependent variable	Cost To Income Ratio (CIR)	Global Financial Development
2	Bank Stability (BS_{it})	Dependent variable	Z-Score	Global Financial Development
3	Foreign Bank Entry Restriction (FBER)	Independent variable	Dummy 1 = Unrestricted 0 = Restricted	World bank (Bank Regulation and Supervision Survey (BRSS)
4	Log of GDP (lGDP)	Control variable	GDP per capital (current US$)	World Development Indicators Database
5	Inflation (INF)	Control variable	Percentage change in consumer price index	World Development Indicators Database

6	Technology (TC)	Control variable	Internet users % of population	The global economy.com
7	Log Bank Concentration (lBC)	Control variable	Assets of three largest commercial banks as a share of total commercial banking assets	Global Financial Development
8	Voice and Accountability (VA)	Control variable	Indexed -2.5 to +2.5	World Governance indexes
9	Political Stability (PS)	Control variable	Indexed -2.5 to +2.5	World Governance indexes
10	Corruption (CC)	Control variable	Indexed -2.5 to +2.5	World Governance indexes
11	Regulatory Quality (RQ)	Control variable	Indexed -2.5 to +2.5	World Governance indexes
12	Rule of Law (RL)	Control variable	Indexed -2.5 to +2.5	World Governance indexes
13	Government Effectiveness (GE)	Control variable	Indexed -2.5 to +2.5	World Governance indexes

Table 2. Descriptive Statics

Variable	Obs	Mean	Std. Dev.	Min	Max
CIR	572	57.5	10.206	29.68	82.11
Z-SCORE	572	13.658	4.986	2.731	25.76
FBER	572	.962	.192	0	1
lGDP	572	6.937	1.129	4.705	9.458
INF	572	9.361	15.164	-8.238	98.546
TC	572	11.485	13.126	.015	39.363
lBC	572	4.253	.29	3.149	4.605
RQ	572	-.458	.548	-1.685	.768
VA	572	-.301	.629	-1.725	.983
PS	572	-.421	.857	-2.523	1.283
CC	572	-.503	.594	-1.581	.994
RL	572	-.488	.595	-1.87	.949
GE	572	-.553	.601	-1.629	1.161
Source: Author's Stata output, 2023					

This study found that most of the sampled countries are not restricted to foreign bank entry, with a mean value of 0.962. However, SSA banks have higher CIR and lower Z-scores, indicating relative inefficiency compared to international banks. The Z-score measures the distance from insolvency, with higher rates indicating better stability. These findings highlight the need for improved financial efficiency and stability in SSA countries. Separate descriptive statistics for those have restricted/unrestricted bank regulation are append at the back

The study reveals that countries with restricted foreign bank entry regulations, such as Ethiopia, have different means CIR and Z-scores from the rest of the group, indicating that group identification is mandatory and highlighting the differences between these two groups (see in the Appendix).

The study compared the CIR and Z-scores before and after the 2008 crisis using the sample means and found no significant differences. Despite the impact of the financial crisis on several

countries, regulatory responses have generally been slow (Čihák, Demirgüç-Kunt, Pería, et al., 2012) (See in the Appendix).

Table 3: Pairwise Pearson's correlation matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) CIR	1.000										
(2) Z-score	-0.104	1.000									
(3) FBER	0.327	0.141	1.000								
(4) lGDP	-0.226	0.252	0.195	1.000							
(5) INF	-0.172	-0.236	-0.048	-0.108	1.000						
(6) TC	-0.153	0.121	0.086	0.678	-0.091	1.000					
(7) lBC	-0.067	-0.130	-0.107	-0.157	-0.002	-0.231	1.000				
(8) RQ	-0.199	0.311	0.209	0.626	-0.358	0.332	-0.072	1.000			
(9) VA	-0.093	0.268	0.296	0.543	-0.306	0.354	-0.126	*0.813	1.000		
(10) PS	-0.109	0.034	0.260	0.476	-0.180	0.228	0.208	0.645	*0.689	1.000	
(11) CC	-0.293	0.141	0.033	0.615	-0.253	0.407	0.131	*0.822	*0.763	0.710	1.000

Source: Author's Stata output, 2023

The study found a 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 show a mean of 2.987, indicating no multicollinearity problem.

This study tests the normality of the residuals using skewness and kurtosis statistics, indicating a normal distribution for Bank Efficiency (BE) and Bank Stability (BS). 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.

Cross-sectional dependence (csd) is also a crucial test in panel datasets to determine the correlation among units within the same cross-section. The xtcsd test proposed in (Frees, 2004,

1995; Friedman, 1937; Pesaran, 2004), used for small T and large N scenarios, addressed this issue. It analyzes both balanced and unbalanced datasets. The results show no significant cross-sectional dependency among the sampled SSA countries, with Pr values of 0.1796 and 0.2581 for the BE and BS, respectively.

Random effects were 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 LM test results suggest rejecting the null hypothesis of zero variance across entities and using the panel data model for Bank Efficiency and Bank Stability with Prob > chi2 = 0.000.

This study aimed to determine the appropriateness of a fixed effects model (FEM) or a random effects model (REM) to analyze the impact of a time-invariant variable on BE and BS. The Hausman specification test (Hausman, 1978) was used to compare the results, with FEM being consistent when ηi (unobserved component) and x_{it} (explanatory variables) are correlated, and REM inconsistent [49]. The Hausman test for bank efficiency (Prob > chi2 = 0.4727) does not reject the null hypothesis of the random effects model, but bank stability (Prob > chi2 = 0.0078) rejects the null hypothesis. Using random effect generalized least squares (GLS) estimation, one can efficiently account for heteroskedasticity and serial correlation owing to unobserved time-constant factors(Wooldridge, 2002).

The researcher's primary interest was to analyze the effect of a time-invariant variable in a panel data analysis. Random-effects models are preferred because of their ability to include observed time-invariant characteristics. However, REM is not consistent with bank stability. Hence, the Hausman and Taylor model may be an option for fixing time-invariant variables in the fixed-effect model. Hausman and Taylor (1981) (HT) use a mixed structure that combines the consistency of a fixed-effects model with the efficiency and applicability of a random-effects model to estimate the impact of foreign bank entry on bank stability (Hausman & Taylor, 1981).

Furthermore, the correlation between regressors and error terms can reveal endogeneity, which can occur because of the omission of important variables, Autoregression, errors-in-variables, and simultaneous causality (Wooldridge, 2002). If researchers have strong evidence-based

arguments that a relevant correlation exists between regressors and model error terms, IV estimation is the most common method for estimating the parameters of interest (Papies et al., 2017). Semadeni et al., (2014) highlights that even low levels of endogeneity can lead to biased and inconsistent results; increasing the likelihood of making incorrect causal inferences. One way to deal with the endogeneity problem is to use instrumental variables techniques (IV).

Relevance and exogeneity are two requirements that must be met by instrumental variables (Kennedy, 2008). The original endogenous variable must be replaced by a strong instrumental variable. However, obtaining legitimate instrumental variables is the main problem with instrumental variables methodologies (Lu et al., 2018; Zaefarian et al., 2017). With regard to the econometric method, we go straight to the general two-stage least squares (G2SLS) estimation method for panel data if the instruments meet both requirements. Suppose z is an instrument for x. The concept is reasonably straightforward (Aghion & Howitt, 2009).

The literature indicates that GDP has an endogeneity issue (Josheski et al., 2016). Therefore, the researcher took instrument factors into account to verify and resolve the endogeneity issue in lGDP. 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. Therefore, the instrumental variables for lGDP in this study were government efficiency (GE) and rule of law (RL). The correlation between lGDP and RL, and lGDP and GE is 0.58 and 0.72, respectively.

In terms of instrument strength, the equivalent F-test result was 57.89, which is higher 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 lGDP endogeneity demonstrate that the variable is endogenous.

The IV model assumes that a model is just identified when the number of instruments equals the number of endogenous variables and is over-identified when the number of instruments exceeds the number of endogenous variables (Lu et al., 2018). The Sargan–Hansen test was used to test

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 BE. The higher the p-value, the better the instrument specification (Roodman, 2006).

REIV is usually preferred over FEIV for efficiency reasons when the selected instrumental variables are exogenous with regard to both heterogeneity and idiosyncratic mistakes, and it would be desirable to use a random effects version of the 2SLS (Joshi & Wooldridge, 2019). The Hausman test was used to select the random-effects IV model Prob > chi2 = 0.0000 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 Regression Results

1. The following result summarizes the impact of FBER on BE (proxies by CIR in SSA countries).

Table 4. Regression result: Foreign bank entry effect on bank efficiency (FBER: 0 for restricted; 1 for unrestricted)

Variable	Random Effect Model	Random Effect IV Model
FBER-0 restricted	-16.066** (0.01)	-25.212*** (0.001)
lGDP	-1.046 (0.194)	-17.997*** (0.001)
INF	-0.100*** (0.000)	-0.199*** (0.000)
TC	-0.001 (0.978)	0.413*** (0.002)
lBC	-2.100 (0.262)	-6.084** (0.029)
RQ	0.052 (0.979)	9.893** (0.014)
VA	0.577 (0.724)	-0.046 (0.983)
PS	1.466* (0.95)	2.591** (0.033)
CC	-5.016*** (0.005)	-2.810 (0.251)
cons	57.480*** (0.000)	185.297*** (0.000)
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%. p-value in parenthesis.

(Source: Author's Stata Output, 2023)

Both the random-effect GLS and G2SLS estimation for the panel data are shown in Table 4. This result is used to understand the effect of FBER on BE in SSA nations. The overall R^2 was 12.1%, indicating that the independent variable explained only 12.1% of the total variance; the remaining variables were not included in the model. However, the primary goal of the study was not to obtain the largest R-squared; while reporting that the R-squared for the IV estimate is not inherently harmful, it also lacks practical value (Wooldridge, 2009). The R-squared has no obvious meaning when x_{it} and υ_{it} are correlated; goodness-of-fit is not a factor. "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 was fitted.

The test results show that the regression coefficient of FBER is (-25.212), with significance at 1%. This implies that restricted/ unrestricted foreign bank entry have a significantly negative/ positive effect on bank efficiency. The results of (Barth et al., 2006; Claessens et al., 2001; Demirgüç-Kunt et al., 1998; Jeon et al., 2011; Lee & Chih, 2013; Lensink & Hermes, 2004; Levine, 1996; Ukaegbu & Oino, 2014) also confirmed this.

The two macro-economic variables, lGDP and INF, are highly significant at 1% with a coefficient of -17.997% and -0.199, respectively. TC and lBC were 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 restriction (FBER) has a significant negative effect on bank efficiency (BE)

As presented above, the regression results imply that the null hypothesis (Ho) of foreign bank entry restrictions has a significant negative effect on bank efficiency. This indicates that the financial regulations on Foreign Bank Entries enforced by central Banks in SSA countries have a significant impact on bank efficiency. Therefore, the test outputs described below provide substantial reliability to the results, and the evolving multiple regression equation is as follows:

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

Table 5 summarizes the effect of FBER on BS in SSA.

Table 5. Regression result: Foreign Bank Entry Restriction (FBER) effect 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
FBER. 0		-0.161	3.850***
		(-0.0231)	(45.37)
LogGDP	0.933***	6.803***	0.952***
	(3.695)	(2.841)	(13.46)
INF	0.0146*	0.0610***	0.0131***
	(1.871)	(2.725)	(7.828)
TC	-0.00896	-0.131**	-0.0101***
	(-0.894)	(-2.574)	(-5.365)
logBC	1.496***	3.060***	1.499***
	(2.788)	(3.109)	(8.846)
RQ	-1.690***	-3.891***	-1.371***
	(-2.878)	(-2.935)	(-3.927)
VA	-0.551	-0.618	-0.351**
	(-1.125)	(-0.890)	(-2.085)
PS	0.374	0.432	0.292*
	(1.434)	(1.166)	(1.735)
CC	-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
t-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1			

Source: Author's Stata Output (2023)

The researchers examined and compared the effects of FBER on BS in SSA countries and Ethiopia (Table 5), using the fixed effects model, random effect IV model, and Hausman & Taylor model. Based on the purpose of this study, the Hausman–Taylor estimator with cluster standard error performs better on the coefficient of variables and their significance.

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

The macro-economic variables lGDP and INF are significant at the 1% level, with coefficients of 0.95% and 0.013, respectively. This finding is supported by a previous study (Pham et al., 2021). Bank concentration is significant at the 1% level with a coefficient of 1.5%. TC 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: FBER has a significantly positive effect on bank financial stability (BS).

The results demonstrate that BS is significantly improving bank financial stability. The results of the regression analysis show that the financial regulations placed by the central banks of SSA countries on foreign banks upon their entry had a noteworthy impact on bank stability. Therefore, the test outputs described below provide considerable reliability to the results. The emerging multiple regression equation is as follows:

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

5. Discussion

According to this study, SSA countries that permit international banks to operate within their borders have lower levels of financial stability but higher levels of operational efficiency than those that forbid such regulations. The efficiency of Ethiopia's commercial banks is significantly negatively impacted by the financial restrictions implemented by the central banks, whereas financial stability is positively impacted. However, it has an encouraging effect on efficiency. This result also confirmed by (Barth et al., 2006; Claessens et al., 2001; Demirgüç-Kunt et al., 1998; Jeon et al., 2011; Lee & Chih, 2013; Lensink & Hermes, 2004; Levine, 1996; Ukaegbu &

Oino, 2014). The foreign bank entry restriction has unfavorable effect on stability in countries that have liberalized their financial regulations to allow international banks. (Fu et al., 2014; Lee & Chih, 2013) also reported the same result. The idea behind liberalizing restrictions on foreign banks entering the country was to exert strong pressure on domestic banks to strengthen their regulations and supervision. Africa, with the exception of a few countries such as Ethiopia, followed these routes.

Opening the banking system to international banks would also encourage improvements in domestic financial infrastructure and policy, which would enhance the growth of the domestic financial sector. This could improve the availability and caliber of the financial services offered by domestic banks. Foreign banks also stimulate financial development by creating competition in domestic banking, improving the efficiency of domestic bank operations and providing financial services at lower costs, thus promoting economic growth. For example, the introduction of a foreign bank may exert pressure on traditional banking practices. Allowing more foreign entry could potentially diminish government power over the domestic banking industry.

Keeping in mind all the benefits of liberalizing financial institutions and checking the risks of relaxing foreign bank entry restrictions, especially in a feeble domestic prudential regulation and supervision system, is critical and requires attention.

Finally, the result tilted to the theory of liberalization school: Privatization of government-owned financial institutions, through liberalizing restrictions on foreign bank entry countries, can accelerate the efficiency of the banking sector.

6. Conclusion

Financial regulations affect financial institutions' efficiency and stability. Banks are among the backbones of financial institutions. Limiting foreign banks' access to the domestic market has a detrimental effect on BE but has a positive impact on BS in SSA countries.

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Limitations and future research

While this study is fascinating, it has certain limitations. First, it is critical to note that this study focuses solely on Sub-Saharan Africa, ignoring other African countries that have experienced financial instability in recent years as a result of various crises. Even parts of SSA countries are ignored due to data accessibility. Second, this investigation did not look at bank-level data. Future research should look into these links using bank-level data and expand the scope of the study to include all African countries.

References

Addison, T., & Geda, A. (2001). Ethiopia ' s New Financial Sector and its Regulation. In *World Insititution for Development Economics Research* (Vol. 55).

Aghion, P., & Howitt, P. (2009). *The Economics of Growth*. The MIT Press Cambridge, Massachusetts.

Akhter, N. (2018). The Impact of Liquidity and Profitability on Operational Efficiency of Selected Commercial Banks in Bangladesh : A Panel Data Study TheImpactofLiquidityandProfitabilityonOperationalEfficiencyofSelectedCommercialBanksinBangladeshAPanelDataStudy. *Global Journal of Management and Business Research: A Administration and Management*, *18*(7), 1–14.

Amel, D. F., & Liang, J. N. (1992). The Relationship between Entry into Banking Markets and Changes in Legal Restrictions on Entry. *The Antitrust Bulletin*, *37*(3), 631–649. https://doi.org/10.1177/0003603x9203700304

Anginer, D., Bertay, A. C., Cull, R., Demirgüç-Kunt, A., & Mar, D. S. (2019). Bank Regulation and Supervision Ten Years after the Global Financial Crisis. In *Policy research working paper* (9044). https://doi.org/10.1596/1813-9450-9044

Asfaw, M., & Kassahun, M. (2014). Financial Regulation and Supervision in ethiopia. *SSRN Electronic Journal*, *5*(17), 63–72. https://doi.org/10.2139/ssrn.391998

Ayinuola, T. F., Gumel, B. I., Ayinuola, T. F., Ibrahim, B., The, G., Ratio, C., Folorunso, T., & Ibrahim, B. (2023). The Impact of Cost-to-Income Ratio on Bank Performance in Nigeria. *International Journal of Multidisciplinary and Current Educational Research*, *5*(2), 125–137.

Barth, J., Caprio, G., & Levine, J. R. (2006). *Rethinking bank regulation:till Angels Govern*. Cambridge University Press.

Beck, T., Demirgüç-Kunt, A., & Merrouche, O. (2013). Islamic vs. conventional banking: Business model, efficiency and stability. *Journal of Banking and Finance*, *37*(2), 433–447. https://doi.org/10.1016/j.jbankfin.2012.09.016

Bogale, F. (2017). *Foreign Bank Entry and Issues Efficiency, Stability and Economic Growth: Implication for Ethiopia from Sub-Sahara African Countries Panel Data.*

Boyd, J. H., & De Nicoló, G. (2005). The theory of bank risk taking and competition revisited. *Journal of Finance*, *60*(3), 1329–1343. https://doi.org/10.1111/j.1540-6261.2005.00763.x

Boyd, J. H., & Runkle, D. E. (1993). Size and performance of banking firms. Testing the predictions of theory. *Journal of Monetary Economics*, *31*(1), 47–67. https://doi.org/10.1016/0304-3932(93)90016-9

Čihák, M., Demirgüç-Kunt, A., Feyen, E., & Levine, R. (2012). Benchmarking Financial Systems around the World. In *Global Financial Development Report* (6175; Issue August). https://doi.org/10.1596/9780821395035_ch01

Čihák, M., Demirgüç-Kunt, A., Pería, M. S. M., & Mohseni-Cheraghlou, A. (2012). Bank Regulation and Supervision Around the World: A Crisis Update. In *SSRN Electronic Journal* (6286; Issue December 2012). https://doi.org/10.2139/ssrn.2196659

Čihák, M., & Hesse, H. (2010). Islamic Banks and Financial Stability: An Empirical Analysis. *Journal of Financial Services Research*, *38*(2), 95–113. https://doi.org/10.1007/s10693-010-0089-0

Claessens, S., Demirgiuc-Kunt, A., & Huizinga, H. (2001). How does foreign entry affect domestic banking markets? *Journal of Banking and Finance*, *25*(5), 891–911. https://doi.org/10.1016/S0378-4266(00)00102-3

Coelli, T. J., Rao., D. S. P., O'Donnel, C. J., & Batesse, G. E. (2005). *AN INTRODUCTION TO EFFICIENCY AN INTRODUCTION TO EFFICIENCY Spri mger*. springeroline.com.

D.Levitt, S. (1995). *USING ELECTORAL CYCLES IN POLICE HIRING TO ESTIMATE THE EFFECT ON PLOICE ON CRIME* (Issue 4991).

Demirguc-Kunt, A., & Honohan, P. (2008). Finance for all? Policies and Pitfalls in Expanding access. In *World Bank Policy Research Report* (Issue August).

Demirgüç-Kunt, A., Levine, R., & Min, H.-G. (1998). Opening for Foreign Banks: Issues of

Stability, Efficiency and Growth. *The Implications of Globalization of World Financial Market*, *01*, 83–105.

Detragiache, E., Tressel, T., & Gupta, P. (2008). Foreign banks in poor countries: Theory and evidence. *Journal of Finance*, *63*(5), 2123–2160. https://doi.org/10.1111/j.1540-6261.2008.01392.x

Frees, E. . (2004). *longitudinal and panel data analysis and applications in the social sciences*. Cambridge University Press.

Frees, E. W. (1995). Assessing cross-sectional correlation in panel data. *Journal of Econometrics*, *69*(2), 393–414. https://doi.org/10.1016/0304-4076(94)01658-M

Friedman, M. (1937). The Use of Ranks to Avoid the Assumption of Normality Implicit in the Analysis of Variance. *Journal of the American Statistical Association*, *32*(200), 675–701. https://doi.org/10.1080/01621459.1937.10503522

Fu, X. (Maggie), Lin, Y. (Rebecca), & Molyneux, P. (2014). Bank competition and financial stability in Asia Pacific. *Journal of Banking and Finance*, *38*(1), 64–77. https://doi.org/10.1016/j.jbankfin.2013.09.012

Gakunu, P. (2007). *Reforming the Financial System in Sub-Saharan Africa: the (long) Way Ahead* (Vol. 3). https://doi.org/10.3917/fbc.028.0139

Gordon, D. B., & Levine, R. (1987). *The ' Problem ' of Capital Flight - a Cautionary Note*.

Gujarati, D. N. (2003). Basic Economitrics. In *McGraw-Hill Companies*.

Han, C. (2016). Efficiency comparison of random effects two stage least squares estimators. *Economics Letters*, *148*, 59–62. https://doi.org/10.1016/j.econlet.2016.09.007

Hausman, J. A. (1978). Specification Tests in Econometrics. *Journal of the Technology Society*, *46*(6), 1251–1271.

Hausman, J. A., & Taylor, W. E. (1981). Panel Data and Unobservable Individual Effects. *Econometrical Journal of the Technologic Society*, *49*(6), 1377–1398.

Imai, K., Thapa, G., & Gaiha, R. (2009). *Economics Discussion Paper Series Has Poverty Reduction Slowed Down in the Developing World ? Evidence Based on New Poverty Estimates Katsushi Imai Raghav Gaiha*.

Jeon, B. N., Olivero, M. P., & Wu, J. (2011). Do foreign banks increase competition? Evidence from emerging Asian and Latin American banking markets. *Journal of Banking and Finance*, *35*(4), 856–875. https://doi.org/10.1016/j.jbankfin.2010.10.012

Josheski, D., Lazarov, D., Fotov, R., & Koteski, C. (2016). *Institutions and Growth revisited: OLS, 2SLS, G2SLS Random effects IV regression and Panel Fixed (within) IV regression with cross-country data*. *6*, 1–21.

Joshi, R., & Wooldridge, J. M. (2019). Correlated Random Effects Models with Endogenous Explanatory Variables and Unbalanced Panels. *Annals of Economics and Statistics*, *134*, 243–268.

Kedir, A. M., Iftikhar, S. F., Murinde, V., & Dia Kamgnia, B. (2018). Bank fragility in Africa: GMM dynamic panel data evidence. *Transnational Corporations Review*, *10*(2), 170–178. https://doi.org/10.1080/19186444.2018.1475105

Kennedy, P. (2008). *A Guide to Econometrics* (sixth edit). BLACKWELL PUBLISING.

Laeven, L., & Levine, R. (2009). Bank governance, regulation and risk taking. *Journal of Financial Economics*, *93*(2), 259–275. https://doi.org/10.1016/j.jfineco.2008.09.003

Lee, T., & Chih, S. (2013). Does financial regulation affect the profit efficiency and risk of banks? Evidence from China's commercial banks. *North American Journal of Economics and Finance*, 20. https://doi.org/10.1016/j.najef.2013.05.005

Lensink, R., & Hermes, N. (2004). The short-term effects of foreign bank entry on domestic bank behaviour: Does economic development matter? *Journal of Banking and Finance*, *28*(3), 553–568. https://doi.org/10.1016/S0378-4266(02)00393-X

Levine, R. (1996). Foreign Banks, Financial Development, and Economic Growth. In E. B. (Ed.) (Ed.), *International Financial Markets* (Claude, pp. 224–254). AEI Press.

Lu, G., Ding, X. (David), Peng, X. (David), & Chuang, H. H.-C. (2018). Addressing Endogeneity in Operations Management Research: Recent Developments, Common Problems, and Directions for Future Research. *Journal of Operations Management*, *64*, 53–64.

Miele, M. G., & Sales, E. (2011). The financial crisis and regulation reform. *Journal of Banking Regulation*, *12*(4), 277–307. https://doi.org/10.1057/jbr.2011.7

Mlachila, M., Dykes, D., Zajc, S., Aithnard, P.-H., Beck, T., Ncube, M., & Nelvin, O. (2013). Banking in Sub-Saharan Africa Challenges and Opportunities. In *European Investment Bank*. https://doi.org/10.5089/9781484344538.087

Musalem, A., Vittas, D., & Dermirguc-Kunt, A. (1993). *North American Free Trade Agreement: Issues on Trade in Financial Services for Mexico. August 1993*, 1–64.

Neyapti, B., & Dincer, N. (2005). Measuring the quality of bank regulation and supervision with an application to transition economies. *Economic Inquiry*, *43*(1), 2. https://doi.org/10.1093/ei/cbi007

Papies, D., Ebbes, P., & Van Heerde, H. J. (2017). Addressing Endogeneity in Marketing Models. In *Advanced Methods for Modelling Markets* (pp. 581–627). https://doi.org/10.1007/978-3-319-53469-5_18

Papke, L. E. (2005). The effects of spending on test pass rates: Evidence from Michigan. *Journal of Public Economics*, *89*(5–6), 821–839. https://doi.org/10.1016/j.jpubeco.2004.05.008

Papke, L. E., & Wooldridge, J. M. (2008). Panel data methods for fractional response variables with an application to test pass rates. *Journal of Econometrics*, *145*(1–2), 121–133. https://doi.org/10.1016/j.jeconom.2008.05.009

Pasiouras, F. (2008). Estimating the technical and scale efficiency of Greek commercial banks: The impact of credit risk, off-balance sheet activities, and international operations. *Research in International Business and Finance*, *22*(3), 301–318. https://doi.org/10.1016/j.ribaf.2007.09.002

Pesaran, M. H. (2004). General Diagnostic Tests for Cross Section Dependence in Panels. In *IZA Discussion paper No.1240*.

Pham, T. T., Dao, L. K. O., & Nguyen, V. C. (2021). The determinants of bank's stability: a system GMM panel analysis. *Cogent Business and Management*, *8*(1), 1–18. https://doi.org/10.1080/23311975.2021.1963390

Poghosyan, T., & Poghosyan, A. (2010). Foreign bank entry, bank efficiency and market power in Central and Eastern European Countries. *Economics of Transition*, *18*(3), 571–598. https://doi.org/10.1111/j.1468-0351.2009.00378.x

Rashid, A., Yousaf, S., & Khaleequzzaman, M. (2017). Does Islamic banking really strengthen financial stability? Empirical evidence from Pakistan. *International Journal of Islamic and Middle Eastern Finance and Management*, *10*(2), 130–148. https://doi.org/10.1108/IMEFM-11-2015-0137

Roodman, D. (2006). How to do xtabond2: An introduction to difference and system GMM in Stata. *Stata Journal*, *9*(1), 86–136. https://doi.org/10.1177/1536867x0900900106

Roy, A. D. (1952). Safety First and the Holding of Assets. *Journal of the Econometrics Society*, *20*(3), 431–449. https://doi.org/10.1007/978-3-642-21551-3__35

Semadeni, M., Withers, M. C., & Trevis Certo, S. (2014). THE PERILS OF ENDOGENEITY AND INSTRUMENTAL VARIABLES IN STRATEGY RESEARCH: UNDERSTANDING THROUGH SIMULATIONS. *Strategic Management Journal*, *35*(7), 1070–1079. https://doi.org/10.1002/smj

Stock, J. H., Wright, J. H., & Yogo, M. (2002). A survey of weak instruments and weak identification in generalized method of moments. *Journal of Business and Economic Statistics*, *20*(4), 518–529. https://doi.org/10.1198/073500102288618658

Ukaegbu, B., & Oino, I. (2014). The impact of foreign bank entry on domestic banking in a developing country: The Kenyan perspective. *Banks and Bank Systems*, *9*(1), 28–35.

UNECA. (2002). Economic Report on 2002. In *Economic Commission for Africa*.

Wooldridge, J. M. (2002). *Econometric Analysis of Cross Section and Panel Data* (M. Cambridge (ed.)). The MIT Press.

Wooldridge, J. M. (2009). Introductory econometrics. In M. Worls & L. B. nger Sr. (Eds.), *South-Western Cengage Learning*. https://doi.org/10.1007/9783319659169

Zaefarian, G., Kadile, V., Henneberg, S. C., & Leischnig, A. (2017). Endogeneity bias in marketing research: Problem, causes and remedies. *Industrial Marketing Management*, *http://dx.* https://doi.org/10.1016/j.indmarman.2017.05.006

Appendix

Descriptive statistic based on countries regulation

FBER = restricted

Variable	Obs	Mean	Std.Dev.	Min	Max
CIR	22	40.810	8.911	29.680	58.310
Z-SCORE	22	10.145	1.346	8.479	12.790
FBER	22	0	0	0	0
lGDP	22	5.838	0.752	4.705	6.830
INF	22	12.979	11.560	-8.238	44.357
TC	22	5.878	7.121	0.015	16.698
lBC	22	4.408	0.143	3.937	4.581
RQ	22	-1.032	0.113	-1.316	-0.848
VA	22	-1.232	0.117	-1.433	-1.032
PS	22	-1.532	0.244	-2.068	-0.946
CC	22	-0.600	0.148	-0.907	-0.365
RL	22	-0.675	0.183	-0.984	-0.392
GE	22	-0.677	0.217	-1.207	-0.437

Source: Author's Stata output, 2023

FBER = unrestricted

Variable	Obs	Mean	Std.Dev.	Min	Max
CIR	550	58.167	9.679	29.680	82.110
Z-SCORE	550	13.799	5.027	2.731	25.760
FBER	550	1	0	1	1
lGDP	550	6.981	1.119	4.739	9.458
INF	550	9.217	15.281	-3.233	98.546
TC	550	11.710	13.265	0.036	39.363
lBC	550	4.247	0.293	3.149	4.605
RQ	550	-0.435	0.546	-1.685	0.768
VA	550	-0.264	0.612	-1.725	0.983
PS	550	-0.377	0.842	-2.523	1.283
CC	550	-0.499	0.605	-1.581	0.994
RL	550	-0.480	0.604	-1.870	0.949
GE	550	-0.548	0.611	-1.629	1.161

Source: Author's Stata output, 2023

Two-sample t test with equal variances for Restricted and Unrestricted

	restricted	unrestricted	Mean restricted	Mean unrestricted	dif	St Err	t value	p value
CIR by FBE:	22	550	40.810	58.168	-17.358	2.099	-8.25	0
Z-score by FBE:	22	550	10.145	13.799	-3.654	.358	-10.2	0

Two-sample t test with equal variances before and after 2008 global financial crisis

	Before 2008	After 2008	Mean Before 2008	Mean after 2008	diff	St Err	t value	p value
CIR by year	364	208	57.581	57.358	.224	.888	.25	.801
Z-score by year	364	208	13.671	13.635	.036	.434	.1	.934