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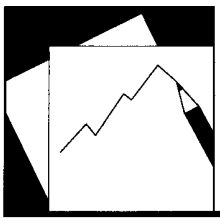

IMF Working Paper

Bank Efficiency in Sub-Saharan African Middle-Income Countries

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Bank Efficiency in Sub-Saharan African Middle-Income Countries

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Authorized for distribution by Calvin McDonald

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Abstract

We use bank level data to study the efficiency of banks in Sub-Saharan African middle-income countries and provide possible explanations for the difference in the efficiency levels of banks. We find that banks, on average, could save 20–30 percent of their total costs if they were operating efficiently, and that foreign banks are more efficient than public banks and domestic private banks. Among the factors that could affect the efficiency levels are macroeconomic stability, depth of financial development, the degree of market competition, strong legal rights and contract laws, and better governance, including political stability and government effectiveness. Our findings point to the importance of policies that aim to build stronger institutions, promote more competition, and improve governance.

JEL Classification Numbers: G21, O16
Keywords: cost efficiency, stochastic frontier analysis, competition

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I. INTRODUCTION

Bank efficiency has long been a subject of many studies. Most of the studies have focused on industrial countries (US and Europe, in particular). Research on developing countries is a recent phenomenon. Studies on Sub-Saharan African (SSA) banks are relatively few, partly due to the low level of financial development, small number of banks, limited market activities, and lack of quality data. However, it is worth noting that some middle-income countries in SSA have developed relatively complex financial systems, with commercial banks as the core financial intermediaries. The availability of data for these countries has made it possible to understand how banks operate, and to investigate the major factors that can improve their efficiency.

This paper uses bank level data to study the efficiency of the banking sectors in 10 SSA middle-income countries.[2] We focus on the cost efficiency of the banks, and rely on the stochastic frontier analysis (SFA) to compute the efficiency score that reflects the difference between a bank's cost efficiency levels and the cost efficiency frontier. We find that, on average, banks would save about 20–30 percent of their total costs if they were operating on the frontier. We also find that foreign-owned banks and private banks are more efficient than public banks.

What explains the differences in efficiency levels? We try to identify them from several perspectives, with an emphasis on market structure and institutional factors. We find that, in general, stable macroeconomic conditions and financial development contribute to higher efficiency, and so does a higher degree of market competition. Stronger legal rights institutions and enforcement of contract are found to be beneficial to efficiency levels, as well as political stability and government effectiveness.

This paper complements a recent study (Flamini, McDonald, and Schumacher, 2008) on the determinants of commercial bank profitability in SSA by focusing on the factors that explain bank efficiency in the region. The contribution of this paper is two-fold. First, it expands on the small literature on banking research on SSA countries. To our knowledge, this paper is the first cross-country study on bank efficiency dedicated only to SSA countries. Second, it contributes to the literature that seeks to explain bank efficiency, particularly, the role played by market structure, and institutional factors, which are perhaps more important to understand for developing countries.

The major purpose of this paper is to find the common factors that could help explain the differences in efficiency among banks in a group of SSA middle-income countries, and the study focuses on the aggregate influence rather than bank or country-specific factors.

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[2]According to World Bank classification, there are 13 middle-income countries (2006 per capita GNI between US$906 and US$11,115, calculated by World Bank Atlas method) in SSA: Angola, Botswana, Cameroon, Cape Verde, Republic of Congo, Equatorial Guinea, Gabon, Lesotho, Mauritius, Namibia, Seychelles, South Africa, and Swaziland. We exclude Republic of Congo, Equatorial Guinea, and Gabon due to lack of data, and their relatively lower level of financial development compared to other countries in the same group.

Therefore, the findings of this paper could be seen as an initial step toward understanding the efficiency of the banking sectors in these countries. Policy implications for specific countries, however, would certainly require more detailed follow-up country studies, which could be the next step in our research.

The paper is organized as follows. Section II reviews the literature on cost efficiency analysis. Section III provides an overview of the banking sector in SSA middle-income countries. Section IV conducts the cost efficiency analysis. Section V explores the determinants of bank efficiency levels, and Section VI concludes.

II. LITERATURE REVIEW

Studies of efficiency of commercial banks have generally evolved around explaining a performance measure of efficiency by a vector of variables that capture the key components determining the efficiency. Two broad approaches are generally used in the literature: structural and nonstructural. Structural approaches are based on theoretical models of banking behavior, and involves such optimization problems as cost minimization or profit maximization. Nonstructural approaches choose different performance measures, and focus on explaining these measures by a variety of financial ratios or other factors considered appropriate. For example, there is a large literature on financial intermediation efficiency measured by interest rate spreads or net interest margins.

Structural approaches to bank efficiency have basically focused on estimating an efficient frontier and measuring differences between the point at which the bank is operating and the efficiency frontier. The efficiency is called X-efficiency[3] and measures how productive the bank is in its use of inputs to create output. Two types of efficiency concepts are commonly used to measure the X-efficiency of a bank: cost efficiency and profit efficiency. Cost efficiency measures how close a bank's cost is to the minimal cost for producing a certain level of output with given input prices and technology. Profit efficiency measures how close a bank's profit is to the maximum possible profit with a given level of input prices and output prices. Measuring the efficiency levels of individual banks is usually the first step. After all, understanding the determinants behind the differences among banks' efficiency levels are more interesting.

Studies of bank efficiency are numerous. Berger and Humphrey (1997) provide a detailed survey of 130 studies in 21 countries. Most studies are for banks in the US or other industrial countries, and in recent years studies for banks in developing countries have become more frequent. For example, Berger, et al (2004) study 28 developing countries, Bonin, Hasan, and Watchel (2005) study 11 European transition nations, Bonaccorsi Di Patti and Hardy (2005) study banks in Pakistan. However, studies dedicated to SSA

[3]Two other efficiency concepts used in the literature are scale efficiency and scope efficiency, which are found to be small in explaining the differences in performance.

countries remain limited, although SSA countries are included in some cross-country studies (Demirguc-Kunt, et al, 2004).

Many studies examine the relationship between efficiency and bank ownership. A general finding is that foreign banks are more efficient, or, at least as efficient as private domestic banks. Berger, et al (2004) find foreign banks to have the highest profit efficiency, followed by private domestic banks, and then state-owned banks in a sample of 28 developing countries. For cost efficiency, private domestic banks rank higher than foreign banks. Claessens, et al (2004) find that countries with a higher share of foreign banks experience lower average margins, and foreign bank entry imposes competitive pressure with resulting efficiency gains. Bonaccorsi Di Patti and Hardy (2005) find that foreign banks are more profit efficient than private domestic and state-owned banks in Pakistan, but share similar average cost efficiency.

Other studies use efficiency changes to understand the impact of financial sector reforms. Hauner and Peiris (2005) in a study of Ugandan banks find that efficiency levels are higher after privatization and consolidation in the banking sector, and, on average, larger banks and foreign-owned banks have become more efficient. Bonaccorsi Di Patti and Hardy (2005) find increases in efficiency in terms of both revenue and costs after the financial sector reform in Pakistan, which meant that the benefits of reform were passed on to consumers. Isik and Hassan (2003) find that bank efficiency improved considerably after the financial liberalization during 1981–90 in Turkey.

The relationship between efficiency and market structure is not so clear-cut. Dabla-Norris and Floerkemeier (2007) study the Armenian banking system over the 2002–06 period, and found that banks with higher market power have higher net interest margins, and high concentrations in loan and deposit markets have a positive effect on both interest spreads and net interest margins. Beck and Hesse (2006) find that in Uganda during 1999–2005, market structure played a limited role in determining bank efficiency, and structural impediments were more significant in lowering spreads and margins. Demirguc-Kunt, et al (2004) find no robust association between bank concentration and interest rate margins.

Studies on the impact of regulations and supervision of banks on their performance have found negative relationships between the two. For example, Barth, et al (2004) find that restrictions on banking activities tend to reduce banking sector efficiency. Demirguc-Kunt, et al (2004) find that tighter regulations on bank entry and bank activities are associated with higher net interest margins and a high cost of financial intermediation. Gonzales (2005) reports that stricter regulations could increase bank's risk-taking incentives by reducing their charter value and, thus, harm the stability of the banking system.

III. Overview of the Banking Sectors

Compared with other middle-income countries, the banking sectors in SSA middle-income countries face similar levels of overall financial development, but a fairly large disparity exists between South Africa and the rest of the countries. The banking sectors in

SSA middle-income countries also show higher concentration and foreign ownership, and enjoy generally higher profits and efficiency levels.

Banks in SSA middle-income countries operate in a financial system with comparable financial depth as in other middle-income countries with overshadowing influence from South Africa. The ratios of narrow money (M1) and broad money (M2) to GDP are commonly used to measure financial depth, with higher ratios indicating deeper markets. The ratio of M1 over M2, however, should decrease when financial markets deepen, as the demand for broad money increases. SSA middle-income countries have similar M1 to M2 ratios as other middle-income countries during the 2000–07 period, but a lower M2 to GDP ratio. The banking sectors' role in financial intermediation is similar in terms of private sector credit from the banking institutions, but the deposit ratio is lower than those in other middle-income countries.

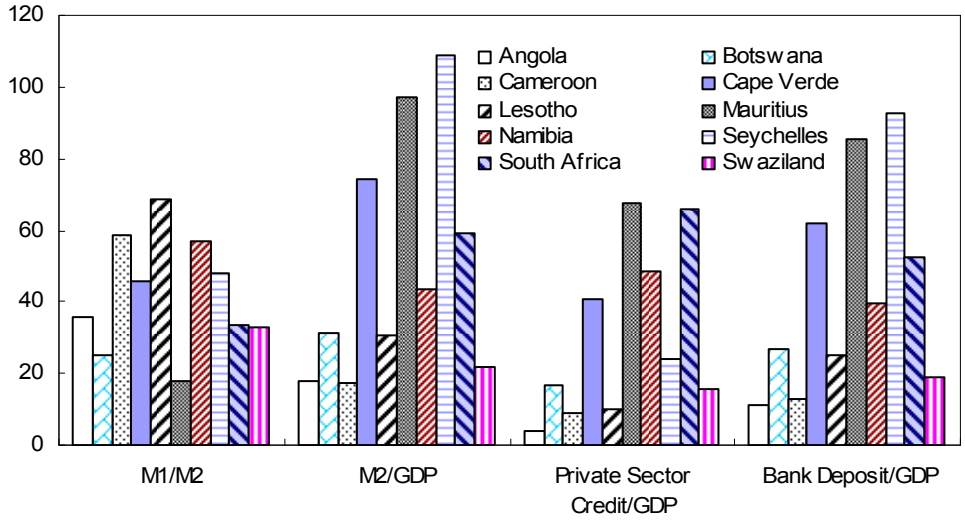
It is notable that the financial depth indicators for SSA middle-income countries are strongly influenced by the far more mature financial market of South Africa. South Africa dominates these indicators, and without it, the average indicators fall far behind those of other middle-income countries. Another notable feature is that there is also considerable disparity among the countries in terms of the level of financial development (Figure 1). Besides South Africa, countries such as Mauritius, Namibia, Seychelles, and Cape Verde also exhibit higher levels of financial depth in one or more categories of indicators, while some countries show much lower level of financial development.

Indicators of Financial Development, 2000–07 1/

	M1/M2	M2/GDP	Private Sector Credit/GDP 2/	Bank Deposit/GDP
Middle-income countries	34.8	77.4	52.6	61.5
SSA middle-income countries	35.2	51.0	52.5	44.8
South Africa	33.3	59.0	66.0	52.7
Excluding South Africa	40.2	29.4	16.1	23.4
Other middle-income countries	34.7	78.4	52.7	62.2

Sources: *World Economic Outlook* and author's calculations.
1/ The calculations are based on PPP adjusted weights.
2/ Only including banking institutions.

Figure 1. Sub-Saharan African Middle-Income Countries' Financial Development Indicators, 2000–07



Overall, the banking sectors in SSA middle-income countries compare favorably with their peers in terms of performance and efficiency. Their better efficiency is indicated in both lower costs and lower net interest margins. Data from 2000 to 2006 show that SSA middle-income countries have average overhead costs of 4.5 percent of total assets, lower than the average of 5.2 percent for all middle-income countries. Their average net interest margin of 5.6 percent is also lower than the overall average of 6.1. Perhaps it is worth noting that the difference between South Africa and the rest of the countries is not that significant in this respect, reflecting greater similarity of efficiency among the banks in SSA middle-income countries.

Efficiency Indicators for Middle-Income Countries, 2000–06

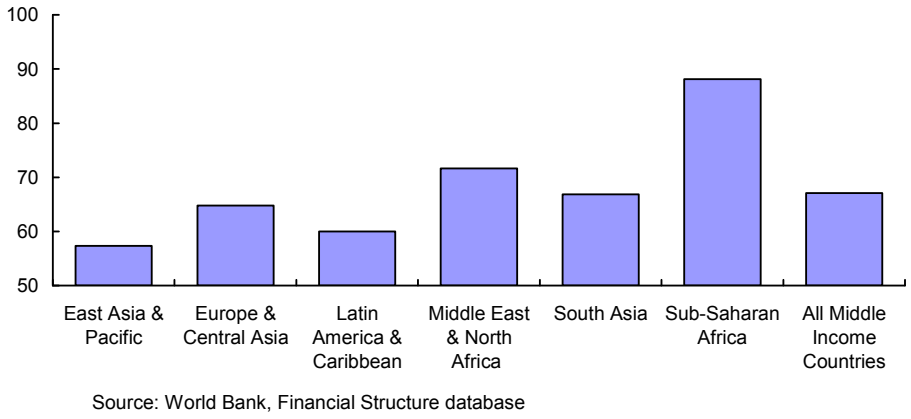
	Overhead (percent of total assets)	Net Interest Margin (percent of total assets)
East Asia and Pacific	2.4	3.5
Europe and Central Asia	5.3	5.9
Latin America and Caribbean	7.0	7.5
Middle East North Africa	2.1	3.4
South Asia	4.1	3.9
Total	**5.2**	**6.1**
Sub-Saharan Africa	4.5	5.6
Excluding South Africa	4.3	5.5

Source: World Bank, Financial Structure Database, 2007

The banking sectors are highly concentrated and dominated by foreign ownership. Among all middle-income countries, the SSA region has the highest concentration ratios in terms of the average share of assets held by the three largest banks during 2000–06 (Figure 2). Foreign ownership is also common among banks in the SSA region (Figure 3).

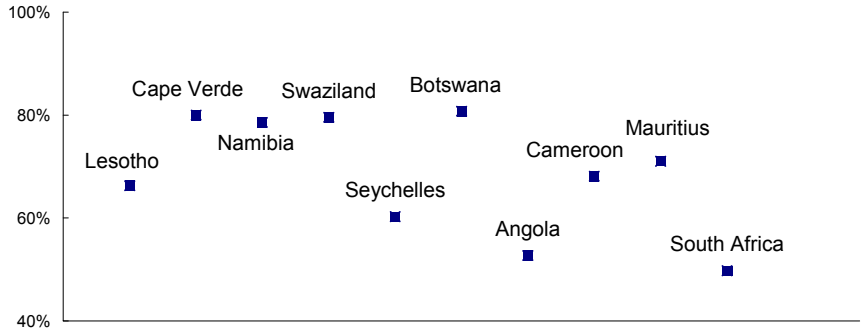
The average share of foreign-owned assets in 10 countries in our sample is 69 percent, still higher than most middle-income countries in other regions.

Figure 2. Banking Sector Concentration: Middle-Income Countries, 2000–06



Source: World Bank, Financial Structure database

Figure 3. Foreign Ownership: Selected Sub-Saharan African Middle-Income Countries



Source: BankScope, and Barth, Caprio and Levine (2006)

IV. Efficiency Analysis

A. Methodology

In this paper we adopt the SFA approach to estimate the efficiency frontier. The stochastic frontier production model was first proposed independently by Aigher, et al (1977), and Meeusen and van den Broeck (1977), and was later introduced in the research of U.S. banks in the early 1990s. Since then, it has been a major tool for studying bank efficiency in individual countries as well as in cross-country analysis (Berger, et al 2004, Bonin, et al 2005, and Beccalli, et al 2006).

The SFA approach is one of the structural approaches to study efficiency. It is based on the economics of cost minimization or profit maximization by banks, and thus starts with a standard cost or profit function with factors of input, output, and their respective prices. It estimates the minimal cost or maximum profit based on these functions, and generates

an efficiency frontier for the sample. The efficiency of each bank is then measured as the distance of its cost or profit to the frontier value.

The SFA approach treats the observed inefficiency of a bank as a combination of the inefficiency specific to the bank and a random error, and tries to disentangle the two components by making explicit assumptions about the underlying inefficiency process. The random error is usually assumed to be a normally distributed variable and can affect the overall inefficiency in either way, but the inefficiency term is assumed to be only one-sided, and can affect the overall efficiency from one direction. For a cost frontier, this inefficiency factor should be non-negative, as banks operate on or above the minimum cost, and for a profit frontier, it is always non-positive, as banks can only achieve profit levels lower than the maximum profit in the same sample. As one of the parametric estimation techniques[4] commonly used by the literature, SFA has been shown to be more robust as it controls for measurement errors and random effects.

Our study focuses on the cost minimization problem of banks, and, thus, cost efficiency. A bank is labeled inefficient if it is behaving less optimally with respect to cost than the frontier value after taking out the random error.

A bank's total cost can be modeled as follows:

$$\ln C_{it} = f(w_{it}, y_{it}, z_{it}) + \varepsilon_{it} \qquad \text{(IV.1)}$$

The cost function represents the bank's desire to minimize its cost with respect to its input and output (all in logarithm terms). C_{it} is the total cost bank i incurs at time t, w_{it} is the vector of input prices bank i faces at time t, y_{it} is the vector of outputs, and z_{it} is a vector of semi-fixed netput, such as physical capital and equity. The error term ε_{it} is composed of two parts:

$$\varepsilon_{it} = \mu_i + \upsilon_{it} \qquad \text{(IV.2)}$$

where μ_i represents the inefficiency factor pertaining to bank i and is constant across time. υ_{it} is the random error. More specifically μ_i and υ_{it} are assumed to follow the following distributions:

$$\begin{aligned} \mu_i &\sim N^{+}\left(0, \sigma_{\mu}^2\right) \\ \upsilon_{it} &\sim N\left(0, \sigma_{\upsilon}^2\right)_{iid} \end{aligned} \qquad \text{(IV.3)}$$

[4] There are five common techniques for estimating efficiency frontiers: data envelopment analysis (DEA), free disposable hull analysis (FDH), stochastic frontier analysis (SFA), thick frontier approach (TFA), and distribution free approach (DFA). The first two are nonparametric, and the latter three are parametric techniques in that assumptions are needed for a specific functional form of the unobservable inefficiency process.

Here, we assume μ_i follows a half-normal distribution. Alternatively, μ_i can be modeled to follow a truncated normal distribution, or exponential distribution so that it can only take non-negative values. It measures the difference of bank i's cost compared with that of the frontier $f(w_{it}, y_{it}, z_{it})$. The inefficiency can then be obtained by

$$E(\mu_i \mid \varepsilon_{it}) = \frac{\sigma\lambda}{(1+\lambda^2)}\left[\frac{\phi(\varepsilon_{it}\lambda/\sigma)}{\Phi(\varepsilon_{it}\lambda/\sigma)} - \frac{\varepsilon_{it}\lambda}{\sigma}\right] \qquad \text{(IV.4)}$$

where $\lambda = \frac{\sigma_\mu}{\sigma_\upsilon}$, and $\sigma^2 = \sigma_\mu^2 + \sigma_\upsilon^2$. λ measures the ratio of the standard deviation of the inefficiency component to the standard deviation of the random error (noise). If $\sigma_\mu = 0$, then there is no inefficiency and all deviations from the efficiency frontier are due to random error. We can then define the cost efficiency of bank i as a ratio between two costs: the estimated cost needed to produce the same output mix if the bank were producing on the efficiency frontier (where $\mu = 0$) divided by the actual cost.[5]

$$CostEFF_i = \frac{\hat{C}^{frontier}}{\hat{C}_i} = \frac{\exp(f(w_i, y_i, z_i))}{\exp(f(w_i, y_i, z_i) + \hat{\mu}_i)} = \exp(-\hat{\mu}_i) \qquad \text{(IV.5)}$$

As $\mu_i \geq 0$, $CostEFF \in (0,1]$. The cost efficiency can be explained as the percentage of cost that was used efficiently. For example, a cost efficiency of 0.9 means that the bank is 90 percent cost-efficient, and can reduce 10 percent of its total cost if it were operating at the cost efficiency frontier.

Regarding the specification of the cost function, we follow the literature of the intermediation approach,[6] namely, a bank's production process is one of financial intermediation. That is, it borrows funds from savers and provides those funds to investors in the form of loans or other investments. In this way, deposits and other borrowed funds, together with labor and physical capital, consist of the inputs in the production process. In terms of outputs, in addition to loans and other investment (earning) assets, we also follow Berger and Humphrey (1992) to include deposits, as this is a service product that the bank produces.

We estimate the following standard multi-product translog cost function:

[5]Alternatively, the cost efficiency can be defined by the ratio between the cost needed to produce the same output mix as the best-practice bank in sample divided by the actual cost. The frontier value is usually unobservable and for most studies the relative efficiency is more important than absolute efficiency.

[6]Another approach is the production approach, where a bank uses labor and physical capital to produce services. This approach ignores the intermediation function of the bank and does not consider deposit as input for the bank's production process.

$$\ln\left(C_{i,t}/z_{i,t}w_{i,3t}\right)=\alpha_0+\sum_l\beta_l\ln(y_{i,lt}/z_{i,t})+\frac{1}{2}\sum_m\sum_n\beta_{mn}\ln(y_{i,mt}/z_{i,t})\ln(y_{i,nt}/z_{i,t})+$$
$$\sum_j\gamma_j\ln(w_{i,jt}/w_{i,3t})+\frac{1}{2}\sum_h\sum_k\gamma_{hk}\ln(w_{i,ht}/w_{i,3t})\ln(w_{i.kt}/w_{i,3t}) \quad \text{(IV.6)}$$
$$+\frac{1}{2}\sum_l\sum_j\delta_{lj}\ln(y_{i,lt}/z_{i,t})\ln(w_{i,jt}/w_{i,3t})+u_i+v_{it}$$

The total cost ($C_{i,t}$) includes both interest and operating expenses. Outputs (y_{it}) are measured by all the products the bank offers: (1) various types of loans (y_1); (2) other earning assets, such as securities investments (y_2); and (3) total deposit (y_3). Inputs include deposits and other borrowed funds, labor, and fixed capital. The price of deposits and other borrowed funds (w_1) is calculated by total interest expense divided by total deposit and other borrowed funds. The price of labor (w_2) is measured by personnel expenses divided by total assets.[7] The price of fixed capital (w_3) is calculated as total expenditures on these assets divided by total fixed assets.[8] To control for scale biases in the estimation, we use fixed equity capital (z) to normalize cost and output quantities. We also normalize the input prices by the price of fixed capital (w_3) to control for homogeneity of the model.

B. Data and Results

We obtain bank level data from *BankScope*, which covers 90 percent of banks worldwide. Only commercial banks are included in our data, and as indicated earlier, our sample is limited to 10 SSA middle-income countries. We start with a sample of 411 observations for 77 banks. We first take out banks with only dated information (either because they no longer exist or only dated information is available) and banks which only opened for business in the most recent two years. We then delete observations with at least one missing main variables (such as interest expenses, total loans or total deposits) or with questionable values (such as negative capital). This leaves us with a sample of 71 banks with 392 observations, averaging 5.5 observations per bank. The panel data cover years from 2000 to 2007 but is unbalanced. All the variables used in the cost function are obtained from the balance sheet and income statement information in the *BankScope* database.

Tables 1 and 2 report the summary statistics of the major variables used for the cost efficiency estimation and their correlations. These variables include revenue, cost and profit, output variables, input prices, and equity. The estimation results are reported in

[7]We approximate the price of labor in terms of total assets as data on number of employees for each bank year is not available.

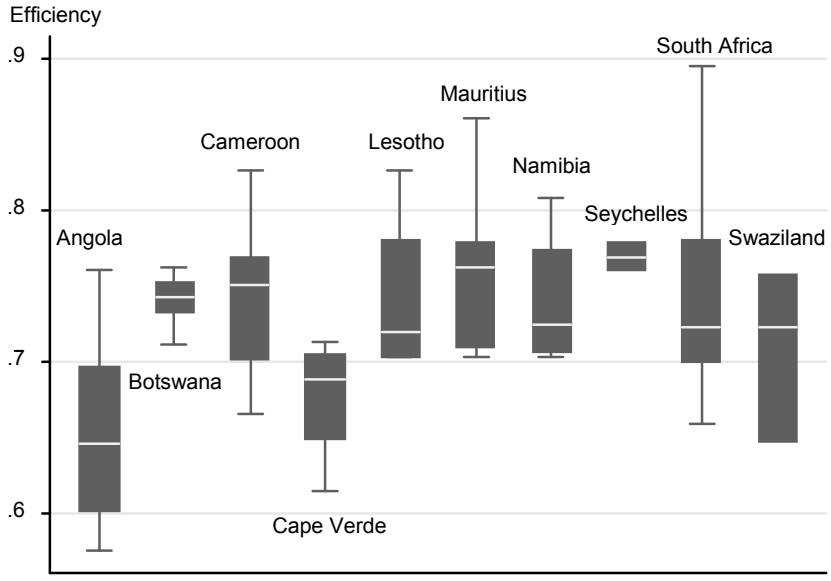
[8]The total expenditure on fixed assets is approximated by total non-personnel operating expenses.

Table 3. We first estimate the model by pooled Ordinary Least Squares (OLS) regression (regression 1), and then conduct the frontier analysis by making the assumption that μ_i follows half-normal distribution (regression 2). We also estimate the model controlling for country- and bank- specific effects (regressions 3 and 4).

Table 4 reports the efficiency estimates from regression models in Table 3. The results show that individual inefficiency can explain a large part of the variance we see in the production process of the banks. Estimate of λ ranges from 1.559 to 2.834, which means the underlying inefficiency of the banks can explain 61 to 74 percent of the variations of the overall inefficiency observed. The estimation also shows consistency in terms of the efficiency levels and ranking of the banks. The overall efficiency levels are about 0.7–0.8, meaning 20–30 percent of total cost can be saved if banks were operating efficiently.

Figure 4 illustrates the distribution of the efficiency scores of the banks by country. One observation is that the average efficiency level is very similar in the southern African countries, particularly those in the Common Monetary Area (CMA). This is perhaps related to the fact that the banking sectors in these countries are dominated by the major banks from South Africa, which enjoy more sophisticated management and supervisory practices.

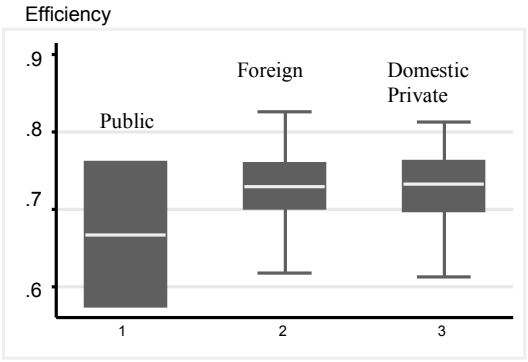
Figure 4. Efficiency Estimates by Country



When comparing efficiency levels by ownership (Figure 5), we find that, consistent with many other studies, on average, public banks are falling behind both foreign banks and

private banks, while foreign banks are slightly more efficient than domestic private banks.

Figure 5. Efficiency Estimates by Bank Ownership



Perhaps it is not surprising that, after controlling for country effects (Column 2 in Table 4), the average efficiency levels are higher, but the dispersion of the efficiency is also greater, which indicates that country-specific factors are playing an important role in determining bank efficiency levels. Controlling for both country-specific and bank-specific effects, however, only slightly change the efficiency levels. This could be caused by the fact that variations in bank-specific operations are already largely captured in other variables included in the original regression (IV.6). Therefore, in the next section, we investigate the country-specific and bank-specific factors in more detail.

V. DETERMINING EFFICIENCY FACTORS

Having obtained the individual bank's cost efficiency, we next investigate if the efficiency levels can be explained by several different groups of country-specific or bank-specific factors. We will first determine the variables and then include them as explanatory variables in the following equation:

$$CostEFF_{i,t} = \eta_0 + \eta M_{i,t} + \varepsilon_{i,t} \qquad \text{(V.1)}$$

where $CostEFF_{i,t}$ is the bank level cost efficiency score from the SFA analysis, and $M_{i,t}$ includes the variables that could have potential impact on the cost efficiency levels of the banks. More specifically, we consider two groups of variables. The first group includes factors that are more specific to individual banks, and the second encompasses the external environment that banks operate in, such as macroeconomic conditions, financial depth, market structure, regulatory framework, and overall institutions. Since we study cross-country data, bank-specific characteristics alone might not be enough to explain the difference in efficiency levels observed across the sample. In fact, there could be important country-specific factors that are omitted, but significantly correlated with both efficiency levels and the bank-specific characteristics we use. To disentangle the impact of bank-specific factors from that of environmental factors, we keep bank-specific

variables in each regression. To avoid the possible multicollinearity between the different groups of variables, we also include each group of factors one at a time. After these exercises, we conduct a robust check, where the possible dominance of South Africa in the sample and the correlations between some of the variables are discussed.

A. Bank-Specific Factors

Bank- specific characteristics, such as size, ownership, organization forms, and so on, can affect bank efficiency. We are particularly interested in three of them: risk profile, business specialty, and service quality. These factors are not independent from each other. Given a bank's ability to produce, the amount of risk it takes on can change the efficiency results significantly. The business areas the bank focuses on also reflect the bank's risk appetite, and can have different efficiency implications for the same bank. Banking service quality is another factor that may considerably change a bank's efficiency score when it chooses a similar risk level and business areas as other banks.

We use the ratio of loan loss provisions to total loans (LOSS) to proximate the risk level. To account for the impact of the difference in product and services a bank offers, we consider the loan-to-asset ratio (Loan/Asset), which may reflect the bank's investment preferences between loans and other earning assets. Banking service quality is controlled by the ratio of total other operating income to total asset (Other Income). Data are obtained directly from *BankScope.*

Results (Table 7) show that higher levels of loss provision mean lower cost efficiency for banks, although this variable is statistically insignificant across all regressions. The loan-to-asset ratio exhibits a positive relationship with cost efficiency, indicating that for banks in our sample, loan products are more cost-efficient than other types of earning assets. This could, however, also indicate that higher market power might exist in the loan product market than other product markets (Berger and Master, 1997). Higher total other income, however, is found to lower the cost efficiency of banks, implying that higher income from sources such as fees and commissions, could reflect a higher cost of providing such services.

When included in regressions with other groups of variables, the bank-specific factors show a consistent pattern. The loss provision variable is insignificant, while the loan-to-asset ratio and ratio of total other income to assets are found to be significant in most regressions except in those with macroeconomic variables or overall institution variables.

B. Macroeconomic Conditions

We next consider if cost efficiency levels can vary systematically across countries due to differences in the macroeconomic environment. Two macroeconomic variables are used: logarithm of per capita GDP and inflation. Both per capita GDP and inflation data are obtained from the International Monetary Fund's *World Economic Outlook* (WEO).

Per capita GDP is used to reflect the general income level. A higher income level is more likely to be associated with a more developed banking sector. Our estimation shows that

it can also bring higher cost efficiency. Inflation is an indicator of macroeconomic stability, and is directly related to the interest rate levels and, thus, interest expense and revenue. Macroeconomic instability would, in general, have an adverse impact on banking sector performance. A bank's ability to manage interest rate risk under inflationary conditions can also affect its cost structure. Our study shows that a higher inflation level tends to lower cost efficiency of banks.

The level of financial development is also crucial to bank efficiency. Higher levels of financial depth could contribute to the better performance and higher efficiency levels of banks. We use bank deposits to GDP to capture the cross-country differences in financial depth. We find the relationship between cost efficiency and bank deposits to GDP to be positive. This indicates that more financial intermediation in the form of bank deposits tends to help reduce costs of bank operations.

C. Market Structure

The relationship between market structure and efficiency is an important aspect that this paper explores. The usual indicator for market structure is market concentration, often expressed by an Herfindahl index. There are basically two views on the relationship between market structure and bank efficiency. One view holds that concentration and restrictions generate market power and, thus, monopolistic profits. In this case, one often observes a positive relationship between concentration and profitability, which might not mean higher efficiency. The other view, however, argues that market structure is a result of competition whereby more efficient banks dominate the less efficient ones and, thus, market concentration is a result of higher efficiency. Empirical studies have also found an ambiguous relationship between market concentration and bank efficiency, which, as recognized by many, indicates that simple market structure indicators, such as concentration ratios, are not good proxies of market structure.

Instead of focusing on the concentration ratios, we investigate the degree of competition in the market within which the banks are operating. This is because competition pressures might be more effective in improving efficiency, and a concentrated banking market could also be competitive and efficient. We explore whether the difference in market competition pressures can explain the variation in efficiency across countries.

First, we follow Panzar and Rosse (1987) and estimate the reduced form revenue equations to formally test the level of competition for each country. The equation takes the following log-linear form:

$$\ln REVN_{\text{it}} = \alpha + \beta_1 \ln INTC_{it} + \beta_2 \ln LC_{it} + \beta_3 \ln OTHC_{it} + \gamma_1 \ln LOAN_{it} + \gamma_2 \ln CAP_{it} + \gamma_3 \ln TA_{it} + YearDummy + \varepsilon_{it} \quad \text{(V.2)}$$

where $REVN_{it}$ is the ratio of total interest revenue to total assets for bank i at time t, $INTC_{it}$ is the total interest expenses to total deposit, LC_{it} is the ratio of personnel

expense to total assets, and $OTHC_{it}$ is the ratio of total other operating expenses to total assets. We also include the following variables to control for bank-specific characteristics: $LOAN_{it}$ is the ratio of total loans to total assets, CAP_{it} is the ratio of equity to total assets, and TA_{it} is total assets. After conducting the estimation, we construct the H-statistic as $H = \beta_1 + \beta_2 + \beta_3$. The H-statistic is a quantitative assessment of the competitive nature of the banking sector and market power of the banks. More specifically, the market structure is categorized based on the value of H:

if $H \leq 0$, monopoly or perfect cartel;
if $H \in (0,1)$, monopolistic competition or oligopoly; and
if $H = 1$, perfect competition.

We estimate the H-statistic for each country using both fixed effects and random effects models. For robustness, we also estimate models with total revenue as a dependent variable, where other operating revenue such as commission and fee income is included. Following Gelos and Roldos (2002), we estimate two reduced form revenue equations, one for scaled revenue and one for unscaled revenue, as the scaled one provides a price equation. The results are reported in Table 5.

The four specifications generally provide consistent estimates for the H-statistic for each country. Most of the countries report a H-statistic between 0 and 1, which suggests that monopolistic competition best describes the level of competition in the banking sector. We then include the average of the H-statistics from the different specifications in the second stage regression to determine the effect of the market structure.

We found that higher levels of competition in the market will boost the cost efficiency in various specifications of the model. This finding is also supported by estimation results for another variable we include for market structure: activities restrictions. We construct an indicator of activities restrictions based on data from the Bank Regulation and Supervision database (2007, 2003) compiled by Barth, Caprio, and Levine. A higher score means more restrictions are imposed on banks to engage in alternative investment activities, such as securities investment, insurance business, and real estate investment. Results show that restrictions to enter alternative businesses could lower the cost efficiency levels.

D. Legal Framework

The quality of the legal framework with regard to enforcement of contracts and protection of property rights is important for banking sector efficiency. For example, in their study of financial deepening in SSA, McDonald and Schumacher (2007) find that after controlling for financial liberalization and macroeconomic variables, countries with stronger creditor rights and information sharing have deeper financial systems. We include two variables that reflect the quality of the legal framework in our study—strength of legal rights and enforcement of contracts, both obtained from the World Bank's Doing Business Indicators.

The legal rights index includes seven aspects in collateral law and three in bankruptcy law that collectively measure the degree to which collateral and bankruptcy laws protect the rights of borrowers and lenders, and, thus, facilitate lending. The index ranges from 0 to 10, with higher scores indicating that collateral and bankruptcy laws are better designed to expand access to credit. The index for enforcement of contracts reflects the effectiveness of the court system in terms of the time, cost, and number of procedures involved for a plaintiff to get actual payment after filing a dispute. We obtain the ranking of each country among a total of 178 countries, where a higher number indicate a lower ranking in terms of effectiveness in enforcing contracts.

The estimation results show that a better legal framework is indeed beneficial to improving cost efficiency of banks. High quality collateral and bankruptcy laws could effectively protect the banks' rights as lenders, as well as those of borrowers, and higher efficiency in enforcing contracts could reduce costs for banks. We also estimate the impact of the legal framework while controlling for other groups of variables (Table 8) and results are consistent across all specifications.

E. Political Environment

Apart from the legal framework, it is also desirable to investigate the impact of overall institutions, especially those related to political stability and quality of public service. These variables are perhaps more relevant to the countries in our sample than elsewhere, given the frequency of episodes of internal conflict.

We obtain data on overall institutional quality from the World Bank's Worldwide Governance Indicators (WGI). The WGI reports aggregate and individual governance indicators for 212 countries or territories over the period 1996 to 2006, based on input from a variety of survey institutes, think tanks, nongovernmental organizations, and international organizations. Annual data for two indicators[9] —political stability and violence, and government effectiveness[10] —are gathered for each country in our sample from 2000 to 2006, and the average is used in the regression. A higher score indicates a more stable political environment and better quality of government services.

The estimation results show that banks enjoy higher efficiency with more political stability and better government effectiveness. The coefficients are statistically significant in most specifications. To see if the results remain valid with effects from other variables, we also conduct regressions with other groups of variables (Table 8). We find the results to be consistent across all specifications.

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[9]Six indicators are available from the WGI: voice and accountability, political stability and violence, government effectiveness, regulatory quality, rule of law, and control of corruption.

[10] Political stability and violence measures the likelihood that the government in power will be destabilized or overthrown by possibly unconstitutional and/or violent means, including domestic violence and terrorism. Government effectiveness measures the quality of public service provision, the quality of the bureaucracy, the competence of civil servants, the independence of the civil service from political pressures, and the credibility of the government's commitment to policies.

F. Robustness Checks

As discussed earlier, the financial depth indicators in SSA middle-income countries are influenced by the dominance of South Africa. And South African banks have a dominating share in some countries in our sample, especially those in the Common Monetary Area, such as Namibia and Swaziland. The efficiency level of the banks in these countries could be related to that of South Africa, and the results from previous regressions could be influenced by the existence of large numbers of South African banks. To check the possible bias in our previous estimations resulting from the dominance of South African banks in the sample, we conduct the same regressions in Tables 7 and Table 8 with a subsample of all countries excluding South Africa. Results are reported in Tables 9 and 10, respectively. Compared to the full sample, the qualitative results remain valid in most cases, except that in a few cases, the significance level changes. This reinforces our previous conclusions of the effects of the various groups of variables on cost efficiency.

Another robustness check is done to test if macroeconomic conditions are the dominant factors that determine the efficiency levels of the banks, and if there is multicollinearity between the various groups of variables. We observe strong correlations between GDP per capita and quite a few variables, such as bank deposits, legal right index, enforcement of contracts, political stability, and government effectiveness. While a strong correlation between GDP per capita and many of these variables are expected and can be easily justified, we want to investigate to what extent other variables can still explain the differences in cost efficiency among banks, while controlling for macroeconomic conditions. Table 11 reports estimation results for different specifications, all including GDP per capita, inflation, and bank deposits. Results show that GDP per capita and inflation are significant across all specifications, and the effects of some other variables are less pronounced when included together with the macroeconomic conditions, such as bank deposits and legal framework. To explore the possible multicollinearity between the variables, we also calculate the variance inflation factors for the regressions. The results show that variance of the political environment variables are highly correlated with those of the other variables, but adding the other variables by group or together would be unlikely to create a multicollinearity problem.

VI. Conclusion

Banks in SSA middle-income countries play a central role in the financial intermediation process. To understand how efficient they are, and more importantly, what determines their level of efficiency, is important to help strengthen the financial intermediation function of banks, as well as the overall financial market.

We use bank level data in this paper to analyze the cost efficiency levels of commercial banks in 10 SSA middle-income countries, and find that, in general, banks are operating 20–30 percent below the cost efficiency frontier, and that foreign banks on average are more efficient than private banks and government-owned banks. We also find that a stable macroeconomic environment, deeper financial development, higher degrees of

market competition, stronger institutions, and better governance would help improve the bank efficiency levels.

While the focus of this study is to find the common factors that could help explain the differences in efficiency among banks in SSA middle-income countries, we acknowledge that there is large disparity among these countries in terms of both the environment that the banks face and the way in which the banks operate. More in-depth studies of these country-specific factors are warranted for future research.

Table 1. Summary Statistics of Major Variables Used in Cost Efficiency Estimates

		Mean	Standard Deviation	Minimum	Maximum
Revenue, cost, and profit					
RPROFIT	Profits/total assets	0.024	0.029	-0.204	0.149
RREVN	Revenue/total assets	0.090	0.051	0.002	0.391
RCOST	Costs/total assets	0.097	0.055	0.010	0.497
Output variables					
RLOAN	Total loans/total assets	0.490	0.222	0.029	0.912
REARN	Other earning assets/total assets	0.376	0.204	0.005	0.891
RDEPO	Total deposit/total assets	0.756	0.186	0.092	0.941
Input prices					
RINTC	Interest expenses/total deposits	0.070	0.076	0.002	0.735
RPERS	Personnel expenses/total assets	0.022	0.019	0.000	0.161
ROTHC	Other operating expenses/fixed assets	0.349	0.537	0.003	5.208
Other					
RCAP	Equity/total assets	0.110	0.070	0.010	0.481

Table 2. Correlation Between Major Variables in Cost Efficiency Estimates

	RPROFIT	RREVN	RCOST	RCAP	RLOAN	REARN	RDEPO	RINTC	RPERS	ROTHC
RPROFIT	1									
RREVN	0.492	1								
RCOST	0.040	0.751	1							
RCAP	0.250	0.277	0.218	1						
RLOAN	0.037	0.280	0.181	-0.077	1					
REARN	-0.042	-0.245	-0.223	0.078	-0.826	1				
RDEPO	-0.261	-0.339	-0.261	-0.512	-0.149	0.096	1			
RINTC	0.305	0.747	0.577	0.284	0.295	-0.203	-0.660	1		
RPERS	0.104	0.373	0.655	0.204	0.109	-0.193	-0.269	0.288	1	
ROTHC	-0.013	0.522	0.743	0.139	0.021	-0.045	-0.164	0.298	0.553	1

Table 3. Cost Efficiency Estimation

(1) OLS regression; (2) regression based on (IV.6), assuming half normal distribution; (3) (2) with country effect; (4) (2) with country and bank effects.

	(1)	(2)	(3)	(4)
Constant	1.947***	1.697***	1.631***	1.632***
	(0.087)	(0.150)	(0.145)	(0.143)
Ln*LOAN*	0.044***	0.138**	0.199***	0.195***
	(0.066)	(0.076)	(0.080)	(0.076)
Ln*OTHEARN*	0.504	0.108	0.072	0.083
	(0.103)	(0.110)	(0.129)	(0.116)
Ln*DEPS*	0.081***	0.324***	0.350***	0.341***
	(0.098)	(0.143)	(0.161)	(0.150)
$(\text{Ln}LOAN)^2$	0.133***	0.171***	0.188***	0.187***
	(0.029)	(0.027)	(0.025)	(0.024)
$(\text{Ln}OTHEARN)^2$	0.055**	0.031	0.030**	0.031**
	(0.017)	(0.018)	(0.017)	(0.016)
$(\text{Ln}DEPS)^2$	0.248***	0.205***	0.209***	0.211***
	(0.060)	(0.045)	(0.055)	(0.052)
Ln*LOAN*Ln*OTHEARN*	0.017	0.035	0.034	0.036
	(0.081)	(0.057)	(0.056)	(0.056)
Ln*OTHEARN*Ln*DEPS*	-0.205	-0.081	-0.076	-0.082
	(0.084)	(0.069)	(0.075)	(0.073)
Ln*LOAN*Ln*DEPS*	-0.193***	-0.260***	-0.291***	-0.289***
	(0.085)	(0.056)	(0.050)	(0.049)
Ln*PERS*	0.692***	0.700***	0.689***	0.688***
	(0.049)	(0.090)	(0.083)	(0.083)
$(\text{Ln}PERS)^2$	0.065***	0.080***	0.080***	0.080***
	(0.011)	(0.013)	(0.014)	(0.014)
Ln*INTC*	0.291***	0.179***	0.177***	0.172***
	(0.056)	(0.058)	(0.060)	(0.059)
$(\text{Ln}INTC)^2$	0.120***	0.111***	0.110***	0.111***
	(0.013)	(0.014)	(0.017)	(0.016)
Ln*PERS*Ln*INTC*	-0.172***	-0.190***	-0.189***	-0.190***
	(0.020)	(0.021)	(0.024)	(0.023)
Ln*LOAN*Ln*PERS*	-0.135***	-0.112***	-0.104***	-0.104***
	(0.027)	(0.041)	(0.039)	(0.038)
Ln*OTHEARN*Ln*PERS*	-0.025	-0.062	-0.073**	-0.072**
	(0.031)	(0.045)	(0.042)	(0.042)
Ln*DEPS*Ln*PERS*	0.035	0.039	0.045	0.043
	(0.037)	(0.064)	(0.049)	(0.049)
Ln*LOAN*Ln*INTC*	0.105***	0.106***	0.094***	0.094***
	(0.033)	(0.041)	(0.044)	(0.044)
Ln*OTHEARN*Ln*INTC*	0.038	0.031	0.033	0.034
	(0.035)	(0.044)	(0.043)	(0.041)
Ln*DEPS*Ln*INTC*	0.012	0.021	0.024	0.026
	(0.042)	(0.057)	(0.055)	(0.054)
Lambda		1.559	2.727	2.834
Sigma u		0.289	0.526	0.526

Standard error in bracket.
***, **, and * correspond to 1, 5, and 10 percent of significance respectively.

Table 4. Efficiency Estimates

Model 1: efficiency scores based on regression illustrated in IV.6.
Model 2: efficiency scores based on Model 1 plus country effect.
Model 3: efficiency scores based on Model 1 plus country and bank effects.

	(1)	(2)	(3)
Lamda	1.559	2.727	2.834
Corresponding share of inefficiency	61%	73%	74%
Mean	0.725	0.781	0.778
Min	0.453	0.370	0.369
Median	0.730	0.882	0.878
Max	0.896	0.941	0.940
Public	0.668	0.667	0.665
Foreign	0.730	0.796	0.792
Private	0.720	0.765	0.762

Table 5. H-statistics for Sub-Saharan African Middle-Income Countries Regression Based on (V.2)

	Total Interest Revenue	Total Interest Revenue/Total Assets	Total Revenue	Total Revenue/ Total Assets
Angola	0.62	0.73	0.44	0.44
Botswana	0.66	0.66	0.54	0.66
Cameroon	0.93	0.93	0.72	0.63
Cape Verde	0.49	0.48	0.57	0.73
Lesotho	0.51	0.26	0.19	0.07
Mauritius	0.79	0.81	0.71	0.81
Namibia	0.82	0.80	0.73	0.77
South Africa	0.67	0.65	0.50	0.53

Table 6. Correlation Between Cost Efficiency and Determinants

	Efficiency	Loss Provision	Loan to Asset	Other Income	GDP Per Capita	Inflation	Bank Deposit	Competition	Activity Restrictions	Legal Right	Enforcement of Contract	Political Stability	Government Effectiveness
Efficiency	1												
Loss provision	-0.175	1											
Loan to asset	0.186	-0.237	1										
Other income	-0.296	0.245	-0.151	1									
GDP per capita	0.357	-0.174	0.214	-0.361	1								
Inflation	-0.431	0.437	-0.393	0.375	-0.313	1							
Bank deposit	0.370	-0.169	0.235	-0.479	0.685	-0.312	1						
Competition	0.194	-0.105	0.332	-0.263	0.242	-0.203	0.351	1					
Activity restrictions	-0.280	0.129	-0.388	0.336	-0.558	0.265	-0.656	-0.393	1				
Legal right	0.324	-0.205	0.301	-0.235	0.518	-0.347	0.272	-0.124	-0.22	1			
Enforcement of contract	-0.403	0.241	-0.431	0.379	-0.609	0.425	-0.697	-0.100	0.47	-0.672	1		
Political stability	0.432	-0.219	0.109	-0.471	0.620	-0.372	0.609	0.328	-0.26	0.691	-0.659	1	
Government effectiveness	0.434	-0.251	0.437	-0.391	0.719	-0.458	0.693	0.051	-0.69	0.784	-0.872	0.638	1

Table 7. Second Stage Regression

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Constant	0.711***	0.771***	0.687***	0.682***	0.825***	0.697***	0.662***
	(0.008)	(0.010)	(0.010)	(0.016)	(0.034)	(0.023)	(0.014)
LOSS	-0.021*	0.011	-0.020	-0.021*	-0.021*	-0.015	-0.012
	(0.012)	(0.013)	(0.012)	(0.012)	(0.012)	(0.012)	(0.020)
Loan/asset	0.042***	-0.002	0.034***	0.033**	0.017	0.023*	0.018
	(0.013)	(0.014)	(0.013)	(0.014)	(0.014)	(0.014)	(0.012)
Other income	-0.507***	-0.163	-0.273**	-0.456***	-0.453***	-0.360***	-0.185
	(0.111)	(0.113)	(0.123)	(0.113)	(0.116)	(0.116)	(0.135)
GDP per capita		0.014***					
		(0.004)					
Inflation		-0.105***					
		(0.016)					
Bank deposit			0.048***				
			(0.012)				
Competition				0.050***			
				(0.023)			
Activity restrictions					-0.146***		
					(0.047)		
Legal right						0.007**	
						(0.003)	
Enforcement of contract						-0.016*	
						(0.009)	
Political stability							0.034**
							(0.016)
Government effectiveness							0.062***
							(0.016)
R square	0.110	0.228	0.147	0.120	0.137	0.155	0.199
Adjusted R square	0.103	0.218	0.139	0.111	0.128	0.144	0.189
F test	15.90	22.77	16.71	13.25	14.48	14.13	19.24

Standard error in bracket.
*, **, and *** correspond to 10, 5, and 1 percent of significance, respectively.

Table 8. Second Stage Regression—Legal Framework and Political Environment

	Legal Framework				Political Environment			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Constant	0.742***	0.622***	0.631***	0.795***	0.703***	0.661***	0.622***	0.682***
	(0.027)	(0.033)	(0.029)	(0.037)	(0.025)	(0.012)	(0.017)	(0.045)
LOSS	0.011	-0.015	-0.014	-0.013	0.010	-0.012	-0.013	-0.009
	(0.013)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
Loan/asset	-0.003	0.026**	0.003	-0.005	-0.002	0.018	-0.005	0.010
	(0.014)	(0.013)	(0.014)	(0.014)	(0.014)	(0.014)	(0.016)	(0.014)
Other income	-0.162	-0.227**	-0.247**	-0.308	-0.076	-0.183	-0.129	-0.165
	(0.115)	(0.121)	(0.118)	(0.115)	(0.118)	(0.123)	(0.119)	(0.119)
GDP per capita	0.011**				0.003			
	(0.004)				(0.005)			
Inflation	-0.099***				-0.086***			
	(0.017)				(0.017)			
Bank deposit/GDP		0.051***				0.0008		
		(0.016)				(0.015)		
Competition			0.088***				0.076***	
			(0.023)				(0.024)	
Activity restrictions				-0.089*				-0.029
				(0.048)				(0.058)
Legal right	0.004	0.011***	0.011***	0.006*				
	(0.003)	(0.003)	(0.003)	(0.003)				
Enforcement of contract	-0.0002	0.021	-0.028*	-0.052***				
	(0.017)	(0.022)	(0.016)	(0.018)				
Political stability					0.020	0.034**	0.012	0.065***
					(0.016)	(0.017)	(0.018)	(0.018)
Government effectiveness					0.042***	0.061***	0.083***	0.045**
					(0.019)	(0.018)	(0.017)	(0.021)
R square	0.233	0.178	0.185	0.202	0.248	0.200	0.220	0.238
Adjusted R square	0.219	0.165	0.172	0.189	0.234	0.187	0.208	0.226
F test	16.64	13.87	14.57	15.28	18.09	15.99	18.08	18.88

Standard deviation in bracket
*, **, and *** correspond to 10, 5, and 1 percent of significance, respectively.

Table 9. Second Stage Regression (South Africa excluded)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Constant	0.720***	0.700***	0.700*	0.690***	0.806***	0.697*	0.677***
	(0.009)	(0.011)	(0.012)	(0.018)	(0.041)	(0.023)	(0.015)
LOSS	-0.009	0.009	-0.011	-0.011	-0.010	-0.007	-0.008
	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
Loan/asset	0.043***	0.015	0.039***	0.022	0.027	0.028**	0.020
	(0.016)	(0.016)	(0.016)	(0.019)	(0.017)	(0.017)	(0.016)
Other income	-0.847***	-0.288*	-0.580***	-0.776***	-0.775***	-0.671***	-0.365**
	(0.144)	(0.159)	(0.179)	(0.148)	(0.167)	(0.162)	(0.168)
GDP per capita		0.302***					
		(0.066)					
Inflation		0.043***					
		(0.009)					
Bank deposit			0.033***				
			(0.013)				
Competition				0.055**			
				(0.028)			
Activity restrictions					-0.110*		
					(0.058)		
Legal right						0.008**	
						(0.003)	
Enforcement of contract						-0.007	
						(0.010)	
Political stability							0.036
							(0.053)
Government effectiveness							0.121**
							(0.053)
R square	0.164	0.275	0.181	0.178	0.195	0.198	0.240
Adjusted R square	0.156	0.2624	0.170	0.164	0.183	0.184	0.227
F test	18.99	21.85	16.00	13.25	16.09	14.20	18.20

Standard error in bracket.
*, **, and *** correspond to 10, 5, and 1 percent of significance, respectively.

Table 10. Second Stage Regression—Legal Framework and Political Environment
(South Africa excluded)

	Legal Framework				Political Environment			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Constant	0.687***	0.635***	0.615***	0.801***	0.699***	0.677***	0.635***	0.682***
	(0.024)	(0.035)	(0.031)	(0.043)	(0.015)	(0.015)	(0.021)	(0.045)
LOSS	0.009	-0.009	-0.010	-0.008	0.009	-0.008	-0.011	-0.004
	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.012)	(0.012)
Loan/asset	0.012	0.031**	-0.020	0.002	0.001	0.020	-0.010	0.010
	(0.017)	(0.017)	(0.021)	(0.017)	(0.016)	(0.016)	(0.019)	(0.016)
Other income	-0.288*	-0.486***	-0.460***	-0.488***	-0.151	-0.370**	-0.236	-0.319*
	(0.168)	(0.179)	(0.168)	(0.174)	(0.167)	(0.179)	(0.172)	(0.173)
GDP per capita	0.268***				0.218***			
	(0.073)				(0.084)			
Inflation	-0.042***				-0.044***			
	(0.009)				(0.009)			
Bank deposit/GDP		0.040**				0.001		
		(0.017)				(0.016)		
Competition			0.110***				0.074***	
			(0.029)				(0.026)	
Activity restrictions				-0.097*				-0.033
				(0.057)				(0.062)
Legal right	0.004	0.011***	0.012***	-0.006*				
	(0.003)	(0.004)	(0.003)	(0.003)				
Enforcement of contract	-0.0008	0.012	-0.008	-0.026**				
	(0.010)	(0.013)	(0.010)	(0.011)				
Political stability					-0.114**	0.034	-0.039	0.175***
					(0.053)	(0.056)	(0.052)	(0.016)
Government effectiveness					0.153***	0.121**	0.130**	-0.071
					(0.051)	(0.053)	(0.052)	(0.066)
R square	0.279	0.213	0.236	0.258	0.303	0.240	0.260	0.299
Adjusted R square	0.261	0.196	0.220	0.241	0.286	0.224	0.245	0.283
F test	15.78	12.92	14.79	15.30	17.78	15.12	16.84	18.73

Standard deviation in bracket
*, **, and *** correspond to 10, 5, and 1 percent of significance, respectively.

Table 11. Second Stage Regression—Macroeconomic Conditions and Financial Depth

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Constant	0.692***	0.672***	0.701***	0.676***	0.698***	0.685***	0.677***
	(0.006)	(0.013)	(0.039)	(0.013)	(0.014)	(0.007)	(0.015)
GDP per capita	0.285***	0.277***	0.156**	0.238***	0.282***	0.259***	0.208***
	(0.070)	(0.070)	(0.076)	(0.077)	(0.071)	(0.072)	(0.079)
Inflation	-0.048***	0.047***	-0.051***	-0.045***	-0.047***	-0.045	-0.042***
	(0.007)	(0.007)	(0.007)	(0.008)	(0.008)	(0.007)	(0.008)
Bank deposit	0.016	0.012	0.036**	0.018	0.013	0.007	0.005
	(0.012)	(0.013)	(0.015)	(0.012)	(0.015)	(0.014)	(0.014)
Competition		0.035*					
		(0.021)					
Activity restrictions			-0.004				
			(0.051)				
Legal right				0.004			
				(0.003)			
Enforcement of contract					-0.004		
					(0.015)		
Political stability						0.027*	
						(0.015)	
Government effectiveness							0.037**
							(0.017)
R square	0.235	0.241	0.257	0.240	0.236	0.241	0.244
Adjusted R square	0.229	0.233	0.248	0.232	0.228	0.234	0.236
F test	39.81	30.72	31.39	30.49	29.85	30.79	31.25

Standard error in bracket.
*, **, and *** correspond to 10, 5, and 1 percent of significance, respectively.

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