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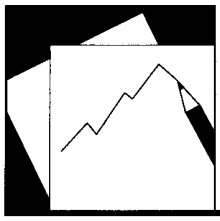

# IMF Working Paper

# Determinants of Bank Interest Margins in Sub-Saharan Africa

*Calixte Ahokpossi*

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**IMF Working Paper**

African Department

# Determinants of Bank Interest Margins in Sub-Saharan Africa

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## Abstract

Financial intermediation is low in sub-Saharan Africa (SSA) compared to other regions of the world. This paper examines the determinants of bank interest margins using a sample of 456 banks in 41 SSA countries. The results show that market concentration is positively associated with interest margins, but the impact depends on the level of efficiency of each bank. In particular, compared to inefficient banks, efficient ones increase their margins more in concentrated markets. This indicates that policies that promote competition and reduce market concentration would help lower interest margins in SSA. The results also show that bank-specific factors such as credit risk, liquidity risk, and bank equity are important determinants of interest margins. Finally, interest margins are sensitive to inflation, but not to economic growth or public or foreign ownership. There are regional differences within SSA regarding the level of interest margins even after controlling for other factors.

JEL Classification Numbers:E44; G21; L8.

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[1] Calixte Ahokpossi is an economist in the African Department of the IMF and is grateful for comments received during an African Department seminar as well as additional comments received from Doris Ross, Mauro Mecagni and Cheikh Anta Gueye.

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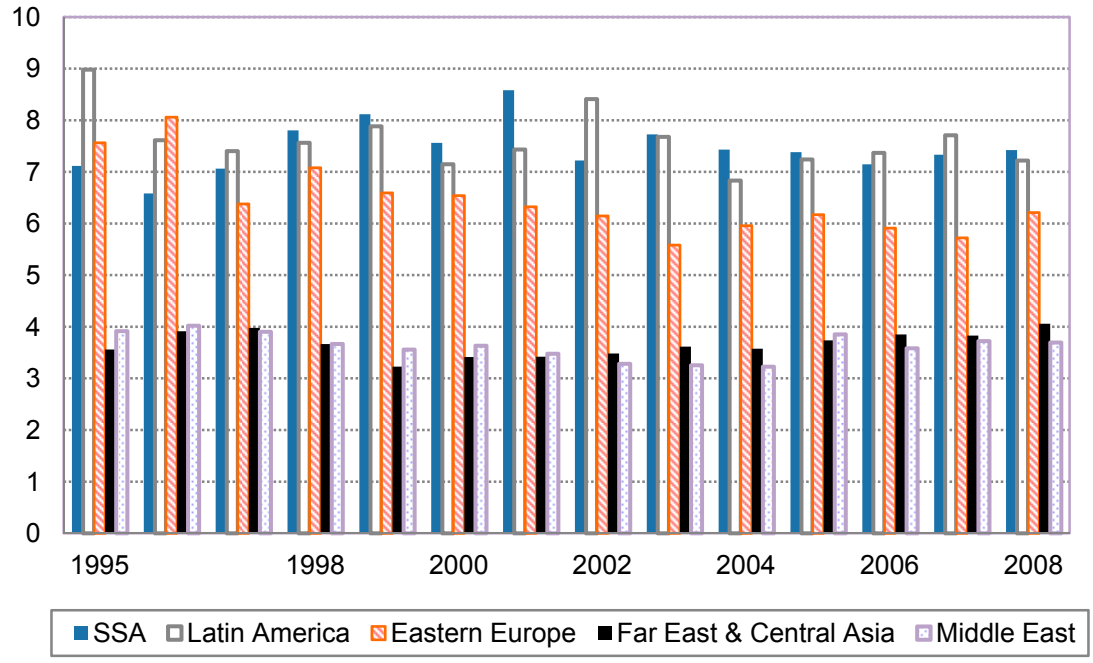
## I. Introduction

Low financial intermediation in sub-Saharan Africa (SSA) results from many factors. These factors vary greatly across regions and include financial policies, market structure, and bank behavior, to name a few. In sub-Saharan Africa (SSA), financial intermediation is very low, compared to other regions of the world. As a result, bank lending is low and interest margins are high compared to the rest of the world.

**Figure 1. Net Interest Margins: International Comparisons**




Source: Bankscope and author's calculations.

This paper investigates the main factors that explain the high bank interest margins observed in SSA (Figure 1), focusing mainly on the impact of market structure. Interest margins[2] could be high because the financial sector is relatively small, concentrated (Figure 2), and shallow in most African countries. Bank operations entail large fixed costs, including the costs of setting up a network of branches to be close to clients, to collect deposits, and to extend loans. If markets are small, banks may not enjoy the benefits of economies of scale. Banks may also be able to charge high interest margins

[2] Net interest margin is defined here as total interest income minus total interest expense divided by average interest-earning assets.

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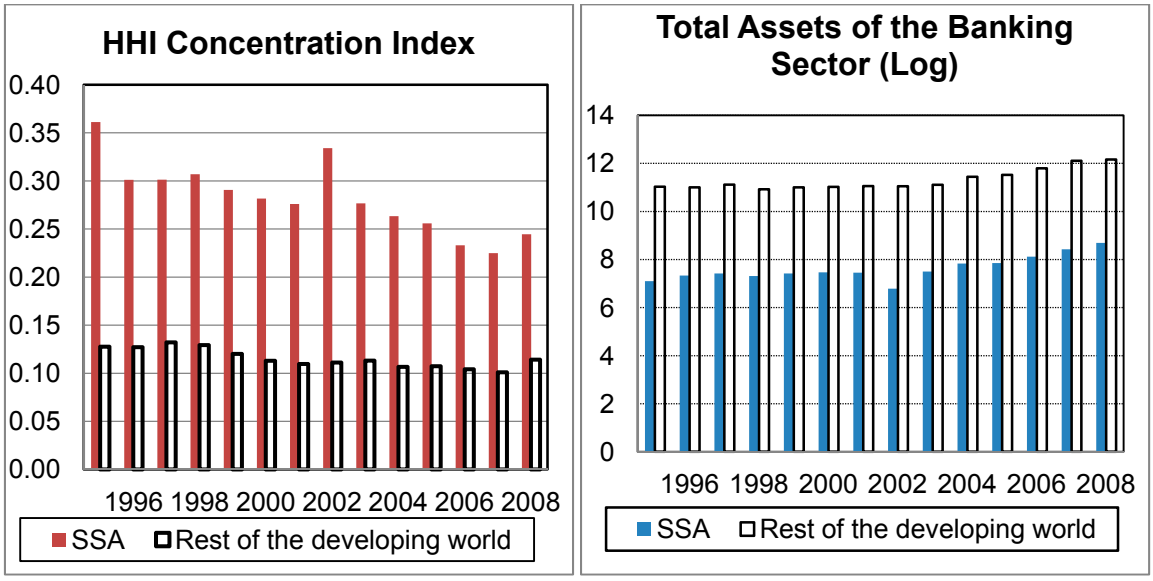
when they have a dominant position in the market. Figure 2 shows that banks have market power and operate in more concentrated markets in SSA compared to the rest of the developing world.

**Figure 2. Market Concentration and Size of the Banking Sector**




Source: Bankscope and author's calculations.

Banks' market power could also explain the observed high interest margins. Banks with relative market power (RMP), that is, banks with larger market shares, can exercise market power in pricing and therefore earn higher margins. However, market share can be negatively associated with interest margins if dominant banks lower their margins, at least temporarily, to evict rivals from the market, or if interest-based activities constitute a loss leader for banks with diversified activities.

The interaction among market participants also matters for the level of interest margins. Considering the concept of structure-conduct-performance (SCP), which asserts that market performance (profits, price, product quality, etc.) depends on market conduct (pricing behavior, legal tactics, merger, collusion, etc.) that in turn depends on market structure (number of buyers and sellers, barriers to entry, etc), there could be a link between interest margins (performance) and market concentration (structure). In this paper, the SCP hypothesis implies that a positive relationship between bank interest margins and market structure reflect non-competitive pricing behavior in concentrated markets. The analysis presented here accounts for both market power (RMP) and market concentration (SCP) to untangle their impacts.

Bank interest margins in African countries could be high also because of real and perceived market risks. The risks could be related to the managerial skills of bank managers. Well-managed banks have lower overhead, and everything else equal, they

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would charge lower margins. The literature also points to the importance of liquidity risk and credit risk as important determinants of bank interest margins. The quality of the legal environment is another risk factor that affects bank margins. When loans cannot be recovered easily and contract enforcement is costly and difficult, banks factor this risk into their margins.

There is a dearth of research on interest margins in SSA, and this paper intends to fill the gap by analyzing the determinants of bank interest margins in Sub-Saharan Africa in 1995–2008. In particular, this paper focuses on the role of market structure (concentration, market power, public and foreign ownership), but also looks at the impact of bank characteristics and macroeconomic factors.

The results provide evidence that the SCP hypothesis holds for the banking sector in SSA. However, the relationship between interest margins and market concentration depends on bank efficiency. In particular, more efficient banks are able to charge higher margins in concentrated markets compared to inefficient banks. The results also confirm the importance of bank-specific factors (credit risk, liquidity risk, efficiency). The role of macroeconomic variables appears mixed. Inflation is positively related to interest margins, but there is no conclusive evidence that economic growth has any impact on margins.

The paper is organized as follows. Section II reviews the literature on bank interest margins. Section III discusses the data and the empirical methodology. The results are discussed in Section IV, and Section V concludes the paper.

## II. Literature Review

The literature suggests that three types of factors affect interest margins: bank-specific factors, market structure and macroeconomic factors.

*Bank-specific factors* such as overhead, bank size, credit risk, and liquidity risk are important determinants of interest margins (Demirgüç-Kunt and Huizinga, 1999). Saunders and Schumacher (2000) studied six European countries and the United States and found a trade-off between assuring bank solvency (high capital-to-asset ratios) and lowering the cost of financial services to consumers (low interest margins). In a study of U.S. banks, Angbazo (1997) found that net interest margins of commercial banks reflect both default and interest rate premiums. The author also found that credit risk and liquidity risk increase interest margins (see also Carbó and Rodríguez, 2007).

The importance *of market structure and the regulatory environment* has been stressed by many studies. Carbó and Rodríguez (2007) used the Ho and Saunders (1981) framework to analyze the impact of market power on interest margins in seven European countries. They found that the relationship between bank margins and market power varies significantly across bank specializations, and market power increases as bank activities

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become more diversified toward non-traditional activities (including non-interest income). Regulation on bank entry, market structure, market transparency, and information sharing on borrowers also affect the efficiency of financial intermediation (Demirgüç-Kunt, Leaven, and Levine, 2003). More segmented markets are associated with high market power, which in turn increases interest margins (Saunders and Schumacher, 2000).

*Macroeconomic conditions* are also found to play an important role in determining interest margins. Saunders and Schumacher (2000) showed that interest rate volatility increases interest margins. Demirgüç-Kunt and Huizinga (1999) found that macroeconomic conditions, implicit and explicit bank taxation, and legal and institutional variables are important determinants of interest margins. Some studies stress the importance of credit and macroeconomic risk premia for the determination of interest margins (Angbazo, 1997).

The results described above have been confirmed to different degrees in various studies across different regions in the world. Studies of the banking sector in Armenia (Dabla-Norris and Floerkemeier, 2007) and in Latin America (Gelos, 2006), have also confirmed the importance of bank-specific factors such as bank size, liquidity, and market structure for the determination of interest margins. In a study of Eastern European countries, Claeys and Vander Vennet (2008) showed that increased efficiency in the banking sector translated into lower interest margins in European Union (EU) accession countries, but not in non-accession countries.

The literature on bank interest margins and profitablity in sub-Saharan Africa (SSA) is scant. Beck and Hesse (2009) found that interest margins are consistently high in Uganda because of the small size of Ugandan banks, persistently high T-bill rates, and institutional deficiencies. They also found that interest spreads and margins vary significantly with the sectoral composition of the loan portfolio of banks, but there is little evidence for other variables such as foreign bank entry, privatization, or changes in market structure in explaining variation in spreads or margins over time.

Mlachila and Chirwa (2002) investigated the impact of financial sector reforms on interest rate spreads in the commercial banking system in Malawi. Financial reforms were carried out throughout the 1990s and included the easing of entry requirements into the banking system, the introduction of indirect monetary policy instruments, and the adoption of a floating exchange rate. Using alternative definitions of spreads, the authors found that spreads increased significantly following liberalization, and that the observed high spreads can be attributed to high monopoly power, high reserve requirements, high central bank discount rates and high inflation.

Flamini, McDonald, and Schumacher (2009) used a sample of commericial banks in SSA and found that high bank profitability (as measured by return on assets) is associated with

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credit risk, bank size, activity diversification, private ownership, and inflation. They also found a moderate persistence in profitability and a considerable lag in the impact of return on assets on capital, suggesting that high returns are not immediately retained as equity increases.

## III. DATA AND METHODOLOGY

We use a sample of 456 banks in 41 sub-Saharan African countries in 1995–2008, resulting in an unbalanced panel of 2582 observations. Bank data come from the Bankscope database. The analysis is limited to commercial banks to have comparable data across countries.[3] We use all commercial banks available in Bankscope over the period of the analysis. Macroeconomic data come from the IFS database maintained by the International Monetary Fund (IMF). Tables 1 and 2 report, respectively, the definition and the summary statistics of the variables used in the analysis. Net interest margins average 7.47% in the sample. However, there are some regional differences, as the margins vary from 6.58 % in Southern Africa to 7.85 % in East Africa (Table 4).

To investigate the role of bank-specific, market structure, and macroeconomic factors in determining interest rate margins, we stipulate the following model:

$$I_{i,c,t} = \alpha + \beta_1 X^B_{i,c,t} + \beta_2 X^S_{c,t} + \beta_3 X^M_{c,t} + \varepsilon_{i,c,t}$$

where the subscripts *i, c,* and *t* represent respectively, individual banks, a country, and the time variable. The dependent variable *I* represents bank interest margins. $X^B$, $X^S$, and $X^M$ are respectively vectors of bank-specific variables, market structure variables, and macroeconomic variables; ε represents the residuals. We estimated a random effect model, because some variables were fixed over time and therefore cannot be used in fixed-effect estimation models.

***Credit risk*** is measured here as the ratio "loans/deposits and short-term funding." The higher this ratio, the more the bank is exposed to loan default risk,[4] and banks would resort to higher margins to cover this risk.

***Liquidity risk*** is the risk of not having enough cash or borrowing capacity to meet deposit withdrawals or new loan demand. Liquidity risk is expected to affect bank margins positively (Angbazo, 1997). Banks with high liquidity risk tend to borrow emergency funds at high cost and therefore charge a liquidity premium that is reflected in higher

[3] In addition, other types of banks have different constraints and different determinants of interest margins.

[4] We have also used alternative measures of credit risk: the ratios "impaired loans/equity" and "net charge-off." The results obtained are similar, but the sample size is considerably reduced on account of missing data for the alternative variables (see the robustness checks section).

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margins. We measure liquidity risk as the ratio "liquid assets/deposits and short-term funding." Therefore, lower ratios correspond to higher liquidity risks, and the sign of our estimated coefficient is expected to be negative.

***Equity*** as measured by "equity/total assets" is an important indicator of solvency. Well-capitalized banks face lower costs of borrowing and low risk of bankruptcy. As a result of the lower costs and low risk of bankruptcy, well-capitalized banks should charge lower margins. However, if banks are well capitalized because of regulatory constraints (high capital and reserve requirements), then high capital reflects risks and represents a premium on bank margins (Berger, 1995). In this case, the relationship between capital and bank margins could be positive.

Various studies have shown that *operational inefficiency* leads to higher costs of intermediation and therefore to higher margins: Brock and Rojas Suarez (2000) and Gelos (2006) for Latin America; Carbó Valverde and Rodríguez Fernández (2007) for Europe. We use overhead/average assets as a proxy for operational inefficiency.

The relationship between bank margins and growth will depend on the correlation between prices, costs, and the business cycle. Because prices and costs could be affected in different proportions, the impact of *GDP growth* on margins cannot be clearly determined (Carbó Valverde and others, 2003). But in general, the relationship is considered negative. During recessions, the default rate increases, credit risks are higher, and banks cover themselves with higher margins. Conversely, during booms, defaults decrease, activity is higher, and banks charge smaller margins. *Inflation* constitutes a macroeconomic risk. Inflation can affect bank margins if lending and deposit rates adjust to monetary shocks at different speeds or to different extents.

We capture market structure with several variables. In particular, we focus *on market share* and *market concentration.* Both variables were computed using total bank assets.[5] A bank's market share is its total assets relative to the market (country) total assets. Market share is a proxy for market power. The higher a bank's market share, the higher its interest margin, when it operates in a non-competitive environment. However, if the market is competitive, firms with large market share may have lower margins as a result of aggressive business tactics aimed at beating the competition and gaining even bigger market share. Along with market share, market concentration also plays an important role in determining interest margins. According to the traditional Market Structure Conduct Performance (SCP) Hypothesis, concentration and bank margins are positively related. However, this relationship can become negative if it is affected by other variables. In the present study, concentration is approximated by the Herfindahl-Hirschman Inde*x* (HHI).

[5] For a robustness check, these variables were also computed from total deposits and total loans, but the estimation results were similar.

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We also used other market structure variables such as foreign and public ownership of banks. It is generally accepted that foreign-owned banks affect interest margins in developing countries. We included *foreign* (a dummy variable), in our model to represent banks at least 50 percent owned by foreign entities.[6] We also include *public* (a dummy variable), to represent banks at least 50 percent owned by the government.[7]

## IV. RESULTS

The discussion below refers to different specifications of the model, estimated using a random effects model. In this section, we look successively at the impact of market structure, bank-specific factors, and macroeconomic variables on bank interest margins in SSA.

### Market structure

Market concentration is positively associated with interest margin, particularly for bank efficiency. Contrary to our expectation, market concentration first appeared to be negatively, albeit insignificantly, associated with interest margins (Table 6, column 1).[8] However, we explored the possibility that the impact of market concentration on interest margins depends on bank efficiency, by interacting concentration and bank inefficiency (Table 6, column 3). In this specification, the impact of market concentration on interest margin is positive, and the coefficient of the interaction between concentration and inefficiency is negative and significant. This indicates that the impact of concentration on interest margins depends on bank efficiency. In other words, compared to inefficient banks, highly efficient banks increase their margins more in concentrated markets. Because inefficient banks have higher costs, when the market becomes more concentrated (say, when a competitor leaves the market) they can increase their margin by less than their efficient competitors.

[6] We also experimented with another dummy variable *foreign* that represents banks at least 25 percent owned by foreign entities, but the results were similar.

[7] We also experimented with another dummy variable *public* that represents banks at least 25 percent owned by the government, but the results were similar.

[8] Some recent evidence indicates that interest margins may actually be lower in more concentrated markets. Cetorelli and Gambera (2001) explain that when an industrial sector is in need of external financing, banks in a concentrated market facilitate access to credit for young firms. In a concentrated market, banks can establish special relationships with young firms and take the risk of providing them with cheap loans (therefore getting lower margins), with the expectation of being rewarded with a long-term relationship when the firms succeed. In a more competitive market (less concentrated), successful startups are more likely to switch banks once they are mature, and banks will be unable to reap the full benefit of the risk they took initially.

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The positive sign on concentration indicates that after controlling for bank-specific and macroeconomic variables, banks in SSA earn higher interest margins in concentrated markets. This contrasts with the result of Beck and Hesse (2009) who found that concentration lowers interest margins, in a broader sample of sample of countries. Their result is only significant at 10 percent, when controlling for overhead costs. However, the authors do not interact overhead and concentration as we do in this study.

The result of this paper is in line with some recent literature showing that a negative sign of concentration on interest margins may be reflecting an omitted variable bias. In a study of central European countries, Claeys and Vander Vennet (2008) found that the negative impact of concentration on interest margins reflected the fact that more concentrated markets are dominated by foreign-owned banks. Given that these banks are more efficient than their domestic counterparts, they have lower margins. By interacting foreign ownership and concentration, the authors showed that the negative sign found on concentration was spurious and reflected the indirect effect of foreign ownership. We explored this possibility without success in our sample. Table 6, column 7, shows that the foreign ownership and the interaction variables are insignificant. We also investigated whether the presence of public banks played any role, but could not detect a relationship (Table 6, column 5).

Other market structure indicators used in this study (public or foreign ownership of banks) have no significant impact on interest margins (Table 6, columns 4–7). After accounting for other bank characteristics, this study detects no difference between foreign and local banks or between public and private banks in the way they determine their net interest margins. Our results, combined with the findings of similar studies, raise the question of the role and importance of state-owned banks in the banking sector. In a study of SSA commercial banks, Flamini, McDonald, and Schumacher (2009) found that public banks are less profitable than private ones, after controlling for other bank characteristics. Their results combined with ours imply that lower interest margins are not the cause of the lower profitability of public banks.

Banks market share does not matter for the determination of interest margins, reflecting the insignificant coefficient on the variable “market share” in our sample (Table 6). Note that banks with high market share are larger and generally benefit from economies of scale, which translate into higher efficiency. If this is not properly accounted for, the market share variable may be biased by the indirect effect of inefficiency. We explored this possibility by interacting market share and bank inefficiency, but the results do not support this hypothesis, as the market share variable and the interaction term are insignificant (Table 6, column 3).

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**Bank-specific and macroeconomic factors**

Bank liquidity risk, equity, and inefficiency all matter for the determination of interest margins. The liquidity ratio negatively and significantly affects interest margins, reflecting the possible need for less liquid banks (i.e., banks with high liquidity risk) to borrow emergency funds at a high cost. The results also highlight the importance of credit risk for the determination of interest margins, because credit risk is positively and significantly associated with net interest margins.

The coefficient on equity is positive and significant, supporting the hypothesis that banks in SSA charge a premium to account for the pressure of solvency regulations on lending activities. Higher capital could be voluntarily raised by banks to signal their solvency or to fulfill a regulatory requirement. In either case, investors are compensated for their risk-taking through higher margins.

As expected, bank inefficiency (as measured by bank overhead relative to average assets) is associated with high interest margins. Inefficient banks pass their high costs on to their customers, raising their lending rates and lowering their deposit rates. This result holds for banks of any size (as described earlier, the coefficients of market share and the interaction of market share and inefficiency are both insignificant).

The coefficient on inflation is positive and significant for all specifications of the model (Tables 6 and 7). On the other hand, the coefficient on GDP growth is insignificant in most specifications of the model. It is positive and marginally significant only when country fixed effects are not accounted for (Table 6, column 1). This indicates that perhaps some country characteristics are unaccounted for in the model, affecting both interest margins and growth.

**Robustness checks**

Because the variables used for foreign or public ownership of banks may not capture well their impact on interest margins, we experimented with alternative definitions of these variables, and we obtained similar results. In particular, we used the number of public banks and the number of foreign banks in the market, but the results did not change (Table 7, columns 6 and 7). For foreign ownership we also considered a dummy variable representing banks at least 25 percent owned by foreign entities. In addition, we looked at a variable representing the total market share of foreign-owned banks. We defined similar concepts for public ownership of banks: a dummy for banks in which the government owns at least 25 percent of the shares; another variable representing the market share of publicly owned banks. These alternative variables do not alter the results.

To ensure that the results are not distorted by the limtations of the proxy used for credit risk (loans/deposits and short-term funding), we used alternative proxies that seem better, but for which the sample size is significantly reduced. These are “net charge-offs” and

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"impaired loans/equity. Similar to the proxy used earlier, the impact of net charge-offs on interest margins is positive and significant and the fit of the model is better (Table 7, column 1). However, this comes at the cost of a major drop of sample size and the loss of observations from a significant number of countries. The proxy "impaired loans/equity" on the other hand is insignificant (Table 7, column 2), and its use resulted in significant loss of observations.

Because the economic literature indicates that the origin of rule of law (civil versus common law or French versus English) matters for most economic outcomes, we tested whether banks from the CFA franc zone behave differently from others in terms of their interest margins. We found no such difference (Table 7, column 5).

*Are there regional differences?*

Tables 4 and 5 show that the interest margins are significantly lower for banks in central and southern Africa compared to those of banks in west and east Africa. The regional difference persists somewhat even after controling for bank and market characteristics (Table 7, column 4). The dummy variable for west and east Africa is significant, albeit at a low level. However, when country fixed effects are taken into account, the dummy for west and east Africa becomes insignificant (Table 7, column 3).

## V. CONCLUSIONS

The paper uses bank data across 41 countries in sub-Saharan Africa (SSA) for 1995–2008 to investigate the role of market structure, bank-specific characteristics, and macroeconomic conditions in determining bank interest margins. We limit our study to commercial banks to ensure the comparability of the data across countries.

The results show that market concentration translates into higher interest margins for banks in SSA. However, the impact of market concentration depends on the efficiency of each bank. More efficient banks charge higher margins compared to their inefficient counterparts when markets are more concentrated. Because the banking sector is more concentrated in SSA compared to the rest of the world, policies to promote competition are important, as they help to improve financial intermediation through lowering interest margins. The policies should not focus on increasing the numbers of banks only, because markets are small in most SSA countries, and increasing the number of banks may not be feasible or desirable. Also, presence of a large number of banks may not ensure competition, as banks usually form bankers' associations in most SSA countries and there is a risk that they may collude. The promotion of competition will probably come from a better enforcement of competition laws in general, and antitrust laws in particular.

Public ownership of banks does not seem to affect interest margins. Unless public banks have lower costs than private banks, the former's loans would not be any cheaper. Our finding, combined with the result of other studies that public banks are less profitable

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than private banks in SSA, raises the question of the role of public banks in SSA. What purpose are public banks serving in the financial sector? Are they simply similar to private banks, or are they serving less attractive markets than private banks? These are interesting questions for further research.

Foreign ownership of banks does not seem to matter for the determination of interest margins. This could be because foreign banks do not feel the same competitive pressure they face in other regions of the world. A natural extension of our work would be to look at whether the legal and regulatory environments are reasons why foreign ownership does not matter. Another reason foreign ownership is not significant could be the limitations of the dataset used. The coverage of the Bankscope dataset is known to vary across countries, especially in developing countries.

Regional differences exist for the level of interest margins in SSA. After controling for bank-specific, macroeconomic, and market structure factors, central and southern Africa still have lower interest margins compared to west and east Africa. It would be interesting to investigate which regional factors explain this difference.

Our results confirm that bank-specific factors such as equity, credit risk, liquidity risk, specialization (or activity mix), and operational inefficiency significantly affect interest margins. The role of macroeconomic variables is mixed. The impact of GDP growth on interest margins is insignificant, once we account for country fixed effects, but inflation positively affects interest margins.

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## REFERENCES

Angbazo, L., 1997, "Commercial Bank Net Interest Margins, Default Risk, Interest Rate Risk, and Off-Balance Sheet Banking," *Journal of Banking & Finance,* 21, pp. 55–87.

Beck, T., and H. Hess, 2009, "Why Are Interest Spreads So High in Uganda?" *Journal of Development Economics*, 88, pp. 192–204.

Berger, A., 1995, "The Relationship Between Capital and Earnings in Banking," *Journal of Money, Credit and Banking*, 27, pp. 432–456.

Berlin, M., and L.J. Mester, 1999, "Deposits and Relationship Lending," *The Review of Financial Studies*, 12, pp. 579–607.

Boot, A.W.A, 2000, "Relationship Banking: What Do We Know?" *Journal of Financial Intermediation,* 9, pp. 7–25.

Brock, P., and L. Rojas Suarez, 2000, "Understanding the Behavior of Bank Spread in Latin America," *Journal of Development Economics,* 63, pp. 113–134.

Carbó Valverde, S., and F. Rodríguez Fernández, 2007, "The Determinants of Bank Margins in European Banking," *Journal of Banking and Finance*, 31, 2043–2063.

Cetorelli, N., and M. Gambera, 2001, "Banking Market Structure, Financial Dependence and Growth: International Evidence from Industry Data," *The Journal of Finance*, Vol. LVI, No. 2, April.

Claeys, S., and R. Vander Vennet, 2008, "Determinants of Bank Interest Margins in Central and Eastern Europe: A Comparison with the West," *Economic Systems*, 32, pp. 197–216

Dabla-Norris, E., and H. Floerkemeier, 2007, "Bank Efficiency and Market Structure: What Determines Banking Spreads in Armenia?" IMF Working Paper No. 07/134 (Washington: International Monetary Fund).

Demirgüç-Kunt, A., L. Leaven, and R. Levine, 2003, "Regulations, Market Structure, Institutions, and the Cost of Financial Intermediation," NBER Working Paper No. 9890 (Washington: National Bureau of Economic Research).

Demirgüç-Kunt, A., and H. Huizinga, 1999, "Determinants of Commercial Bank Interest Margins and Profitability: Some International Evidence," *World Bank Economic Review,* Vol. 13, No. 2, pp. 379–408.

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Flamini, V., C. McDonald, and L. Schumacher, 2009, "The Determinants of Commercial Bank Profitability in Sub-Saharan Africa," IMF Working Paper No. 09/15 (Washington: International Monetary Fund).

Gelos, R.G., 2006, "Banking Spreads in Latin America," IMF Working Paper No. 06/44 (Washington: International Monetary Fund).

Ho, T., and A. Saunders, 1981, "The Determinants of Bank Interest Margins: Theory and Empirical Evidence," Journal of Financial and Quantitative Analysis, 16, pp. 581–600.

Levine, R., and S. Zervos, 1998, "Stock Markets, Banks, and Economic Growth," *American Economic Review,* 88, pp. 537–558.

Mlachila, M., and E.W. Chirwa, 2002, "Financial Reforms and Interest Rate Spreads in the Commercial Banking System in Malawi," IMF Working Paper No. 02/6 (Washington: International Monetary Fund).

Peterson, M.A., and R. Rajan, 1995, "The effect of Credit Market Competition on Lending Relationships," *The Quarterly Journal of Economics,* 42, pp. 407–444.

Saunders, A., and L. Schumacher, 2000, "The Determinants of Bank Interest Rate Margins: An International Study," *Journal of International Money and Finance,* 19, pp. 813–832.

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**Table 1. Variables Definitions**

| Variable | Description |
|---|---|
| Net interest margin | Difference between total interest income and expenses over average assets |
| Equity | Equity/total assets |
| Credit risk | Loans/deposits and short-term funding |
| Liquidity risk | Liquid assets/short-term funding |
| Operational inefficiency | Overheads/average assets |
| Market share | Bank assets /total banks assets in economy, represents market power |
| Concentration | Market concentration, measured by HHI index of total asset (sum of squared assets/total asset market shares of banks) |
| Output growth | GDP growth rate |
| Inflation | CPI growth rate |
| Public | Dummy variable for publicly owned banks (at least 25% stake by the state) |
| Foreign | Dummy variable for foreign-owned banks (at least 25% stake by foreign investors) |

Source: Bankscope, IFS and author's definitions

**Table 2. Summary Statistics**

| Variable | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|
| Net interest margin | 7.47 | 4.94 | -46.98 | 49.94 |
| Equity/assets | 13.41 | 11.80 | -44.31 | 99.68 |
| Credit risk | 63.53 | 57.94 | 0.03 | 986.36 |
| Liquidity risk | 53.08 | 48.23 | 0.00 | 897.62 |
| Market share | 0.16 | 0.21 | 0.00 | 1.00 |
| Concentration | 0.27 | 0.19 | 0.08 | 1.00 |
| Op. Inefficiency | 8.00 | 5.78 | -27.79 | 79.09 |
| GDP growth | 0.05 | 0.04 | -0.18 | 0.19 |
| Inflation | 0.10 | 0.11 | -0.08 | 0.98 |
| Foreign | 0.50 | 0.50 | 0.00 | 1.00 |
| Public | 0.04 | 0.20 | 0.00 | 1.00 |

Source: Bankscope, IFS and author's calculations

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**Table 3. Country Classifications**

| Country Name | Region* | CFA Zone** |
|---|---|---|
| ANGOLA | South | 0 |
| BENIN | West | 1 |
| BOTSWANA | South | 0 |
| BURKINA FASO | West | 1 |
| BURUNDI | Central | 0 |
| CAMEROON | Central | 1 |
| CAPE VERDE | West | 0 |
| CENTRAL AFRICAN REPUBLIC | Central | 1 |
| CHAD | Central | 1 |
| CONGO | Central | 1 |
| CONGO, DEMOCRATIC REP. OF | Central | 0 |
| EQUATORIAL GUINEA, REP. OF | Central | 1 |
| ERITREA | East | 0 |
| ETHIOPIA | East | 0 |
| GABON | Central | 1 |
| GAMBIA | West | 0 |
| GHANA | West | 0 |
| GUINEA | West | 0 |
| COTE D'IVOIRE | West | 1 |
| KENYA | East | 0 |
| LESOTHO | South | 0 |
| LIBERIA | West | 0 |
| MADAGASCAR | South | 0 |
| MALAWI | South | 0 |
| MALI | West | 1 |
| MAURITIUS | South | 0 |
| MOZAMBIQUE | South | 0 |
| NAMIBIA | South | 0 |
| NIGER | West | 1 |
| NIGERIA | West | 0 |
| RWANDA | East | 0 |
| SAO TOME & PRINCIPE | Central | 0 |
| SENEGAL | West | 1 |
| SEYCHELLES | South | 0 |
| SIERRA LEONE | West | 0 |
| SOUTH AFRICA | South | 0 |
| SWAZILAND | South | 0 |
| TANZANIA | East | 0 |
| TOGO | West | 1 |
| UGANDA | East | 0 |
| ZAMBIA | South | 0 |

Source: Author's classifications.

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**Table 4. Net Interest Margin by Region**

| Regions | Obs | Mean | Std. Dev. |
|---|---|---|---|
| West | 1058 | 7.74 | 4.19 |
| Central | 160 | 6.32 | 6.46 |
| East | 787 | 7.85 | 4.68 |
| South | 682 | 6.58 | 5.05 |

**Table 5. Mean Difference Test**

H0: Mean Region 1 = Mean Region 2
H1: Mean Region 1 - Mean Region 2 < 0

| Regions | Difference | t value | |
|---|---|---|---|
| Central - West < 0 | -1.422 | -2.702 | * |
| Central - East < 0 | -1.530 | -2.849 | * |
| Central - South < 0 | -0.263 | -0.482 | |
| South - West < 0 | -1.159 | -4.994 | * |
| South - East < 0 | -1.267 | -4.961 | * |
| West - East < 0 | -0.108 | -0.510 | |

* Reject H0 at 1% level.

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**Table 6. Net Interest Margin: Bank Characteristics and Macroecomic Variables**

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| Equity/assets | 0.046 | 0.046 | 0.045 | 0.045 | 0.045 | 0.045 | 0.045 |
| | [0.009]*** | [0.009]*** | [0.009]*** | [0.009]*** | [0.009]*** | [0.009]*** | [0.009]*** |
| Credit risk | 0.007 | 0.007 | 0.006 | 0.006 | 0.006 | 0.006 | 0.006 |
| | [0.002]*** | [0.002]*** | [0.002]*** | [0.002]*** | [0.002]*** | [0.002]*** | [0.002]*** |
| Liquidity risk | -0.010 | -0.010 | -0.009 | -0.009 | -0.009 | -0.009 | -0.009 |
| | [0.002]*** | [0.002]*** | [0.002]*** | [0.002]*** | [0.002]*** | [0.002]*** | [0.002]*** |
| Market share | 0.611 | 0.040 | 0.333 | 0.331 | 0.333 | 0.370 | 0.323 |
| | [0.760] | [1.043] | [0.757] | [0.758] | [0.759] | [0.758] | [0.775] |
| Concentration | -1.272 | -1.233 | 2.273 | 2.275 | 2.268 | 2.245 | 2.089 |
| | [0.828]*** | 0.830 | [1.037]*** | [1.037]*** | [1.041]*** | [1.038]*** | [1.068]*** |
| Op. inefficiency | 14.993 | 14.455 | 33.372 | 33.366 | 33.385 | 33.298 | 33.336 |
| | [2.091]*** | [2.220]*** | [3.871]*** | [3.872]*** | [3.886]*** | [3.872]*** | [3.874]*** |
| GDP growth | 2.985 | 2.974 | 2.867 | 2.868 | 2.876 | 2.871 | 2.843 |
| | [1.837]*** | [1.840] | [1.827] | [1.827] | [1.829] | [1.827] | [1.830] |
| Inflation | 3.644 | 3.614 | 3.725 | 3.727 | 3.733 | 3.712 | 3.702 |
| | [1.465]*** | [1.468]*** | [1.456]*** | [1.457]*** | [1.459]*** | [1.457]*** | [1.458]*** |
| Foreign | | | | | | -0.371 | -0.460 |
| | | | | | | [0.437] | [0.530] |
| Public | | | | 0.097 | 0.041 | | |
| | | | | [1.130] | [1.357] | | |
| (Inefficiency) x (Market share) | | 12.333 | | | | | |
| | | [15.460] | | | | | |
| (Inefficiency) x (Concentration) | | | -67.996 | -68.001 | -68.086 | -67.869 | -68.005 |
| | | | [12.092]*** | [12.094]*** | [12.153]*** | [12.094]*** | [12.107]*** |
| Concentration x Public | | | | | 0.179 | | |
| | | | | | [2.389] | | |
| Concentration x Foreign | | | | | | | 0.319 |
| | | | | | | | [1.091] |
| Constant | -0.660 | 3.732 | 0.929 | 0.929 | 0.932 | -0.034 | 0.062 |
| | [3.294] | [4.104] | [4.116] | [4.121] | [4.125] | [3.276] | [3.285] |
| Country fixed effects | YES | YES | YES | YES | YES | YES | YES |
| Time dummies | YES | YES | YES | YES | YES | YES | YES |
| Observations | 2582 | 2582 | 2582 | 2582 | 2582 | 2582 | 2582 |
| R-squared | 0.340 | 0.340 | 0.349 | 0.349 | 0.349 | 0.349 | 0.349 |

Standard errors in brackets; ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

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**Table 7. Robustness Checks**

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| Equity/assets | 0.074 | 0.047 | 0.045 | 0.051 | 0.045 | 0.046 | 0.045 |
| | [0.014]*** | [0.014]*** | [0.009]*** | [0.009]*** | [0.009]*** | [0.009]*** | [0.009]*** |
| Credit risk | | | 0.006 | 0.004 | 0.006 | 0.006 | 0.006 |
| | | | [0.002]*** | [0.002]*** | [0.002]*** | [0.002]*** | [0.002]*** |
| Liquidity risk | -0.006 | -0.008 | -0.009 | -0.007 | -0.009 | -0.009 | -0.009 |
| | [0.002]*** | [0.002]*** | [0.002]*** | [0.002]*** | [0.002]*** | [0.002]*** | [0.002]*** |
| Market share | 1.734 | 1.904 | 0.333 | 0.986 | 0.333 | 0.337 | 0.333 |
| | [1.101] | [0.974]* | [0.757] | [0.742] | [0.757] | [0.757] | [0.757] |
| Concentration | -0.423 | 7.204 | 2.273 | 1.147 | 2.273 | 2.306 | 2.276 |
| | [1.739] | [1.357]*** | [1.037]*** | [0.996]*** | [1.037]*** | [1.038]*** | [1.038]*** |
| Op. inefficiency | 72.365 | 73.426 | 33.372 | 35.658 | 33.372 | 33.304 | 33.357 |
| | [5.454]*** | [4.869]*** | [3.871]*** | [3.818]*** | [3.871]*** | [3.872]*** | [3.874]*** |
| (Inefficiency) x (Concentration) | -47.438 | -180.324 | -67.996 | -64.922 | -67.996 | -67.823 | -67.946 |
| | [22.981]*** | [15.377]*** | [12.092]*** | [11.757]*** | [12.092]*** | [12.096]*** | [12.104]*** |
| GDP growth | -0.720 | -3.056 | 2.867 | 3.838 | 2.867 | 2.854 | 2.876 |
| | [3.115] | [2.293] | [1.827] | [1.797]*** | [1.827] | [1.827] | [1.829] |
| Inflation | 4.441 | 6.028 | 3.725 | 5.189 | 3.725 | 3.746 | 3.728 |
| | [2.378]* | [1.672]*** | [1.456]*** | [1.422]*** | [1.456]*** | [1.457]*** | [1.457]*** |
| NCO average assets | 0.039 | | | | | | |
| | [0.012]*** | | | | | | |
| Impaired loans/equity | | -0.001 | | | | | |
| | | [0.001] | | | | | |
| Dummy West and East Africa | | | 2.497 | 0.774 | | | |
| | | | [4.257] | [0.432]* | | | |
| Dummy for CFAF zone | | | | | 3.635 | | |
| | | | | | [3.468] | | |
| Number of public banks | | | | | | 0.103 | |
| | | | | | | [0.111] | |
| Number of foreign banks | | | | | | | 0.003 |
| | | | | | | | [0.027] |
| Constant | 3.445 | -2.794 | 0.929 | 4.563 | -0.209 | 0.792 | -0.214 |
| | [3.257] | [3.489] | [4.116] | [0.608]*** | [3.270] | [4.113] | [3.271] |
| Country fixed effects | YES | YES | YES | NO | YES | YES | YES |
| Time dummies | YES | YES | YES | YES | YES | YES | YES |
| Observations | 984 | 1417 | 2582 | 2582 | 2582 | 2582 | 2582 |
| R-squared | 0.459 | 0.466 | 0.349 | 0.200 | 0.349 | 0.349 | 0.349 |

Standard errors in brackets; ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

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